Lifelong Learning
Erasmus
University of Ruse

Faculty
of Mechanical and
Manufacturing Engineering

UNIVERSITY OF RUSE

FACULTY
MECHANICAL AND MANUFACTURING ENGINEERING

Erasmus ECTS
Information Package

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GENERAL INTRODUCTION

THE ECTS SYSTEM

The Information Package provides a description of the University of Ruse, of the Faculty of Mechanical and Manufacturing Engineering and the courses offered by the Faculty in order to help prospective ECTS students to prepare their study period at this institution.

What is ECTS?

ECTS, **The European Community Course Credit Transfer System,** was developed by the Commission of the European Communities in order to provide common procedures to guarantee academic recognition of studies abroad. It provides a way of measuring and comparing learning achievements and transferring them from one institution to another. The European Commission promotes the system and the international cooperation between universities as a means of improving the quality of education bringing benefits both to students and higher education itself. In this respect, student exchange is the basic element in university cooperation. Recognition of education and diplomas is the necessary condition for establishing an open European higher education space where students and lecturers can "move" with no restriction.

ECTS provides **transparency** through the following means:

- **ECTS credits** which are a numerical value allocated to course units to describe the student workload required to complete them;
- **The Information Package** which supplies written information to students and staff on institutions, departments/faculties, the organization and structure of studies and course units;
- **The Transcript of Records** which shows students' learning achievements in a way which is comprehensive, commonly understood and easily transferable from one institution to another;
- **The Learning Agreement** covering the programme of study to be taken and the ECTS credits to be awarded for their satisfactory completion, committing both home and host institutions, as well as the student.

The ECTS Credits

ECTS credits are allocated units to describe the **student workload** required to complete them. They reflect the **quantity** of work each course requires **in relation to** the total quantity of work required to complete a full year of academic study at the institution, i.e. lectures, practical work, seminars, self-study –in a library or at home- and exams or other assessment activities. ECTS credits express a **relative value**.

In ECTS, **60 credits** represent the workload of a year of study; normally **30 credits** are given for a semester and **20 credits** for a term. It is important that no special courses are set up for ECTS purposes, but that all ECTS courses are mainstream courses of the participating institutions, as followed by the home students under normal regulations.

Credits are awarded only when the course has been completed and all required examinations or other assessment activities have been successfully passed. Detailed information about disciplines (short description of course contents, teaching methods, types of assessment, etc.) is given in the information package of each degree programme.

ECTS Students

Students participating in ECTS receive full credit for all academic work successfully carried out at any of the ECTS partner institutions. These credits are transferred to the home university and fully replace the annual/semester workload including exams and other forms of assessment. In this way students can study abroad for a certain period of time and when they come back, they are able to continue their education without any loss of semesters and exams. Some students may also decide to graduate from the host university, and permission for that is given by the academic authorities based upon the student's transcript of credit points and his/her performance at the home university.

DATA ABOUT BULGARIA

The Republic of Bulgaria is a country situated in South-East Europe. In the north it borders the Republic of Romania, in the east it ranges to the Black Sea, in the south it neighbours the Republic of Turkey and the Republic of Greece, and in the west it borders (Former Yugoslavian) Republic of Macedonia and Republic of Serbia.

Area: 110,993.6 sq km

Population: 7,262, 675

Capital city: Sofia

Official language: Bulgarian

Alphabet: Cyrillic

Religion: There is freedom of religious confessions. Traditional religion in the Republic of Bulgaria is Eastern Orthodox Christianity

National holiday: March 3, the Day of the Liberation of Bulgaria from Ottoman domination (1878)

Public (non-working) holidays:

3 March – Liberation Day (national holiday)

1 January – New Year

Easter (Resurrection of Christ) – two days (Easter Sunday and Easter Monday)

1 May – Labour Day (the Day of International Working Class Solidarity)

6 May - Day of Bravery and Bulgarian Army, Gergyovden (St. George's Day)

24 May – Day of Bulgarian Education and Culture, and of the Slavonic Alphabet

6 September - Unification Day

22 September - Independence Day

1 November – Day of the National Revival Leaders

24 December – Christmas Eve

25 and 26 December - Christmas

Monetary unit: the Bulgarian Lev

Administrative division: 28 regions, named after their respective regional centres

State system: a parliamentary republic with a one-chamber parliament (National Assembly), consisting of 240 national representatives, elected for a four-year term of service. The head of state of the republic is the President, elected for a five-year term of service. The Council of Ministers is the main body of executive power.

Climate: moderate continental with Black Sea influence in the east and Mediterranean in the south

Waters: rivers (main rivers are the Danube, Maritsa, Mesta, Strouma, Iskar, and Yantra); warm and cold mineral springs (more than 600)

Transport: railway, automobile, air and water

International automobile sign: BG

International telephone code: +359 ……..

International telephone code for Ruse: +359 82 ……..

Official Symbols of Bulgaria

The national flag of the Republic of Bulgaria is in three colours: white, green and red bands, following horizontally from top to bottom.

A legend associates the origin of these three colours with the colour symbols of the Old Bulgarian Army. Its left wing was set apart by white strips on the spears, the right one by red, while arranged in the centre were the elite troops with a green strip, the traditional colour of the ruler. The three-colour flag had first been used by the First Bulgarian Legion of Georgi Rakovski (1861). By force of the Turnovo Constitution (1879), the three-colour flag - white, green and red, was confirmed as Bulgaria's national flag.

The coat-of-arms of the Republic of Bulgaria is a rampant gold crowned lion against a dark-red background in the form of a shield. Above the shield there is a big crown, whose original shape was that of the crowns of medieval Bulgarian rulers, with five crosses and one other cross, separately, over the crown itself. The shield is supported by two golden crowned rampant lions, facing the shield from the left and right heraldic side. They are standing on two crossed oak tree twigs with acorns. Inscribed in golden letters onto a white strip with a three-colour edging, placed under the shield across the ends of the oak twigs, is ***Union is Strength***.

The Bulgarian Landmarks in the UNESCO List of the World Natural and Cultural Heritage

Kazanluk Tomb
A Thracian tomb, dated to the late 4th-early 3rdcentury B.C. The murals in the burial chamber and in the corridor are of exclusive artistic value. The tomb is located in the Tyulbeto Hill near the town of Kazanluk.

Ivanovo Rock Churches
A rock monastery compound of the Holy Archangel Michael, with partially preserved churches. The murals in the Church of the Holy Virgin have been described as some of the most significant achievements of 14th century Bulgarian medieval art. The churches are located about 20 km away from the city of Ruse, east of the village of Ivanovo, in the rocks of the Rusenski Lom Nature Park.

Boyana Church
It has unique murals from 1259, considered among the masterpieces of medieval European painting. It is at a distance of about 8 km from the centre of the city of Sofia (in the Boyana residential district), in the foothills of Mount Vitosha.

Madara Horseman
A rock relief, cut into the Madara rocks on the northern slope of the Provadiisko Plateau at a height of 23 m. This is the most significant monumental piece of art from the early Middle Ages, unique of its kind in European cultural history. It is close to the village of Madara, about 16 km away from the city of Shumen.

Rila Monastery
The most impressive monastery compound in Bulgaria of exceptional architectural and artistic merits. Founded in the 10th century, rebuilt in the 13th-14th century, a literary centre in the 15th century and completed in its present-day striking appearance during the 19thcentury. A spiritual centre of the Bulgarian people, it is located in the northwest part of the Rila Mountain, about 20 km from the town of Rila and about 120 km from Sofia.

Nessebur, the old part of the town
An architectural, historical and archaeological reserve at the Black Sea coast with valuable archaeological relics from different periods, original churches from the 5th to the 17th century and authentic National Revival Period houses.

Sveshtari Tomb
A Thracian tomb from the first half of the 3rd century B.C. The central burial chamber has exceptionally lavish decoration and impressive caryatides in high relief. It is located close to the village of Sveshtari, 7 km northwest of the town of Isperih.

Sreburna Reserve
A biosphere reserve in the valley of the Danube, including the Sreburna Lake and its surroundings. It has been established for the preservation of rare plant and animal species. It is 16 km west of the town of Silistra.

Pirin National Park
It is part of the scenic Pirin Mountain. Located in the high parts of the Northern Mount Pirin, it is characterized by a specific relief and an inimitable plant and animal world. It also incorporates the Bayuvi Dupki - Dzhindzhiritsa Biosphere Reserve and the Yulen Reserve.

INFORMATION
ON
THE CITY
AND
THE UNIVERSITY

THE CITY OF RUSE

Welcome to Ruse

" ... All that I experienced afterwards had already been in Roustchouk"
Elias Canetti

Ruse is the biggest Bulgarian port town on the bank of the river Danube. After the opening of the Rhein - Main - Danube canal which covers 3,500 km and connects thirteen European countries with the Near and Far East via the Black Sea, the river becomes the longest inland waterway on the planet.

This key position has determined the nineteen century long co-existence of town, river, and people, carrying the unique atmosphere of history as a precious heritage, and of future as an open road full of promises. The Romans were the first to build the fort which they called Sexaginta Prista (the port of sixty ships). Then came others, from Europe, leaving their indelible imprint in this intersection of material and spiritual culture, followed by the imbued with the zeal of drive and enterprise Bulgarians, who gradually turned the place into a centre of the Bulgarian national revival. The very name Ruse became a synonym of economic growth and cultural rebirth.

The nineteenth century saw here the opening of the first Bulgarian printing house, the first model farm, the first Bulgarian railroad connecting Ruse with Varna, the first Bulgarian weather service, the first technical school and technical society, the first professional teachers' club, the first insurance agency, the first chamber of commerce and industry, the first inland navigation service on the Danube, the first teletel, the first moving picture show, the first Bulgarian newspaper, the first geography map.

New industries sprang up, banks and trade agencies were founded and European shipping agencies, as well as 17 foreign consulates were established. A large number of Bulgarian, Austrian, Italian, and Swiss men of arts created the wealth of architectural forms and styles characteristic of the period in Europe: Neoclassicism, Neo-baroque, Neo-gothic style, Art Nouveau, and Fin du siecle.

The town hosted a vast variety of multinational ethnic groups, which the Nobel writer Elias Canetti defined as a microcosmos of two dozen nationalities. French, German, Italian, Jewish, Armenian, Turkish, and other schools, boarding houses and churches, reading clubs, theatres and music halls, museums and bookshops, opened their doors to help diversify the cultural life of the city in its steady march towards enlightenment. In this completed picture of social life, today the town is still rediscovering its true face, spanning a bridge across cultures in the new context of integrated Europe.

THE UNIVERSITY OF RUSE

On **12 November 1945** the first out-of-capital higher education institution was founded in Ruse. Its three departments were specialized in Engineering for the purposes of the agricultural sector. On **13 June 1966**, as a result of its intensive growth, the Minister of Education issued an Order No. 2583 to set up a Higher Institute of Mechanical Engineering, Mechanization and Electrification of Agriculture. On **9 April 1981,** due to the widened scope of its engineering provision, including the sectors of transport, electronics and computing, it was transformed into 'Angel Kanchev' Technical University by a Decree No. 584 of the Council of Ministers. On **1 August 1995** a Decision of the National Assembly was made to establish "Angel Kanchev" University of Ruse, thus recognizing its academic expertise not only in the engineering fields, but also in natural sciences, education, law, public health and healthcare, business and management, which were introduced as a response to the societal changes.

Its mission and goals are based on commitments for:

Quality assurance of all its degree programmes

Excellence in fundamental and applied research

Internationalization of staff and student communities

National leadership in the European Union exchange programmes

Constant widening of lifelong learning opportunities

Building successful lives and careers for students and graduates

Proactive and reactive approach to societal needs and business demands

Attractive and creative environment for personal development

ACADEMIC CALENDAR

The academic year at the University of Ruse starts in September and is divided into two semesters – Fall and Spring. Each semester consists of:

- 15 weeks of classes;
- 4 weeks of regular examination session;
- 1 week for supplementary examination and 1 vacation week after the fall semester;
- Summer holidays (4-8 weeks) start after the end of the examination session and last till the beginning of the new academic year or till the beginning of the annual supplementary examination session in September for those students who have to resit exams left from the previous year.

The organisation of the training process is realised in the framework of the *Academic Calendar*, which is adopted each year by a resolution of the University's Academic Council.

BUSINESS CARD of the University of Ruse (UR)

Name of higher education institution	**"Angel Kanchev" University of Ruse**
Type of higher education institution	**State University**
Location and address	**8, Studentska Street, Ruse 7017, Bulgaria**

Rector Prof. Hristo Beloev, MEng, PhD

Number of students for the academic year 2008-09: 9200

Number of international students: 487 from **17** countries

Number of PhD students for the period 2000-2008: 270

Full-time personnel: 709

of which faculty **450**

full and associate professors **203**

Number of degree programmes offered:

41 in **6** of the **10** major fields of study (education, humanities, economics and management, mathematics and natural sciences, health care, engineering and technology)

The University of Ruse is the only university in the present and former Ruse region (with a population of approximately 1 million), which complies with the international index "one higher education institution per one million people".

The University of Ruse ranks 13th among the largest higher education institutions comparing indexes, such as: number of state-approved vacancies for admission, overall number of students, number of doctoral study students, size of state subsidy, applicants versus approved vacancies ratio, etc.

The University of Ruse is the only Bulgarian higher education institution, which is a regular member of the European Association of the Universities from the Danube Countries.

The University of Ruse was accredited on 26th January 2006 by the National Evaluation and Accreditation Agency for a six–year period with the highest grade – "very good".

International collaboration and admission of foreign students

International collaboration

The University of Ruse develops its international cooperation through:

- Participation in the scientific EC programmes NATO, SIXTH and SEVENTH FRAMEWORK PROGRAMMEs, PHARE
- Participation in the academic programmes CEEPUS, ERASMUS, LEONARDO DA VINCI, COMENIUS
- Participation in bilateral collaboration with traditional and new partners

The University of Ruse is one of the first Bulgarian universities which got involved in the ERASMUS programme. There are 80 Bilateral agreements signed with 24 European countries. At least 70 undergraduate, post-graduate and PhD-students are annually involved in all EU exchange programmes. The University of Ruse is the only university in Bulgaria which coordinates three thematic networks of about 70 participants each. It has contributed to the establishment of the first cross-border higher education centre in SEE – Bulgarian-Romanian Interuniversity Europe Centre (BRIE), which has been accredited in Germany and in Romania.

Admission of foreign students

Terms of study:

- ***For a Bachelor's degree*** - 4 years;
- ***For a Master's degree*** – 1 or 1,5 years following a Bachelor's degree programme;
- ***For a Doctoral degree*** – a minimum of 3 years

Degree programmes at the University of Ruse

Faculty of Agricultural and Industrial Engineering:

- Agricultural Machinery and Technologies
- Ecology and Environmental Protection
- Industrial Design
- Hydraulic and Pneumatic Equipment
- Agricultural Engineering
- Equipment Maintenance and Management

Faculty of Mechanical and Manufacturing Engineering:

- Machine Building Equipment and Technologies
- Computer-aided Design in Manufacturing Engineering
- Industrial Engineering
- Materials Science and Engineering

Faculty of Electrical Engineering, Electronic and Automation:

- Electrical Power Engineering
- Electronics
- Automatics, Information and Control Engineering
- Computer Systems and Technologies
- Communications and Communications Technologies

Faculty of Transport Engineering:

- Transport Engineering

- Transportation Technologies and Management

Faculty of Natural Sciences and Education:
- Mathematics and Informatics
- Informatics and Information Technologies
- Bulgarian Language and History
- Pre-school and Primary School Education
- Primary School Education and a Foreign Language

Faculty of Business and Management:
- Marketing
- International Economic Relations
- European Studies
- Business Administration
- Industrial Management

Bulgarian-Romanian Interuniversity Europe Centre (BRIE):
- European Studies (in German and English)
- European Public Administration (in English)

Faculty of Law:
- Law

Public Health and Health Care:
- Kinesitherapy
- Occupational Therapy

Silistra Branch:
- Bulgarian Language and Foreign Language
- Physics and Informatics
- Transportation Technologies and Management
- Electrical Power Engineering
- Automatics, Information and Control Engineering

Razgrad Branch:
- Biotechnologies
- Chemical Technologies
- Food Processing Technologies.

Other University Units and Services

- Quality of Education and Accreditation Directorate
- Public Relations Directorate
- Foreign Students Directorate
- Student Admissions and University Registrar
- Scientific Research Sector
- University Computing and Information Services Center (UCISC)
- Center for Distance Learning
- Center for European Integration, International Cooperation and Mobility
- Center for Continuing Education
- Center for Career Development
- University Library

The language of instruction for students in Bachelor and Master Degrees is Bulgarian.
For international students, who wish to study at the University of Ruse under the ERASMUS programme, selected courses are offered in English. The list of these courses can be found on the university WEB site.

Application Procedures

General Conditions and Documents for Admission of Foreign Students

Foreigners, who hold a higher school diploma, giving them access to universities in the country issuing this diploma, are eligible for admittance into the University of Ruse.

Preparatory Training

During the first year of their studies foreign students study Bulgarian in a 10-month intensive course. The course is organised by the Foreign Students Department.

Tuition Fees

Foreign citizens, studying at RU, pay tuition fees. The fees are paid in two installments: at the beginning of the academic year and at the beginning of the second (Spring) semester.

For sending applications and for more detailed information foreign applicants can address:

Foreign Students Department
University of Ruse
8 Studentska Street
7017 Ruse
Bulgaria
tel: +359 82 888 281
e-mail: chs@ru.acad.bg

Conditions and documents for admission of foreign students under Programmes of the European Union

Application, admission and forms of training of foreign students under different programmes of the European Union are settled in compliance with the individual bilateral or international agreements. For sending application forms under ERASMUS and for more detailed information foreign applicants can address the Centre for European Integration and International Cooperation:

Centre for European Integration, International Cooperation and Mobility
University of Ruse
8 Studentska Str.
Ruse 7017
Bulgaria
tel/fax: +359 82 888 650
e-mail: cicm@ru.acad.bg

The Application form can be obtained at:
http://cicm.ru.acad.bg/

General Information

Visa Requirements

According to the Law for Foreigners' Stay in the Republic of Bulgaria, each foreigner may enter the country with a valid passport (or other ID document) and an entry visa for Bulgaria. Entry visas are issued in all Embassies or Consulates of Bulgaria abroad. *No visas are required* for citizens of the countries of the European Union and of a number of other countries as well. On arrival in Bulgaria every foreigner, if not accommodated in a hotel, should, within 24 hours, register his/her address with the Passport Service for Foreigners. Foreigners who are admitted as students at the University of Ruse should present their

documents for admission issued by the University. This will allow them to get permission for longer stay in the country after their entry visas expire.

Traveling to Ruse

The distance from Ruse to Sofia (the capital of Bulgaria) is 315 km.

The distance from Ruse to Bucharest (the capital of Romania) is 60 km.

Travel to both capitals is by train and by bus.

There are also provisions for quick and easy transport to various parts of the city and other regions of the country.

After arriving at the University you are welcome to contact the office of the Vice Rector for International Relations and European Integration:

Living Expenses

The optimum amount of living expenses is connected with a balanced budget, including subsistence costs, accommodation costs, medical services, public transport, food and public services, tuition costs and other expenses. Minimum living costs are achieved through the use of the refectory and through modest expenses for transport and other public services. Under these conditions, the average living expenses amount to 150 – 250 Euro per month.

Accommodation and on-campus facilities

Accommodation can be found in several sectors:

In one of the many hotels in Ruse. The approximate price for a single room is about 40 – 80 Euro per night.

In one of the cheaper hotels. Offering less comfort, or in single rooms in hotel chains at prices about 15–25 Euro per night.

Renting a flat. The rent for such a flat (1 to 3 rooms) varies from 60 to 250 Euro per month depending on the degree of comfort, furniture and location. Rents exclude expenses for electricity, hot water, central heating and telephone, which may cost about 50–100 Euro per month.

The University of Ruse offers very good on-campus accommodation for 2400 students at rents of about 35 Euro per month. There are eight student hostels, two of which are for families.

The University of Ruse on-campus facilities offer excellent opportunities for study, research, recreation and sport. The student hostels, the refectory, the medical centre, the post office, the sports facilities and the student culture club are all situated on the campus, which is surrounded by green parkland and is within easy reach of the city parks, the river Danube and the city centre.

The University of Ruse offers on-campus sports facilities for volleyball, basketball, table tennis, bodybuilding, football, field and track events and other sports. The sports teams and clubs for football, athletics, volleyball, basketball, handball, aerobics and calisthenics are the responsibility of qualified teachers, which explains why they often win first prizes at various competitions.

There is a variety of amateur clubs, forming the Student Cultural Club Society, which was established in 1954. Examples are the Folk Dance Society, the Artists Club, the Pantomime Studio, the Drama Society, the Photographer's club, the Literature Club, the Modern Dance Society, and the folk dance theatre. Their guidance is entrusted to distinguished performers, artists and musicians.

The Tourist Society ACADEMIC unites a variety of clubs: for mountain climbing, water sports, skiing, cycling, rock climbing, mountaineering, speleology and cross-country walking. They attract large numbers of students, faculty members and administrative staff, who can take holidays in the university resort centres on the Black Sea coast, in the Balkan mountains, or along the bank of the Danube.

Medical Services and Insurance

There are many clinics, hospitals and private medical offices where you may ask for qualified medical help paying cash at quite reasonable rates. You may also get medical insurance in one of the numerous insurance companies in Bulgaria.

Other Useful Information

Public Transport: Trams, buses and trolley buses are the main public transport in Bulgaria. Tickets are sold at bus stations (bus stops), at newspaper stands or in some cases by drivers. Tickets should be perforated in the vehicle. There are also season travel cards for one day, one week or one month. The price of the ticket for public transport is 1.00 Lv. (about 0.50 Euro).

Taxi: There are many taxis in Ruse, provided mostly by private firms. Information about the firm and charge rates (day and night) can be seen on stickers on the front or rear windows of the car. Charge rates for 1 kilometre are between 0.70 and 0.90 Lv. (about 0.35–0.45 Euro).

Money Exchange: Popular currencies in Bulgaria are the USD and EURO. Open hours of the banks are usually between 9.00 a.m. and 4.00 p.m. There are also a lot of foreign exchange offices.

Food Stores. Restaurants: All food stores work usually till 7.00 or 8.00 p.m., but there are also 24-hour open stores and stores that work on Saturdays and Sundays. Most foodstuffs, vegetables and fruit are sold at prices, similar to those in Western Europe. Restaurants offer highly varied prices depending on their category. In some small and inexpensive restaurants the price of a meal is about 10 Euro.

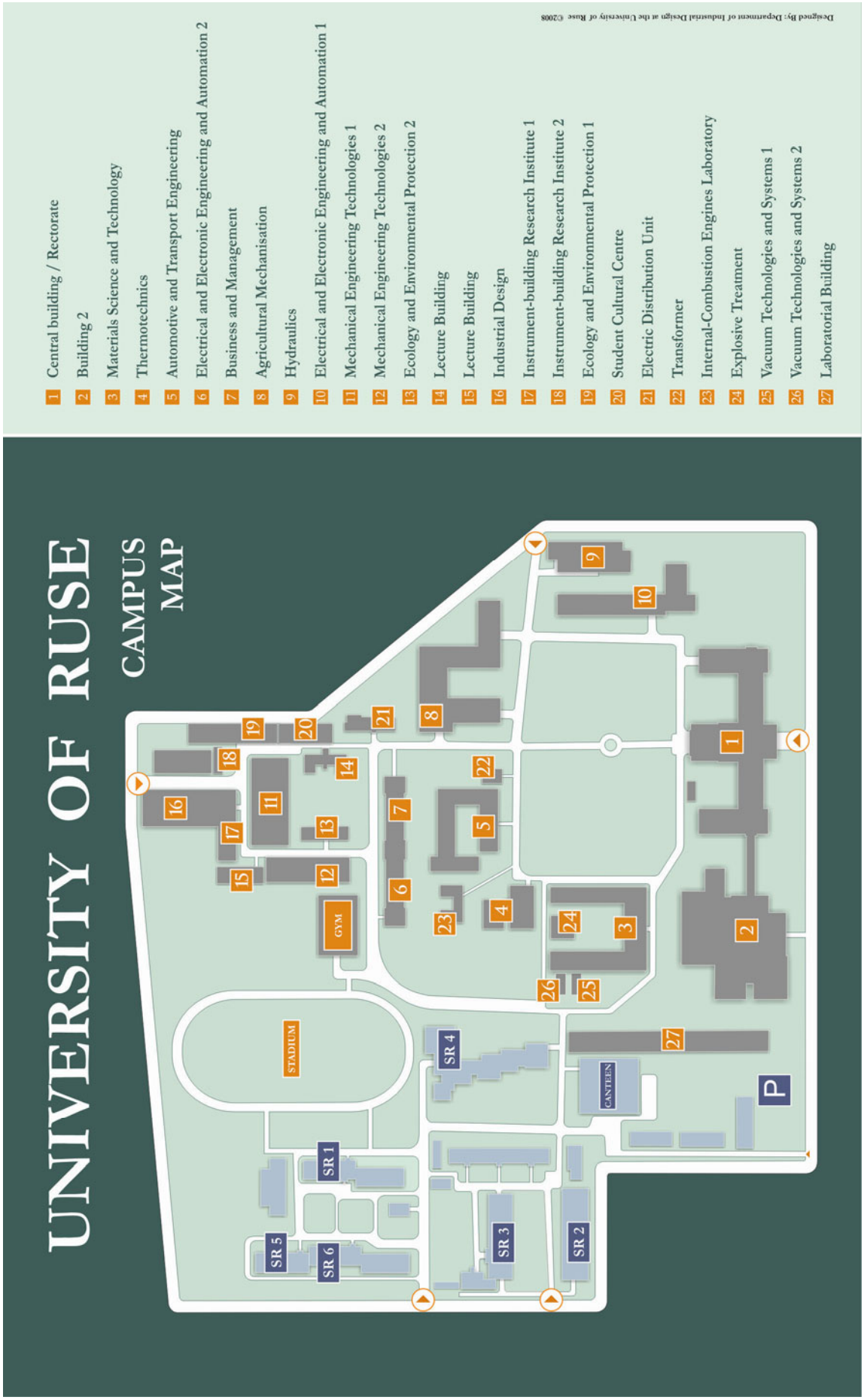
Phone Services: Street phones can be used with a phone card (either "Bulfon" or "Betkom"). Phone cards are available at post offices, stations of the public transport or news-stands. For international calls you may use the above phone cards or phones in post offices. There are 3 large mobile network operators on the territory of Bulgaria and these are M-Tel, GloBul and Vivatel.

Book Shops and Photocopying Services: Copy services, books, textbooks, manuals and other training aids are offered in the University bookshop and stationery shop.

Student Organisations

The Student Council is a body which protects the interests of the students. It is elected by full-time bachelor, master and doctoral students and includes student representatives in the General Assembly of the University. The Student Council at the University of Ruse maintains an information centre, located on the first floor of the Central Building.

Campus Map of the University of Ruse



INFORMATION ON THE FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING

University of Rousse

FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING

(Faculty of MME)

The Faculty of Mechanical and Manufacturing Engineering was founded in 1966. It comprises three departments: **the Department of Machine Tools and Manufacturing, the Department of Material Science and Material Technology and the Department of Engineering Mechanics**. Its staff includes 59 full-time lecturers, among whom there are 2 professors, 30 associate professors and 8 of the lecturers have a PhD degree. The faculty has a large laboratory base for study work and research in the sphere of machine tools and manufacturing, testing, research and machining of modern construction materials.

The faculty has received **very good** credits by the National Agency for evaluation and accrediting in 1998. It was entitled to train engineers in the two educational qualification degree programmes **Bachelor** and **Master** and to prepare **PhD students** in 13 scientific specialties.

The faculty initiated the foundation of the Association of Mechanical and Manufacturing Engineering faculties in Bulgaria, a joint member of the Scientists Union in Ruse and a member of the Bulgarian Metallurgy Association. The lecturers from this faculty have constant contacts with many Bulgarian and European universities and are good partners in the realization of international study and research projects with universities from England, Germany, France, Austria, Ireland, Italy, Portugal, Poland, the Czech Republic, Slovakia, Slovenia, Hungary, Croatia, Romania, Greece.

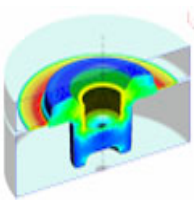
The teaching process is organized with the assistance of two faculty administrative officers and 31 technical staff in the departments.

During the academic year 2008/09 there were 504 full-time students and 113 part-time students in the faculty in degree courses for the **Bachelor** educational qualification degree, 32 full-time students and 20 part-time students in degree courses for the **Master** educational qualification degree and 21 PhD students.

For the **Bachelor** educational qualification degree students are trained in the following degree courses:

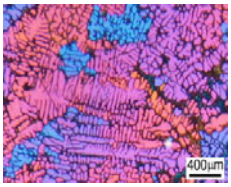
Manufacturing Equipment and Technologies – 183 full-time and 113 part-time students.

It provides universal technological training for all processes in mechanical manufacturing. The teaching process follows the model of leading European universities. Students have the opportunity to specialize in **Technology and Automation of Manufacture** or **Equipment and technologies for metal treatment**. Bachelor graduates obtain the professional qualification **mechanical engineer**.

Computer aided design in Mechanical and Instrument Engineering – 86 full-time students.
Students receive basic and specialized training in design, construction, testing and exploitation of modern machines and devices, automation devices, tools, optical and electronic systems. The curriculum envisages specialization in **Mechanical Engineering** or **Instrument construction**. Bachelor graduates obtain the professional qualification **mechanical engineer**.


Industrial engineering – 126 full-time students.
This degree course was designed in collaboration with the Nottingham Trent University - England. The subjects that are studied are: Material Science, Machine Science, Technologies, Electrical engineering, Electronics, Management, Communications. Students are trained as specialists in production and exploitation of **machines and other devices with electronic operation**. Bachelor graduates obtain the professional qualification **industry engineer**.



Material Science and Technology – 109 full-time students.
It provides general and specialized training in technologies for obtaining, testing and machining of materials. Training is carried out in study laboratories, equipped with modern devices and unique facilities. Bachelor graduates obtain the professional qualification **technological engineer** and can work as specialists in analysis, selection, evaluation and machining of materials.

For the **Master** educational qualification degree students in the following degree courses are trained in this faculty:

- Technologies for NC machines – full-time and part-time study;
- Mechanical Engineering;
- Instrument Engineering;
- Materials technology;
- Quality control – full-time and part-time study;
- Robotics and robotics systems;
- Resource saving technologies;
- Tools manufacturing;
- Industrial engineering.

The faculty prepares **PhD students** in the following scientific degree courses

- Applied mechanics;
- Construction mechanics and strength of materials;
- Mechanics of the deformable solid body;
- Material science and Materials technology;
- Manufacture technology;
- Materials Cutting and cutting tools;
- Machine Tools and systems;
- Technologies, machines and systems for metal forming;
- Technologies, machines and systems for foundry;
- Technologies, machines and systems for welding;
- Metrology and metrological supply;
- Metal science and metal heat treatment;
- Automation of Manufacture.

The PhD study is individual, under a professor's guidance and matches profound methodological training with independent research, experimental investigations and original applications in the solution of significant problems of modern engineering and practice.

ECTS
Coordinators

Faculty ECTS Coordinator:

Assoc. Prof. Petar Angelov, MEng, PhD
tel.: + 359 82 888 237, e-mail: pangelov@ru.acad.bg

Departmental ECTS Coordinators:

Department of Machine Tools and Manufacturing
Sr. Assist. Prof. Tzvetelin Georgiev
tel.: + 359 82 888 493, e-mail: cid@abv.bg

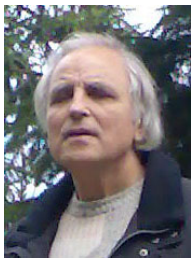
Department of Material Science and Material Technology
Assoc. Prof. Ivan Dermendjiev, MEng, PhD
tel.: + 359 82 888 318, e-mail: ivadim@ru.acad.bg

Department of Technical Mechanics
Assoc. Prof. Ivelin Ivanov, MEng, PhD
tel.: + 359 82 888 224, e-mail: ivivanov@ru.acad.bg

DEPARTMENTS IN THE FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING

DEPARTMENT OF MACHINE TOOLS AND MANUFACTURING

BUSINESS CARD of the Department

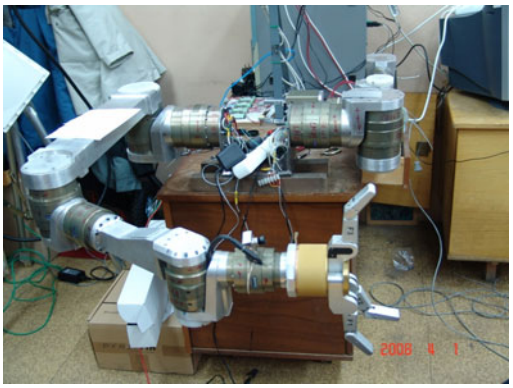


Head of department
Assoc. Prof. Mihail Kolev Karshakov, MEng, PhD
Tel.: +359 82 888 309
E-mail: mkarshakov@ru.acad.bg
http://www.ru.acad.bg/faculties/mtf/tmm/index.html

Teaching at the University of Ruse started in 1954. The first assistants were appointed in 1955. The Department was set up in 1957 under the name of Metals Processing and Technologies at the head with Prof. Valcho Michev. In 1964 the department adopted its present name – Machine Tools and Manufacturing. In 1972 part of the department lecturers separated to found a new department - Material Science and Material Technology, and in 1992 another part of the lecturers established the department of Metrology and Quality Management.

The department of Machine Tools and Manufacturing includes 28 lecturers, among whom 1 professor, 16 associated professors, 11 assistant professors and 8 technicians.

The department is accredited to teach students in Bachelor's , Master's and PhD's degree courses. The department is responsible for the education of students in the following degree courses: Manufacture Technologies, Computer aided design in Mechanical and Instrument Engineering and Industrial engineering. The lecturers of the department teach students from other faculties in technological subjects. Education and research activities of the department are carried out in seven main directions: Metal cutting and materials processing; Tooling; Machine Tools; Manufacturing and constructions technology; Manufacturing automation and robotics; Finishing processing methods; CAD/CAM systems, in each of which necessary laboratories are provided.



Lecturers from the department participate in various international educational and research programs like: TEMPUS, ERASMUS, Da Vinci and the Framework programs of the European Union. Under these programs students have the opportunity to study in different leading European universities.

Training of students is done by highly qualified lecturers, on new educational plans according to state requirements and in compliance with international standards.

Elaborated designs of the department are exposed at regional, national and international fairs.

The department organizes seminars and workshops involving students and guests to discuss the new tendencies in materials manufacturing and computerized control systems. A project funded by Pharre has been under way, aiming at setting up centres for technologies transfer

The department has three computerized lecture halls and CAD/CAM systems

Classes are conducted in laboratories equipped with state of the art measurement, technological and computing facilities

DEPARTMENT OF MATERIAL SCIENCE AND MATERIAL TECHNOLOGY

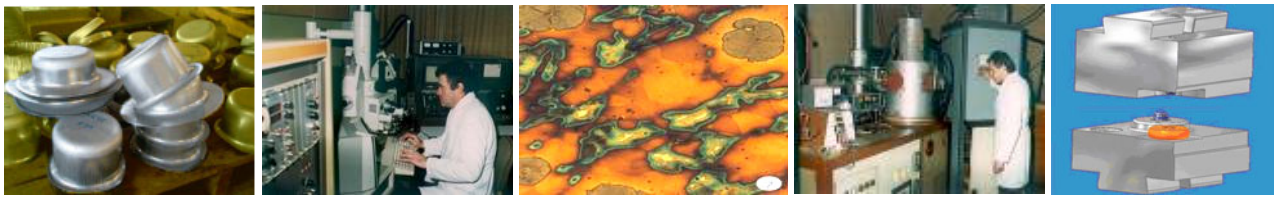
BUSINESS CARD of the Department

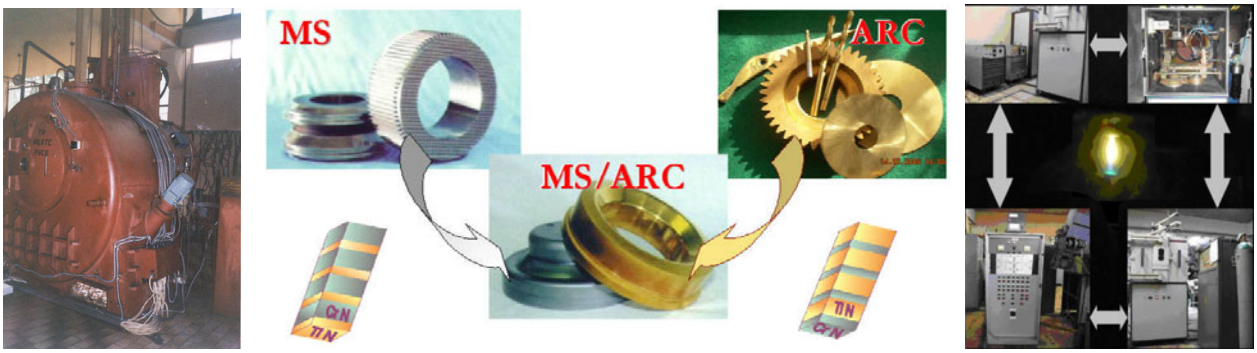
HEAD OF DEPARTMENT
Prof. RUSKO IVANOV SHISHKOV, MSc (Eng), DSc
Tel.: +359 82 888 204
E-mail: rish@ru.acad.bg
http://www.ru.acad.bg/faculties/mtf/mtm/index.html

The training in Material Science and Material Technology is an integral part of engineering education. At the University of Ruse it began in 1954/55 academic year, when the first teachers were appointed in this area. The Department has existed as a separate unit since 1972 when it separated from the then unified department of Technology and Metal Processing.

The Department of Material Science and Material Technology comprises 17full-time lecturers-1 professor, 7 associate professors, 1 PhD Sc and 9 with PhD degree. The department has 7 employees (3 of them with higher engineering education) 3 professors and 5 associate professors take part in the teaching process as part-time lecturers.

The Department provides training of all students in Technology of Materials and Material Science, Mechanical Engineering and General Engineering in more than 40 basic and special courses, classified in the following thematic areas: Material Science and Heat Treatment, Metal Forming and Testing of Materials, Metal Founding and Welding of Materials. The Department is situated in a separate building and has its own computer-room, seminar-room and specialized labs for teaching and research activities.





The Department traditionally maintains and develops versatile research in collaboration with post-graduate and PhD students in the following directions: Technologies for Coating Deposition and Heat Treatment, Resource Saving Technologies in Billet Production, Modern Methods for Testing and Research of Materials, Computer Aided Simulation of Metal Forming Processes.

DEPARTMENT OF ENGINEERING MECHANICS

BUSINESS CARD of the Department

HEAD OF DEPARTMENT
Assoc. Prof. IVELIN VELIKOV IVANOV, Ph.D.
Tel.: +359 82 888 472
E-mail: ivivanov@ru.acad.bg
http://ivivanov.orgfree.com

The department of Engineering Mechanics is one of the first departments created at the University of Ruse, when it was established in 1954. The department has 13 people teaching staff, 6 of them associate professors and 2 associates – additional supporting staff.

The department staff members teach students in fundamental and specializing courses:

I. Bachelor degree program:

- Mechanics
- Mechanics of Materials
- Strength of Materials
- Engineering Mechanics
- Applied Mechanics
- Strength and Dynamics of Machines
- Lightweight Structures
- Computational Modelling

II. Master degree program:

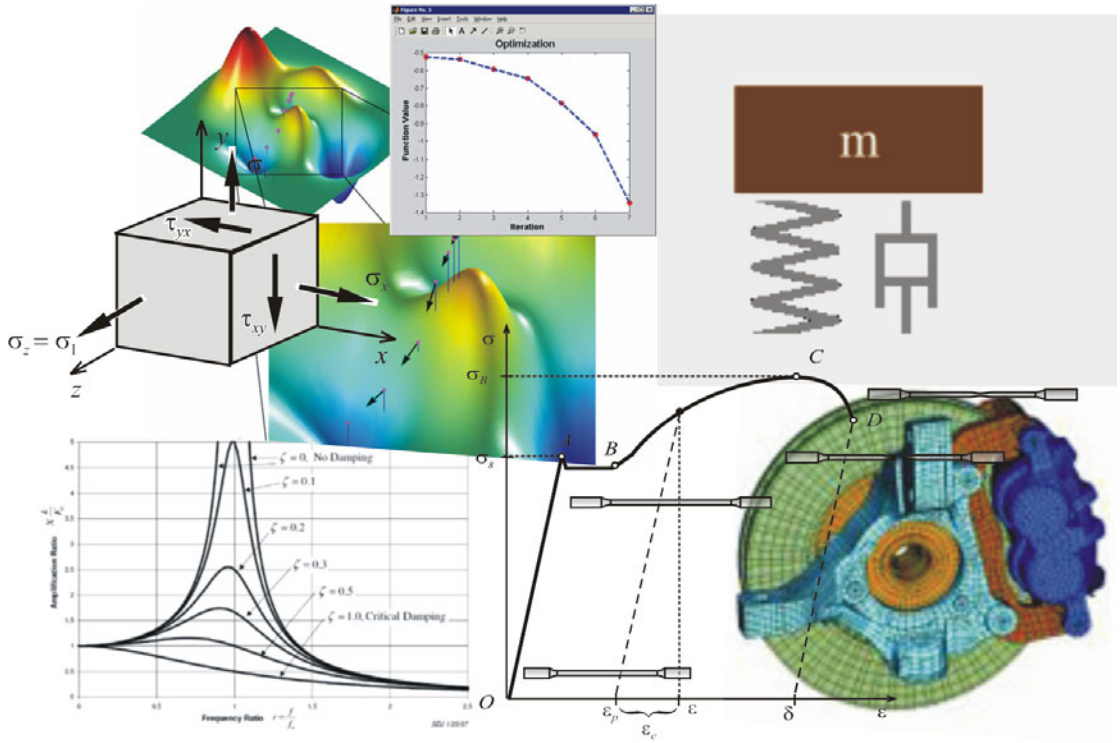
- Analytical Dynamics
- Finite Element Method
- Applied Optimization
- Continuum Mechanics
- Nonlinear Vibrations
- Dynamics of Machines and Equipment
- Optimal Design of Machinery

III. Doctoral degree program:

- Methods for Optimization
- Computational Modelling of Continua.

The department research activity is associated with the following areas and sciences:

- Applied Mechanics
- Stochastic Dynamics
- Continuum Mechanics
- Finite Element Method
- Composite Materials
- Stress and Strain in Deposits
- Computational Modelling of Discrete Mechanical Systems
- Impact Simulations
- Multi-objective Optimization
- Fracture and Damage Mechanics
- Smart Materials and Structures.



UNDERGRADUATE PROGRAMS

UNDERGRADUATE STUDIES IN MANUFACTURING EQUIPMENT AND TECHNOLOGIES

PROFESSIONAL STANDARDS
OF A BACHELOR IN

MANUFACTURING EQUIPMENT AND TECHNOLOGIES

Degree course: **Manufacturing Equipment and Technologies**
Educational degree – **Bachelor**
Professional qualification: **mechanical engineer**
Term of education: **4 years (8 terms)**

The main objective of the study is to prepare contemporary and wide profile executive engineer staff in the area of technical equipment and technologies for manufacturing of machine products. Under certain conditions students have the basis and opportunity to continue their study with 1,5 years more and to receive MASTER's degree.

General and specialized training – the curriculum is based on the Unified State requirements for the degree course. During the first four semesters some basic and general technical subjects are studied, which are the basis of modern engineering education, such as: Mathematics, Physics, Chemistry, Informatics, Mechanical Engineering, Strength of Materials, Fluid Mechanics, Material Science and Material Technology, Theory of mechanisms and machines, Machine Elements, Heating Engineering, Electrical engineering and Electronics, Metrology and Measurement Equipment. Great attention is paid to the special and specializing training during the second two years. The image of this degree course is formed by the compulsory subjects: Cutting of Materials, Cutting Tools, Metal Cutting Machines, Machine building technology, Thermal processing of metals, Technology of welding, Surface Plastic Deformation, Manufacturing Technologies, Automated Programming and Robotics, Control of Manufacturing Equipment and Automation of the technological preparation.

At the end of the fifth semester students choose a series of specializing courses, united thematically in two groups:

Group A – technology and automation of machine building;
Group B – technology of metal processing.

Each group includes a series of 8 courses, which are studied during the 6, 7 and 8 semester. So, students obtain more specialized preparation.
The course of study finishes with elaboration and presentation of the Final Year project. It is assigned at the end of the 7^{th} semester and it is developed during the 8^{th} semester. Therefore the 8^{th} semester has a reduced duration of 10 weeks and it does not include active study forms (course assignments and projects).

Practical training of students (15 ECTS credits) consists of:

- Study practice in Manufacturing Technologies – during semester One and Two, 7 ECTS.
- Technological practice in manufacturing companies – 2 weeks during the summer holiday after semester Four, 2 ECTS.
- Specializing practice in manufacturing companies – 2 weeks during the summer holiday after semester Six, 2 ECTS.
- Diploma practice – during semester Eight, 4 ECTS.

General and special skills in:

a) Design of technological routes for producing machine items with little and intermediate complexity;
b) Selection of appropriate technological equipment;
c) Elaborate development of separate stages and operations of the technological process;
d) Selection and design of technological equipment;
e) Using computer software for engineering activity;
f) Organization and management of small production units and firms.

Career prospects:
The engineers, who have graduated the Bachelor degree course in Manufacturing Equipment and Technologies can work for firms, companies, organizations etc., which deal with research, design, production, maintenance and commercial activity in the sphere of machine building as executive technological engineers, constructors, metrology engineers, consultants, experts and managers of small and medium sized enterprises.

CURRICULUM

of the degree course in

MANUFACTURING EQUIPMENT AND TECHNOLOGIES

First year

Code	*First term*	*ECTS*	*Code*	*Second term*	*ECTS*
1024	Mathematics 1	5	2068	Mathematics 2	6
0410	Chemistry	4	1609	Visual Programming in MS Office	5
2073	Material Science and Material technology I	5	2069	Physics	6
0380	Applied Geometry and Engineering Graphics I	5	2070	Applied Geometry and Engineering Graphics II	4
1038	Informatics I	4	2071	Mechanics I	5
0076	Study Practice	3	0001	Study Practice	4
	Elective Foreign Language	4			
	Total for the term:	***30***		***Total for the term:***	***30***
1102	Sports	1	1102	Sports	1

Second year

Code	*Third term*	*ECTS*	*Code*	*Fourth term*	*ECTS*
3268	Mathematics 3	5	2543	Machine Elements I	6
2402	Strength of materials I	5	2544	Strength of materials II	4
3357	Fluid mechanics	5	3300	Metrology and measurement equipment	5
2531	Mechanics II	4	2403	Cutting of materials	5
2530	Electrical Engineering and Electronics	6	2430	Theory of mechanisms and machines	4
2532	Material Technology	5	2545	Heat Treatment of Materials	4
			2443	Course Project Theory of mechanisms and machines	2
	Total for the term:	***30***		***Total for the term:***	***30***
1102	Sports	1	1102	Sports	1
			3299	Specialized practice – 2 w.	2

Third Year

Code	*Fifth term*	*ECTS*	*Code*	*Sixth term*	*ECTS*
2561	Machine Elements II	3	3272	Economics	4
2546	Heating engineering	5	3305	Manufacturing technologies I	6
3301	Cutting Tools	5	3306	Technology of foundry production	5
3302	Machine Tools-part 1	5	3307	Metal-working equipment	5
3303	Technology of welding	5		**Elective groups of courses (students elect a group)**	
3304	Metal forming	5		**Group A**	
2453	Machine Elements II – course project	2	3308	Design of manufacturing tools	5
			3309	Machine Tools-part 2	5
				Total for the term for A group:	30
				Group B	
			3310	Weld ability and welded constructions	5
			3311	Dies for metal forming	5
				Total for the term for B group:	30
	Total for the term:	***30***		***Total for the term:***	***30***
1102	Sports	1	1102	Sports	1
			3312	Specialized practice – 2 w.	2

Forth Year

Code	*Seventh term*	*ECTS*	*Code*	*Eighth term*	*ECTS*
3280	Technical Safety	3	3322	Quality control and management	4
3313	Production automation and robotics	5	3323	Technical organization of industrial companies	4
3314	Control of manufacturing equipment	7		**Optional courses (students select two subjects)**	
3315	CAM-systems	5	3325	Assembly technology and automation	4
	Optional groups of courses (students select a group)		3326	Group and type technological processes	4
	Group A		3327	Grounding in metallurgy	4
3316	Manufacturing technologies II	4	3328	Testing of materials	4
3318	Technological equipment	4			
3317	Manufacturing technologies II–course project	2			
	Total for the term for A group:	30			
	Group B				
3319	Tools for metal and plastic founding	4		**Graduation**	
3321	Methods for coating deposition	4	3324	Self-dependent training	4
3320	Tools for metal and plastic founding-course project	2	3329	Diploma work	10
	Total for the term for B group:	30			
	Total for the term:	***30***		***Total for the term:***	***30***
1102	Sports	1	1102	Sports	1

Total for the training course: 240 ECTS credits

1024 Mathematics part I

ECTS credits: 5 **Weekly classes**: 2 lec+0sem+0labs+2ps+ca
Assessment: exam **Type of exam**: written
Departments involved:
Department of Algebra and Geometry, Faculty of Education
Lecturers:
Assoc. Prof. Docho Trifonov Dochev, PhD, Dept. of Algebra and Geometry, tel: 888 489;
E-mail: tcetcka@ami.ru.acad.bg.
Assoc. Prof. Stoycho Dimitrov Dimitrov, PhD, Dept. Algebra and Geometry, tel: 888 453;
E-mail: tpeter@ami.ru.acad.bg.
Abstract:
The course is a basic one in engineering education. It uses the mathematical knowledge from secondary school and extends it on a higher level. It is essential for the next mathematical subjects, Physics, Mechanics, general and special engineering courses.
Course content:
Complex numbers and polynomials. Systems of linear equations and determinants. Matrix calculus. Line in plane. Lines and planes in space – forms of determining and common positions. Linear space and linear operators. Second order curves and surfaces. Functions and sequences. Limits and derivatives. Basic theorems of differential calculus. Applications of derivatives for investigating functions. Indefinite integral – definitions and basic properties; methods for calculation - integration by parts, integration by substitution, integration of rational, irrational and transcendental functions.
Teaching and assessment:
The theoretical basis of the topics presented at lectures is acquired at seminars through solving problems; individual practise and reinforcement is accomplished by weekly assignments. Three written tests are administered and students with grades above 4.50 are exempt from an exam and their mark is formed on the basis of an interview with the lecturer. Students are given six problems at the exam and they have to solve at least three to pass. Each student is required to do a course assignment. Its successful presentation at seminars and a regular class attendance are a necessary prerequisite to have a term validated.

0410 Chemistry

ECTS credits: 4 **Weekly classes**: 2lec+0sem+1labs+0ps+p
Assessment: exam **Type of exam**: written
Departments involved:
Department of Repair, Reliability and Chemical Technologies,
Faculty of Agricultural Mechanization.
Lecturer:
Assoc. Prof. Dimitar Jordanov Pavlov, PhD, Dept. of Repair, Reliability and Chemical Technologies,
tel. 888 733, chimia@ru.acad.bg
Abstract:
The subject helps students obtain particular knowledge of the structure of substances, chemical phenomena and processes, directly connected with engineering. Laboratory exercises simulate these processes and show the way for their use or avoidance in engineering practice. The course achieves leveling of students' previous knowledge of chemistry and provides necessary knowledge and skills for the next courses of Physics, Materials and Manufacturing Engineering, Strength of Materials, etc.
Course content:
Structure of substances. Kinetics of chemical processes. Chemical equilibrium. Chemical thermodynamics. Metals and alloys. Electrochemical processes. Dispersions. Surface phenomena. Review and classification of the main groups of organic compounds used in engineering practice. Isomerism of the organic compounds and its influence on their properties.
Teaching and assessment:
Laboratory classes provide students with the opportunity to receive visual notion about important theoretical issues, such as: chemical properties of metals and alloys, the work of electric cells, electrolysis, surface phenomena, etc. There is a test control on basic topics at the beginning of each class, which could be either written or oral, with duration of about 15 minutes.

2073 Material science

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science and Materials Technology,
Faculty of Mechanical and manufacturing engineering
Lecturers:
Prof. Rusko Ivanov Shishkov, MEng, DSc, PhD, Dept. of Material Science and Materials Technology,
tel. 888 204, E-mail: rish@ru.acad.bg
Assoc.Prof. Penka Dimitrova Etarska, MEng, PhD, Dept. of Material Science and Materials Technology,
tel. 888 307, E-mail: etarska@ru.acad.bg.
Abstract:
This course studies the composition, structure and property connections in materials, which are used both in techniques and daily life, as well as the opportunities, granted to change and redirect these properties in a certain way. Basic knowledge of physics and chemistry is needed. Students acquire useful knowledge and experience, which can be applied in other subjects having something in common with material processing or new product construction.
Course content:
Main notions on the structure and properties of metal, dielectric and semiconductor crystal materials. Structure analyzing methods. One-, two-, and multi-component systems. Balance equilibrium diagrams of conditions. Regularity of crystallization and transformations in hard condition – mechanisms and kinetics. Metastable conditions. Iron, steel and cast iron, copper, titanium, aluminum and their alloys. Other kinds of metal material. Ceramics and metal ceramics. Polymer materials. Composition materials.
Teaching and assessment:
Theoretical knowledge taught at lectures is assimilated, specified and improved during laboratory classes. They concern mainly material structure and thermal methods of its change. Three tests are appointed during the semester. The test results are reflected in the exam's assessment

0380 Applied geometry and engineering graphics 1

ECTS credits: 5 **Weekly classes:** 1lec+0sem+0labs +2ps+cw
Assessment: continuous assessment **Type of exam:** written
Departament involved:
Department of Engineering graphics, Faculty of Automotive and Transport Engineering
Lecturer:
Assoc. Prof. Ventsislav Dimov Dochev PhD MEng. , Dept. of Engineering Graphics ,tel.888-437
Annotation:
The course examines methods and means of presentation of three-dimensional objects by plane images and ways of analysis , convert and optimize graphic images. A precondition for learning this subject is a basic knowledge of geometry and technical drawing . It develops the steric imagination of students and their skills to cope with graphic and technical information .This subject is a base of further learning of other technical branches of science.
Course content:
Kinds of projection. Comprehensive drawing . Reciprocal position of principal geometric objects. Convert of a comprehensive drawing . Methods of projection. Reciprocally crossing of geometric objects. Images in the drawings . Axonometric projection.
Teaching and assessment:
The theory ,read in lectures by didactic means, gives the needed base for leading practical classes and course assignments .During the training problems are solved , instructions given , examples considered. In the course assignment students are required to do a number of plans with different images of steric objects. The course ends with a continuous assessment, which is formed by marks of two tests and the score of the course assignment .An attestation is given , according to the academic regulations , when the course assignment is done and the lectures and practical classes are attended.

1038 Informatics I

ECTS credits: 4 **Weekly classes:** 1lec+0sem+0labs+2ps+ca
Assessment: continuous assessment **Type of exam:** test
Department involved:
Dept.of Informatics and Information Technologies, Faculty of Natural Sciences and Education
Lecturers:
Assoc. Prof. Margarita Teodosieva, PhD, Dept. of IIT, tel. 888 464, Email: mst@ami.ru.acad.bg
Pr. Assis. Prof. Stoyan Donchev Chernev, PhD, Dept. of IIT, tel. 888 470, E-mail: stenly@ami.ru.acad.bg
Abstract:
The course objective is to introduce students to the computer with its components as technical aid, as well as to the most widely spread software products – operating systems, word processing systems, spreadsheet data processing systems, data bases, information systems, artificial intellect systems, computer graphics systems, computer aided design and manufacturing (CAD/CAM) systems. The workshops aim at providing students with knowledge of the use of the most widely spread application program systems – Windows, Word, Excel.
Course content:
History and classification of computers. Hardware. Operating systems. Application software. Word processing systems. Spreadsheets. Databases: relation database, database management systems, widely spread databases, data exchange and computer networks.
Teaching and assessment:
Lectures are given in 2 academic hours every other week. Workshops are carried out in computer laboratories to practice theoretical knowledge under the guidance of the teacher. For getting a feedback of students' progress the teacher makes a 10-minute-revision of the material taught in the beginning of the workshop by giving them a test, or making a concise written or oral testing. Student's practical knowledge on the application of currently studied software product is assessed at the end of every course sections. Through course assignments students reveal whether they are able to apply independently the program systems. Students get assessments on course assignments that are considered for the total grade.
In the end of the semester students' theoretical knowledge is assessed through a test of 100 questions covering the whole material taught.
Semester grade is formed on the basis of the results from the main test, workshop performance and course assignment average grade.

0076 Training practice in Metals engineering

ECTS credits: 3 **Weekly classes:** 0lec+0sem+0labs+4ps
Assessment: exam **Type of exam:** oral exam
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 211, E-mail: rus@ru.acad.bg.
Sr. Assist. Prof. Peter Stoykov Petrov, MSc (Eng), Dept. of Material Science & Material Technology,
tel. 888 316, 206
Abstract:
The course provides preliminary knowledge and practical skills in the main stages of technological processes for metal casting, welding, plastic deformation used in the manufacture organization.
Course content:
Metal casting; manual moulding using non-sectional pattern in two moulds; moulding with cutting; using a semi-mould; moulding using sectional patterns; moulding using mould plates; machine moulding. Welding: manual arc welding; excitation and running of the welding arc; welding of initial and monolayer welds; welding of fillet welds; welding of long welds; welding of multilayer welds. Manual forging: open manual and machine forging of a wedge, clamp and hinge bolt.
Teaching and assessment:
Practical classes are held in the learning work-department, where the working places are prepared in advance. Students are divided in groups, each of which uses a separate working place. Control is carried out through an oral exam. A certain practical assignment is carried out, as well as a short discussion of a theoretical issue.

Foreign Language for the Mechanical Engineering Course
0383 English; 0843 German; 0950 French; 0983Russian

ECTS credits: 4 **Weekly classes:** 0lec+0sem+0labs+4ps
Assessment: continuous assessment **Type of exam:** written and oral
Departments involved:
Department of Foreign Languages, Faculty of Law
Lecturers:
English: Lecturer Ivelina Dimitrova Petrova, Department of Foregn Languages;
E-mail: ipetrova@ecs.ru.acad.bg;
German: Senior Lecturer Elmira Maksimova Maksimova, Department of Foreign Languages;
tel.: 888 824 E-mail: sbartenev@ecs.ru.acad.bg
French: Senior Lecturer Roumyana Ivanova Milanova, Department of Foreign Languages;
E-mail: rmivanova@ecs.ru.acad.bg;
Russian: Senior Lecturer Iliyana Gancheva Benina, Department of Foreign Languages;
E-mail: Ibenina@ecs.ru.acad.bg;
Abstract:
The foreign language module is aimed at achieving communicative competence in the area of the degree course and the future job. The teaching objectives comprise the development of reading comprehension skills to handle specialist texts and the acquisition of communication skills to interact successfully in professional settings and everyday situations.
Course content:
Meeting people. Talking about the present and the past. Writing instructions. Comparing things. Properties of materials. Describing processes. Searching for information in catalogues. Linking facts and ideas. Applying for a job. Infinitive and gerund. Passive voice. Mathematical symbols in engineering – reading formulae.
Teaching and assessment:
A wide range of authentic and specially constructed texts (articles, diagrams and tables, brochures, catalogues, manuals, etc.), as well as audio, video, and multimedia materials are used to acquire the necessary language knowledge and to develop skills in using the language as a means of communication. Students are offered lessons in computer laboratories, in which multimedia learning packages and on-line materials are used.
In class students participate in role-plays, pair and group activities. The oral examination covers the topics discussed during the semester. The semester grade is based on the marks from 2 tests administered during the term.

2068 Higer mathematics – Part 2

ECTS credits: 6 **Weekly classes:** 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written
Departments involved: Department of Mathematical Analysis, Faculty of Pedagogy.
Lecturers:
Prof. DSc Stepan Agop Tersian, Dept of Mathematical Analysis, tel. 888 226, 888587.
Assist. Prof. Julia Vancheva Chaparova, PhD, Dept. of Mathematical Analysis, tel. 888 226, 888587.
Assist. Prof. Antoaneta Tileva Mihova Dept. of Mathematical Analysis, tel. 888 226, 888727.
Annotation:
The degree course Higher Mathematics - Part 2 is basic for mathematical education in engineering sciences. It gets the students acquainted with the basic notions of the mathematical analysis such as definite integral, partial derivatives, double and triple integrals, and gives them computational abilities (including computations with mathematical software) to solve ordinary differential equations and systems, find extrema and integrate functions of two variables. This knowledge is necessary for further study of higher mathematics – part 3, physics, computer sciences.
Course content:
Basic themes: definite integrals and applications, functions of two variables, ordinary differential equations and systems, multiple integrals, numerical series.
Teaching and learning methods:
Educational process is carried out through lectures and practical classes. In the lectures the educational material is theoretically presented and illustrated with proper example problems. In the practical classes educational material understanding is controlled and skills for solving practical problems are developed. A term certification is obtained according to Interval rules for the educational activities. The exam test includes 6 problems and/or theoretical questions from the educational material.

1609 Visual Programming in MS Office

ECTS credits: 5 **Weekly classes**: 2lec+0sem+0labs+2ps+ca
Assessment: continuous assessment **Type of exam**: written
Department involved:
Department of Informatics and Information Technologies, Faculty of Natural Sciences and Education
Lecturers:
Assoc. Prof. Margarita Teodosieva, PhD, Dept. of IIT, tel. 888 464 Email: mst@ami.ru.acad.bg
Pr. Assist. Prof. Stoyan Donchev Chernev, PhD, Dept. of IIT, tel. 888 754 E-mail: stenly@ami.ru.acad.bg
Abstract:
The course objective is for students to get familiar with MS Office package and prepared for programming with Visual Basic for Application; they become able to efficiently use the applications in Office environment and develop their own applications. Prerequisites for attending the course are students' preparation in Mathematics gained at high schools and the knowledge from studying Informatics 1. The knowledge and skills acquired from studying Visual Programming in Office Environment are the basis for doing course assignments, course tasks and projects and they can be successfully used for diploma projects and students' further work.
Course content:
Introduction. Office programming. Object-oriented programming. VBA and objects in Office. Data types. Macros creation and editing. Constants, variables. Integrated functions and statements. Assignment statements. Control statements. Arrays. Introducing to objects and collections. Procedures and functions. Projects and modules. Interaction design. Menu. Dialogue windows. Dialogue window objects. Events. Methods. Files management. Office applications host control.
Teaching and assessment:
The theory taught by lectures, accompanied with relevant exemplary programs, is consolidated during workshop sessions.Continuous assessment is carried out for controlling students' progress and forming their final grades. Students perform two tests during the semester. The course assignment given to students is the active form of testing their skills for working independently and they get an adequate mark. For estimating students' involvement in the course studies students may get maximum 100 scores. Semester validation is obtained after student's regular attendance at lectures, active participation in workshop sessions, minimum 70 scores and successfully presented course assignment. The continuous assessment is formed as an average of the grades from the two tests given during the semester, and taking into consideration the grade from the entry test as well as student's performance during workshop sessions.

2069 Physics

ECTS credits: 6 **Weekly classes:** 3lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam**: written
Department involved: Department of Physics
Faculty of Electrical Engineering, Electronics and Automation
Lectures:
Assoc. Prof. Nadezhda Marinova Nancheva, PhD, Department of Physics, tel.888 219,
E-mail: nancheva@ru.acad.bg
Assoc. Prof. Galina Zaharieva Krumova, PhD, Department of Physics, tel.888 218,
E-mail: gal@ru.acad.bg
Abstract:
The course aims at familiarizing students with the physical character of processes and phenomena in nature and the methods for their investigation, with the most general properties of matter and the material objects. Laboratory classes aim at creating skills for experimental investigation of physical phenomena and solving physical problems.
Course content:
Measuring physical quantities, Kinematics and Dynamics of material point and rigid body, Interaction in nature, Work and energy, Mechanical preservation laws, Molecular physics and thermodynamics, Transfer phenomena, Periodic processes and waves, Electric field and electric current, Magnetic field and electro-magnetic induction, Optical phenomena, Atoms, atom nuclei, elementary particles.
Teaching and assessment:
Lectures give the main theoretical material, supported by some demonstrations of physics phenomena and processes. At laboratory classes students work independently and investigate particular physical phenomena. Knowledge of lecture material and laboratory classes is tested regularly. The final mark is formed after an exam in the form of a test.

2070 Applied geometry and engineering graphics 2

ECTS credits 4 **Weekly classes:** 1lec+0sem+0labs+2ps+cw
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Engineering graphics, Faculty of Automotive and Transport Engineering
Lecturer:
Assoc. Prof.. Ventsislav Dimov Dochev PhD .MSc.(Eng), dep. of Engineering graphics 888-437
Annotation:
The course examines the rules for doing and making out plans , scheme and technical text documents; norms and instructions of Bulgarian and international standards considering drawing up technical documents. . It develops the steric imagination of students and their skills to cope with technical documents This course is a base of further learning of other technical branches of science and doing a course project and a graduation paper.
Course content:
Different connections – threaded , splinted and permanent connections. Drawing of a machinery piece – content , composition , images , measures , tolerance of dimensions ,method of indicating surface texture , text information .Special documentation of some technical products . Drawings of precast units. Item list . Text documents . Schemes . Building drawings.
Teaching and assessment:
The theoretical subject matter read in lectures by didactic means, gives the needed base for conducting practical classes and course assignment .During training problems are solved , instructions given , examples considered. In the course assignment students are required to make technical documents of a precast unit given as axonometric images. The course ends with a continuous assessment, which is formed by the marks of two tests and the score of the course assignment .An attestation is given , according to the academic regulations , when the course assignment is done and the lectures and practical classes are attended.

2071 Mechanics 1

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Georgi Gabrovski, MEng, PhD, tel. 888 474, e-mail: ggabrovski@ru.acad.bg;
Assoc. Prof. Venko Vitliemov, MEng, PhD, tel. 888 572, e-mail: venvit@ru.acad.bg;
Assoc. Prof. Stoyan Stoyanov, MEng, PhD tel. 888 572, e-mail: sgstoyanov@ru.acad.bg.
Abstract:
Students get acquainted with methods for investigation of deferent kinds of rigid body motion, for different force transformations, and for investigation of the mechanical interaction in rigid bodies in equilibrium. The course provides a basis for modeling structures, mechanisms, dynamic processes and the applications of computer methods needed for their investigation. Preliminary knowledge in Mathematics, Physics, and Informatics is necessary for this course. The degree course is fundamental for engineering courses on analysis and design of mechanical structures and machines.
Course contents:
Particle kinematics. Translational, rotational, and plane rigid body motion. Relative motion of a particle. Equilibrium of a rigid body. Reduction of a system of forces. Equilibrium of a multi-body system. Equilibrium in presence of friction. Gravity center.
Teaching and assessment:
The theoretical basis of the topics is elucidated in lectures and illustrated with examples. Students solve problems in practical classes by utilizing the software environment of MATLAB. They apply the learned methods in their course task, which is assigned individually to each student. The course task is controlled and graded. The total score of a student is formed by a system of tests, including two midterm and a final term test with a preexamination test. The mark gained for the semester is accounted for in the final grade.

0001 Practice in Manufacturing Technologies

ECTS credits: 4 **Weekly classes:** 0lec+0sem+1labs+4ps
Assessment: oral exam **Type of exam:** oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturer:
Assoc.Prof. Ivan Kolev Ivanov, MEng, PhD, Dept. of Machine Tools and Manufacturing, Tel: 888-544,
E- mail: kolev@ru.acad.bg.
Annotation:
The goal of the course is to give students practical skills and knowledge of the main machining processes, the machines and tools that are applied in them as well as various machining and assembling operations.
Course contents:
During the laboratory classes students are made familiar with the organization, preparation and control of various machine tools, cutting tools, equipment and the positioning of the parts or cutting tools on machines. During the practical classes students carry out independent work on a Lathe, a Milling machine, a Drilling machine and a Shaper. In the bench department students lay out parts and carry out basic bench operations. The practical classes complete making a check part following a drawing.
Teaching and assessment:
Laboratory classes correspond to practical classes. They are organized so that students can have an access to machines, tools and equipment and the needed setup. Practical classes are conducted in a training workshop. Each student is assigned a personal work place where he/she can produce test and real parts with relatively simple configuration.
Students' knowledge is assessed though discussions as well as during the practical and laboratory exercises. The final grade is the result of a colloquium.

3268 Mathematcs - Part III

ECTS credits: 5 **Weekly workload:** 2lec+0sem+0labs+2ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Numeric Methods and Statistics, Faculty of Education.
Lecturers:
Assoc. Prof. Ljuben Georgiev Valkov, PhD, Dept. of Numeric Methods and Statistics, tel:888 466,
home tel: 082- 622 - 566, E-mail: lvalkov@ru.acad.bg
Pr. Assist. Prof. Violetka Atanassova Kostova, Dept. of Numeric Methods and Statistics, tel: 888 466,
home tel: 082- 897-213, E-mail: vkostova@ru.acad.bg
Abstract:
The degree course is aimed at providing students with skills in processing data, obtained from experiments in the field of engineering, which requires the use of:

- Probability theory mathematical apparatus
- Mathematical statistics methods of experimental data processing
- MATLAB in practice

Course content:
The course includes elements from: probability theory, mathematical statistics, regression and correlation analysis, linear algebra numerical methods and mathematical analysis.
Teaching and assessment:
The training process is organized in lectures, seminars and practical classes. At lectures theoretical issues are presented and illustrated with appropriate exemplary problems, connected with students' degree course. At seminars students solve problems, connected with engineering practice and requiring the application of the theory of probality mathematical apparatus, as well as mathematical statistics.
Each student is required to do an individual course assignment.
The final course mark is formed on the basis of the following formula:
Final course mark = 3/4 the grade of the test + 1/4 the grade of practical classes.

2402 Strength of Materials I

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps+cw
Assessment: continuous assessment **Type of exam:** tests
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lectures:
Assoc. prof. Dr. Nedka Stancheva, tel. 888 478, e-mail: nedka@ru.acad.bg
Assoc. prof. Dr. Ivelin Ivanov, tel. 888 224, e-mail: ivivanov@ru.acad.bg
Abstract:
The degree course provides students with a system of knowledge about assessment methods through calculations of the advisability, reliability, and effectiveness of the shapes and dimensions of structural elements. Preliminary knowledge in basic Mechanics (Statics) and Mathematics is necessary. The course is fundamental for the following courses in design of specific machines.
Course contents:
Introduction. Basic terms and principles, stress, deflections, strain. Internal forces in trusses. Tension and compression. Testing of materials, basic mechanical properties. Shear and crushing. Torsion of circular and noncircular bars. Moments of area of cross sections. Plane bending and 3D bending, deflections in bending, deflected axis of a beam. Non-axial tension and compression. Buckling of struts.
Teaching and assessment:
The theoretical basis of the topics, presented in lectures, is applied by students in their practical classes by solving problems for training. Students work out an individually assigned complex course task , which is graded on two-week schedule. Students make three tests, which are graded. The final grade is accumulated from the grades of the tests and from the grade of the course task presentation. Regular attendance of classes and course paper submission are the requirements for semester validation.

3357 Fluid mechanics in machine design

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Department of Thermothechnics, Hydro and Pneumotechnics, Agro-Industrial Faculty.
Lecturers:
Assoc. Prof. Ivanka Mitkova Zheleva, PhD, tel: 082 888 582, home tel: 084/ 662 332
Assoc Prof. Gencho Stoikov Popov, PhD, tel: 082 888 580
Abstract:
The course introduces students to the main relationships and physical treatment of the phenomena analyzed in hydrostatics, kinematics and fluid dynamics from the perspective of their application in engineering practice. Basic knowledge of Mathematics, Physics, Theoretical Mechanics is a prerequisite for acquiring Fluid Mechanics and it, in its turn, is a prerequisite for acquiring hydraulic and pneumatic machines and drives, agricultural machines, internal combustion engines, etc.
Course content:
Main properties of fluids. Equilibrium of fluids. Kinematics and dynamics of ideal and real fluids. Hydraulic resistances and calculation of pipelines and channels. Resistance of streamlined bodies and wings. Liquid leakage from openings, end-pieces, jets. Turbopumps.
Teaching and assessment:
The topics of the lectures provide students with the opportunity to get acquainted with the main laws of fluid mechanics preceding laboratory classes, during which the obtained knowledge is consolidated and its practical application is clarified. For each laboratory class students work out a written statement. Students work out a course assignment in stages, consisting of solving particular tasks from the studied material. The requirement to have a term validated is the submission of the course assignment and the written statements from the laboratory classes. The exam is in a written form, including short answers to theoretical questions and a solution of a certain number of problems.

2530 Electrical and Electronic Engineering

ECTS credits: 6 **Week classes:** 3lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Dept. of Theoretic Electrical Engineering and Electrical Measuring, Faculty of Electrical Engineering, Electronics and Automatics
Lecturers:
Assoc. Prof. Georgi Rashkov Georgiev, tel. 888 412, e-mail: grashkov@ru.acad.bg,
Assoc. prof. Svilena Vasileva Todorova, tel. 888 224, e-mail: svito@ru.acad.bg,
Assoc. prof. Emil Nikolaev Pawlikjanov, tel. 888 265
Pr. Assist. Prof. Docho Rusev Ivanov, tel. 888 501
Annotation:
The degree course Electrical and Electronic Engineering is part of the curriculum for the bachelor degree in non-electrical courses. The aim of the course is for students to get knowledge in the fields of Main Laws of the Theoretical Electrical Engineering, Electrical Measurement, of Electrical and Non-electrical Quantities, DC and AC Electrical Machines, Electronic semiconductors and schemes. It is necessary for students to have preliminarily knowledge from the courses Physics and Mathematics. The knowledge of Electrical and Electronic Engineering is used in the next courses and when preparing the graduation paper.
Course content:
Basic elements and magnitudes of electrical circuits - DC and AC, Three-phase and magnetic circuits, Electrical measurements of electrical and non-electrical quantities, DC machines, Transformers, Synchronous and Induction AC Machines, Electronic Devices, the most used diagrams, Operational Amplifiers, Digital networks.
Teaching and assessment:
Training falls into lectures and laboratory classes. In the laboratory classes students can receive practical knowledge. There is a test control on basic topics at the beginning classes, which could be either written or oral, having 15- minute duration. The purpose of test control is to help performance at the exam.

2531 Mechanics 2

ECTS credits: 4 **Weekly classes**: 2lec+0sem+0labs+1ps+ca
Assessment: exam **Type of exam**: written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Venko Vitliemov, MEng, PhD, tel. 888 572, e-mail: venvit@ru.acad.bg
Assoc. Prof. Georgi Gabrovski, MEng, PhD, tel. 888 474, e-mail: ggabrovski@ru.acad.bg;
Assoc. Prof. Stoyan Stoyanov, MEng, PhD, tel. 888 572, e-mail: sgstoyanov@ru.acad.bg.
Abstract:
Students get acquainted with the methods of investigation of the dynamic processes in mechanical multi-body systems. The course provides a basis for modeling structures, mechanisms, dynamic processes and the application of engineering methods for their investigation. Preliminary knowledge of Mathematics, Physics, Informatics and Mechanics 1 is necessary for this course. It is fundamental for engineering courses in analysis and design of mechanical structures and machines.
Course contents:
Basic problems of the particle dynamics. Linear oscillation of a particle. Relative motion dynamics of a particle. Mass inertia moments and centrifugal inertia moments. Theorems of the dynamics. Kinetostatics. Dynamics of a body. Analytical mechanics. Impact theory.
Teaching and assessment:
The theoretical basis of the topics is explained at lectures and their application is illustrated with examples. Students solve problems at practical classes by utilizing the software environment of MATLAB. The training of students is provided by a course task which is individually assigned to each student and graded after submission. The total score of a student is formed by a system of tests, including midterm and final tests with a reexamination test. The mark gained for the semester is accounted for in the final grade.

2532 Technology of materials

ECTS credits: 5
Weekly classes: 3lec+0sem+2labs+0ps
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science and Materials Technology,
Faculty of Mechanical and manufacturing engineering
Lecturers:
Assoc.Prof. Georgi Ivanov Nikolov,MSc, PhD, Dept. of Material Science and Materials Technology,
tel. 888 311, 888 210
Assoc.Prof. Mladen Tzvetanov Trifonov, MSc, PhD, Dept. of Material Science and Materials Technology,
tel. 888 206, E-mail: mtr@ru.acad.bg
Abstract:
The course aims at supplying knowledge and skills in the fundamentals of the following technological processes – casting plastic deformation and welding as well as the fields of their application where machine manufacturing and some non-machine manufacturing materials and goods are processed. Some general knowledge of physics, chemistry and strength of materials is a necessary prerequisite for studying this subject. It is basic for studying other subjects in the field of mechanical engineering technologies.
Course content:
Introduction: Main principles of casting technology – a process diagram, working out a casting form, casting of metal materials, special methods for getting mouldings. Main principles of deformation technology – a process diagram methods of volume and sheet deformation, special deformation methods, plastic deformation of metal materials. Main principles of welding technology – a process diagram methods of welding through melting and pressure special welding methods, thermal cutting, welding of metal materials. Fundamentals of other materials' processing: plastic and metal-ceramic materials.
Teaching and assessment:
Training is carried out through lectures and laboratory classes. Three tests are scheduled during the lectures. The final exam includes three written issues with an oral discussion. Final assessment is worked out on the basis of the tests and exam results.

2543 Machine elements I

ECTS credits: 6
Weekly classes: 2labs+0sem+1labs +1ps+cw
Assessment: continuous assessment
Type of exam: written
Departments involved:
Department of Machine knowledge and machine elements, Faculty of Auto transport
Lecturers:
Assoc. Prof. Peter Stamatov, MEng, PhD, dept. of Machine knowledge and machine elements, tel. 888592
E-mail: stamatov@ru.acad.bg.
Assoc. Prof. Ivan Spasov, MEng, PhD, dept. of Machine knowledge and machine elements, tel. 888235
E-mail: igs@ru.acad.bg.
Annotation:
The course takes the role of a mediator among general-theoretic courses (Mechanics, Resistance of Materials, Machine Mechanics Theories, Applicable Geometry and Engineering Graphics, Material knowledge and Technology of Materials, Metrology and Measuring Devices, etc.) and some technical courses included in the general module. The aim of the course is to teach the basics of the theory of machine elements with general preordination and methods for their calculation and construction.
Course content:
Bulk and surface strength of machine elements. Limit of fatigue. Connections: threading, rivets, welding, press, cotters and grooves. Elements of rotary motion: axis and shafts, bearings, automated non-automated and automatic couplings.
Teaching and assessment:
Lectures are held in front of a stream of students. Current students' training is controlled through two control assignments on the material. Practical classes are held in a computer hall with 12 modern computers. There are tables, standards and prospects, models, projectors available for students. Laboratory classes explicate series of theoretical situations from the lectures. There are also control tests. Results from laboratory classes are sorted out by computer and put in specific forms. The course assignment is individual and concerns screw projecting and frictional coupling. There are weekly consultations and control of calculations and graphical parts. These two assignments are to be presented by students. Continuous assessment is formed on the basis of the results of current controls and the presentation of course assignments.

2544 Strength of Materials II

ECTS credits: 4 **Weekly classes:** 2lec+0sem+0labs+1ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lectures:
Assoc. Prof. Ivelin Ivanov, MEng, PhD, tel. 888 224, e-mail: ivivanov@ru.acad.bg
Assoc. Prof. Dr. Nedka Stancheva, MEng, PhD, tel. 888 478, e-mail: nedka@ru.acad.bg
Abstract:
The course provides students with a system of knowledge about methods to assess the strength and stiffness of machine parts with complex stress state and complex structure with high degree of redundancy. Preliminary knowledge of basic Mechanics, Mathematics, and Strength of Materials I is necessary. The gained knowledge in the course is useful in the following courses in design of specific machines.
Course content:
Introduction in the theory of stress and strain. Failure criteria. Thick tubes. Fundamentals in matrix methods of structure mechanics. Bar element. Analysis of plane truss. Beam element. Analysis of plane frame. Element loadings and temperature expansion.
Teaching and assessment:
The theoretical basis of the topics, presented in lectures, is applied by students in their practical classes by solving problems for training using computers and computer software. Students apply their knowledge individually working out their course assignment, which is graded on a two-week schedule. Students can voluntarily participate in three tests and the gained grade, if it is above 50% of the maximum, leads to a final grade allowing students to skip the exam. The exam consists of two problems and three questions. The semester grade is accounted for in the final grade of the exam. Regular attendance of classes and course task submission are the requirements for semester passing approval.

3300 Metrology and Measurement Equipment

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps+ca
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Cwiatko Stanev Korjikov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: korijkov@ru.acad.bg
Ass. Prof. Boris Borisov Sakakushev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: bsak@ru.acad.bg
Abstract:
The course gives students fundamental engineering and technical knowledge about Manufacturing Technologies, Machine and Instrument Building, and Materials Science and Technology. Through various teaching methods it enhances their specific knowledge and practical skills in areas such as Theoretical and Legislative Metrology, Methods and Equipment for Measuring Machine Parts, and Tolerance design.
Course content:
Theoretical bases of metrology. Legislative bases of metrology. Basic metrological properties of measurement devices. Selection of measurement devices. Primary transformers used in measurement Devices. Measurement of length. Design of geometrical tolerances of machine parts. Methods and measurement devices for cylindrical, conical, thread, key and groove surfaces. Control of gears. Measurement of the quality of a process.
Teaching and assessment:
Lectures are case-based and include the basic principles of tolerance design of machine parts. At laboratory classes each student is given a chance for measuring specific machine parts with general and special measurement devices and for working with various standards for machine parts' geometrical parameters. Each laboratory class starts with a test and includes a preparation of a report. Course assignments are based on a specific design drawing and each student designs the fittings in the drawing, specifies and notes on a chosen draft drawing of a machine part the geometrical tolerances and chooses a measurement method and device. The course assignment includes explanatory notes and drawings. Continuous assessment is formed as the average of the first and second tests, and the mark of the course assignment.

2403 Cutting of Metals

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Ivan Kolev Ivanov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-546, E- mail: kolev@ru.acad.bg
Pr. Assist.Prof. Krasimir Ivanov, Meng, Department of Machine Tools and Manufacturing,
Tel: 888-546, E- mail: kivanov@ru.acad.bg.
Abstract:
The goal of the course is to give students knowledge about the cutting process characteristics as well as the main machining processes, defining the regimes for cutting- traditionally and using computers. Inputs are Higher Mathematics, Physics, Resistance of materials, and Practice in manufacturing technologies. Outputs are courses dealing with machining technologies.
Course content:
General information about the process of cutting. Instrumental materials. Physical basics of cutting. Turning. Scraping and carving. Drilling, hole-enlarging and reaming. Pull-broaching. Milling. Gear-cutting. Threading. Grinding. Computer optimization of the cutting regimes.
Teaching and assessment:
The topics, covered in lectures are the theoretical basis for laboratory exercises and homework. All students individually process and analyze the results of the experiments and fill out a report. The semester is verified when the reports are submitted, the homework- defended, and the lectures have been attended regularly. The exam is written and the questions and problems are marked by a point system. The final mark is based on the number of points and continuous assessment.

2430 Theory of mechanisms and machines

ECTS credits: 4 **Weekly classes:** 2lec+0sem+2labs+0ps
Assessment: continuous assessment **Type of exam:** written and oral
Departments involved:
Department of Theory of Mechanisms and Machines and Hoist Equipment and Technologies (TMMHET); Agro-Industrial Faculty
Lecturers:
Assoc.Prof.Petar Atanasov Koev,Dept.of TMMHET; tel.:082-888-486;E-mail: pkoev@ru.acad.bg
Assoc.Prof. Tanya Petkova Grozeva,Dept.of TMMHET; tel.:082-888-258; E-mail: tgrozeva@ru.acad.bg
Assoc.Prof.Ognyan Lyubenov Alipiev,Dept.of TMMHET; tel.:082-888-593; E-mail: oalipiev@ru.acad.bg
Assoc.Prof. Dimitar Ivanov Zafirov,Dept. of TMMHET; tel.: 082-888-428; E-mail: dzafirov@ru.acad.bg
Abstract:
The course in Theory of Mechanisms and Machines (TMM) is a general science course which introduces students to methods of analysis and synthesis of mechanisms and machines in structural, geometric, kinematic and dynamic aspect. The goal of the course in TMM is to teach students how to discover the main features of mechanisms, as well as how to synthesize those features through a proper choice of their structure and metrics. As a rule, the most common features of mechanisms and the methods for their analysis are reviewed, that is those features and methods which are valid for any realisation of mechanisms and machines. The synthesis approaches are reviewed through specific examples taken from practice, taking into account only the main requirements to the mechanism synthesized. To study this course, some knowledge in Technical Mechanics, Mathematics and Informatics is a prerequisite. The course is a foundation for the study of mechanisms and machines with specific application, reviewed in specialized courses.
Course content:
Structure and classification of mechanisms. Kinematics of leverage, cam and gear mechanisms. Theory of gear mechanisms with involuted gear wheels. Kinetostatics of mechanisms. Dynamics of machine units. Balancing of flat leverage mechanisms and rotors.
Teaching and assessment:
The essence of the methods of synthesis and analysis is presented during lectures. Specific problems of mechanism investigation are solved during labs. Visual aids, such as overhead projectors, computer simulations of mechanisms, models in motion, as well as real constructions are used extensively in the teaching process. The process of acquisition is controlled through a test and problem solving tasks. The grades of the test and tasks are combined to form the continuous assessment grade.

2443 Theory of mechanisms and machines -course project

ECTS credits: 2 **Weekly classes:** 0lec+0sem+0labs+0ps+cp
Assessment: project defense **Type of exam:** oral
Departments involved:
Department of Theory of Mechanisms and Machines and Hoist Equipment and Technologies (TMMHET); Agro-Industrial Faculty
Lecturers:
Assoc.Prof. Ognyan Lyubenov Alipiev,Dept.of TMMHET;tel.:082-888-593; E-mail: oalipiev@ru.acad.bg
Assoc.Prof. Tanya Petkova Grozeva, Dept.of TMMHET; tel.:082-888-258;E-mail: tgrozeva@ru.acad.bg
Assoc.Prof. Petar Atanasov Koev, Dept.of TMMHET; tel.:082-888-486; E-mail: pkoev@ru.acad.bg
Assoc.Prof. Dimitar Ivanov Zafirov,Dept. of TMMHET; tel.:082-888-428; E-mail: dzafirov@ru.acad.bg
Abstract:
The goal of the course project is to help students acquire and rationalize the general methods of research (analysis) and design (synthesis) of different types of mechanisms and machines. It aids students in building practical skills to discover the main features of mechanisms and prepares them for independent solving of specific engineering problems. The project in Theory of Mechanisms and Machines (TMM) is the first stage of machine-building design, connecting the knowledge acquired in a number of general science courses with the course design of real technical objects, studied in specialised courses.
Course content:
A machine unit is designed in which the driving and the operating machines are an electric motor and a flat leverage mechanism respectively, joined through involution gear. The course project includes the following stages: structural and kinematical analysis of leverage mechanism; kinetostatic investigation of leverage mechanism; optimisation geometric synthesis of gear mechanism. It consists of a calculation part, structured as explanatory calculation notes and a graphic part with a specified number of blueprints.
Teaching and assessment:
The course project is developed individually, using detailed methodological guidance and calculation and simulation software developed for this purpose by the Department staff. Students receive an individual assignment and a weekly schedule for reporting the results of the successive stages at the beginning of the semester. The work on the separate stages is carried out both at home and in the project lab, equipped with modern computers, multimedia, and a number of models in motion and real constructions of mechanisms. The calculation and graphic part of the project solutions are controlled in stages and evaluated based on their reliability and the way they have been explained, as well as on the analysis of the results obtained. The final grade for the project is formed after a public presentation

2545 Heat Treatment of Metals

ECTS credits: 4 **Weekly classes:** 2lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science and Materials Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof, Plamen Simeonov Danev, MEng, PhD, Dept. of Material Science and Materials Technology, tel. 888 204, E-mail: plasida@ru.acad.bg
Abstract:
The course gives knowledge about the theory and practice of heat treatment and its place in machine-building and metal processing. The main aim is to achieve optimal mechanical and physical properties of metals by heat treatment (HT). The relationship “composition – structure – properties of materials, the theory and practice of HT of metals and alloys, the design of a technological process for heat treatment of a concrete metal article are studied.
Course content:
Parameters of HT of metals and their alloys. Structural changes in alloys having a partial solid solubility caused by heating up and cooling. Annealing: homogenizing, recrystallization, stress-relief annealing, annealing with phase transformation. Hardening of steels and non-ferrous alloys, martensite transformation. Tempering and aging. Chemical heat treatment (CHT) of steel and alloys. Thermo-mechanical treatment. Technology and practice of HT: practice of annealing, hardening, tempering , aging and carburization. Other types of CHT. Quality control of treated articles.
Teaching and assessment:
The teaching process consists of lectures and laboratory classes. At the beginning of each class students are asked in short about the concrete topic. The results of the classes are analyzed and summarized in a report. The latter is defended and can be used during the exam.

2561 Machine elements II

ECTS credits: 3 **Weekly classes**: 1lec+0sem+1labs+1ps
Assessment: exam **Type of exam**: written
Department involved:
Department of Machine knowledge and machine elements; faculty of Auto transport
Lecturers:
Assoc. Prof. Peter Stamatov, MEng, PhD, dept. of Machine knowledge and machine elements, tel. 888592
E-mail: stamatov@ru.acad.bg.
Assoc. Prof. Ivan Spasov, MEng, PhD, dept. of Machine knowledge and machine elements, tel. 888235
E-mail: igs@ru.acad.bg.
Annotation:
The course takes the role of interconnection among general-theoretic courses (Mechanics, Resistance of Materials, Machine Mechanics Theories, Applicable Geometry and Engineering Graphics, Material knowledge and Technology of Materials, Metrology and Measuring Devices, etc.) and some technical courses, included in the general module. The aim of the course is to teach the basics of the theory of machine elements with general preordination and methods for their calculation and construction.
Course content:
Mechanical drives. Cylindrical involute gears – geometry, kinematics, bending stress and surface durability calculations. Planetary, wave, bevel, and worm gears. Speed reducers. Chain and belt drives. Frictional drives and variators.
Teaching and assessment:
Lectures and control are conducted in the same way as described in Machine elements I. Practical classes are organised in subgroups in a computer hall with 12 modern computers. There are tables, standards and prospects, models, projectors available for the students. Laboratory classes are based on fundamental parts of the lecture material. There are also current control tests. The scores from these classes are processed by a computer and the results are filled in in forms. A course assignment is held by weekly consultations, including computer ones. The assigned tasks are solved individually through designing various cylindrical, bevel, worm and other reducers. General evaluation for Machine elements –a course project is based on the course assignments on Machine elements I. Evaluation of Machine elements II is formed through a written exam on 2 questions.

2546 Thermotechnics

ECTS credits: 5 **Weekly classes**: 2lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam**: written
Department involved:
Thermotechnics, Hydro- and Pneumotechnics, Agro-Industrial Faculty
Lecturers:
Associate Professor Valentin Vasilev Bobilov, PhD, Dept. of Thermotechnics, Hydro- and Pneumotechnics,
tel.: 082/888 844, E-mail: bobilov@ru.acad.bg
Abstract:
The course provides some fundamental knowledge of the main principles of thermotechnics ; it deals with the structure of heat generating equipment, the most economical methods of heat generation, its conversion and utilization in industry, agriculture and everyday life.
Good knowledge of Mathematics, Physics, Mechanics and Electrical engineering is a prerequisite for working successfully in this course.
Course content:
Basic concepts of thermodynamics. First law of thermodynamics. Formulation of the first law of thermodynamics for open and closed systems. Specific heat capacity, thermodynamic bases of equilibrium conditions. Second fundamental law of thermodynamics. Mathematical expressions of the second law of thermodynamics. Entropy, convertibility and inconvertibility of processes. Thermodynamic consummation of processes, calculation of strength and energy. Thermodynamic processes of real gases. Heat exchange: basic concepts and definitions. Complex heat exchange and heat transmission. Heat insulation. Thermodynamics of a cooling machine.
Basic concepts of the drying process. Drying methods. Ventilation devices. Uncommon energy sources and methods for their utilization.
Teaching and assessment:
Lectures are meant to provide theoretical knowledge, which is extended at laboratory classes. Students submit reports with the experimental data compiled during laboratory classes as well as analysis and conclusions on the experiment results. Assessment is based on students' performance at laboratory classes and their test results.

3301 Cutting Tools

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+ca
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof. Veliko Kolev Ivanov, DSc MEng, Department of Machine Tools and Manufacturing,
Tel: 888-714, e-mail: vivanov@ru.acad.bg
Abstract:
The main goal of the course is to teach students about tools design, geometry, technological capabilities and exploitation conditions.Materials cutting is an input course. Outputs are courses, providing technological background of future engineers.
Course content:
General information about cutting tools. Tools for turning, drilling, reaming, boring, milling, threading, pull-broaching, gear-cutting and abrasive machining.
Teaching and assessment:
The theoretical material from lectures is applied at laboratory classes, where students individually check, measure, draw the geometry of tools, and define technological parameters for exploitation and restoration. The final grade is based on tests, covering the material from the lectures, as well as the laboratory classes and course project. The semester is verified only after successfully completed course project. The process of continuous assessment is done if minimum 80 points are gained during the semester.

3302 Machine Tools – Part I

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc Prof. Parashkev Tonev Enchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 237, e-mail: parench@ru.acad.bg
Abstract:
Studying the course students build a knowledge system about the technological capabilities and indicators, and the area of implementation of Machine Tools (MT). The lectures cover the principles of shape forming through cutting, defining the kinematical structure and the technological capabilities of MT. Based on that, the technological capabilities, the technical and economical indexes, as well as implementation are studied about some typical MT. Students also study the design features, kinematics and setting of commonly used MT, both manually and automatically controlled. Trends in MT development are discussed from a complex automation point of view.
Students perform the setting of MT for a specific technological cycle at laboratory classes.
Course content:
Methods for machining various surfaces of parts. Kinematical links and kinematical structure of MT. Typical mechanisms for realizing the kinematical links. Parts and units of MT. Technical and economical indexes of MT. Types of MT: lathes, milling machines, gear-cutting machines, boring and drilling machines, grinding machines, scraping and slotting machines, cut-off machines. Control systems for MT. Automated lathes semi-automated lathes, controlled by a distributing shaft. Aggregate machines. CNC machines.
Teaching and assessment:
Continuous assessment is made during laboratory classes through oral examination or written tests on pre-announced topics. The final grade is based on the written exam and continuous assessment. At the beginning of the semester students are given a conspectus, work instructions, organization of the exam, and grading.
Lectures and laboratory classes are illustrated with slides and on stands.

3303 Technology of welding

ECTS credits: 5
Weekly classes: 2lec+0sem+2labs+0ps+ca
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science and Materials Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Mladen Tzvetanov Trifonov, MEng, PhD, tel. 888 206,
E-mail: mtr@ru.acad.bg.
Abstract:
The course has the aim to give knowledge about the technological possibilities of the most widely used and modern method of obtaining unassembled joints and manufacturing constructions –welding. Students acquire knowledge about the cases in which welding must be preferred as a way of manufacturing constructions instead of other technological methods with analogical possibilities.
Course content:
Technological bases of welding: physical nature of welding; basic concepts of the elements of the welded joints; thermal processes of welding; metallurgical processes of welding; welding stresses and deformations; technological strength of welded joints. Technological specificities of contemporary welding methods – nature and characteristics, advantages and disadvantages, fields of application. Quality of welded constructions. Welding-related processes: build-up welding, bonding.
Teaching and assessment:
Teaching is done via lectures and laboratory classes. Visual materials like slides, tables, charts, patterns, etc., are used during classes, as well. Continuous assessment is done through oral discussion before starting the class and submission of a report, which is checked and evaluated. A course assignment is worked out , which is submitted and evaluated at the end of the semester. The exam is written. When forming the final mark, the marks from the continuous assessment and the course assignment are taken into consideration, as well.

3304 Metal forming

ECTS credits: 5
Weekly classes: 2lec+0sem+2labs+0ps+p
Assessment: exam
Type of exam: written exam
Departments involved:
Department of Material Science and Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Valentin I. Gagov, MEng, PhD, Department of Material Science and Material Technology,
tel: ++ 359 82 888 778 , E-mail: gag@ru.acad.
Abstract:
The course is to give basic knowledge in the theory, technology and praxes of plastic deformation of metals allowing planning and over working of both bulk and sheet metal processes. Knowledge in Physics, Mathematics I and II, Material Science, Mechanics-II (stress and strain analyses) is a prerequisite. It is a basic course for the degree courses Production Engineering and Material Science Engineering. It is also supporting the final projects and Engineering practice.
Course content:
Basic knowledge in Physics and Mechanics of plastic deformation of metals. Analysis and planning of bulk (forging, closed-die forging, rolling, drawing and extrusion) and sheet-metal forming(shearing, bending and deep-drawing) processes. Brief introduction in machines for plastic deformation of metals. Modern varieties of the processes and development of these technologies.
Teaching and assessment:
All modern facilities are applied at lectures and work in laboratories. Different appliances and computer simulation are applied at laboratoty classes . Assessment is carried out twice a semester and the results are considered at the examination which is written. According to the student's desire, a discussion aimed at precise assessment of score is possible.

2453 Machine elements – course project

ECTS credits: 2 **Week classes**: 0lec+0sem+0labs+0ps+cp
Assessment: defending a project **Type of the exam:** oral
Departments involved:
Department of Machine knowledge and machine elements; faculty Auto transport
Lecturers:
The course is taught by each lecturer in the department of Machine knowledge and machine elements
Assoc. Prof. PhD. Eng. Peter Stamatov, dep. Machine knowledge and machine elements;
faculty Auto transport, tel. 888592, E-mail: stamatov@ru.acad.bg.
Abstract:
The course aim is to develop skills in reading engineering drawings, summarizing schemes of constructions and their loading and also to stabilize habits of strength calculation of elements acquired from the course assignment. The course is a connection between the courses of Engineering graphics and course projecting of specific degree courses.
Course content:
During the development of the course project basic questions in connection to the design and strength calculations of complex machine elements as shafts, housings, cylindrical, bevel and worm gears.
Teaching and assessment:
The course is conducted through weekly consultations, in the modern hall 305B, equipped with computers. There are individual project assignments which are very different in construction and initial parameters. These are assigned in specific forms, which also involve recommendations for the way and range of their fulfillment. The project contains two parts – calculating and graphical.The graphical part involves a general draft,a list of components and work schemes of non-standard details. The calculating part is formed as an explanation and calculation note. The project goes trough several stages. Each stage is certified by the lecturer after a consultation. When the project is done, the student presents it in front of an audience. The presentation is evaluated and the resultis are contributed to the scores of the course assignments forming the final mark for the course Course project for machine elements

3272 Economics

ECTS credits: 4 **Weekly classes:** 3lec+1sem+0labs+0ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Economics, Faculty of business and management
Lecturers:
Assoc. Prof. Djanko Hristov Minchev, PhD, Dept. of Economics, tel. 888 557, E-mail: Dminchev@ru.acad.bg
Assoc. Prof. Emil Georgiev Trifonov, Dept. of Economics, tel. 888 557
Abstract:
The course is concerned with general problems, laws and categories of contemporary market economy. Thus, it creates a certain basis for the remaining economic courses. It also gives general knowledge, which is expressed in alternative ways of economic viewing and which forms and creates abilities for independent and expert choice in economic surroundings.A course prerequisite is knowledge of mathematics.It is related to concrete branches and functional economic subjects.
Course content:
Introduction – the economic system and the fundamentals of economic theory. Main economic issues. Market mechanism. Public sector and taxation. Demand and supply of individual markets. Consumer demand and behavior. Manufacture, company assets and expenses. Imperfect competition and supplying. Price formation and incomes depending on production factors: Gross domestic product and economic growth. Economic cycles, unemployment and inflation. Microeconomic balance. Budget policy. Monetary policy. Foreign policy in open-plan economics.
Teaching and assessment:
The material is taught in two ways – lectures and practical classes, which elucidate and develop further some of the issues discussed at lectures. Continuous assessment is carried out. It includes two test assignments and the student's performance during the semester.The final assessment is an average of the above-mentioned components of evaluation.

3305 Manufacturing Technologies – Part I

ECTS credits: 6 **Weekly classes:** 3lec+0sem+1labs+0ps+cw
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Ivan Zamfirov Ivanov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 822, E-mail: zamfirov@manuf.ru.acad.bg
Annotation:
The main goal of the course is to teach students basic phenomena, regularities and acting during the processes of manufacturing products and their application in the search of the most effective technologies. Inputs are: Mathematics, Mechanics, Technologies for the Production of Blanks, Cutting of Metals, Cutting Tools and Metal Cutting Machines. The course is the basis for general technological training of students, combined with some other courses, a diploma project course and engineering practice.
Course content:
Basic terms and definitions. Technological dimensional calculations. The machine- an object for manufacturing. Positioning of blanks. Choice of technological bases. Faults when machining and their addition. Faults, caused by force deformations of the technological system. Faults and methods of setting machines. Allowances and intermediate dimensions. Productivity and prime cost of technological processes. Precision analysis and control. Methods of finishing machining. Electro-physical and electro-chemical methods of machining.
Teaching and assessment:
The theoretical basics of Manufacturing technologies, given in lectures, are mastered during laboratory classes and applied individually in the course project during the following semester. Each laboratory class is finalized by writing a report. Each student is given a choice to take two tests and if successful, may not sit for the exam. The average of the tests grades counts as an exam grade. The semester must be certified before students can attempt to take the exam. Certification is given if all classes have been attended regularly and all reports have been submitted. The exam begins with a written answer to two questions and finishes with a discussion.

3306 Technology of casting production

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science and Materials Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Dept. of Material Science and Materials Technology,
tel. 888 211, E-mail: rus@ru.acad.bg.
Abstract:
The course has the aim to acquaint students with materials and the technological process of obtaining high quality machine parts through casting. The different types of cast alloys, their properties and the opportunities for using them in industry are discussed. The technology and different methods of production of casting parts are discussed.
Course content:
Casting properties of alloys. Crystallization of alloys. Obtaining, structure, properties and application of cast alloys. Design and application of the technology of cast mould. Special methods of casting. Interaction between the mould and cast. Organization, mechanization, automation and control of cast production.
Teaching and assessment:
Teaching is done in the form of lectures, laboratory classes and a course project. Different visual aids are used for clarifying the more complex technological charts. Part of the lecture material is further clarified during laboratory classes. Some of them have research character. The mark from the laboratory classes is taken into consideration for forming the final mark from the exam.

3307 Metal Engineering Techniques

ECTS credits: 5 **Weekly classes:** 3lec+0sem+1labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science and Materials Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Boris Rusev Mateev, MEng, PhD, Dept. of Material Science and Materials Technology,
tel. 888 307, E-mail: bmateev@ru.acad.bg.
Assoc. Prof. Mihail Rosinov Krustev, MEng, PhD, Dept. of Material Science and Materials Technology,
tel. 888 205, E-mail: mrkrustev@ru.acad.bg.
Pr. Assist. Prof. Petar Varbanov Rachev, MEng, PhD, Dept. of Material Science and Materials Technology,
tel. 888 210,
Abstract:
The course aims at acquainting students with the most common machines and equipment in the sphere of metal casting, treatment by means of plastic deformation and welding. It gives basic knowledge about the application, the structure of working devices, motion, action principle and the general structure of modern machines and equipment.
Course content:
Machines and equipment for the preparation of moulding materials. Machines for pressing and vibration moulding. Moulding lines. Machines and equipment for preparing metal burden. Equipment for mould pouring. Machines and equipment for cast cleaning. Classification of forging machines. Presses. Hammers. Rotation machines. Impulse machines and equipment. Power system welding electrical source - electrical arc. Aparatus for hand, mechanized, semi-mechanized arc welding; electroslag welding; surface welding; resistance welding; electron-beam welding; diffusive and laser welding; thermal cutting of metals.
Teaching and assessment:
Teaching is done by lectures and laboratory classes. Continuous assessment during the semester is achieved by short oral discussion before startingeach class. The exam is written and it includes three questions. When forming the final mark, students participation and their preparation for classes are taken into consideration, as well.

3308 Design of Manufacturing Tools

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+cw
Assessment: continuos assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Yulian Penchev Mladenov, MEng, PhD, Department 'Machine Tools and Manufacturing',
Tel: 888 405, 716, 84 20 07, E-mail: jmladenov@ru.acad.bg
Abstract:
The main goal of the course is to teach how to design the most widely used manufacturing tools in industrial manufacturing. The tasks that aim at achieving this goal focus on studying the main principles and methods of designing manufacturing tools. Outputs are the course project for the same course, the diploma project and the future work of the bachelors in mechanical engineering.
Course content:
Introduction into design of manufacturing tools. Design of profile cutting tools. Design of hole-enlarging, broaching tools, and drilling heads. Design of pull-broaches for machining of holes. Design of general purpose cutters. Design of tools, using centroidal traveling over. Design of tools for machining cylindrical involute gears. Design of tools for machining of threads. Modern trends in the development and design of manufacturing tools.
Teaching and assessment:
Lectures are problem- oriented. They discuss the basics of designing the most used manufacturing tools, applied in factories of all sizes. Special attention is devoted to modern trends in design. Laboratory classes deepen the knowledge taught during lectures and help acquiring special skills in design. The classes regarding the automated design are illustrated using software products for designing certain tools. Students take three tests, and their results form the continuous assessment.

3309 Machine Tools – Part II

ECTS credits: 5
Weekly classes: 2lec+0sem+2labs+0ps+cw
Assessment: exam
Type of exam: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof. Stefan Dimitrov Velchev, MEng, PhD, Department of Machine Tools and Manufacturing, tel: 888-451
Assoc Prof. Petar Angelov, MEng, PhD, Department of Machine Tools and Manufacturing, tel: 888-237,
e-mail: pangelov@ru.acad.bg
Abstract:
The main goal of the course is for students to acquire knowledge and skills in the composition, design and calculations of characteristic units and parts of machine tools. Input courses are Machine Parts, Cutting of Materials, Metrology, and Machine tools - Part I. Outputs are master's degree courses, as well as, course and diploma projects.
Course content:
Introduction to design of machine tools. Main drives. Spindle units. Feed drives. Control systems. Base systems. Guidances.
Teaching and assessment:
The topics of the lectures are applied during laboratory classes through individual processing the results of experiments, working out reports and solving problems; also through a chosen course assignment. Students individually and creatively apply their knowledge in the courseassignment, using reference books and computers when calculating and designing units of machine tools. Continuous assessment is based on written tests. Depending on the results of the continuous assessment, a student may be freed from solving problems at the exam. The exam is written; the problems and the questions given are marked by points. The final grade depends on the exam score and the continuous assessment grade.

3310 Weldability and welded constructions

ECTS credits: 5
Weekly classes: 2lec+0sem+2labs+0ps +cw
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof.Mladen Tsvetanov Trifonov MEng, PhD, Dept. of Material Science and Materials Technology,
tel. (+ 359 82) 888 206, E-mail: mtr@ru.acad.bg.
Abstract:
The course aims at disseminating new knowledge and skills to broaden and deepen those already acquired about the production of welded structures. The topics to discuss are the following: main types of materials used for the production of welded structures and their behaviour in welding; peculiarities in the production of the most common groups of welded constructions / full wall, beams, sheet, machine; specifics of monitoring and ensuring the quality of this type of products.
Course content:
Lectures include 3 sections. In the first section, Materials and their Behaviour in Welding, 6 topics are discussed: weldability of materials; weldability and welding of low-carbon and non and low-alloy steel, cast iron, aluminium and copper alloys, plastics. In the second section,Production of Welded Structures, 5 topics are included: full wall, beam, sheet and machine construction, technological training of welding production. In the Quality and Quality Assurance of Welded Structures section are included 2 subjects related to quality and methods and means of control. Laboratory classes include 8 topics, out of which 5 refer to the first section, and 3 to the second and third. Course assignment is given to work out a welding technology of a given welded unit.
Teaching and learning methods:
Monitoring is done by conducting 2 lecture control tests on the subject matter and through oral questions at the beginning of each class and a check at the end of it. For the course task students are set a schedule of consultations with the Project manager for verifying and evaluating the performance of tasks. The final inspection is a written examination with a possible exemption from it.

3311 Dies for plastic deformation of metals

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+cw
Assessment: continious assesment **Type of exam:** written
Departments involved:
Department of Material Science and MaterialTechnology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Professor Valentin I. Gagov.PhD, MEng, Department of Material Science and MaterialTechnology
telephone: ++ 359 82 888 778 , E-mail: gag@ru.acad.
Pr. Assist. Prof. Rosen Chr. Radev, MEng, PhD, Department of Material Science and MaterialTechnology
telephone:++ 359 82 888778, E-mail: rradev@ru.acad.bg
Abstract:
The course is to give basic knowledge about function, the most common structures, and guidelines for a dies design, both for bulk and sheet-metal deformation. Prerequisites required are knowledge in Engineering graphics, Principles of plastic deformation of metals, Heath-treatment and Material processing technology.
This course is fundamental for the course- and diploma – project in the field of plastic deformation of metals.
Course content:
Dies for bulk deformation (Closed hot die forging, cold impact forging, Trimming dies, and appliances, supporting the deformation process). Dies for sheet-metal forming (for cutting, bending and deep-drawing. Tools for special purposes: rolling of threads, surface rolling micro deformation. Requirements put to that kind of tools.
Teaching and assessment:
All modern facilities are applied during lectures and work in the laboratories. At laboratory classes different appliances and computer simulation are applied. Plenty of model and real dies and tools are observed and analyzed. In order to assess the knowledge acquired, written tests are used and also oral discussions take place. If necessary, a final conversation also takes place.

3280 Technical safety

ECTS credits: 3 **Weekly classes**: 2lec+0sem+1labs+0ps
Assessment: continuous assessment **Type of exam**: written
Department involved:
Department of Ecology and Environmental Protection, Agro-Industrial Faculty
Lecturers:
Assoc. Prof. Vladimir Tomov Vladimirov;PhD, Dept. of Ecology and Environmental Protection;
tel.: 44507 481 E-mail: vvladimirov@ecs.ru.acad.bg
Abstract:
The course has social and economic importance. The main objective for students is to acquire skills for analysis and synthesis of technical solutions in production processes and safety equipment application. The activities to work out in the training course are: assimilate the main terms, definitions and categories in risk and safety theory, the principles and methods of technical- production systems risk analysis, risk sources, characteristics, actions, normalizing, measurements and evaluation of Bulgarian and international standards of risk factors, assimilating the methods of creation of safety technical – production systems.
The course has entrance links with other courses such as Physics, Chemistry, Materials knowledge, and outgoing links to compulsory and optional courses in specialized directions and these with management purposes.
Course content:
Main terms and definitions. Risk management. Ergonomic fundamentals of technical and manufacturing systems safety. Subjective safety. Mechanical safety. Electrical safety. Electro-magnetic safety. Emission safety. Noise and vibration safety. Ray safety. Ecological safety. Fire safety. Damage, rescue and rebuilding technologies. Different safety activities. Social and economical effectiveness of safety.
Teaching and assessment:
Lectures are supported with examples in accordance with the specificities of the course. Laboratory classes are of experimental and research character. It is required that students be prepared in advance on the lecture themes, which is checked by questions. They have to do two written tests on pre-given topics, as well. The final mark is formed considering the results of both tests and successful participation in practice classes.

3313 Manufacturing Automation and Robotics

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof. Vladimir Denev Vietliemov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 713; E-mail:vdv@manuf.ru.acad.bg
Assoc. Prof. Miroslav Stanchev Penchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 712; E-mail: mpenchev@ru.acad.bg
Abstract:
The main goal of the course is to teach students the basics of automation of piece production and to prepare them to individually solve problems regarding the design of automatic systems of unified modules and units, as well as the design of unique technical means of automation. Inputs: Mathematical Analysis, Mechanics, Theory of Machines and Mechanisms, Electrical Engineering and Electrical Drives. Outputs: Assembly Technologies and Automation, diploma project and engineering practice.
Course content:
Technological bases of manufacturing automation. Control of automation equipment. Control systems. Work cycle automation devices for technological machines. Automation of control operations. Automatic equipment in mass production. Productivity of equipment for various structure schemes. Automatic equipment in serial production- special features of technological equipment and its setup. Industrial manipulators and robots– mechanical systems, control systems. Principles of robotics and building flexible manufacturing systems. Special devices in flexible manufacturing systems. Trends and perspectives for manufacturing automation and robotics.
Teaching and assessment:
Lectures discuss the principal issues of the curriculum, using examples from the engineering practice. Laboratory classes use the industrial robots and the technical equipment existing in the laboratory for conducting experimental studies. Continuous assessment is based on tests, control questions, and the reports from the laboratory classes. The final grade is based on an oral exam.

3314 Control of Manufacturing Equipment

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps+cw
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Georgi Vasilev Nenov, MSc (Eng), PhD, Department of 'Machine Tools and Manufacturing',
Tel: 888 653, E-mail: gosho@manuf.ru.acad.bg
Abstract:
The course teaches methods and devices for controlling machines and equipment, used in manufacturing. Topics of discussion are regulators, systems of CNC machines, programmable controllers. Inputs are: Electrical Engineering, Electronics, and Machine Tools. The knowledge acquired during the course is applied when building and using automated systems.
Course content:
Systems of automatic regulation. Regulation laws and types of regulators. Regulating through interrupted action. Control of resistance and induction furnaces. Thyristor regulators. Electrical equipment. Programming of CNC machine tools. Elements of CNC systems. Electrical drive of the main and the feeding remittance. Execution of external commands. Programmable controller. CNC application for dimensional control. Other CNC machines.
Teaching and assessment:
Laboratory classes start after initial discussion and clarification of tasks. The very tasks and hints for their fulfillment are handed out to students. Some of the classes make use of computer simulation programs. For classes that require the use of a CNC machine one of the students operates on the machine under the supervision of the instructor, while the rest of the students observe. The course assignment consists of working out a program for a CNC machine. The final mark of the exam is based on questions discussed in the lectures, the grade of the course assignment and the student's performance at classes.

3315 Computer Aided Process Planning

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+02ps+cw
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Petar Nedyalkov Angelov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel. 888 487; E-mail: pangelov@ru.acad.bg
Pr. Assist. Prof. Ivo Yordanov Atanasov, MSc(Eng), PhD, Department of Machine Tools and Manufacturing,
Tel. 888 469; E-mail: iwo@roboman.ru.acad.bg
Abstract:
The main goal of the course is to teach the basic principles of computer aided process planning as well as the functional capabilities of the program media and packages such as systems for computer aided programming of CNC machines, CAD/CAM and systems for computer aided process planning. During practical classes the existing software is used, such as SolidWorks 2007 EE, CAD/CAM system FeatureCAM 2008, etc.
Course content:
Systems for automated programming of CNC machines. Definition of geometrical objects and trajectory of the cutting tool movement. Postprocessors for machine tools, used in practice. Technical capabilities and functional models of CAD/CAM systems. Graphical information exchange standards. Parametric and structural optimization of technological processes. Stages of computer aided process planning. Project data and knowledge representation. Expert systems.
Teaching and assessment:
Teaching is done through lectures, practical classes, course assignment and out-of-class work. The exercises are done using computers and work stations. Students can use the free-access computer room of the university or other Internet resources for their individual work on the course assignment. It should be done according to a schedule, corresponding to the assignment. The final grade is based on a score system, specified in the educational plan.

3316 Manufacturing Technologies - Part II

ECTS credits: 4 **Weekly classes:** 2lec+0sem+1labs+1ps
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Ivan Zamfirov Ivanov, MEng, PhD, Department of 'Machine Tools and Manufacturing,
Tel: 888 822, E-mail: zamfirov@manuf.ru.acad.bg
Assoc.Prof. Milko Dimitrov Enchev, MEng, PhD, Department of Machine Tools and Manufacturing',
Tel: 888 653, E-mail: milko@manuf.ru.acad.bg
Abstract:
The main goal of the course is to teach the basic issues regarding the design of technological processes for manufacturing and assembly of parts. Inputs are: Material Science, Heat Treatment, Blanks Design and Technologies, Cutting Machines and Machine Tools, Cutting Tools, Manufacturing Technologies - Part I. Outputs are: the course project, the diploma project, and the engineering practice.
Course content:
Technical and economic principles in designing technological processes for machining and assembly. Basic rules for building the structure of the technological process. Stages and types of technological design. Specific rules for designing technological processes for machining basic types of parts like, bodies, shafts, gears, levers, flanges, bushings, and complex profile parts. Typical methods for manufacturing and control, used in modern manufacturing. Assembly of typical units in general manufacturing.
Teaching and assessment:
The series of lectures are structured in a way that general methods are studied in the beginning, and then the specific rules for designing technological processes for machining and assembly of typical parts in manufacturing. If students apply their knowledge creatively they would be able to design technological processes and various parts. The theoretical knowledge acquired during the lectures is applied in laboratory classes and a course project. Continuous assessment is based on the systematical work of the students during the semester. Two tests are done, each of them with one-hour duration. The final mark is initially based on the average of both tests. It may be corrected by 0.5, taking into account the performance of the students.

3317 Manufacturing Technologies – Course Project

ECTS credits: 2 **Weekly classes:** 0lec+0sem+0labs+0ps+cp
Assessment: defence of a course assignment **Type of exam**: oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Ivan Zamfirov Ivanov, MEng, PhD, Department of 'Machine Tools and Manufacturing',
Tel: 888822, E-mail: zamfirov@manuf.ru.acad.bg
Assoc. Prof. Milko Dimitrov Enchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 653, E-mail: milko@manuf.ru.acad.bg
Pr. Assist. Prof. Dimitar Stefanov Dimitrov, MEng, Department of Machine Tools and Manufacturing,
Tel: 888653; E-mail: dimitar@manuf.ru.acad.bg
Abstract:
The course project is optional and is done by the students, who have chosen the Manufacturing technologies series of courses. It is an immediate application of the knowledge acquired in the courses Cutting of metals, Cutting tools, Machine tools – Part I and Manufacturing Technologies – Part I, as well as, the courses studied during the same semester - Manufacturing technologies – Part II and Technological equipment. The knowledge and skills acquired are applied in the diploma project and the engineering practice.
Course content:
The main objective of the project is the design of a technological process for manufacturing two parts of different type. The basic stages are: analysis of the manufacturability of parts construction, design of one of the parts blank, choice of bases, design of route and operational technologies, choice of machine tools and cutting tools, choice of cutting regimes, dimensioning of the operational schemes, design of a fixing device, technological and economical analysis of competing variants.
Teaching and assessment:
The course project is done according to a pre-approved assignment and schedule of the different stages. Every week consultations are scheduled by the leading assistant, who monitors the normal and rhythmical development of the projects. Extra individual consultations are also provided. Students are given all reference books needed. If the student has a delay of three weeks behind schedule and has no legitimate excuse they are officially warned, and if they are more than five weeks late their work on the project is suspended. This means that the semester is not verified. The project is defended publicly in front of two teachers, conducting such a project.

3318 Technological Equipment

ECTS credits: 4 **Weekly classes:** 2lec+0sem+1labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc Prof. Ivan Zamfirov Ivanov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888- 822, E-mail: zamfirov@manuf.ru.acad.bg
Abstract:
The main goal of the course is to give students the basics in designing and choosing equipment for machining and assembling. Special attention is paid to precision and economic feasibility. Inputs are general engineering subjects and special disciplines. The obtained knowledge is immediately put into practice in the course project for the following semester, the diploma work and the engineering practice.
Course content:
General information and principles for equipment building. Positioning elements. Calculation of the fixing forces. Elementary fixing devices. Fixing units and systems. Auxiliary elements and bodies. Design of blanks' fixing equipment. Precision of constructions. Cutting tools positioning, assembly and control equipment. Normalization and unification of equipment. Small series and automated production equipment.
Teaching and assessment:
Lectures cover thoroughly only the topics, concerning the design of equipment. Students should come prepared for laboratory classes. Their preparation is tested at the beginning of the class, then experiments are carried out and a report of the results and conclusions is written out. In order to have the semester verified students should attend laboratory classes regularly and have the full set of reports. The exam comprises two written questions and solving a problem regarding the calculation and assigning of tolerances of equipment. The final mark is formed after following a short discussion between the student and the professor.

3319 Tools for casting of metals and plastics

ECTS credits: 4
Weekly classes: 2lec+0sem+1lab+1ps
Assessment: continuous assessment
Type of exam: written
Departments involved:
Department of Material Science & Material technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Dept. of Material Science & Material technology,
tel. 888 307, E-mail: rus@ru.acad.bg.
Abstract:
The course aims at giving basic knowledge about the technological peculiarities and the instrument equipment, used in casting production. The characteristics for development of technological processes for casting in metal forms of metals and plastic materials are discussed. Attention is paid to the principles of metal forms construction.
Course content:
Metal moulds as a casting tool. Gravity castings in metal moulds - dies. Pressure casting. Design of a technological process for casting in dies. Bases of the dies design. Devices and mechanisms of casts from dies. Die usage. Materials and ways for die producing. General information on the tools for production of plastic articles. Types of tools.
Teaching and assessment:
Teaching is done via lectures and laboratory classes. Different visual materials are used for clarifying more complex technological charts. Part of the lecture material is further clarified during the laboratory classes. Some of them have research character.

3320 Tools for casting of metals and plastics – course project

ECTS credits: 2
Weekly classes: 0lec+0sem+0labs+ 0ps+cp
Assessment: project
Type of exam:
Departments involved:
Department of Material Science & Material technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Dept. of Material Science & Material technology,
tel. 888 307, E-mail: rus@ru.acad.bg.
Abstract:
The course project has the aim to give basic knowledge necessary for the development of a technology for casting of a machine part. The project presents the main activity, which must be done by a technological engineer in foundry.
The course has the following prerequisites: Material technology, Metallurgy Production, Technology of casting. It is a prerequisite for the course on Instruments for metal and plastic casting, the Final Year project and the engineering practice.
Course content:
The project consists of a specification of the casting chemical composition so that defined mechanical characteristics can be obtained, accounting for the burden and design of the technology of the cast mould; dimensioning of the casting patterns and gating system, pattern plates, core boxes and boxes; making of a casting drawing, pattern and pattern plate drawings in necessary views and core box drawings; a scheme of the cast mould.
Teaching and assessment:
Students use a methodological instruction manual and they are consulted by the lecturer at given stages of the project. The final mark is formed on the basis of the project presentation. The student's activity during the tutorials is also taken into consideration for forming the final mark.

3321 Coating Deposition Methods

ECTS credits: 4 **Weekly classes:** 2lec+0sem+1labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science & Material technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Docho Danev Dochev, MEng, PhD, Dept. of Material Science & Material technology,
tel. 888 307, E-mail: ddochev@ru.acad.bg.
Abstract:
The course gives knowledge and skills about the technologies for coatings deposition. The studied material needs knowledge in physics, chemistry, material science, technology of materials, electrophysical technologies. The course is a base for students' graduating project.
Course content:
Classification and general characteristics of coatings. Types of coatings and methods for their deposition. Structure of coatings. Methods for investigation of structure, thickness and adhesion. Conventional methods for coatings deposition: sinking in molten metal, plastic coatings, chemical coating deposition, electrochemical deposition. Vacuum methods for coatings deposition: thermal evaporation, ion sputtering, ion plating. Means of vacuum deposition and equipment. Paints, lacquers and methods for their deposition.
Teaching and assessment:
The theoretical knowledge given in lectures is assimilated, specified and extended through laboratory classes. The lectures are illustrated by schemes, diagrams, graphics, etc. During the semester students have two progress tests. The exam is written.

3322 Quality Management and Control

ECTS credits: 4 **Weekly classes**: 3lec+0sem+3labs+0ps
Assessment: exam **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Tsvyatko Stanev Koriykov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: korijkov@ru.acad.bg
Abstract:
The course is a very important part of the curriculum for Manufacturing Technologies students. Through various forms of teaching it enhances students' knowledge and skills for applying the methods and techniques for quality management and control.
Course content:
Quality of a Product, Service and Process. Quality Management Principles. Ways of Expressing Quality. Process Management Cycle. Levels of Quality Management Processes. Expenses for Quality. Quality Improvement Methods and Techniques. Quality Control Plans and Systems. Quality Planning. Quality Assurance. Product Reliability.
Teaching and assessment:
The teaching process includes lectures and laboratory classes. During the laboratory classes each student works on his/her own while following the tasks, specified in a report sheet, analyzes the problems and offers solutions and recommendations for solving them. The final mark is the average of the written exam and the laboratory report assessment.

3323 Technical Organization and Management of a Company

ECTS credits: 4 **Weekly classes:** 4l+0sem+2labs+0ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Vasil Stefanov Kostadinov, MEng, DSc, Department of Machine Tools and Manufacturing,
Tel: 888 781, E-mail: vkostadinov@ru.acad.bg
Abstract:
Analysis of issues, regarding the organization and management of the resources needed for carrying out the decisions for manufacturing- capital, personnel, technology, materials.
Prerequisites for studying the course are knowledge of cutting tools, machine tools and manufacturing technologies. Everything learned can be applied in the diploma project as well as for solving problems, regarding the organization of manufacturing companies and the management of their activities.
Course content:
Structure of a company. Capital building/construction. General plan. Production capacity. Spatial organization of the manufacturing process. Factory buildings. Organizational forms of business. Capital and analysis of invested capital. Personnel management in manufacturing companies. Management of equipment.
Teaching and assessment:
Lectures teach the basic principles regarding technical organization and management of a company. Students must come prepared for the laboratory classes and they prepare specific examples individually (using methodical help).

3325 Assembly Technologies and Automation

ECTS credits: 4 **Weekly classes:** 4lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof. Vladimir Denev Vitliemov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 713, E-mail: vdv@manuf.ru.acad.bg
Pr. Assist. Prof. Ivanka Vasileva Peeva, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 712, E-mail: ipeeva@manuf.ru.acad.bg
Abstract:
The main goal of the course is to prepare students to individually solve practical problems regarding the design of assembly devices. The technological basics of automatic assembly, as well as the methods for providing assembly capability through relative orientation, are systematically demonstrated. Special attention is devoted to the basics for designing technical means for assembly automatization and the possibilities for the creation of flexible manufacturing systems. Inputs are: Mechanics, Theory of Machines and Mechanisms, Manufacturing Technologies, and Manufacturing Automatization and Robotization. The knowledge acquired is applied in the diploma project and the engineering practice.
Course content:
Assembly as a technological process. Product analysis as an assembly object. Technological bases of automated assembly. Structure of automated assembly equipment. Features of automated feeding devices. Relative orientation of parts for assembly position. Actuators for automated assembly. Cassette automated assembly. Schemes of technical robots and assembling centers.
Teaching and assessment:
The main issues of the course are reviewed during lectures, using examples from the engineering practice. Teaching videos are used to demonstrate the experience of industrial companies. The laboratory classes make use of the technical equipment for conducting experiments, existing in the laboratory. The final mark is based on an oral exam.

3326 Group and Typical Technological Processes

ECTS credits: 4 **Weekly classes:** 4lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Stefan Veselinov Vichev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 451; E-mail: svichev@ru.acad.bg
Assoc. Prof. Ivan Zamfirov Ivanov, MEng, PhD, Department Machine Tools and Manufacturing,
Tel: 888 822,E-mail: zamfirov@manuf.ru.acad.bg
Abstract:
The main goal of the course is to broaden and deepen students' technological training . Inputs are: Cutting of metals, Cutting tools, Machine tools, Manufacturing technologies, and Technological equipment. Through studying and applying unified technological processes, the effectiveness of machining can be improved. The formation of the quality indexes is an interrelated process of the sequential stages. Special attention is devoted to some typical and specific technologies.
Course content:
Unification of technological processes. Essence of typical technologies. Principles of group processes. Complex part. Group matrix. Design of group routes and operations. Effectiveness of group and typical technological processes. Manufacturing of frames and bodies. Machining of guides. Production of spindles. Deep drilling. Balancing. Production of motion threaded screws. Production of thin-walled cylinders. Production of crankshafts, connecting rods and pistons.
Teaching and assessment:
Because of the limited and not very accessible literature sources, lectures cover all specified topics. Students are given lecture notes as paper copies or on a disc. The specifics of the issues require that the main part of laboratory classes takes place in manufacturing companies, such as 'Mashstroy'- Troyan, 'Sparky'- Lovetch and 'MTM' -Rousse. The semester is certified if students have attended classes regularly.
The exam takes the form of a discussion, in which three students take part simultaneously. Each one of them picks a list of four short and specific questions. They all have 10 minutes to think. The discussion begins when all three students are ready. After one of them reports his answer, the other two students can share their opinion- either conform and add or disapprove of the original opinion. Additional questions may be asked if needed.

3327 Bases of the metallurgical production

ECTS credits: 4 **Weekly classes:** 4lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science & Material technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Professor Antonij Enchev Mednev, MEng, PhD, Dept. of Material Science & Material technology,
tel. 888 307, E-mail: mednev@ru.acad.bg.
Abstract:
The course has the aim to give knowledge about contemporary methods, processes and equipment for obtaining cast iron, steel and metals. The structure of metallurgy furnaces is discussed. Information about the peculiarities about their constructions and exploitation is given, as well.
Course content:
Materials and processes in metallurgy. Thermo- dynamical functions and basic laws of chemical thermodynamics used in metallurgy. Obtaining cast iron. Theoretical bases of steel production. Obtaining steels in electrical furnaces. Converter production of steel. Out-furnace treatment of steel. Obtaining copper, aluminum and titanium.
Teaching and assessment:
Teaching is done through lectures and laboratory classes. The lecture material is consolidated solving problems during laboratory classes. The final mark is based on two written tests and students' activity during laboratory classes is also taken into consideration.

3328 Materials Investigation and Testing

ECTS credits: 4
Weekly classes: 4lec+0sem+2labs+0ps
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science & Material technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Valentin Gagov, MEng, PhD, Dept. of Material Science & Material technology,
tel. 888 778, E-mail: gag@ru.acad.bg.
Abstract:
The course aims at acquainting students with the characteristics of some mechanical properties of machine-building materials; with the methods for their determination and with the ways of presenting and using the experimental result; with the characteristics of some physical properties; with the methods of their determination and with some physical methods of researching materials; with the possibilities for using the discussed methods by solving certain technical problems (selection of materials for manufacturing parts and tools, prognosis of the resources of machines and constructions, optimizing technological processes, etc.).
Course content:
Summarizing the results from static tests. Dynamic tests. Tests at high temperatures. Specificities of the elastic behavior of metals and alloys. Fatigue of materials. Physical nature of brittle fracture. Mechanical tests of plastics. X-ray analysis. Calorimetric and thermal analyses of metals and alloys. Density and thermal expansion of metals. Investigation of metals by measuring their electrical resistance and specifics of magnetic properties. Friction and wear test
Teaching and assessment:
Different visual aids, like slides, are used for presenting the subjest matter . At the beginning of the semester several main issues on each topic of the laboratory classes are highlighted and students must prepare themselves for discussing them at the respective class . Students are assessed by using a score system. It encourages creative thinking and consecutive accumulation of knowledge.

3324 Diploma Prcatice

ECTS credits: 4
Weekly classes: 0lec+0sem+0labs+10ps
Assessment: oral exam
Type of exam: oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The diploma practice aims at giving students the opportunity to get acquainted with contemporary scientific and technical achievements in the sphere, in which they work out a diploma project and with the existing condition of the problem in the organization, which has suggested the topic for the diploma project.
Course content:
In relation to the topic of the diploma project, students get acquainted with literature sources, patents, inventions etc., with methods for theoretical and experimental investigations and the results from them; with constructive and technological solutions; with laboratory equipment, measurement devices, tools patterns, machines for mechanical treatment, casting, welding, plastic deformation and thermal treatment; with methodology for constructive and technological calculations; with software packages for solving engineering problems; with quality management systems, etc.
Teaching and assessment:
The diploma practice is carried out in the department laboratories, mechanical and mechanical-mounting workshops, constructive and technological offices or divisions of machine-building companies, libraries, etc. in relation to the topic of the diploma project and the organization, which has suggested it. The tasks of the practice are determined by the tutor of the diploma project and are reported to him. The results from the practice are used in forming the literature reference of the diploma project and the development of its specific sections.

3329 Diploma Project

ECTS credits: 10 **Weekly classes:**
Assessment: defense **Type of exam**: oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The diploma project aims at giving students the opportunity to apply the obtained knowledge and skills in an independent and thorough elaboration of engineering projects. The most common topics are connected with the design of machine-building technologies, the design of technological equipment, the design of automation devices, management and control of technological processes. Students who have excellent achievements are given topics with research character. The Final Year project gives students practical skills and experience for the future engineering practice or for continuing their study in a Master degree course.
Course content:
Review of the information regarding the diploma project topic. Formulating the aim and tasks. Analysis of the output and work conditions. Idea project or methodology of research. Design of machine-building technologies. Design of the necessary equipment and devices. Running of tests and processing of results. Technical and economical analysis of the developed variants. Development of technical documentation and graphical representation of research results.
Teaching and assessment:
The diploma project is developed following a given routine. Students work individually, using paper or electronically based information, the equipment of the department or other departments, and their instructor's help. The diploma project instructor assesses the level of involvement, the social and moral qualities of the student. The assessor evaluates the diploma project. The student defends the diploma project in front of the State Exam Committee and open public. The State Exam Committee evaluates both the diploma project and the way it is defended.

UNDERGRADUATE STUDIES IN COMPUTER AIDED DESIGN IN MECHANICAL AND INSTRUMENT ENGINEERING

PROFESSIONAL STANDARDS
OF A BACHELOR IN

COMPUTER AIDED DESIGN IN MECHANICAL AND INSTRUMENT ENGINEERING

SUBJECT: **Computer aided design in Mechanical and Instrument Engineering**
Educational degree – **Bachelor**
Professional qualification: **mechanical engineer**
Term of education: **4 years (8 terms)**

The main objective of the study is to prepare contemporary and wide profile executive engineer staff in the area of machine and tools design. Under certain conditions students have the basis and opportunity to continue their study with 1,5 years more and to receive a MASTER degree.

General and special preparation – the curriculum is based on the Unified State requirements about the degree course. During the first four semesters some basic and general technical courses are studied, which are the basis of modern engineering education, such as: Mathematics, Physics, Chemistry, Informatics, Mechanical Engineering, Strength of Materials, Fluid Mechanics, Material Science and Material Technology, Theory of Mechanisms and Machines, Machine Elements, Heating Engineering, Electrical Engineering and Electronics, Metrology and Measurement Equipment. Great attention is paid to the special and specializing training during the second two years. The image of this degree course is formed by the compulsory courses: Hydro and Pneumatic Motion; Manufacturing Technologies; Design Methodology; Regulating and Control Devices; Robustness and Dynamics of Constructions; Tools Elements; Lifting and Transport Equipment; Tools Technology; Automated Programming and Robotics; Precise Measurement and Technological Specifications of Constructions; Testing of Machine Building Materials; Quality Management and Control; Design Automation; Standardization, Certification and Intellectual Products.

At the end of the fifth semester students choose a special series of specializing courses, unified thematically in two groups:

Group A – Mechanical Engineering
Group B – Instrument Engineering

Each of the groups includes a series of 6 courses , which are studied during the 6^{th} and 7^{th} semester. So students obtain more specialized preparation.
The study course finishes with the elaboration and presentation of the Final Year project. It is assigned at the end of the 7^{th} semester and it is worked out during the 8^{th} semester. Therefore, the 8^{th} semester has a reduced duration of 10 weeks and it does not include active study forms (course assignments and projects).

Practical training of students (15 ECTS credits) consists of:

- Study practice in Manufacturing Technologies – during semester One and Two, 7 ECTS.
- Technological practice in manufacturing companies – 2 weeks during the summer holiday after semester Four, 2 ECTS.
- Specializing practice in manufacturing companies – 2 weeks during the summer holiday after semester Six, 2 ECTS.
- Diploma practice – during semester Eight, 4 ECTS.

General and special skills in:

a) Design of basic knodes and parts of modern machines, tools, devices and equipment;
b) Testing and research of machines, tools and devices;
c) Preparation of standardization and certification documents;
d) Organizing and management of maintenance activity;
e) Exploitation, maintenance and repair of machine products, tools and devices;
f) Using computer software for engineering activities.

Career prospects:
The engineers, who have graduated the Bachelor degree course in Machine Building and Tools Construction can work for firms, companies, organizations etc., which deal with research, design, production, maintenance and commercial activity in the sphere of machine building as executive technological engineers, constructors, metrology engineers, consultants, experts and managers of small and medium sized enterprises.

CURRICULUM

of the degree course in

COMPUTER AIDED DESIGN IN MECHANICAL AND INSTRUMENT ENGINEERING

First year

Code	*First term*	*ECTS*	*Code*	*Second term*	*ECTS*
1024	Mathematics 1	5	2068	Mathematics 2	6
0410	Chemistry	4	1609	Visual Programming in MS Office	5
2073	Material Science and Material technology I	5	2069	Physics	6
0380	Applied Geometry and Engineering Graphics I	5	2070	Applied Geometry and Engineering Graphics II	4
1038	Informatics I	4	2071	Mechanics I	5
0076	Study Practice	3	0001	Study Practice	4
	Elective Foreign Language	4			
	Total for the term:	***30***		***Total for the term:***	***30***
1102	Sports	1	1102	Sports	1

Second year

Code	*Third term*	*ECTS*	*Code*	*Fourth term*	*ECTS*
3268	Mathematics 3	5	2543	Machine Elements I	6
2402	Strength of materials I	5	2544	Strength of materials II	4
2529	Fluid mechanics	5	3300	Metrology and measurement equipment	5
2531	Mechanics II	4	3330	Hydro & Pneumatic motion	4
2530	Electrical Engineering and Electronics	6	2430	Theory of mechanisms and machines	4
2532	Material Technology	5	0166	Manufacturing technologies	5
			2443	Theory of mechanisms and machines - course project	2
	Total for the term:	***30***		***Total for the term:***	***30***
1102	Sports	1	1102	Sports	1
			3331	Specialized practice – 2 w.	2

Third Year

Code	*Fifth term*	*ECTS*	*Code*	*Sixth term*	*ECTS*
2561	Machine Elements II	3	3272	Economics	4
2546	Heating engineering	5	3764	Manufacturing Automation & Robotics	5
3332	Design Methodology	4	3336	Material handling engineering	3
2453	Machine Elements II – course project	2	3337	Material handling engineering – course project	2
3333	Regulating & control devices	5	3338	Instrument engineering technologies	7
3334	Robustness & Dynamics of Constructions	6		**Elective groups of courses (students elect a group)**	
3335	Tools Elements – 1	5		**Group A**	
			3339	Pattern Design	5
			3340	Machine Tools Design	4
				Total for the term for A group:	30
				Group B	
			3341	Optical & optical electronic devices	4
			3342	Tools Elements - 2	5
				Total for the term for B group:	30
	Total for the term:	**30**		**Total for the term:**	**30**
1102	Sports	1	1102	Sports	1
			3312	Specialized practice – 2 w.	2

Forth Year

Code	*Seventh term*	*ECTS*	*Code*	*Eighth term*	*ECTS*
3280	Technical Safety	3	3322	Quality control and management	4
3344	Precision dimensioning and Manufacturibility of Constructions	7	3352	Organization & Management of a Company	4
3345	Materials Testing	5	3353	Computer aided design	4
	Elective groups of courses (students elect a group)		3354	Standardization, Certification & Intellectual Product	4
	Group A				
3346	Design of automated devices	5			
3347	Electrical motion & power automatics	5			
3348	Design of Metal Treatment Equipment	5			
	Total for the term for A group:	30			
	Group B				
3349	Automation devices	5		**Graduation**	
3350	Converters in Mechanical & Instrument Engineering	5	3355	Self-dependent training	4
3351	Measurement devices	5	3356	Diploma work	10
	Total for the term for B group:	30			
	Total for the term:	***30***		***Total for the term:***	***30***
1102	Sports	1	1102	Sports	1

Total for the training course: 240 ECTS credits

1024 Mathematics Part I

ECTS credits: 5 **Weekly classes**: 2 lec+0sem+0labs+2ps+ca
Assessment: exam **Type of exam**: written
Departments involved:
Department of Algebra and Geometry, Faculty of Education
Lecturers:
Assoc. Prof. Docho Trifonov Dochev, PhD, Dept. of Algebra and Geometry, tel: 888 489;
E-mail: tcetcka@ami.ru.acad.bg.
Assoc. Prof. Stoycho Dimitrov Dimitrov, PhD, Dept. Algebra and Geometry, tel: 888 453;
E-mail: tpeter@ami.ru.acad.bg.
Abstract:
The course is a basic one in engineering education. It uses the mathematical knowledge from secondary school and extends it on a higher level. It is essential for the next mathematical courses, Physics, Mechanics, general and special engineering courses.
Course content:
Complex numbers and polynomials. Systems of linear equations and determinants. Matrix calculus. Line in plane. Lines and planes in space – forms of determining and common positions. Linear space and linear operators. Second order curves and surfaces. Functions and sequences. Limits and derivatives. Basic theorems of differential calculus. Applications of derivatives for investigating functions. Indefinite integral – definitions and basic properties; methods of calculation - integration by parts, integration by substitution, integration of rational, irrational and transcendental functions.
Teaching and assessment:
The theoretical bases of the topics presented at lectures is acquired at seminars through solving problems; individual practice and consolidation is accomplished by weekly assignments. Three written tests are administered and students with grades above 4.50 are exempt from an exam and their mark is formed on the basis of an interview with the lecturer. Students are given six problems at the exam and they have to solve at least three to pass. Each student is required a course assignment. Its successful presentation at seminars and a regular class attendance are a necessary prerequisite to have a term validated.

0410 Chemistry

ECTS credits: 4 **Weekly classes**: 2lec+0sem+1labs+0ps+p
Assessment: exam **Type of exam**: written
Departments involved:
Department of Repair, Reliability and Chemical Technologies,
Faculty of Agricultural Mechanization.
Lecturer:
Assoc. Prof. Dimitar Jordanov Pavlov, PhD, Dept. of Repair, Reliability and Chemical Technologies,
tel. 888 733, chimia@ru.acad.bg
Abstract:
The course helps students obtain particular knowledge of the structure of substances, chemical phenomena and processes, directly connected with engineering. Laboratory classes simulate these processes and show the way for their use or avoidance in engineering practice. The course achieves leveling of students' previous knowledge of chemistry and provides necessary knowledge and skills for the next courses in Physics, Materials and Manufacturing Engineering, Strength of Materials, etc.
Course content:
Structure of substances. Kinetics of chemical processes. Chemical equilibrium. Chemical thermodynamics. Metals and alloys. Electrochemical processes. Dispersions. Surface phenomena. Review and classification of the main groups of organic compounds used in engineering practice. Isomerism of the organic compounds and its influence on their properties.
Teaching and assessment:
Laboratory classes provide students with the opportunity to receive visual notion about important theoretical issues, such as: chemical properties of metals and alloys, the work of electric cells, electrolysis, surface phenomena, etc. There is a test control on basic topics at the beginning of each class, which could be either written or oral, with duration of about 15 minutes.

2073 Material science

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science & Material technology,
Faculty of Mechanical and manufacturing engineering
Lecturers:
Prof. Rusko Ivanov Shishkov, MEng, DSc, PhD, Dept. of Material Science & Material technology,
tel. 888 204, E-mail: rish@ru.acad.bg
Assoc.Prof. Penka Dimitrova Etarska, MEng, PhD, Dept. of Material Science & Material technology,
tel. 888 307, E-mail: etarska@ru.acad.bg.
Abstract:
This course studies the composition, structure and property connections in materials, which are used both in technique and daily life, as well as, the opportunities granted to change and redirect these properties in a certain way. Basic knowledge of physics and chemistry is needed. Students acquire useful knowledge and experience, which can be applied in other subjects having much in common with material processing or new product construction.
Course content:
Main notions on the structure and properties of metal, dielectric and semiconductor crystal materials. Structure analyzing methods. One-, two-, and multi-component systems. Balance equilibrium diagrams of conditions. Regularity of crystallization and transformations in hard condition – mechanisms and kinetics. Metastable conditions. Iron, steel and cast iron, copper, titanium, aluminum and their alloys. Other kinds of metals. Ceramics and metal ceramics. Polymer materials. Composition materials.
Teaching and assessment:
Theoretical knowledge taught at lectures is assimilated, specified and improved during laboratory classes. They concern mainly the material structure and the thermal methods of its change. Three tests are appointed during the semester. The test results are reflected in the exam's assessment

0380 Applied geometry and engineering graphics 1

ECTS credits: 5 **Weekly classes:** 1lec+0sem+0labs +2ps+cw
Assessment: continuous assessment **Type of exam:** written
Departament involved:
Department of Engineering graphics, Faculty of Automotive and Transport Engineering
Lecturer:
Assoc. Prof. Ventsislav Dimov Dochev PhD MEng. , Dept. of Engineering Graphics ,tel.888-437
Annotation:
The course examines the methods and means of presentation of three-dimensional objects by plane images and ways of analysis , conversion and optimization of graphic images. A precondition for studying this course is basic knowledge of geometry and technical drawing . It develops the steric imagination of students and their skills to cope with graphic and technical information .This course is a base of further learning of other technical branches of science.
Course content:
Kinds of projection. Comprehensive drawing . Reciprocal position of principal geometric objects. Conversion of a comprehensive drawing . Methods of projection. Reciprocal crossing of geometric objects. Images in drawings . Axonometric projection.
Teaching and assessment:
The theoretical subject matter presented at lectures by didactic means, gives the needed base for conducting practical classes and course assignments .During the training problems are solved instructions given , examples considered. In the course assignment students are required to do a number of plans with different images of steric objects. The course ends with a continuous assessment, which is formed by the marks of two tests and the score of the course assignment .An attestation is given , according to the academic regulations , when the course assignment is done and the lectures and practical classes are attended.

1038 Informatics I

ECTS credits: 4 **Weekly classes:** 1lec+0sem+0labs+2ps+ca
Assessment: continuous assessment **Type of exam:** test
Department involved:
Dept.of Informatics and Information Technologies, Faculty of Natural Sciences and Education
Lecturers:
Assoc. Prof. Margarita Teodosieva, PhD, Dept. of IIT, tel. 888 464, Email: mst@ami.ru.acad.bg
Pr. Assis. Prof. Stoyan Donchev Chernev, PhD, Dept. of IIT, tel. 888 470, E-mail: stenly@ami.ru.acad.bg
Abstract:
The course objective is to introduce students to the computer with its components as technical aid, as well as to the most widely spread software products – operating systems, word processing systems, spreadsheet data processing systems, data bases, information systems, artificial intellect systems, computer graphics systems, computer aided design and manufacturing (CAD/CAM) systems. The workshops aim at providing students with knowledge on the use of the most widely spread application program systems – Windows, Word, Excel.
Course content:
History and classification of computers. Hardware. Operating systems. Application software. Word processing systems. Spreadsheets. Databases: relation database, database management systems, widely spread databases, data exchange and computer networks.
Teaching and assessment:
Lectures are taught in 2 academic hours every other week. Workshops are carried out in computer laboratories to practice theoretical knowledge under the guidance of the teacher. For getting a feedback of students' progress the teacher makes a 10-minute-revision of the material taught at the beginning of the workshop by giving them a test, or making a concise written or oral testing. Students' practical knowledge of the application of currently studied software product is assessed at the end of every course section. Through course assignments students reveal whether they are able to apply independently the program systems. Students get assessments on course assignments that are considered for the total grade.
At the end of the semester students' theoretical knowledge is assessed through a test of 100 questions covering the whole material taught.
Semester grade is formed on the basis of the results from the main test, workshop performance and course assignment average grade.

0076 Training practice Metals engineering

ECTS credits: 3 **Weekly classes:** 0lec+0sem+0labs+4ps
Assessment: exam **Type of exam:** oral exam
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 211, E-mail: rus@ru.acad.bg.
Pr. Assist. Prof. Peter Stoykov Petrov, MSc (Eng), Dept. of Material Science & Material Technology,
tel. 888 316, 206
Abstract:
The course provides preliminary knowledge and practical skills on the main stages of the technological processes for metal casting, welding, plastic deformation used in the manufacture organization.
Course content:
Metal casting; manual moulding using non-sectional pattern in two moulds; moulding with cutting; using a semi-mould; moulding using sectional patterns; moulding using mould plates; machine moulding. Welding: manual arc welding; excitation and running of the welding arc; welding of initial and monolayer welds; welding of fillet welds; welding of long welds; welding of multilayer welds. Manual forging: open manual and machine forging of a wedge, clamp and hinge bolt.
Teaching and assessment:
Practical classes are held in the training work-department, where working places are prepared in advance. Students are divided into groups, each of which uses a separate working place. Control is carried out through an oral exam. A certain practical assignment is carried out, as well as a short discussion of a theoretical issue.

Foreign Language for the Mechanical Engineering Course
0383 English; 0843 German; 0950 French; 0983Russian

ECTS credits: 4 **Weekly classes:** 0lec+0sem+0labs+4ps
Assessment: continuous assessment **Type of exam:** written and oral
Departments involved:
Department of Foreign Languages, Faculty of Law
Lecturers:
English: Lecturer Ivelina Dimitrova Petrova, Department of Foregn Languages;
E-mail: ipetrova@ecs.ru.acad.bg;
German: Senior Lecturer Elmira Maksimova Maksimova, Department of Foreign Languages;
tel.: 888 824 E-mail: sbartenev@ecs.ru.acad.bg
French: Senior Lecturer Roumyana Ivanova Milanova, Department of Foreign Languages;
E-mail: rmivanova@ecs.ru.acad.bg;
Russian: Senior Lecturer Iliyana Gancheva Benina, Department of Foreign Languages;
E-mail: Ibenina@ecs.ru.acad.bg;
Abstract:
The foreign language module is aimed at achieving communicative competence in the area of the subject specialty and the future job. The teaching objectives comprise the development of reading comprehension skills to handle specialist texts and the acquisition of communication skills to interact successfully in professional settings and everyday situations.
Course content:
Meeting people. Talking about the present and the past. Writing instructions. Comparing things. Properties of materials. Describing processes. Searching for information in catalogues. Linking facts and ideas. Applying for a job. Infinitive and gerund. Passive voice. Mathematical symbols in engineering – reading formulae.
Teaching and assessment:
A wide range of authentic and specially constructed texts (articles, diagrams and tables, brochures, catalogues, manuals, etc.), as well as audio, video, and multimedia materials are used to acquire the necessary language knowledge and to develop skills in using the language as a means of communication. Students are offered lessons in computer laboratories, in which multimedia learning packages and on-line materials are used.
In class students participate in role-plays, pair and group activities. The oral examination covers the topics discussed during the semester. The semester grade is based on the marks from 2 tests administered during the term.

2068 Higer mathematics – Part 2

ECTS credits: 6 **Weekly classes:** 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written
Departments involved: Department of Mathematical Analysis, tel. 888 226, Faculty of Pedagogy.
Lecturers:
Prof. DSc Stepan Agop Tersian, Dept of Mathematical Analysis, tel. 888 226, 888587.
Assist. Prof. Julia Vancheva Chaparova, PhD, Dept. of Mathematical Analysis, tel. 888 226, 888587.
Assist. Prof. Antoaneta Tileva Mihova Dept. of Mathematical Analysis, tel. 888 226, 888727.
Annotation:
The course Higher Mathematics - Part 2 is basic for the mathematical education in engineering sciences. It gets students acquainted with the basic notions of mathematical analysis such as definite integral, partial derivatives, double and triple integrals, and gives them computational abilities (including computations with mathematical software) to solve ordinary differential equations and systems, find extrema and integrate functions of two variables. This knowledge is necessary for further study of higher mathematics – part 3, physics, computer sciences.
Course content:
Basic themes: definite integrals and applications, functions of two variables, ordinary differential equations and systems, multiple integrals, numerical series.
Teaching and learning methods:
The educational process is realized by lectures and practical classes. In the lectures the educational material is theoretically presented and demonstrated by proper example problems. In the practical classes knowledge of the subject matter is controlled and skills for solving practical problems are developed. A term certification is obtained according to the Interval rules for educational activities. The exam test includes 6 problems and/or theoretical questions from the educational material.

1609 Visual Programming in MS Office

ECTS credits: 5 **Weekly classes**: 2lec+0sem+0labs+2ps+ca
Assessment: continuous assessment **Type of exam**: written
Department involved:
Department of Informatics and Information Technologies, Faculty of Natural Sciences and Education
Lecturers:
Assoc. Prof. Margarita Teodosieva, PhD, Dept. of IIT, tel. 888 464 Email: mst@ami.ru.acad.bg
Pr. Assist. Prof. Stoyan Donchev Chernev, PhD, Dept. of IIT, tel. 888 754 E-mail: stenly@ami.ru.acad.bg
Abstract:
The course objective is students to get familiar with MS Office package and prepared for programming with Visual Basic for Application; they become able to efficiently use the applications in Office environment and develop their own applications. Prerequisites for attending the course are students' preparation in Mathematics gained at high schools and the knowledge from studying Informatics 1. The knowledge and skills acquired from studying Visual Programming in Office Environment are the basis for developing course assignments, course tasks and projects and they can be successfully used for diploma projects and students' further work.
Course content:
Introduction. Office programming. Object-oriented programming. VBA and objects in Office. Data types. Macros creation and editing. Constants, variables. Integrated functions and statements. Assignment statements. Control statements. Arrays. Introducing to objects and collections. Procedures and functions. Projects and modules. Interaction design. Menu. Dialogue windows. Dialogue window objects. Events. Methods. Files management. Office applications host control.
Teaching and assessment:
The theoretical subject matter taught at lectures, accompanied with relevant exemplary programs, is consolidated during workshop sessions. Continuous assessment is carried out for controlling students' progress and forming their final grades. Students perform two tests during the semester. The course assignment given to students is the active form of testing their skills for working independently and they get an adequate mark. For estimating students' involvement in the course studies students may get maximum 100 scores. Semester validation is obtained after students' regular attendance at lectures, active participation in workshop sessions, minimum 70 scores and successfully presented course assignment. The continuous assessment is formed as an average of the grades from the two tests given during the semester, and taking into consideration the grade from the entry test as well as students' performance during workshop sessions.

2069 Physics

ECTS credits: 6 **Weekly classes:** 3lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam**: written
Department involved: Department of Physics
Faculty of Electrical Engineering, Electronics and Automation
Lectures:
Assoc. Prof. Nadezhda Marinova Nancheva, PhD, Department of Physics, tel.888 219,
E-mail: nancheva@ru.acad.bg
Assoc. Prof. Galina Zaharieva Krumova, PhD, Department of Physics, tel.888 218,
E-mail: gal@ru.acad.bg
Abstract:
The course aims at familiarizing students with the physical character of processes and phenomena in nature and the methods for their investigation, with the most general properties of matter and material objects. The laboratory classes aim at creating skills for experimental investigation of physical phenomena and solving physical problems.
Course content:
Measuring physical quantities, Kinematics and Dynamics of material point and rigid body, Interaction in nature, Work and energy, Mechanical preservation laws, Molecular physics and thermodynamics, Transfer phenomena, Periodic processes and waves, Electric field and electric current, Magnetic field and electro-magnetic induction, Optical phenomena, Atoms, atom nuclei, elementary particles.
Teaching and assessment:
Lectures give the main theoretical material, supported by some demonstrations of physical phenomena and processes. At laboratory classes students work independently and investigate particular physical phenomena. The knowledge of lecture material and laboratory classes is tested regularly. The final mark is formed after an exam in the form of a test.

2070 Applied geometry and engineering graphics 2

ECTS credits 4 **Weekly classes:** 1lec+0sem+0labs+2ps+cw
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Engineering graphics, Faculty of Automotive and Transport Engineering
Lecturer:
Assoc. Prof.. Ventsislav Dimov Dochev PhD .MEng, dep. of Engineering graphics 888-437
Annotation:
The course examines the rules for working out plans , schemes and technical text documents; norms and instructions of Bulgarian and international standards considering drawing up technical documents. . It develops steric imagination of students and their skills to cope with technical documents .This course is a base of further learning of other technical branches of science and doing a course projects and a graduation paper.
Course content:
Different connections – threaded , splinted and permanent connections. Drawing of a machinery piece – content , composition , images , measures , tolerance of dimensions ,method of indicating surface texture , text information .Special documentation of some technical products . Drawings of precast units .Item list . Text documents . Schemes . Building drawings.
Teaching and assessment:
The theoretical subject matter read at lectures in didactic ways, gives the needed base for conducting practical classes and course assignment .During the training problems are solved , instructions given, examples considered. The course assignment requires from students to work out technical documents of a precast unit given as axonometric images. The course ends with a continuous assessment grade , which is formed by the marks of two tests and the score of the course assignment .An attestation is given , according to the academic regulations , when a course assignment is submitted and the lectures and practical classes are attended.

2071 Mechanics 1

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2prac+ca
Assessment: exam **Test type:** written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Georgi Gabrovski, MEng, PhD, tel. 888 474, e-mail: ggabrovski@ru.acad.bg;
Assoc. Prof. Venko Vitliemov, MEng, PhD, tel. 888 572, e-mail: venvit@ru.acad.bg;
Assoc. Prof. Stoyan Stoyanov, MEng, PhD tel. 888 572, e-mail: sgstoyanov@ru.acad.bg.
Abstract:
Students get acquainted with the methods of investigation of different kinds of rigid body motion, for different force transformations, and of investigation of mechanical interaction in rigid bodies in equilibrium. The course provides a basis for modeling structures, mechanisms, dynamic processes and the applications of computer methods needed for their investigation. Preliminary knowledge of Mathematics, Physics, and Informatics is necessary for this course. It is fundamental for the engineering courses in analysis and design of mechanical structures and machines.
Course contents:
Particle kinematics. Translational, rotational, and plane rigid body motion. Relative motion of a particle. Equilibrium of a rigid body. Reduction of a system of forces. Equilibrium of a multi-body system. Equilibrium in presence of friction. Gravity center.
Teaching and assessment:
The theoretical basis of the topics is elucidated in lectures and illustrated with examples. Students solve problems at practical classes utilizing the software environment of MATLAB. They apply the learned methods in their course assignment, which is given individually to each student. The course assignment is controlled and graded. The total score of a student is formulated by a series of tests, including two midterm and a final term tests with a reexamination test. The grade gained during the semester is accounted for in the final grade.

0001 Practice in Manufacturing Technologies

ECTS credits: 4 **Weekly classes:** 0lec+0sem+1labs+4ps
Assessment: oral exam **Type of exam:** oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturer:
Assoc.Prof. Ivan Kolev Ivanov, MEng, PhD, Dept. of Machine Tools and Manufacturing, Tel: 888-544,
E- mail: kolev@ru.acad.bg.
Annotation:
The goal of the course is to give students practical skills and knowledge of the main machining processes, the machines and tools that are applied in them,as well as, various machining and assembling operations.
Course contents:
At laboratory classes students are made familiar with the organization, preparation and control of various machine tools, cutting tools, the equipment and positioning of parts or cutting tools on machines. At practical practical students carry out independent work on a Lathe, a Milling machine, a Drilling machine and a Shaper. In the bench department students lay out parts and carry out basic bench operations. The practical classes finish with making a check part according to a drawing.
Teaching and assessment:
Laboratory classes correspond to practical classes. They are organized in such a way that students can have an access to the machines, tools and equipment and the needed setup. The practical classes are conducted in a teaching workshop. Each student is assigned a personal work place where he/she can produce test and real parts with relatively simple configuration.
Students's knowledge is assessed though discussions, as well as, during the practical and laboratory classes. The final grade is the result of a colloquium.

3268 Mathematics - Part III

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Numeric Methods and Statistics, Faculty of Education.
Lecturers:
Assoc. Prof. Ljuben Georgiev Valkov, PhD, Dept. of Numeric Methods and Statistics, tel:888 466,
home tel: 082- 622 - 566, E-mail: lvalkov@ru.acad.bg
Pr. Assist. Prof. Violetka Atanassova Kostova, Dept. of Numeric Methods and Statistics, tel: 888 466,
home tel: 082- 897-213, E-mail: vkostova@ru.acad.bg
Abstract:
The course is aimed at providing students with skills in processing data, obtained from experiments in the field of engineering, which requires the use of:

- Probability theory mathematical apparatus
- Mathematical statistics methods of experimental data processing
- MATLAB in practice

Course content:
The course includes elements from the probability theory, mathematical statistics, regression and correlation analysis, linear algebra numerical methods and mathematical analysis.
Teaching and assessment:
The training process is organized in lectures, seminars and practical classes. At lectures theoretical issues are presented and illustrated with appropriate exemplary problems, connected with students' degree course. At seminars students solve problems, connected with engineering practice and requiring the application of the theory of probality mathematical apparatus, as well as mathematical statistics.
Each student is required to do an individual course assignment.
The final course mark is formed on the basis of the following formula:
Final course mark = 3/4 the grade of the test + 1/4 the grade of practical classes.

2402 Strength of Materials I

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps+cw
Assessment: continuous assessment **Type of exam:** tests
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lectures:
Assoc. prof. Dr. Nedka Stancheva, tel. 888 478, e-mail: nedka@ru.acad.bg
Assoc. prof. Dr. Ivelin Ivanov, tel. 888 224, e-mail: ivivanov@ru.acad.bg
Abstract:
The course provides students with a system of knowledge about the methods of assessment through calculations the advisability, reliability, and effectiveness of the shapes and dimensions of structural elements. Preliminary knowledge of basic Mechanics (Statics) and Mathematics is necessary. The course is fundamental for the following courses in design of specific machines.
Course contents:
Introduction. Basic terms and principles, stress, deflections, strain. Internal forces in trusses. Tension and compression. Testing materials, basic mechanical properties. Shear and crushing. Torsion of circular and noncircular bars. Moments of area of cross sections. Plane bending and 3D bending, deflections in bending, deflected axis of a beam. Non-axial tension and compression. Buckling of struts.
Teaching and assessment:
The theoretical basis of the topics, presented in lectures, is applied by students at their practical classes solving problems of training. Students work out an individually assigned complex course assignment , which is graded on a two-week schedule. Students do three tests, which are graded. The final grade is calculated from the grade of the tests and the grade of the course assignment presentation. Regular attendance of classes and course assignment submission are the requirements for a semester validation.

2529 Fluid mechanics

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Department of Thermothechnics, Hydro and Pneumotechnics, Agro-Industrial Faculty.
Lecturers:
Assoc. Prof. Ivanka Mitkova Zheleva, PhD, tel: 082 888 582, home tel: 084/ 662 332
Assoc Prof. Gencho Stoikov Popov, PhD, tel: 082 888 580
Abstract:
The course introduces students to the main relationships and physical treatment of the phenomena analyzed in hydrostatics, kinematics and fluid dynamics in view of their application in engineering practice. Basic knowledge of Mathematics, Physics, Theoretical Mechanics is a prerequisite for the acquisition of Fluid Mechanics and it, in its turn, is a prerequisite for the acquisition of hydraulic and pneumatic machines and drives, agricultural machines, internal combustion engines, etc.
Course content:
Main properties of fluids. Equilibrium of fluids. Kinematics and dynamics of ideal and real fluids. Hydraulic resistances and calculation of pipelines and channels. Resistance of streamlined bodies and wings. Liquid leakage from openings, end-pieces, jets. Turbopumps.
Teaching and assessment:
The topics of lectures provide students with the opportunity to get acquainted with the main laws of fluid mechanics preceding laboratory classes, during which the obtained knowledge is consolidated and its practical application is clarified. For each laboratory class students work out a written statement. Students work out a course assignment by stages, consisting of solving particular tasks from the studied material. The requirement to have a term validated is submission of the course assignment and the written statements from the laboratory classes. The exam is in written form, including short answers to theoretical questions and a solution of a certain number of problems.

2530 Electrical and Electronic Engineering

ECTS credits: 6 **Week classes:** 3lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Dept. of Theoretic Electrical Engineering and Electrical Measuring, Faculty of Electrical Engineering, Electronics and Automatics
Lecturers:
Assoc. Prof. Georgi Rashkov Georgiev, tel. 888 412, e-mail: grashkov@ru.acad.bg,
Assoc. prof. Svilena Vasileva Todorova, tel. 888 224, e-mail: svito@ru.acad.bg,
Assoc. prof. Emil Nikolaev Pawlikjanov, tel. 888 265
Pr. Assist. Prof. Docho Rusev Ivanov, tel. 888 501
Annotation:
The course Electrical and Electronic Engineering is part of the curriculum for the bachelor course degree of non-electrical courses. The aim of the course is to give students knowledge in the fields of Main Laws of the Theoretical Electrical Engineering, Electrical Measurement of Electrical and Non-electrical Quantities, DC and AC Electrical Machines, Electronic semiconductors and schemes. It is necessary for students to have preliminarily knowledge of the courses in Physics and Mathematics. The knowledge of Electrical and Electronic Engineering is used in the next courses and when preparing the graduation paper.
Course content:
Basic elements and magnitudes of the electrical circuits - DC and AC, Three-phase and magnetic circuits, Electrical measurements of electrical and non-electrical quantities, DC machines, Transformers, Synchronous and Induction AC Machines, Electronic Devices, the most used diagrams, Operational Amplifiers, Digital networks.
Teaching and assessment:
The teaching process is divided into lectures and laboratory classes. In the laboratory classes students can receive practical knowledge. There is a test control on basic topics at the beginning of the classes, which could be either written or oral, having a 15- minute duration. The purpose of test control is to help performance at the exam.

2531 Mechanics 2

ECTS credits: 4 **Weekly classes**: 2lec+0sem+0labs+1ps+ca
Assessment: exam **Type of exam**: written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Venko Vitliemov, MEng, PhD, tel. 888 572, e-mail: venvit@ru.acad.bg
Assoc. Prof. Georgi Gabrovski, MEng, PhD, tel. 888 474, e-mail: ggabrovski@ru.acad.bg;
Assoc. Prof. Stoyan Stoyanov, MEng, PhD, tel. 888 572, e-mail: sgstoyanov@ru.acad.bg.
Abstract:
Students get acquainted with the methods of investigation of the dynamic processes in mechanical multi-body systems. The course provides a basis for modeling structures, mechanisms, dynamic processes and the application of engineering methods of their investigation. Preliminary knowledge of Mathematics, Physics, Informatics and Mechanics 1 is necessary for this course. It is fundamental for the engineering courses in analysis and design of mechanical structures and machines.
Course contents:
Basic problems of the particle dynamics. Linear oscillation of a particle. Relative motion dynamics of a particle. Mass inertia moments and centrifugal inertia moments. Theorems of dynamics. Kinetostatics. Dynamics of a body. Analytical mechanics. Impact theory.
Teaching and assessment:
The theoretical basis of the topics is explained in lectures and their application is illustrated with examples. Students solve problems at their practical classes utilizing the software environment of MATLAB. The training of students is provided by a course assignment which is individually given to each student and graded after submission. The total score of a student is formulated by a system of tests, including midterm and final tests with a reexamination test. The grade gained during the semester is accounted for in the final grade.

2532 Technology of materials

ECTS credits: 5
Weekly classes: 3lec+0sem+2labs+0ps
Assessment: exam
Type of exam: written
Departments involved:
Department of Materials and manufacturing engineering,
Faculty of Mechanical and manufacturing engineering
Lecturers:
Assoc.Prof. Georgi Ivanov Nikolov,MSc, PhD, Dept. of Materials and manufacturing engineering,
tel. 888 311, 888 210
Assoc.Prof. Mladen Tzvetanov Trifonov, MSc, PhD, Dept. of Materials and manufacturing engineering,
tel. 888 206, E-mail: mtr@ru.acad.bg
Abstract:
The course aims at supplying knowledge and skills of the fundamentals of the following technological processes – casting plastic deformation and welding, as well as, the fields of their application where machine manufacturing and some non-machine manufacturing materials and goods are processed. Some general knowledge of physics, chemistry and strength of materials is a necessary prerequisite for studying this course . It is basic for studying other courses in the field of mechanical engineering technologies.
Course content:
Introduction: Main principles of casting technology – a process diagram, working out a casting form, casting of metal materials, special methods of getting mouldings. Main principles of deformation technology – a process diagram, methods of volume and sheet deformation, special deformation methods, plastic deformation of metal materials. Main principles of welding technology – a process diagram, methods of welding through melting and pressure, special welding methods, thermal cutting, welding of metal materials. Fundamentals of other materials' processing: plastic and metal-ceramic materials.
Teaching and assessment:
Training is carried out through lectures and laboratory classes. Three tests are scheduled during the lectures. The final exam includes three written issues with an oral discussion. Final assessment is worked out on the basis of the tests and exam results.

2543 Machine elements I

ECTS credits: 6
Week classes: 2labs+0sem+1labs +1ps+cw
Assessment: continuous assessment
Type of exam: written
Departments involved:
Department of Machine knowledge and machine elements, Faculty of Auto transport
Lecturers:
Assoc. Prof. Peter Stamatov, MEng, PhD, dept. of Machine knowledge and machine elements, tel. 888592
E-mail: stamatov@ru.acad.bg.
Assoc. Prof. Ivan Spasov, MEng, PhD, dept. of Machine knowledge and machine elements, tel. 888235
E-mail: igs@ru.acad.bg.
Annotation:
The course takes the role of interconnection among general theoretical courses (Mechanics, Resistance of Materials, Machine Mechanics Theories, Applicable Geometry and Engineering Graphics, Material knowledge and Technology of Materials, Metrology and Measuring Devices, etc.) and some technical courses included in the general module. The aim of the course is to teach the basics of the theory of machine elements with general preordination and methods of their calculation and construction.
Course content:
Bulk and surface strength of machine elements. Limit of fatigue. Connections: threading, rivets, welding, press, cotters and grooves. Elements of rotary motion: axis and shafts, bearings, automated non-automated and automatic couplings.
Teaching and assessment:
Lectures are held in front of a stream of students. Current students' training is controlled through two control assignments on the subject matter. Practical classes are held in a computer hall with 12 modern computers. There are tables, standards and prospects, models, projectors available for the students. Laboratory classes explicate series of theoretical situations from the lectures. There are also current control tests. Results from the practical classes are processed by a computer and put in specific forms. The course assignment is individual and concerns projecting a screw and frictional coupling. There are weekly consultations and control of calculations and graphical parts. These two assignments are to be defended by the students. Total continuous assessment for the the course Machine elements I is formed on the basis of the scores from the tests and the presentation of the course assignments.

2544 Strength of Materials II

ECTS credits: 4 **Weekly classes:** 2lec+0sem+0labs+1ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lectures:
Assoc. Prof. Ivelin Ivanov, MEng, PhD, tel. 888 224, e-mail: ivivanov@ru.acad.bg
Assoc. Prof. Dr. Nedka Stancheva, MEng, PhD, tel. 888 478, e-mail: nedka@ru.acad.bg
Abstract:
The course provides students with a system of knowledge about the methods to assess the strength and stiffness of machine parts with complex stress state and complex structure with high degree of redundancy. Preliminary knowledge of basic Mechanics, Mathematics, and Strength of Materials I is necessary. The knowledge gained in the course is useful for the following courses in design of specific machines.
Course content:
Introduction in the theory of stress and strain. Failure criteria. Thick tubes. Fundamentals in matrix methods of structure mechanics. Bar element. Analysis of plane truss. Beam element. Analysis of plane frame. Element loadings and temperature expansion.
Teaching and assessment:
The theoretical basis of the topics, presented in lectures, is applied by students at practical classes solving problems of training using computers and computer software. Students individually apply their knowledge working out an individually assigned complex course assignment, which is graded on a two-week schedule. Students can volunteer in three tests and the gained grade, if it is above 50% of the maximum, leads to the final grade, so students can get exempt from the exam. The exam consists of two problems and three questions. The semester grade is accounted for in the final grade of the exam. Regular attendance of classes and course assignment submission are the requirements for semester validation.

3300 Metrology and Measurement Equipment

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps+ca
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Cwiatko Stanev Korjikov, MSc (Eng), PhD, Department of Machine Tools and Manufacturing, Tel: 888 493, E-mail: korijkov@ru.acad.bg
Ass. Prof. Boris Borisov Sakakushev, MSc (Eng), PhD, Department of Machine Tools and Manufacturing, Tel: 888 493, E-mail: bsak@ru.acad.bg
Abstract:
The course gives fundamental engineering and technical knowledge to students of Manufacturing Technologies, Machine and Instrument Building, and Materials Science and Technology. Through various teaching methods it enhances their specific knowledge and practical skills in areas such as Theoretical and Legislative Metrology, Methods and Equipment for Measuring of Machine Parts, and Tolerance design.
Course content:
Theoretical bases of metrology. Legislative bases of metrology. Basic metrological properties of measurement devices. Selection of measurement devices. Primary transformers used in measurement Devices. Measurement of length. Design of geometrical tolerances of machine parts. Methods and measurement devices for cylindrical, conical, thread, key and groove surfaces. Control of gears. Measurement of the quality of a process.
Teaching and assessment:
Lectures are case-based and include the basic principles of tolerance design of machine parts.At laboratory classes each student is given a chance to measure specific machine parts with general and special measurement devices and to work with various standards of machine parts geometrical parameters. Each laboratory class starts with a test and includes a preparation of a report.For a course assignment each student designs the fittings in a drawing, specifies and notes on a chosen draft drawing of a machine part the geometrical tolerances and chooses a measurement method and device. The course assignment includes explanatory notes and drawings. Continuous assessment is formed as the average grade of two tests, and the mark of the course assignment.

3330 Hydro and Pneumatic motion

ECTS credits: 4 **Weekly classes:** 2lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Thermodynamic and hydro pneumatic technics, Agro-Industrial Faculty
Lectures:
Assoc. Prof. Peter Rusev Petrov, PhD, tel. 888-581, 44 37 89
Pr. Assist.Prof. Krasimir Ivanov Tujarov, PhD, tel. 888 581, 83 78 19
Abstract:
This course gets students acquainted with working liquids and gases, hydraulic and pneumatic machines, hydraulic elements, their connection in a hydraulic system of motion and computating such kind of systems. This course also gives knowledge about construction, service and joint function of basic and auxiliary elements, so that students can computate and connect them into pneumo systems.
Course content:
The course examines working liquids, hydro motion and their application in mechanical engineering-structure, characteristics, function, choice of pumps and hydro motors, compressors and pneumatic motors. Parameters of hydro and pneumatic motions. Relieve valves –structure, function and characteristics. Reduce valve – structure, function and characteristics. Distribution valve. Throttles, opposite valves. Dividing and gathering valves. Accessory elements – seals, tanks, filters, hydraulic accumulators. Assemble of hydraulic and pneumatic devices. Tubes for hydro and pneumatic motions. Scheme of connecting hydro and pneumomotors –position, synchronization and sequence of action. Control and stabilization of the velocity of hydro and pneumomotors. Hydraulic reinforcements and proportional devices –kinds, function characteristics, application. Basic principles of hydraulic and pneumosystems design. Heat calculation of hydro systems.
Teaching and assessment:
Lectures are delivered in a traditional way showing slides and other visual aids. Laboratory classes consolidate the knowledge, which is given at the lectures, and they are conducted on laboratory installations. Students work out a report for each class including an installation scheme, a method of experiment, dates, graphs and conclusions. The exam is both written and oral.

2430 Theory of mechanisms and machines

ECTS credits: 4 **Weekly classes:** 2lec+0sem+2labs+0ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Theory of Mechanisms and Machines and Hoist Equipment and Technologies (TMMHET); Agro-Industrial Faculty
Lecturers:
Assoc.Prof.Petar Atanasov Koev,Dept.of TMMHET; tel.:082-888-486;E-mail: pkoev@ru.acad.bg
Assoc.Prof. Tanya Petkova Grozeva,Dept.of TMMHET; tel.:082-888-258; E-mail: tgrozeva@ru.acad.bg
Assoc.Prof.Ognyan Lyubenov Alipiev,Dept.of TMMHET; tel.:082-888-593; E-mail: oalipiev@ru.acad.bg
Assoc.Prof. Dimitar Ivanov Zafirov,Dept. of TMMHET; tel.: 082-888-428; E-mail: dzafirov@ru.acad.bg
Abstract:
The course in Theory of Mechanisms and Machines (TMM) is a general science course which introduces students to the methods of analysis and synthesis of mechanisms and machines in structural, geometric, kinematics and dynamic aspect. The goal of the course in TMM is to teach students how to discover the main features of mechanisms, as well as how to synthesize those features through a proper choice of their structure and metrics. As a rule, the most common features of mechanisms and the methods for their analysis are reviewed, that is those features and methods which are valid for any realization of mechanisms and machines. The synthesis approaches are reviewed through specific examples taken from practice, taking into account only the main requirements to the mechanism synthesized. The course is a foundation for the study of mechanisms and machines with specific application, reviewed in specialized courses.
Course content:
Structure and classification of mechanisms. Kinematics of leverage, cam and gear mechanisms. Theory of gear mechanisms with involuted gear wheels. Kinetostatics of mechanisms. Dynamics of machine units. Balancing of flat leverage mechanisms and rotors.
Teaching and assessment:
The essence of the methods of mechanism synthesis and analysis is presented during lectures. Specific problems on mechanism investigation are solved during labs. Visual aids, such as overhead projectors, computer simulations of mechanisms, models in motion, as well as real constructions are used extensively in the teaching process. The process of acquisition is controlled through a test and problem solving tasks. The grades for the test and the tasks are combined to form the continuous assessment grade.

2443 Theory of mechanisms and machines -course project

ECTS credits: 2 **Weekly classes:** 0lec+0sem+0labs+0ps+cp
Assessment: project defence **Type of exam:** oral
Departments involved:
Department of Theory of Mechanisms and Machines and Hoist Equipment and Technologies (TMMHET); Agro-Industrial Faculty
Lecturers:
Assoc.Prof. Ognyan Lyubenov Alipiev,Dept.of TMMHET;tel.:082-888-593; E-mail: oalipiev@ru.acad.bg
Assoc.Prof. Tanya Petkova Grozeva, Dept.of TMMHET; tel.:082-888-258;E-mail: tgrozeva@ru.acad.bg
Assoc.Prof. Petar Atanasov Koev, Dept.of TMMHET; tel.:082-888-486; E-mail: pkoev@ru.acad.bg
Assoc.Prof. Dimitar Ivanov Zafirov,Dept. of TMMHET; tel.:082-888-428; E-mail: dzafirov@ru.acad.bg
Abstract:
The goal of the course project is to help students acquire and rationalize the general methods of research (analysis) and design (synthesis) of different types of mechanisms and machines. It aids the students in building practical skills to discover the main features of mechanisms and prepares them for independent solving of specific engineering problems. The project in Theory of Mechanisms and Machines (TMM) is the first stage of machine-building design, connecting the knowledge acquired in a number of general science courses with the course design of real technical objects, studied in specialised courses.
Course content:
A machine unit is designed in which the driving and the operating machines are an electric motor and a flat leverage mechanism respectively, joined through involution gear. The course project includes the following stages: structural and kinematical analysis of leverage mechanism; kinetostatic investigation of leverage mechanism; optimisation geometric synthesis of gear mechanism. It consists of a calculation part, structured as explanatory calculation notes and a graphic part with a specified number of blueprints.
Teaching and assessment:
The course project is developed individually, using detailed methodological guidance and calculation and simulation software developed for this purpose by the Department staff. Students receive an individual assignment and a weekly schedule for reporting the results of the successive stages at the beginning of the semester. The work on the separate stages is carried out both at home and in the project lab, equipped with modern computers, multimedia, and a number of models in motion and real constructions of mechanisms. The calculation and graphic part of the project solutions are controlled in stages and evaluated based on their reliability and the way they have been explained, as well as on the analysis of the results obtained. The final grade for the project is formed after a public defence.

0166 Manufacturing Technologies

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Ivan Kolev Ivanov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-544, E- mail: kolev@ru.acad.bg
Abstract:
The goal of the course is to give students practical skills and knowledge about the main machining processes, the machines and tools that are applied in them, basic terms of manufacturing technologies, tolerance assurance during machining operations.
The course is based on the knowledge acquired in Practice in Manufacturing Technologies, Applied Geometry and Engineering Graphics, Mechanics, Resistance of Materials, Materials Science and Materials Technologies. The course is a prerequisite for the specializing course and the Final Year project.
Course content:
Outlook of materials cutting process. Tools materials. Technological characteristics, kinematical schemes of cutting, design and geometrical parameters of cutting tools, forces and power of cutting, wear of tools, different regimes for machining. Types, purpose and design specifics of metal cutting machines. Introduction to Production Technologies.
Teaching and assessment:
The theoretical subject matter taught at lectures is practised at laboratory classes, reports are written and tests are conducted.
The course finishes with a written exam. All the students come to the exam at the same time. They solve two problems and answer four relatively short questions. The exam is assessed in points.

2561 Machine elements II

ECTS credits: 3 **Weekly classes**: 1lec+0sem+1labs+1ps+cp
Assessment: exam **Type of exam**: written
Department involved:
Department of Machine knowledge and machine elements; faculty of Auto transport
Lecturers:
Assoc. Prof. Peter Stamatov, MEng, PhD, dept. of Machine knowledge and machine elements, tel. 888592
E-mail: stamatov@ru.acad.bg.
Assoc. Prof. Ivan Spasov, MEng, PhD, dept. of Machine knowledge and machine elements, tel. 888235
E-mail: igs@ru.acad.bg.
Annotation:
The course takes the role of interconnection among general theoretical courses (Mechanics, Resistance of Materials, Machine Mechanics Theories, Applicable Geometry and Engineering Graphics, Material knowledge and Technology of Materials, Metrology and Measuring Devices, etc.) and some technical courses, included in the general module. The aim of the course is to teach the basics of the theory of machine elements with general preordination and methods of their calculation and construction.
Course content:
Mechanical drives. Cylindrical involute gears – geometry, kinematics, bending stress and surface durability calculations. Planetary, wave, bevel, and worm gears. Speed reducers. Chain and belt drives. Frictional drives and variators.
Teaching and assessment:
Lectures and control are conducted in the same way as described in Machine elements I. Practical classes are held in subgroups in a computer hall with 12 modern computers. There are tables, standards and prospects, models, projectors available for the students. Laboratory classes are based on the fundamental parts of the lecture material. There are also current control tests. The results from performance at classes are processed by a computer filled in in forms. The course assignment is done by weekly consultations, including computer ones. The assigned tasks are solved individually trough designing various cylindrical, bevel, worm and other reducers. General evaluation for Machine elements –the course project is based on the course assignments of Machine elements I. Evaluation of performance in Machine elements II is made with the help of a written exam on 2 questions.

2546 Thermotechnics

ECTS credits: 5 **Weekly classes**: 2lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam**: written
Department involved:
Thermotechnics, Hydro- and Pneumotechnics, Agro-Industrial Faculty
Lecturers:
Associate Professor Valentin Vasilev Bobilov, PhD, Dept. of Thermotechnics, Hydro- and Pneumotechnics,
tel.: 082/888 844, E-mail: bobilov@ru.acad.bg
Abstract:
The course provides some fundamental knowledge of the main principles of thermotechnics ; it deals with the structure of heat generating equipment, the most economical methods of heat generation, its conversion and utilization in industry, agriculture and everyday life.
Good knowledge of Mathematics, Physics, Mechanics and Electrical engineering is a prerequisite for working successfully in this course.
Course content:
Basic concepts of thermodynamics. First law of thermodynamics. Formulation of the first law of thermodynamics for open and closed systems. Specific heat capacity, thermodynamic bases of equilibrium conditions. Second fundamental law of thermodynamics. Mathematical expressions of the second law of thermodynamics. Entropy, convertibility and inconvertibility of processes. Thermodynamic consummation of processes, calculation of strength and energy. Thermodynamic processes of real gases. Heat exchange: basic concepts and definitions. Complex heat exchange and heat transmission. Heat insulation. Thermodynamics of a cooling machine.
Basic concepts of the drying process. Drying methods. Ventilation devices. Uncommon energy sources and methods for their utilization.
Teaching and assessment:
Lectures are meant to provide theoretical knowledge, which is extended at laboratory sessions. Students submit reports with the experimental data compiled during laboratory sessions as well as analysis and conclusions on the experiment results. Assessment is based on students' performance at laboratory sessions and their test results.

3332 Design Methodology

ECTS credits: 4 **Weekly classes:** 2lec+ 0sem+0labs+2ps
Assessment: exam **Type of exam:** written
Department involved:
Department of Machine knowledge and Machine elements, faculty of Auto transport
Lecturers:
Assoc. Prof. Torkom Norair Diulgerian, MEng, PhD, dept. of Machine knowledge and Machine elements, tel. 888 461; E-mail: tomy@ru.acad.bg.
Abstract:
The course Design Methodology is intended to prepare bachelors in the degree course Machine and Instrument Building. Its aim is to assist students to acquire a system of knowledge, to learn about methods, ways and means for design and to construct technical sites. Necessary profound knowledge of Machine elements, Strength of materials, Mechanics, Application geometry and Engineering draft drawing, Metrology and measurement instruments. The course is a base for further study in other courses in methods for design of concrete machine building sites.
Course content:
Technical systems as element and means of changing in the system of transformation. Systematization of machine design. Basic principles, rules and successions in machine design. Organization and planning the designer's process. Information procurement in design. Contradiction and compromise decisions in machine design. Prognostication and moulding in machine design. Optimal design. System approach, system analysis, system project. Ergonomic requirements in machine design. Artisticdesign. Evaluation of designers' decisions quality.
Teaching and assessment:
The topics of lectures give students the chance to get acquainted with the theoretical aspects of Design Methodology. Practical classes are conducted in a specially equipped computer room. At the exam students dwell upon two questions.

3333 Regulating and Control Equipment

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+cw
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Georgi Vasilev Nenov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 653, E-mail: gosho@manuf.ru.acad.bg
Sr. Assist. Prof. Svetlana Koleva Jordanova, MEng., Department of Machine Tools and Manufacturing,
Tel: 888 653; e-mail: svetla@ru.acad.bg
Abstract:
The main objective of the course is to teach the laws of regulation, methods and control devices for the machines and equipment used in manufacturing. Review of regulators, CNC systems of machine tools, controller organization and programming. Inputs are: Electrical Engineering, Machine Tools, and Electrical Drives.
Course content:
Automatic regulation systems. Elements of automatic regulation systems. Programmable controllers. CNC systems. Elements of CNC systems. Programming of CNC machines. Electrical equipment of CNC machines. Electrical drive of transmissions.
Teaching and assessment:
Laboratory classes start after an initial discussion and teacher's instructions. The problems to be solved and methodologiical help are provided to students as hand-outs. Some of the classes are based on simulation computer programs. Laboratory classes that require the usage of CNC machine are conducted in such a way that students take turns to work under the supervision of their teacher . Continuous assement is based on the results of two tests and the student's performance in class. Students, who have failed one of the tests or like to improve their grades, a third test is done at the end of the semester.

3334 Strength and Dynamics of Machines

ECTS credits: 6 **Weekly classes**: 2lec+0sem+0labs+3ps+cw
Assessment: exam **Type of exam**: written
Department involved:
Deptartment of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lectures:
Assoc. Prof. Marko Todorov, MEng, PhD, tel. 888 224, e-mail: mtodorov@ru.acad.bg;
Assoc. Prof. Georgi Gabrovski, MEng, PhD, tel. 888 474, e-mail: ggabrovski@ru.acad.bg
Abstract:
The course acquaints students with the dynamic model development of machines and structures, basic methods of analysis of the motion and the interaction in linear mechanical systems, as well as, with contemporary methods for strength and stiffness calculations of structures. The numerical method used for structure analysis is the Finite Element Method (FEM). A preliminary knowledge of Mathematics, Mechanics, Strength of Materials, Fluid Mechanics, and Machine Elements is necessary.
Course content:
Dynamic models – characteristics and methods of experimental characterization. Disturbing factors and their characteristics. Vibrations of discrete mechanical systems – beams and shafts. Dynamics of machine and structure state. Influence of vibrations on the human body. The basic problems of the Theory of elasticity: governing equations, plane problems, axisymmetric structures, plates, shells. Boundary conditions. FEM basis, types of finite elements, specifics in FEM solutions, preparation of problems, result analysis.
Teaching and assessment:
The learning material is presented in lectures with the allowable minimum of mathematical proves and without redundant theory considerations. The assertions are illustrated with examples that could ease studentsat their practical classes. Practical classes and the individual course assignment are carried out in a computer lab and It is important for students to work on their own using the program environment MATLAB. A popular software is utilized for FEM analysis. Students have three assignments in the semester. A computer lab is provided for students' work. The grading system determines the minimum required for the semester passing approval and the final grade after two written tests. If the final grade of the semester is high enough, the student can get this as a final grade of the course to get exempt from the exam. The exam is written and it is on several theoretical questions and problems for to be soved

3335 Device Elements – Part I

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof.Stefan Dimitrov Velchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-456; svelchev@ru.acad.bg
Assoc. Prof. Boris Borisov Sakakushev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-493; bsak@ru.acad.bg
Abstract:
The main objective of the course is to give the knowledge and skills needed for calculating and designing typical elements of devices and mechanisms. Inputs are: Mechanics, Resistance of materials, and Machine parts. The knowledge and skills acquired are applied in the specialized courses in device building, the course and diploma projects.
Course content:
General information about the design of devices. Elastic elements– flat, spiral, flat and spiral, bimetal and screw springs. Bearing fulcrums – rolling and gliding friction bearings. Fine mechanical transmissions– kinematical, accuracy and strength calculations. Reading and counting devices. General composition of devices.
Teaching and assessment:
The theoretical subject matter given at lectures is applied at laboratory classes carrying out experimental studies and solving problems, as well as, through the individual course assignment, that is defended and graded on each stage. Students individually process and analyze the experimental results, creating a report for each of them. The semester is verified if the reports are accepted, the course assignment defended, and classes regularly attended. The written exam consists of solving problems and answering control questions graded by a score system. The final mark depends on the number of points and the continuous assessment.

2453 Machine elements – course project

ECTS credits: 2 **Weekly classes**: 0lec+0sem+0labs+0ps+cp
Assessment: defending a project **Type of the exam:** oral
Departments involved:
Department of Machine Design; faculty of Auto transport
Lecturers:
The course project is taught by every lecturer in the department of Machine knowledge and machine elements Assoc. Prof. Peter Stamatov, MEng, PhD, dept. of Machine knowledge and machine elements; Faculty of Auto transport, tel. 888592, E-mail: stamatov@ru.acad.bg.
Abstract:
The aim of the course project is to develop skills in reading engineering drawings, summarizing schemes of constructions and their loading and also to consolidate habits of strength calculation of elements acquired from the course assignment. The course is a connection between the courses in Engineering graphic and course projecting of specific courses.
Course content:
During the elaboration of the course project basic questions in connection with design and strength calculations of complex machine elements as shafts, housings, cylindrical, bevel and worm gears are discussed.
Teaching and assessment:
Work on the course project is carried out through weekly consultations, in the modern, hall equipped with computers 305B. There are individual assignments for projecting which are very different in construction and initial parameters. They are assigned in specific forms, which also include recommendations about the way and range of their fulfillment. The project contains two parts – calculating and graphical. The graphical part involves a general draft,a list of components and work schemes of non-standard details. The calculating part is formed as explanatory and calculation notes. The project goes trough several stages. Each stage is certified by the lecturer after a consultation. When the project is done, the student defends it in front of an audience. The defence is evaluated and the grade, considering also the evaluations of the course assignments, is formed as a final mark for the course in Course project for machine elements.

3272 Economics

ECTS credits: 4 **Weekly classes:** 3lec+1sem+0labs+0ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Economics, Faculty of business and management
Lecturers:
Assoc. Prof. Djanko Hristov Minchev, PhD, Dept. of Economics, tel. 888 557,
E-mail: Dminchev@ru.acad.bg
Assoc. Prof. Emil Georgiev Trifonov, Dept. of Economics, tel. 888 557
Abstract:
The course is concerned with the general problems, laws and categories of contemporary market economy. Thus, it creates a certain basis for the remaining economic courses. It also gives general knowledge, which is expressed in alternative ways of economic viewing and which forms and creates abilities for independent and expert choice in economic surroundings.A course prerequisite is knowledge of mathematics and it is related to concrete branch and functional economic courses.
Course content:
Introduction –economic system and fundamentals of the economic theory. Main economic issues. Market mechanism. Public sector and taxation. Demand and supply of individual markets. Consumer demands and behavior. Manufacture, company assets and expenses. Imperfect competition and supplying. Price formation and incomes dependence on production factors such as gross domestic product and economic growth. Economic cycles, unemployment and inflation. Microeconomic balance. Budget policy. Monetary policy. Foreign policy in the open-plan economics.
Teaching and assessment:
Material is taught in two ways – lectures and practical classes, which elucidate and develop further some of the issues discussed at lectures. Continuous assessment is carried out. It includes two test assignments and students' performance during the semester. Final assessment is the average of the above-mentioned components of evaluation.

3764 Automation and robotics in industry

ECTS credits: 5 **Weekly classes**: 2lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Veselin Vassilev Zajakov, MEng, PhD, Dept. of Machine Tools and Manufacturing;
tel. 888-712, E-mail : zajakov@ru.acad.bg
Abstract:
The course serves as a base of all procedures in automatization and robotization of technological processes in discrete industrial production. The aim of the course is students' acquisition of design abilities of robot feed devices, automatic test systems, reasonable choice of automation elements and resources for building "rigid" and "flexible" automatic systems using industrial robots.
Course content:
The course is general and covers the technological bases of automated production – productivity law; influence of overcyclic losses upon the time and productivity of automated production lines with different schemes of aggregation. It includes the following main topics: Control systems for machines with automated production cycle. Elements of automation. Automated orientation and feed devices. Automation of test systems. Industrial robots – structural schemes, kinematic connections and linkworks, stage of versatility and types of motion, comparative analysis of co-ordinate systems with respect of positioning precision. Flexible automated production systems (FAPS).
Teaching and assessment:
Main education procedures are lectures, laboratory classes and controlled course task. During the lectures the teacher can use multimedia and other facilities. For students' needs, at laboratory classes corresponding experimental equipment and methodical guides are available. Knowledge of lecture material and laboratory classes is tested regularly in a written form. At the end of the semester a written exam is carried out. A numerical estimation system of students' overall knowledge is developed. The final mark is formed after a discussion with the student.

3336 Materials Handling Engineering

ECTS credits: 3 **Weekly classes:** 2lec+0sem+1labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Theory of Mechanisms and Machines, Material Handling Engineering and Technologies, Agro-Industrial Faculty
Lecturers:
Assoc. Prof. Georgy Getsov Kenarov, MEng, PhD, Dept. of Theory of Machines and Mechanisms, Materials Handling Equipment and Technologies tel. 888 239, 888 664 e-mail: gkenarov@ru.acad.bg;
Pr. Assist. Toni Ivanov Uzunov, MEng, Dept. of Theory of Mechanisms and Machines, Material Handling Engineering and Technologies, tel: 888 239, 888 664, E-mail: tuzunov@ru.acad.bg.
Abstract:
The course acquaints students from the degree course Machine building and Tool building with the construction, the technical and exploitation parameters, the calculation bases and designing of material handling equipment, transport machines and devices by using the knowledge gained from the general technical courses and the specialized courses. The course contributes both to a designer's preparation of the future constructor engineer and to some specialization in designing materials handling equipment, which accompanies each manufacturing process.
Course content:
Introduction. Materials handling equipment and devices – classification, building elements; principle solutions and cinematic schemes; calculation, design and selection of elements; dynamic tests, selection of an engine and brake. Machines for non-stop transport - classification, parameters, elements and structure. Additional structures and equipment – structure; determination of main parameters. General information about systems of material handling engineering.
Teaching and assessment:
Lectures acquaint students with the main issues of the course. Various visual aids are used, like slides or OHP. Laboratory classes are conducted in the laboratory rooms of the department. There the students study the structure of different materials handling equipment and make tests. The exam starts with two questions, followed by an oral discussion.

3337 Materials Handling Engineering - course project

ECTS credits: 2 **Weekly classes:** 0lec+0sem+0labs+0ps+cp
Assessment: exam **Type of exam:** oral
Departments involved:
Department of Theory of Mechanisms and Machines, Material Handling Engineering and Technologies, Agro-Industrial Faculty
Lecturers:
Assoc. Prof. Georgy Getsov Kenarov, MEng, PhD, Dept. of Theory of Machines and Mechanisms, Materials Handling Equipment and Technologies tel. 888 239, 888 664 E-mail: gkenarov@ru.acad.bg .
Pr. Assist. Toni Ivanov Uzunov, MEng, Dept. of Theory of Mechanisms and Machines, Material Handling Engineering and Technologies, tel: 888 239, 888 664, E-mail: tuzunov@ru.acad.bg.
Abstract:
The course project gives students from the degree course Machine building and Tool building practical skills for designing material handling equipment The construction of basic mechanisms of widely used materials handling equipment is developed and design skills using prospectus materials, technical manuals, reference books and standards are also acquired. The project includes project calculation and selection of building elements of machine mechanisms with constructive development of a project, containing drafts of the general view of the machine and of some basic mechanisms, work drafts of characteristic details and explanatory calculation notes.
Course content:
General instructions for development of the course project. The place of the machine in a technological process. Basics of the rational construction of Material Handling Engineering, loading and ways of calculation, materials for manufacturing Materials Handling Equipment. Exploration of complete constructions. Drawing of cinematic schemes of a machine in several versions, analysis and choice of a version. Project calculation of machine mechanisms for selecting appropriate aggregates. Development of a version. Dynamic tests, selection of an engine, rough calculation and checking the elements of mechanisms.
Teaching and assessment:
For the development of the project, students have tutorials in a special room for course projects. Prospectus materials, technical manuals, reference books and standards are used. The fulfillment of separate tasks, given in the course assignment are controlled. The final mark is formed after a public defense of the project.

3338 Instrument Engineering Technologies

ECTS credits: 7 **Weekly classes:** 3lec+ 0sem+2labs+0ps+cw
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Mihail Kolev Karshakov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-309, E-mail: mkarshakov@ru.acad.bbg
Abstract:
The main goal of the course is for students to acquire knowledge and skills in using known technical means (machines, instruments and equipment) and processes that turn the billets into finished manufacturing and instrument engineering products. Students are also taught to apply the principles of combining surface quality properties with productivity of machining.
Course content:
Instruments as production objects. Accuracy of parts. Surface quality. Fixation of billets. Machining errors. Dimensional setup. Design of technological processes. Allowances for machining. Methods of finish machining. Other methods that influence the quality of parts. Technological and economic effectiveness. Technological processes for machining shafts, bushings, disks, gears, optical parts, and others typical for instruments. Basics of equipment design. Basics of assembly technologies.
Teaching and assessment:
Teaching is done through lectures, laboratory classes and out-of-class work. Continuous assessment is done through test papers. Lectures are visualized using a multimedia projector and an overhead projector. Laboratory classes are based on the provided necessary equipment and methods. The conditions for certifying the semester are established. The final grade is based on the result (number of points) of a written exam.

3339 Moulding Design

ECTS credits: 5 **Weekly classes**: 2lec+0sem+2labs+0ps+ p
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of Material Science and Material Technology,
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Valentin Ivanov Gagov, Department of Material Science and Material Technology,
tel. 888 778, E-mail: gag@ru.acad.bg
Abstract:
The course gives main knowledge and practical skills for designing technological mouldings, produced by casting, plastic deformation and welding. Prerequisites for this course are: Materials Science and Materials Technology, part 1 and 2, Applied Geometry and Engineering Graphics, part 1 and 2, Machine Elements, part 1 and 2, Design Methodology, Machine-building Technology, Metrology and Measurement Devices. The course gives basic knowledge about precise measurement and technological specifications of constructions, about design automation, about course and diploma projects, about the study for Master and PhD degrees and the engineering practice.
Course content:
Technological capabilities of production methods of casting, plastic deformation and welding of discrete moulding and ready parts. Technological analysis of the material, form, sizes and preciseness of ready parts. Basic knowledge about the technological design of mouldings and welded products. Contemporary means of technological analysis and design of mouldings.
Teaching and assessment:
Lectures are delivered by contemporary means of teaching and analysis of study material. Laboratory experiments, computer demonstrations and model technological calculations are made during practical classes. Continuous assessment is achieved by doing three tests. The course assignment contains technological design of mouldings for given particular products and ways for their manufacturing. Continuous assessment is formed from the results of the tests and the defense of the course assignment.

3340 Design of Machine Tools

ECTS credits: 4 **Weekly classes:** 3lec+0sem+1labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof. Stefan Dimitrov Velchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-451
Assoc. Prof. Petar Nedyalkov Angelov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-237, e-mail: pangelov@ru.acad.bg
Abstract:
The main goal of the course is for students to acquire knowledge and skills in the composition, design and calculations of characteristic units and parts of machine tools. Input courses are: Machine Parts, Cutting of Materials, Metrology, and Machine tools - Part I. Outputs are the courses of the master's degree curriculum as well as course and diploma projects.
Course content:
Introduction to design of machine tools. Main drives. Spindle units. Feed drives. High-speed displacement drives and precise displacement drives. Control systems. Workpiece and tools handling automatic manipulators. Base systems. Guidances.
Teaching and assessment:
The topics of lectures are applied during laboratory classes through individual processing the results from experiments, working out reports and solving problems; also through a chosen course assignment. Students individually and creatively apply their knowledge in the course assignment, using reference books and computers when calculating and designing units of machine tools. Continuous assessment is based on written tests. Depending on their results, the student may be exempt from solving problems at the exam which is written; the problems and the questions given are marked by points. The final grade depends on score and the continuous assessment grade.

3341 Optoelectronic and Laser Devices in Industry

ECTS credits: 4 **Weekly classes**: 3lec+0sem+1labs+0ps+p
Assessment: exam **Type of exam**: written
Departments involved:
Department of Physics, Faculty of Electrical Engineering, Electronics and Automation
Lecturers:
Assoc. Prof. Tamara Grigorievna Pencheva, PhD, Department of Physics; tel. 888 218
e-mail tgp@ru.acad.bg
Assoc. Prof. Todorka Zhekova Stefanova, PhD, Department of Physics; tel. 888 814.
Abstract:
The course aims at familiarising students with complex theoretical, methodological and apparatus problems in recent coherent and incoherent optics and optoelectronics, at introducing students to different application areas of optic and optoelectronics devices and systems.
Laboratory classes aim at creating skills for experimental investigation in applied optics and optoelectronics and solving practical problems connected with the application of modern optoelectronics and optic apparatus in instrument building.
Course content:
Basic properties and characteristics of optical radiation; incoherent optoelectronics; optical sources, photoreceivers; optrons; integrated optoelectronics; coherent optoelectronics: light amplification and generation, types of coherent light sources (lasers), comparison of their characteristics, laser emission control, coherent light propagation through the atmosphere and in optical waveguides; main application areas of optical, optoelectronics and laser systems and devices in industry. The emphasys is put on elemental composition and working principles of optic and optoelectronic devices, their basic parameters and specific application areas. The main principles of optical system design are considered.
Teaching and assessment:
Lectures give the main theoretical material, supported by some demonstrations of optoelectronics phenomena and processes. During laboratory classes students work independently and investigate particular optoelectronics phenomena, optoelectronics elements, devices and systems.
Knowledge on the material of the laboratory classes is tested regularly. The final mark is formed after a discussion with the student.
At the exam students answer two theoretical questions and do one laboratory exercise.

3342 Elements of Instruments II

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps+ca
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Engineering Mechanics, faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Nedka Stancheva, PhD, tel. 888478, e-mail: nedka@ru.acad.bg
Abstract:
The course acquaints students with the specific mechanisms of fine mechanics used in instruments, their application, main characteristics, and specificity of the choice of drive. The course provides students with the ability to analyze the properties of mechanisms and the ability to design instruments by calculations based on geometrical, kinematical, static and dynamical considerations.
Course content:
General questions of the structure and design of instruments. Electromechanical drives of instruments. Elements of instruments with continuous and discontinuous operation. Regulators of instruments. Dampers of instruments. Environment protection of instruments. Parametrical optimization of instrument structures.
Teaching and assessment:
lectures are illustrated with enough examples so that students can solve problems on their own during practical classes. The topics presented are visualized by slides, transparencies and natural models. During laboratory classes, the topics are illustrated by computer animations and practical problems are solved similar to the course assignments developed by students. The final mark is based on the course assignment mark and the mark of two tests. The course work has 40% of the final mark, while the tests have 60% of the final mark.

3280 Technical safety

ECTS credits: 3 **Weekly classes**: 2lec+0sem+1labs+0ps
Assessment: continuous assessment **Type of exam**: written
Department involved:
Department of Ecology and Environmental Protection, Agro-Industrial Faculty
Lecturers:
Assoc. Prof. Vladimir Tomov Vladimirov;PhD, Dept. of Ecology and Environmental Protection;
tel.: 44507 481 E-mail: vvladimirov@ecs.ru.acad.bg
Abstracts:
The course is with social and economic importance. The main objective of students is to acquire skills for analysis and synthesis of technical safety and organizing solutions in production processes and application of safety equipment.The activities to work out in the training course are assimilating the main terms, definitions and categories in risk and safety theory, the principles and methods of risk analysis of technical –production systems, risk sources, characteristics, actions, normalizing, measurements and evaluation of standardized in Bulgaria and internationally risk factors, assimilating the methods for creation of safety technical –production systems.
The course has entrance links with the courses of Physics, Chemistry, Material Science and outgoing links to compulsory and optional courses with specializing directions or with management purposes.
Course content:
Main terms and definitions. Risk management. Ergonomic fundamentals of technical and manufacturing safety systems. Subjective safety. Mechanical safety. Electrical safety. Electro-magnetic safety. Emission safety. Noise and vibration safety. Ray safety. Ecological safety. Fire safety. Damage, rescue and rebuilding technologies. Different safety activities.Social and economic effectiveness of safety.
Teaching and assessment:
Lectures are supported with examples in accordance with the specificities of the course. Laboratory classes are of experimental and investigation character. It is required that students be prepared in advance on the lecture themes , which is checked by questions. They also have to do two written tests on pre-given topics. The final mark is formed considering the results of both tests and successful participation in the practice sessions.

3344 Precision Dimensioning and Manufacturability of Structures

ECTS credits: 7 **Weekly classes:** 2lec+0sem+0labs+3ps+cw
Assessment: current assessment **Type of exam:** tests
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Ivan Zamfirov Ivanov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 822, e-mail: zamfirov@manuf.ru.acad.bg
Assoc. Prof. Milko Dimitrov Enchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 653, e-mail: milko@manuf.ru.acad.bg
Abstract:
The main goal of the course is to teach the formation of quality indexes, rational dimensioning of structures, and methods of achieving the desired precision, estimation and improvement of the manufacturability of created structures. Inputs are other general technological and specializing courses. Outputs are the diploma project and the engineering practice.
Course content:
Functional designation and links in products. Types of bases. Methods for parts dimensioning. Machines precision and cost. Precision capabilities of technological methods. Dimensional analysis of structures. Precision dimensioning of typical units and structures. Manufacturability of structures. Manufacturability assurance. Assembly and maintainability. Technological control of design documentation. Estimation of manufacturability.
Teaching and assessment:
Lectures link products quality and functional designation and the conditions for their manufacturing. From this point of view, the issues of precision dimensioning and manufacturability of structures are studied. Practical classes aim at solving practical problems or study and explore separate issues. The semester is certified if all reports have been submitted, the problems- solved, and classes fully attended. Continuous assessment is a result of the systematic work of students during the semester. The final grade is an average of two one-hour tests. It is subject to change by 0.5 depending on the individual work of the student.

3345 Materials Testing

ECTS credits: 5
Weekly classes: 2lec+0sem+2labs+0ps+ca
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Valentin Ivanov Gagov, MEng, PhD, Department of Material Science & Material Technology, tel. 888 778, E-mail: gag@ru.acad.bg.
Abstract:
The course aims at acquainting students with the characteristics of some mechanical properties of machine-building materials, with the peculiarities of materials, which have complex properties and with the methods of determination of the characteristics of these properties, with the selection of materials and with solving the problem of prognosis of the resource of machines and constructions.
Course content:
Parameters of the stressed and strained state of materials and criteria of determination of its critical state. Summarizing the results from static load tests. Methods of experimental investigation of materials mechanical properties at complex stressed state. Material testing in conditions different from the normal ones –impact loads, high and low temperatures, different media. Radiation exposure, defects caused by it, influence on the mechanical properties of structural materials. Cycling load test- high-cycling and low-cycling fatigue. Accelerated methods of determination of the fatigue limit of structural materials. Material resistance against fracture and methods of determination of its characteristics. Deformation properties of materials methods of determination of their characteristics. Specifics of testing precipitation hardened and eutectic composites, fibrous materials, laminates, polymers and ceramics. Material selection.
Teaching and assessment:
Different visual aids like slides and others are used for presenting lecture material. It is widened and consolidated during laboratory classes. The students' activity and participation during the laboratory classes is taken into consideration for forming the final mark.

3346: Design and development of automation equipment

ECTS credits: 5
Weekly classes: 3lec+0sem+1labs+0ps+cw
Assessment: exam
Type of exam: written
Department involved:
Department of Machine Tools and Manufacturing
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Pr. Assist. Prof. Ivanka Peeva, MSc, PhD, Dept. of Machine Tools and Manufacturing
tel. 888-712, e-mail: ipeeva@manuf.ru.acad.bg;
Assoc. Prof. Miroslav Stanchev Penchev, MSc, PhD, Dept. of Machine Tools and Manufacturing
tel. 888-683, E-mail: mpenchev@ru.acad.bg
Abstract:
The course introduces students to methods of development of equipment for automation and mechanization of discrete processes in different branches of industry. As a fundamental is used the knowledge from specific courses in technology and manufacturing design. The expected result is the ability of students to design independently simple devices for automation and their preparedness to participate in the development of complex machines and systems of machines for automated manufacturing in diploma projects and engineering practice.
Course content:
Basic principles and consequences in the project design. Calculations of project cycle diagrams. Design of mechanisms for supporting motions. Design of manipulation systems. Automation equipment in serial and mass production. The place of man in the automated systems of manufacturing equipment.
Teaching and assessment:
Main education procedures are lectures, laboratory classes and course assignment .Constant control is provided by means of control questions or entrance tests at the beginning of each class. For visualization of the ectures video materials are used and for the laboratory classes the necessary basis combined with the appropriate methodology are provided. At the end of the study term a written exam is carried out. A numerical system for students' overall knowledge estimation is developed. The final mark is formed after a discussion with the student.

3347 Electrical drives and power automation

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam:** written

Department involved:
Department of Automatics, Information and Control Engineering
Faculty of Electrical Engineering, Electronics and Automation

Lecturers:
Assoc. Prof. Venelin Iliev Ykav, MSc PhD, Department of Automatics, Information and Control Engineering, phone: 082/888 269, E-mail: iacov@ru.acad.bg

Abstract:
In the course Electrical drives and power automation, students study the basics of low voltage apparatus, contactors, motor protection, motors, electrical drives (DC and AC), as well as the means and methods of automation. Basic links exist with the courses Electrical engineering, Electronics, and diploma projects.

Course content:
The mechanical part of drives; Basics of drives – types of drives; motor characteristics; speed control. DC – drives; AC drives; Electrical drives of the type "Controlled rectifier – DC motor", Electrical drives of the type "Frequency inverter – AC motor", Softstarters; Protection units and power automation.

Teaching and assessment:
The basic forms of training are the auditory and the independent students' work. Auditory work includes lectures and laboratory practice. Industrial models, electrical drives, and specially developed trial-pieces are used in the laboratory practice. Classes are visualized with prospectus and company literature. Laboratory classes are conducted in a cycle. Attestation is given when all the lessons are attended. The final mark is formed from the written exam result and participation at laboratory classes. There is an oral testing if needed.

3348 Design of Metal Treatment Equipment

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+cw
Assessment: exam **Type of exam:** written

Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering

Lecturers:
Assoc. Prof. Antonii Enchev Mednev, MEng, PhD, Department of Material Science & Material Technology, tel. 888 311/210 E-mail: mednev@ru.acad.bg.
Assoc. Prof. Boris Rusev Mateev, MEng, PhD, Department of Material Science & Material Technology, tel. 888 307, E-mail: bmateev@ru.acad.bg.
Assoc. Prof. Mihail Rosinov Krustev, MEng, PhD, Department of Material Science & Material Technology, tel. 888 205, E-mail: mrkrustev@ru.acad.bg.

Abstract:
The course aims at acquainting students with the design of mechanisms, machines and equipment in the sphere of metal casting, plastic deformation and welding of metals. It gives basic knowledge about the main requirements toward the equipment in relation to its technical and economic parameters, about reliability, safety at work, maintenance and repairs. On this basis, issues connected with the design of main knots and mechanisms are discussed.

Course content:
Design of machines and equipment in the sphere of metal casting. Types. Design of machines and equipment for plastic deformation – main parameters; calculation of the main executive mechanisms; rotation machines; impulse machines and equipment. Design of main and additional welding equipment: general design issues; body-passing devices; devices for moving welding apparatuses; additional welding equipment for fitting, positioning, turning, welding.

Teaching and assessment:
Teaching is done by lectures and laboratory classes in the laboratories for metal casting, plastic deformation and welding. Continuous assessment during the semester is achieved by short oral discussion before starting the class. The exam is written and it includes three questions – one question from each section.

3349 Automation Devices

ECTS credits: 5 **Weekly classes:** 3lec+0sem+1labs+0ps+cw
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Pr. Assist. Prof. Ivanka Vasileva Peeva, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-712; E-mail: ipeeva@manuf.ru.acad.bg
Assoc.Prof. Miroslav Stanchev Penchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-712; E-mail: mpenchev@ru.acad.bg
Abstract:
The course is the basis for students to build a knowledge system about the methods of automatization of manufacturing equipment in instrument engineering. It prepares them to individually solve problems regarding the design of technical means and automatization systems.
Course content:
Introduction. Process analysis- object of automatization. Design sequence and types of tasks when designing automatization devices. Design of composition, synchronization of movements and development of kinematical schemes. Functions of mechanisms and choice of the law of movement. Mechanisms for progressive, cyclic, and interrupted movement. Choice of methods and means for automatic manipulation. Spatial and time orientation devices. Sorting, assembling and packaging devices. Manufacturing manipulators and miniature product robots. Group machining and product assembly devices. Trends in automatization devices development.
Teaching and assessment:
Lectures discuss the basic and principal issues of the curriculum, using examples from the engineering practice. Laboratory classes use the element base, existing in the computer integrated manufacturing systems laboratory. Students should come prepared for the classes, using a methodological hand-out. A course project is optional and is given individually. The exam grade is based on two written answers and a discussion of all the theoretical material from the lectures.

3350 Transducers in Mechanical and Instrument Engineering

ECTS credits: 5 **Weekly classes**: 2lec+0sem+2labs+0ps+cw
Assessment: exam **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Dr. Eng. Veselin Vassilev Zajakov Department of Machine Tools and Manufacturing;
tel. 888-712 E-mail : zajakov@ru.acad.bg
Abstract:
The course gives basic knowledge about sensitive elements for measuring mechanical and non-mechanical physical characteristics of objects for automatization and their environment, which is necessary for automation systems control. Students will be introduced to theoretical principles, design and operation regimes of sensors, their static and dynamic characteristics in main application fields.
Course content:
Introduction. Classification of automation elements. Static and dynamic characteristics. Signal sources and measurement schemes. Road transducers. Transducers for linear and angular movements. Velocity transducers. Force transducers. Transducers for dimensions. Temperature transducers. Transducers for level and consumption of fluids and loos materials. Transducers for sensibilisation of industrial robots.
Teaching and assessment:
Main education procedures are lectures, laboratory classes and controlled course task. During lectures the teacher can use multimedia and other facilities. For the needs of students at laboratory classes corresponding experimental equipment and methodological guides are available. Knowledge of the material of lectures and laboratory classes is tested regularly in written form. At the end of the study term a written exam is carried out. A numerical system of credits for students' overall knowledge estimation is developed. The final mark is formed after a discussion with the student.

3351 Measurement Devices

ECTS credits: 5 **Weekly classes**:2lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Branko Dushkov Sotirov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: bsotirov@ru.acad.bg
Abstract:
This is a fundamental subject for Machine and Instrument Building students. The main objectives of the subject are to teach students some basic terms, units, principles, methods and devices for measurement of geometrical units, mass, and mechanical units, temperature and thermal units, pressure, hydro-static and hydro-dynamic units, noise and vibrations, and other physical and mechanical units. The course also aims to teach students the main reasons for faults when measuring the above-mentioned units and the methods for improving the accuracy of measurement; to create practical skills for using measurement devices and equipment.
Input links with the courses of Higher Mathematics, Chemistry, Physics, Electrical Engineering and Technology, and Electronics, Mechanics of Fluids, Heat Engineering and Technology, Composite Parts of Devices, Metrology and Measurement Equipment.
Output links with the courses of Standardization, Certification and Intellectual Property, Production Practice, Final Year Project, etc.
Teaching and assessment:
Lectures are case-based and include the basic principles, methods and devices for measurement of the above-mentioned units.Laboratory classes include individual choice of a scheme, method, and measurement device, and acquiring practical skills like setting, measuring and checking basic and special devices, as well as using standards and specifications. The course finishes with a written exam, checking students' creative and practical thinking, applied in solving specific cases and problems. The final mark is formed after an oral interview (if needed).

3322 Quality Management and Control

ECTS credits: 4 **Weekly classes**: 3lec+0sem+3labs+0ps
Assessment: exam **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Tsvyatko Stanev Koriykov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: korijkov@ru.acad.bg
Abstract:
The course is a very important part of the curriculum for Manufacturing Technologies students. Through various forms of teaching it enhances students' knowledge and skills for applying the methods and techniques for quality management and control.
Course content:
Quality of a Product, Service and Process. Quality Management Principles. Ways of Expressing Quality. Process Management Cycle. Levels of Quality Management Processes. Expenses for Quality. Quality Improvement Methods and Techniques. Quality Control Plans and Systems. Quality Planning. Quality Assurance. Product Reliability.
Teaching and assessment:
The teaching process includes lectures and laboratory classes. During the laboratory classes each student works on his/her own following the tasks, specified in a report sheet, analyzes the problems and offers solutions and recommendations for solving them. The final mark is the average of the written exam and the laboratory report assessment.

3352 Organization and Management of a Company

ECTS credits: 4 **Weekly classes:** 4lec+2sem+0labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Yulian Penchev Mladenov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 405, 716, 84 20 07, E-mail: jmladenov@ru.acad.bg.
Abstract:
This is an integral course and encompasses some of the most important issues and problems among managerial sciences. The course takes into consideration the fact that it will be studied by engineering students. The main goal is to teach the basics in organizing and managing the activities in a modern company, as well as to facilitate using those skills in practice. The course is closely related to economic and technical courses. The knowledge acquired can be applied in the diploma project and the future work of engineers.
Course content:
Development of the science for managing a company. Marketing as part of company's activities. Strategic issues in company's development. Development of new products. Organizational and legal aspects of a company. Organization of the manufacturing process. Manufacturing management. Management of personnel. Strategic business planning.
Teaching and assessment:
Lectures give the knowledge needed for achieving the goal and the main objectives of the course. Seminar classes are practice- and- application- oriented. They aim at teaching students some basic managerial skills. The final grade is a result of a written exam. In order to give students equal chances they come to the exam at the same time and get three identical questions. The final mark depends on their answers. Each student can choose to take three tests during the semester. They are graded according to the six-grade estimation scale. The final mark is an average of the three tests.

3353 Computer aided design

ECTS credits: 4 **Weekly classes:** 3lec+0sem+3labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. prof. Peter Angelov, MEng PhD, tel.: 888-237, E-mail: pangelov@ru.acad.bg
Pr. Assist. Prof. Iwo Atanasov, MEng, tel. 888-469, E-mail: iwo@roboman.ru.acad.bg
Abstract:
The purpose of the course is to give students knowledge about the application of computers in the design process. Methods for geometrical modeling of parts or assemblies and general questions, connected to the creation of CAD systems, are considered. The course has input connections with the courses: Mathematics, Applied geometry and engineering graphics, Informatics, Machine details, Design methodology. The obtained knowledge is used in diploma projects.
Course content:
General information about the design of technical objects. Mathematical modeling in computer aided design. 2D-modelling. 3D-Solid modeling of parts and assemblies. Drawing Creation of parts and assemblies. Architecture and general principles of the CAD system creation.
Teaching and assessment:
Lectures give the main theoretical methods for geometrical modeling of parts or assemblies and possibilities for their realization. Students work, using computers and software, based on the methods, given during lectures. Each student has to solve individual tasks. A web-based manual gives students the opportunity for self-training in a computer room with a free-access schedule. At the exam students answer two theoretical questions and solve one task, connected with the part modeling. A discussion with the student can be carried out for the formtion of the final mark.

3354 Standardization, Certification and Intellectual Product

ECTS credits: 4 **Weekly classes:** 4lec+2sem+0labs+0ps
Assessment: current assessment **Type of exam:** written test
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Veselin Ivanov Grigorov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 508, E-mail: VGrigorov@ru.acad.bg
Abstract:
The main goal of the course is to teach the principles and methods of standardization and certification, as well as the forms of existence of intangible assets, the procedures for establishing them, acquiring such assets and the possibilities for their usage by companies.
Course content:
Principles and methods of standardization. Certification procedures. Quality-metric grades. Intellectual projects, procedures for establishing intellectual property and possibilities for its economical application.
Teaching and assessment:
The main issues discussed in lectures, regarding the principles and methods of standardization, certification, the establishment and usage of intangible assets, are demonstrated by examples and cases. Continuous assessment is based on two tests, carried out during the semester.

3355 Diploma Practice

ECTS credits: 4 **Weekly classes:** 0lec+0sem+0labs+10ps
Assessment: oral exam **Type of exam**: oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The diploma practice aims at giving students the opportunity to get acquainted with contemporary scientific and technical achievements in the sphere, in which they develop a diploma project and with the existing condition of the problem in the organization, which has suggested the topic for the diploma project.
Course content:
In relation to the topic of the diploma project, students get acquainted with literature sources, patents, inventions etc., with methods for theoretical and experimental investigations and the results from them; with constructive and technological solutions; with laboratory equipment, measurement devices, tools patterns, machines for mechanical treatment, casting, welding, plastic deformation and thermal treatment; with methodology for constructive and technological calculations; with software packages for solving engineering problems; with quality management systems, etc.
Teaching and assessment:
The diploma practice is carried out in the department laboratories, mechanical and mechanical-mounting workshops, constructive and technological offices or divisions of machine-building companies, libraries, etc. in relation to the topic of the diploma project and the organization, which has suggested it. The tasks of the practice are determined by the tutor of the diploma project and reported to him. The results from the practice are used in forming the literature reference of the diploma project and the development of its specific sections.

3356 Diploma Project

ECTS credits: 10 **Weekly classes:**
Assessment: defense **Type of exam**: oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The diploma project aims at giving students the opportunity to apply the obtained knowledge and skills in an independent and thorough development of engineering projects. The most common topics are connected with the design of machine-building technologies, design of technological equipment, design of automation devices, management and control of technological processes. Students who have excellent achievements are given topics with research character. The Final Year project gives the students practical skills and experience for their future engineering practice or for continuing their study in a Master degree course.
Course content:
Review of the information regarding the diploma project topic. Formulating the aim and tasks. Analysis of output and work conditions. Idea project or methodology of research. Design of machine-building technologies. Design of necessary equipment and devices. Running tests and processing results. Technical and economic analysis of the developed variants. Development of technical documentation and graphical representation of the results from the research.
Teaching and assessment:
The diploma project is developed following a given routine. Students work individually, using paper or electronically based information, the equipment of the department or other departments, and their instructor's help. The diploma project instructor assesses the level of involvement, the public and moral qualities of the student. The assessor evaluates the diploma project. Student defend the diploma project in front of the State Exam Committee and the open public. The State Exam Committee evaluates both the diploma project and the way it is defended.

UNDERGRADUATE STUDIES IN MATERIALS TECHNOLOGY AND MATERIAL SCIENCE

PROFESSIONAL STANDARDS
OF A BACHELOR IN

MATERIALS TECHNOLOGY AND MATERIAL SCIENCE

SUBJECT: **Materials Technology and Material Science**
Educational degree - **Bachelor's degree**
Professional qualification: **process engineer**
Term of education: **4 years (8 terms)**

The main objective of the study is to prepare contemporary and wide profile executive engineer staff in the area of engineering materials – selection, testing, research and evaluation, as well as in the technological processes for machining different materials. Under certain conditions the students have the basis and opportunity to continue their study with 1,5 years more and to receive the MASTER educational-qualification degree.

General and special training– the curriculum is based on the Unified State requirements for the degree course. During the first four semesters some basic and general technical courses are studied, which are the basis of modern engineering education, such as: Mathematics, Physics, Chemistry, Engineering Graphics, Informatics, Mechanical Engineering, Electrical Engineering and Electronics, Material Science, Machine Elements, Material Technology, Cristallography, and English Language, which is studied with much greater workload in comparison with the other degree courses from the professional stream of mechanical engineering. Great attention is paid to the special and specializing training during the second two years. The image of the degree is formed by some compulsory and electivev courses. The main compulsory courses are: Electrical and Physical Technologies, Thermal Machining of Materials, Metrology and Measurement Devices, Structure Analysis of Materials, Material Technology, Chemistry (polimery; corrosion), Manufacturing Technologies, Size Machining via Energy Influence, Economy, Automation of Production Processes, Testing of Machine Building Materials. There are three optional courses , which are chosen from a list of six courses and a course project. They are studied consecutively, only one per semester during the last three semesters.

The course of study finishes with the development and defense of the Final Year project. It is assigned at the end of the 7^{th} semester and it is elaborated during the 8^{th} semester. Therefore, the 8^{th} semester has a reduced duration of 10 weeks and it does not include active study forms (course assignments and projects).

The practical training of students (11 ECTS credits) consists of:
- Study practice in Manufacturing Technologies – during semester One and Two, 5 ECTS.
- Technological practice in manufacturing companies – 2 weeks during the summer holiday after semester Four, 2 ECTS.
- Diploma practice – during semester Eight, 4 ECTS.

General and special skills in :
- Correct selection of machine building materials by designing new items and appropriate change by replacing existing ones;
- Practical application of the main methodology and methods for testing materials and their properties;
- Technical management in introducing new and modern materials;
- Organisation and management of the separate stages of a technological process;
- Development of methodology and control means of the quality of materials and items;
- Use of computer software for engineering activities;
- Use of technical documentation and literature in English.

Career prospects:
The engineers, who have graduated the Bachelor degree course in Material Technology and Material Science can work for firms, companies, etc., which deal with research, design, production, maintenance and commercial activity in the sphere of machine building materials and the technology for their machining, as executive technological engineers, laboratory workers, metrology engineers, consultants, experts, researchers and managers of small and medium sized enterprises.

CURRICULUM

of the degree course in

MATERIALS TECHNOLOGY AND MATERIAL SCIENCE

First year

Code	*First term*	*ECTS*	*Code*	*Second term*	*ECTS*
1604	Mathematics 1	7	0984	Mathematics 2	6
0225	Chemistry	5	0141	Material Science I	6
0131	Physics 1	6	0134	Physics 2	5
1605	Informatics	5	2839	Engineering Graphics	6
2838	Study Practice	2	0541	Mechanics I	4
	Elective Foreign Language	5	2840	Study Practice	3
	Total for the term:	***30***		***Total for the term:***	***30***
1686	Sports	1	1686	Sports	1

Second year

Code	*Third term*	*ECTS*	*Code*	*Fourth term*	*ECTS*
3597	Mathematics 3	5	3603	Heat treatment of materials	6
3598	Material Science II	5	3605	Machine Elements	7
3599	Mechanics II	4	3606	Information Technologies in Mechanical engineering	4
3600	Mechanics III	7	3607	Engineering Chemistry	4
3601	Materials Technology I-A	5	3608	Electrical Engineering and Electronics	4
3602	Heating engineering	4	3604	Heat treatment of materials - course project	5
	Total for the term:	***30***		***Total for the term:***	***30***
1686	Sports	1	1686	Sports	1
			3609	Specialized practice – 2 w.	2

Third Year

Code	*Fifth term*	*ECTS*	*Code*	*Sixth term*	*ECTS*
3610	Materials Technology I-B	5	3617	Materials Technology II-A	6
3612	Material selection	5	3618	Electro-physical Technologies	5
3613	Metrology and Measurement Equipment	5	3619	Economics	4
3614	Crystallography	4	3620	Manufacturing technologies I	4
3615	Physical Methods for material analysis	6	3621	Technologies for welding and thermal cutting	6
3611	Materials Technology I-B – course project	2	3616	Dimensional Machining through External Action	3
	Elective courses (students elect a course)		3622	Technologies for welding and thermal cutting - course project	2
3623	Quality control and management	3			
3624	Rapid prototyping in manufacturing technologies	3			
3625	Technologies of Finish Machining	3			
3626	Computer aided design of metal-working tools	3			
	Total for the term:	**30**		**Total for the term:**	**30**
1686	Sports	1	1686	Sports	1

Forth Year

Code	*Seventh term*	*ECTS*	*Code*	*Eighth term*	*ECTS*
3627	Testing of the materials	5	3637	Diploma project fundamentals	4
3628	Production Processes Automation	5	3638	Structure, Organization & Management of a Company	5
3629	Technical Safety	3	3639	Diploma practice	3
3630	Materials Technology II-B	5		**Elective courses (students elect a course)**	
3632	Manufacturing technologies II	7	3642	Coating deposition methods	4
3631	Materials Technology II-B – course project	2	3641	Standardization, Certification and Intellectual Product	4
	Elective courses (students elect a course)		3643	Ecology management	4
3633	Rapid prototyping in metal working	3			
3634	Nano-technologies in mechanical engineering	3		**Graduation**	
3635	Special welding methods	3	3640	Self-dependent training	4
3636	Forging and blanking tools	3	3644	Diploma work	10
	Total for the term:	***30***		***Total for the term:***	***30***
1686	Sports	1	1686	Sports	1

Total for the training course: 240 ECTS credits

1604 Mathematics Part I

ECTS credits: 7 **Weekly classes**: 2lec+1sem+0labs+2ps+cw
Assessment: exam **Type of exam**: written
Departments involved:
Department of Algebra and Geometry, Faculty of Education
Lecturers:
Assoc. Prof. Docho Trifonov Dochev, PhD, Dept. of Algebra and Geometry, tel: 888 489;
E-mail: tcetcka@ami.ru.acad.bg.
Assoc. Prof. Stoycho Dimitrov Dimitrov, PhD, Dept. of Algebra and Geometry, tel: 888 453;
E-mail: tpeter@ami.ru.acad.bg.
Abstract:
The course is a basic one in engineering education. It uses the mathematical knowledge from secondary school and extends it on a higher level. It is essential for the next mathematical courses, like Physics, Mechanics, general and special engineering courses.
Course content:
Complex numbers and polynomials. Systems of linear equations and determinants. Matrix calculus. Line in plane. Lines and planes in space – forms of determining and common positions. Linear space and linear operators. Second order curves and surfaces. Functions and sequences. Limits and derivatives. Basic theorems of differential calculus. Applications of derivatives for investigating functions. Indefinite integral – definitions and basic properties; methods for calculation - integration by parts, integration by substitution, integration of rational, irrational and transcendental functions.
Teaching and assessment:
The theoretical basis of the topics presented at lectures is acquired at seminars through solving problems; individual practice and reinforcement is accomplished by weekly assignments. Three written tests are administered and students with grades above 4.50 are exempt from an exam and their mark is formed on the basis of an interview with the lecturer. Students are given six problems at the exam and they have to solve at least three to pass. Each student is required a course assignment. Its successful presentation at seminars and a regular class attendance are a necessary prerequisite to have a term validated.

0225 Chemistry

ECTS credits: 5 **Weekly classes**: 2lec+0sem+2labs+0ps
Assessment: exam **Type of exam**: written
Departments involved:
Department of Repair, Reliability and Chemical Technologies, Agro-Industrial Faculty
Lecturer:
Assoc. Prof. Petar Vassilev Kopchev, PhD, Dept. of Repair, Reliability and Chemical Technologies,
tel. 888 228, pkopchev@ru.acad.bg
Abstract:
The course helps students obtain particular knowledge of the structure of substances, chemical phenomena and processes, directly connected with engineering. Laboratory classes simulate these processes and show the way for their use or avoidance in engineering practice. The course achieves levelling of the students' previous knowledge of chemistry and provides necessary knowledge and skills for the next courses of Physics, Materials and Manufacturing Engineering, Strength of Materials, etc.
Course content:
Structure of materials, Metals and alloys, Electrochemical processes, Corrosion and metals protection, Dispersions, Surface phenomena.
Teaching and assessment:
Laboratory classes provide students with the opportunity to receive visual notion about important theoretical issues, such as: chemical properties of metals and alloys, the work of electric cells, electrolysis, surface phenomena, etc. There is a test control on basic topics at the beginning of each class, which could be either written or oral, with duration of about 15 minutes.

0131 Physics I

ECTS credits: 6 **Weekly classes:** 3lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam**: written
Departments involved:
Department of Physics, Faculty of Electrical Engineering, Electronics and Automation
Lectures:
Assoc.Prof.Dr. Nadezhda Marinova Nancheva, Department of Physics, tel. 888 219,
E-mail: nancheva@ru.acad.bg
Assoc.Prof.Dr. Parvoleta Ivanova Docheva, Department of Physics, tel. 888 219,
E-mail: docheva@ru.acad.bg
Abstract:
The course aims at familiarizing students with the physical character of processes and phenomena in nature and the methods for their investigation, with the most general properties of matter and material objects. Laboratory classes aim at creating skills for experimental investigation of physical phenomena and solving physical problems.
Course content:
Measuring physical quantities, Kinematics and Dynamics of a material point and rigid body, Interaction in nature, Work and energy, Mechanical preservation laws, Molecular physics and thermodynamics, Transfer phenomena, Periodic processes and waves, Electric field and electric current, Magnetic field and electro-magnetic induction, Optical phenomena, Atoms nuclei and elementary particles.
Teaching and assessment:
Lectures give the main theoretical material, supported by some demonstrations of physical phenomena and processes. At laboratory classes students work independently and investigate particular physical phenomena.
Knowledge of lecture material and laboratory classes is tested regularly. The final mark is formed after an exam in the form of a test.

1605 Informatics

ECTS credits: 5 **Weekly workload:** 1lec+0sem+0labs+3ps+ca
Assessment: continuous assessment **Type of exam:** test
Department involved:
Dept.of Informatics and Information Technologies, Faculty of Natural Sciences and Education
Lecturers:
Assoc. Prof. Margarita Teodosieva, PhD, Dept. of IIT, tel. 888 464, Email: mst@ami.ru.acad.bg
Sr.Assist Prof. Stoyan Donchev Chernev, PhD, Dept. of IIT, tel. 888 470, E-mail: stenly@ami.ru.acad.bg
Abstract:
The course objective is to introduce students to the computer with its components as technical aid, as well as to the most widely spread software products – operating systems, word processing systems, spreadsheet data processing systems, data bases, information systems, artificial intellect systems, computer graphics systems, computer aided design and manufacturing (CAD/CAM) systems. Workshops aim at providing students with knowledge about the use of the most widely spread application program systems – Windows, Word, Excel.
Course content:
History and classification of computers. Hardware. Operating systems. Application software. Word processing systems. Spreadsheets. Databases: relation database, database management systems, widely spread databases, data exchange and computer networks.
Teaching and assessment:
Lectures are taught in 2 academic hours every other week. Workshops are carried out in computer laboratories to practise theoretical knowledge under the guidance of the teacher. To get a feedback of students' progress the teacher makes a 10-minute-revision of the material taught at the beginning of the workshop by giving them a test, or making a concise written or oral testing. Students' practical knowledge of the application of currently studied software product is assessed at the end of every course section. Through course assignments students reveal whether they are able to apply independently the program systems. Students get assessment on course assignments that is considered for the total grade.
At the end of the semester students' theoretical knowledge is assessed through a test of 100 questions covering the whole material taught.
The semester grade is formed on the basis of the results from the main test, workshop performance and course assignment average grade.

2838 Technological training practice

ECTS credits: 2
Weekly classes: 0lec+0sem+1labs+3ps
Assessment: oral exam
Type of exam: practical and discussion
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Material Science & Material Technology,
tel. 888 211, E-mail: rus@ru.acad.bg.
Pr. Assist. Peter Stoykov Petrov, MEng, Material Science & Material Technology, tel. 888 316, 206
Abstract:
The course provides preliminary knowledge and practical skills on the main stages of technological processes for metal casting, welding, plastic deformation used in manufacture organization. The acquired knowledge and skills serve as basis for learning general and specific couses and the active educational forms connected with them.
Course content:
Bases of metal casting. Manual and machine moulding. Bases of metal welding. Manual electric arc welding. Plastic deformation processes. Open manual and machine forging.
Teaching and assessment:
Laboratory classes are held in the laboratories of the M&ME department. Practical classes are held in the training work-department, where the working places are prepared in advance. Students are divided in groups, each of which uses a separate working place. Control is carried out through an oral exam. A certain practical assignment is carried out, as well as a short discussion of a theoretical issue.

Foreign Language for the Material Science Course
1515 English; 1601 German; 1602 French; 1603 Russian

ECTS credits: 5
Weekly classes: 0lec+0sem+0labs+4ps
Assessment: continuous assessment
Type of exam: written and oral
Departments involved:
Department of Foreign Languages, Faculty of Law
Lecturers:
English: Senior Lecturer Diana Stefanova, Department of Foregn Languages;
E-mail: dstefanova@ecs.ru.acad.bg
German: Senior Lecturer Elmira Maksimova Maksimova, Department of Foreign Languages;
tel.: 888 824 E-mail: sbartenev@ecs.ru.acad.bg
French: Senior Lecturer Roumyana Ivanova Milanova, Department of Foreign Languages;
E-mail: rmivanova@ecs.ru.acad.bg;
Russian: Senior Lecturer Iliyana Gancheva Benina, Department of Foreign Languages;
E-mail: Ibenina@ecs.ru.acad.bg;
Abstract:
The foreign language module is aimed at achieving communicative competence in the area of the course and the future job. The teaching objectives comprise the development of reading comprehension skills to handle specialist texts and the acquisition of communication skills to interact successfully in professional settings and everyday situations.
Course content:
Meeting people. Talking about the present and the past. Writing instructions. Comparing things. Properties of materials. Describing processes. Searching for information in catalogues. Linking facts and ideas. Applying for a job. Infinitive and gerund. Passive voice. Mathematical symbols in engineering – reading formulae.
Teaching and assessment:
A wide range of authentic and specially constructed texts (articles, diagrams and tables, brochures, catalogues, manuals, etc.), as well as audio, video, and multimedia materials are used to acquire the necessary language knowledge and to develop skills in using the language as a means of communication. Students are offered lessons in computer laboratories, in which multimedia learning packages and on-line materials in Internet are used according to the modern trends in foreign language teaching.
In class students participate in role-plays, pair and group activities and they are encouraged to work on their own on their translation assignment. The oral examination covers the topics discussed during the semester. The semester grade is an average mark based on the marks from 2 tests administered during the term and the course assignment mark.

0984 Higer mathematics – Part 2

ECTS credits: 6 **Weekly classes:** 2lec+1sem+0labs+2ps+ca
Assessment: exam **Type of exam**: written
Departments involved:
Department of Mathematical Analysis, Faculty of Pedagogy.
Lecturers:
Prof. Doctor of Math. Sciences Stepan Agop Tersian, Dept. of Mathematical Analysis, tel. 888 226, 888587;
Assist. Prof. Julia Vancheva Chaparova, PhD, Dept. of Mathematical Analysis, tel. 888 226, 888587;
Assist. Prof. Rumen Nedkov Raev, Dept. of Mathematical Analysis, tel. 888 226.
Abstract:
The course Higher Mathematics - Part 2 is basic for the mathematical education in engineering sciences. It gets students acquainted with the basic notions of mathematical analysis such as definite integral, partial derivatives, double and triple integrals, and gives them computational abilities (including computations with mathematical software) to solve ordinary differential equations and systems, find extrema and integrate functions of two variables. This knowledge is necessary for the further study of higher mathematics – part 3, physics, computer sciences.
Course content:
Basic themes: definite integrals and applications, functions of two variables, ordinary differential equations and systems, multiple integrals, numerical series.
Teaching and assessment:
The educational process is realized by lectures, seminars and practical classes. In the lectures the educational material is theoretically presented and illustrated with proper example problems. In the seminars and practical classes, understanding of the educational material is controlled and skills for solving practical problems are developed. A term certification is obtained according to the Interval rules of educational activities. The exam test includes 6 problems and/or theoretical questions from the educational material.

0141 Material science I

ECTS credits: 6 **Weekly classses:** 3lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Diana Vasileva Tzaneva, MSc (Chem), PhD, Department of Material Science & Material Technology, tel. 888 307, E-mail: dvc@ru.acad.bg
Pr. Assist. Prof. Maria Ilieva Nedeva, PhD, Department of Material Science & Material, tel. 888 307
Abstract:
The course gives the fundamentals of material science. It is in relation with Physics I and Chemistry I. Material science I trains students for all technological courses and gives them groundings in Material science II, Crystallography, Structure analysis, Engineering Chemistry, Material testing, etc.
Course content:
Atoms, molecules and crystals. Imperfections in crystals. Mechanical, Electrical, Magnetic and thermal properties. Equilibrium phases and structure transformations in mono-component systems. Polymorphism. Binary and multi-component alloy systems – phase diagrams; Binary alloy diagram “iron – carbon”. Structural transformations in the solid state –recrystallization, grains growth, coalescence, spheroidization, equilibrium and non-equilibrium phase transformations.
Teaching and assessment:
Laboratory classes are devoted mainly to metallographical analysis; analysis of the equilibrium binary phase diagrams; non-phase structure changes – recrystallization; primary crystallization kinetics. During the semester students do a course assignment – analysis of a real binary diagram.

0134 Physics II

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam**: written
Departments involved:
Department of Physics, Faculty of Electrical Engineering, Electronics and Automation
Lectures:
Assoc.Prof. Nadezhda Marinova Nancheva, PhD,Department of Physics, tel. 888 219,
E-mail: nancheva@ru.acad.bg
Assoc.Prof. Parvoleta Ivanova Docheva, PhD, Department of Physics, tel. 888 219,
E-mail: docheva@ru.acad.bg
Abstract:
The course aims at familiarizing students with the physical character of processes and phenomena in nature and the methods for their investigation, with the most general properties of matter and the material objects. Laboratory classes aim at creating skills for experimental investigation of physical phenomena and solving physical problems.
Course content:
Measuring physical quantities, Kinematics and Dynamics of the material point and rigid body, Interaction in nature, Work and energy, Mechanical preservation laws, Molecular physics and thermodynamics, Transfer phenomena, Periodic processes and waves, Electric field and electric current, Magnetic field and electro-magnetic induction, Optical phenomena, Atoms nuclei and elementary particles. Solid state structure, Band theory, Thermal properties of solid state, Metal and dielectric in electric field, Electrical properties of materials, Contact phenomena, Magnetic field in matter
Teaching and assessment:
Knowledge of the lecture material and laboratory classes is tested regularly. The final mark is formed after an exam in the form of a test.

2839 Engineering Graphics

ECTS credits: 6 **Weekly classes:**1lec+0sem+0lab +4 ps+cw
Assessment: continuous assessment **Type of exam:** written
Departament involved:
Department of Engineering graphics, Faculty of Transport
Lecturer:
Assoc. Prof. Petar D. Pantileev PhD. MEng , Dept. of Engineering Graphics , tel.888-491
Abstract:
The course examines the methods and means of presentation of three-dimensional objects by plane images and ways of analysis , convert and optimize graphic images. It also examines the rules of carrying out and making plans, technical text documents; norms and instructions of Bulgarian and international standards considering drawing up technical documents. It develops the steric imagination of students and their skills to cope with technical documents .This course is a base of further learning of other technical branches of science.
Course content:
Kinds of projection. Comprehensive drawing . Reciprocal position of principal geometric objects. Conversion of a comprehensive drawing. Methods of projection. Reciprocal crossing of geometric objects. Images in drawings . Axonometric projection. Different connections – threaded, splinted and permanent connections. Drawing of a machinery piece – content , composition , images , measures , tolerance of dimensions ,method of indicating surface texture , text information .Special documentation of some technical products . Drawings of precast units. Item list. Text documents.
Teaching and assessment:
The theoretical subject matter read in lectures by didactic means, gives the needed base for conducting practical classes and course assignments .During the training problems are solved, instructions given, examples considered. For a course assignment students are required to do a number of plans.
The course ends with a continuous assessment grade , which is formed from the marks of two tests and the score of the course assignment .Atestation is given , according to the academic regulations, when the course assignment is carried out and the lectures and practical classes are attended.

0541 Engineering Mechanics 1

ECTS credits: 4 **Weekly clsses:** 2lec+0sem+0labs+1ps+p
Assessment: exam **Test type:** written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical. and Manufacturing Engineering
Lecturers:
Assoc. Prof. Venko Vitliemov, PhD, tel. 888 572, e-mail: venvit@ru.acad.bg .
Pr. Assist. Prof. Veselin Petrov, tel. 888 572, e-mail: vepetrov@ru.acad.bg .
Abstract:
Students get acquainted with methods studying different kinds of rigid-body motion, transformation of forces and studying the equilibrium of bodies. The course is a theoretical and methodological basis for modeling of discrete mechanical systems and application of engineering techniques for their study. Preliminary knowledge of Mathematics and Physics is necessary for this course. The course is fundamental for the engineering courses in Engineering Mechanics 2 and 3, Machine elements and machinery.
Course contents:
Particle kinematics. Translational, rotational, and plane motion of a rigid body. Relative motion of a particle. Equilibrium of a rigid body. Reduction of a system of forces. Equilibrium of a multi-body system. Equilibrium in presence of friction. Gravity center.
Teaching and assessment:
The lectures elucidate the theoretical bases of the studied topics, while their application is illustrated with examples. Numerical examples are solved in practical classes. Self-study is provided by preparing a paper. The paper is graded. Students' knowledge is assessed by a Testing System in Mechanics, which consists of two midterm (and supplementary) tests. All the assessed activities are included in the final grade.

2840 Practice in Manufacturing Technologies

ECTS credits: 3 **Weekly classes:** 0lec+0sem+1labs+3ps
Assessment: oral exam **Type of exam:** oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Ivan Kolev Ivanov, MEng, PhD, Department of Machine Tools and Manufacturing, Tel: 888-544, E-mail: kolev@ru.acad.bg.
Abstract:
The goal of the course is to give students practical skills and knowledge of the main machining processes, the machines and tools that are applied in them as well as various machining and assembling operations.
Course contents:
During laboratory classes students are made familiar with the organization, preparation and control of various machine tools, cutting tools, equipment and positioning of the parts or cutting tools on machines. During practical classes students carry out independent work on a Lathe, a Milling machine, a Drilling machine and a Shaper. In the bench department students lay out parts and carry out basic bench operations. Practical classes finish with making a test part following a drawing.
Teaching and assessment:
Laboratory classes correspond to practical classes. They are organized in such a way that students can have an access to the machines, tools and equipment and the needed setup. Practical classes are conducted in a training workshop. Each student is assigned a personal work place where he/she can produce test and real parts with relatively simple configuration.
Students' knowledge is assessed though discussions as well as during the practical and laboratory classes . The final grade is the result of a colloquium.

3597 Mathematics - Part III

ECTS credits: 5 **Weekly workload:** 2lec+1sem+0labs+1ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Numeric Methods and Statistics, Faculty of Education.
Lecturers:
Assoc. Prof. Ljuben Georgiev Valkov, PhD, Dept. of Numeric Methods and Statistics,
tel:888 466, home tel: 082- 622 - 566, E-mail :lvalkov@ru.acad.bg
Pr. Assist. Prof. Violetka Atanassova Kostova, Dept. of Numeric Methods and Statistics,
tel: 888 466, home tel: 082- 897-213, E-mail : vkostova@ru.acad.bg
Abstract:
The course is aimed at providing students with skills in processing data, obtained from experiments in the field of engineering, which requires the use of:

- Probability theory mathematical apparatus
- Mathematical statistics methods of experimental data processing
- MATLAB in practice

Course content:
The course includes elements from the probability theory, mathematical statistics, regression and correlation analysis, linear algebra numerical methods and mathematical analysis.
Teaching and assessment:
The training process is organized in lectures, seminars and practical classes. At lectures theoretical issues are presented and illustrated with appropriate exemplary problems, connected with students' degree course. At seminars students solve problems, connected with engineering practice and requiring the application of the theory of probality mathematical apparatus, as well as mathematical statistics.
Each student is required to do an individual course assignment.
The final course mark is formed on the basis of the following formula:
Final course mark = 3/4 the grade of the test + 1/4 the grade of practical classes.

3598 Material science II

ECTS credits: 5 **Weekly classes:** 2lec+0s+2labs+0ps+ca
Assessment : exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof, Ivan Dimitrov Dermendjhiev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 204, E-mail: ivadim@ru.acad.bg
Abstract:
The course gives knowledge about concrete technical materials. Students expand their knowledge about the specificities of phase transformations in them and their structures and properties.
Course content:
Iron-based alloys: steels – structures, properties, classification; cast irons, applications. Aluminum- based alloys. Copper-based alloys. Other metal alloys. Rocks, ceramics and other sintered materials. Glasses. Composites. Building materials. Advanced structural and tool materials.
Teaching and assessment:
Lectures are illustrated with multimedia products. During laboratory classes students carry out metallographic analysis of different materials. They also do a course assignment, including a literature review of concrete metal alloys, their structure and properties after different heat treatments.

3599 Engineering mechanics 2

ECTS credits: 4 **Weekly classes:** 1lec+0sem+0labs+2ps+ca
Assesment: exam **Type of exam:** written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical. and Manufacturing Engineering
Lecturers:
Assoc. Prof. Venko Vitliemov, PhD, tel. 888 572, e-mail: venvit@ru.acad.bg
Pr. Assist. Prof. Veselin Petrov, tel. 888 572, e-mail: vepetrov@ru.acad.bg.
Abstract:
Engineering Mechanics 2 (Dynamics) is a fundamental course, which is benefitial to the training of mechanical engineers. The main lows of dynamic behavior of discrete systems are studied here.
Preliminary knowledge of Calculus and Physics is necessary. The knowledge and skills gained in the course are theoretical and methodological basis for specific and specializing engineering courses.
Course contents:
Dynamics of a particle. Introduction into the dynamics of multi-body mechanical systems. Theorems in the dynamics of a particle and of multi-body systems. Kinetostatics. Impact.
Teaching and assessment:
The theoretical basis of the topics is presented in lectures and their application is illustrated with examples. Numerical examples are solved at practical classes by means of the program environment MATLAB. Self-study during the course is provoked by the courseassignment , which is graded. The student's knowledge is assessed by a Testing System in Mechanics, which consists of midterm, final, and supplementary tests. All assessed activities are included in the final grade.

3600 Technical mechanics III

ECTS credits: 7 **Weekly classes:** 3lec+0sem+1labs+2ps+cw
Assessment: continuous assessment **Test type:** tests
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical. and Manufacturing Engineering
Lecturers:
Assoc. Prof. Nedka Stancheva, PhD, tel. 888 478, e-mail: nedka@ru.acad.bg
Abstract:
The course provides students with a system of knowledge about calculation methods of assessment the advisability, reliability, and effectiveness of the shapes and dimensions of structural elements. Preliminary knowledge in basic Mechanics (Statics) and Mathematics is necessary. The course is fundamental for the following courses in design of specific machines.
Course contents:
Introduction. Basic terms and principles, stress, deflections, strain. Internal forces in trusses. Tension and compression. Testing materials, basic mechanical properties. Shear and crushing. Torsion of circular and noncircular bars. Moments of area of cross sections. Plane bending and 3D bending, deflections in bending, deflected axis of a beam. Non-axial tension and compression. Buckling of struts. 3D stress and strain. Failure criteria.
Teaching and assessment:
The theoretical basis of the topics, presented in lectures, is applied by students at practical classes solving problems of training. Students work out an individually assigned complex course assignment , which is graded on a two-week schedule. Students do three tests, which are graded. The final grade is accumulated from the grade of the tests and from the grade of the course assignment presentation . Regular attendance of classes and course assignment submission are the requirements for semester validation.

3601 Materials Technology I – A

ECTS credits: 5
Weekly classes: 3lec+0sem+2labs+0ps
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Anthony Enchev Mednev, MEng, PhD, Dept. of Material Science & Material Technology, tel. 888-311, E-mail: mednev@ru.acad.bg
Sr. Assist. Prof. Peter Varbanov Rachev, MEng, PhD, Dept. of Material Science & Material Technology, tel. 888-210
Abstract:
This course provides students with the fundamentals of contemporary technologies of obtaining materials most used in engineering industry. Equipment and processes for obtaining cast iron, steels, aluminum and copper are discussed, as well as powder metallurgy foundations.
Course contents:
Materials and processes in metallurgy. Ore preparation. Cast iron production. Steel production. Secondary metallurgy of steel. Special methods of obtaining high-quality steel. Aluminium and copper production. Foundations of power metallurgy.
At laboratory classes students acquire knowledge about the methods of analysing alloys chemical composition. Students work on metallurgical problems.
Teaching and assessment:
Teaching is carried out in two forms: lectures and laboratory classes. Three tests are conducted during the semester to improve students' training. At the laboratory classes discussions are carried out with students in order to monitor their self-preparation. Assessment is in the form of a written exam.

3602 Thermotechnics

ECTS credits: 4
Weekly classes: 2lec+0sem+2labs+0ps+p
Assessment: exam
Type of exam: written
Departments involved:
Thermotechnics, Hydro- and Pneumotechnics, Ago-Industrial Faculty
Lecturers:
Associate Professor Valentin Vasilev Bobilov, PhD, Dept. of Thermotechnics, Hydro- and Pneumotechnics, tel.: 888 844, E-mail: bobilov@ru.acad.bg
Abstract:
The course provides some fundamental knowledge of the main principles of thermotechnics ; it deals with the structure of heat generating equipment, the most economical methods of heat generation, its conversion and utilization in industry, agriculture and everyday life.
Good knowledge of Mathematics, Physics, Mechanics and Electrical engineering is a prerequisite for working successfully in this course.
Course contents:
Basic concepts of thermodynamics. First law of thermodynamics. Formulation of the first law of thermodynamics for open and closed systems. Specific heat capacity, thermodynamic bases of equilibrium conditions. Second fundamental law of thermodynamics. Mathematical expressions of the second law of thermodynamics. Entropy, convertibility and inconvertibility of processes. Thermodynamic consummation of processes, calculation of strength and energy. Thermodynamic processes of real gases. Heat exchange: basic concepts and definitions. Complex heat exchange and heat transmission. Heat insulation. Thermodynamics of a cooling machine.
Basic concepts of the drying process. Drying methods. Ventilation devices. Uncommon energy sources and methods for their utilization.
Teaching and assessment:
Lectures are meant to provide theoretical knowledge, which is extended at laboratory sessions. Students submit reports with the experimental data compiled during laboratory sessions as well as analysis and conclusions on the experiment results. Assessment is based on students' performance at laboratory sessions and their test results.

3603 Heat Treatment of Materials

ECTS credits: 6 **Weekly classes:** 2lec+0sem+2labs+2ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof, Plamen Simeonov Danev, MEng, PhD, Dept. Material Science & Material Technology,
tel. 0888 97 56 96, E-mail: plasida@ru.acad.bg
Abstract:
The course gives knowledge and skills necessary for the achievement of optimal properties of materials by heat treatment (HT). The relationship composition – structure – properties of materials, the theory and practice of heat treatment, the design of a technological process for heat treatment of a concrete material are studied.
Course content:
Nature of heat treatment, thermal operation and thermal process. Classification and types of HT steel and cast iron, annealing, hardening, tempering. Practice of HT of steel and cast iron, properties after different treatments. HT of non-ferrous metals and alloys, properties after annealing, hardening and tempering. Specificities of HT of sintered materials – ceramics, metal-based and metal-like sintered materials. Obtaining and HT of glass and cast rock materials. HT of polymers, elastomers and composites. Vulcanization. Quality control of materials after HT.
Teaching and assessment:
The teaching process consists of lectures and laboratory classes. At the beginning of each class students are asked about the concrete topic in short. Results from the classes are analyzed and summarized in a report. The latter is defended and can be used during the exam.

3604 Heat Treatment of Materials – course project

ECTS credits: 2 **Weekly classes:** 0lec+0sem+0labs+0ps+cp
Assessment: public defense **Type of exam:** defense
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof, Plamen Simeonov Danev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 0888 97 56 96, E-mail: plasida@ru.acad.bg
Sr. Assist. Prof. Danail Dimitrov Gospodinov, MEng, Dept. of Material Science & Material Technology,
tel. 888 778, E-mail: dgospodinov@ru.acad.bg
Abstract:
The aim of the training of students in this project, is to acquire, rationalize, develop and describe the essence and characteristics of a given thermal operation or a thermal process for an article of a machine-building material.
Course content:
- An assignment and a draft of the article;
- Characteristics of the article – geometrics, recommended material, original microstructure, properties;
- Specifying the standard regimes of preliminary, intermediate and final thermal processing;
- Choosing the appropriate thermal equipment and control means;
- Designing and developing the devices for putting the articles into the heating equipment. Making an assembly draft;
- Developing the transitions between the specific thermal operations;
- A micro-structural analysis of the material after conducting the operations;
- Choosing the methods and ways to control the quality after thermal processing;
- Filling in technological cards;
- Making a draft with the complete thermal equipment.

Teaching and assessment:
The teaching is carried out by:
- Tutorials;
- Individual work at home, the faculty labs, the University Library and the computer labs;
- Internal defense of the project in the presence of the instructor;
- Public defense of the project in the group or sub-group.

3605 Machine elements and Machine Science

ECTS credits: 7
Week classes: 2lec+0sem+2labs+1ps+cw
Assessment: exam
Type of the exam: written
Departments involved:
Department of Machine Science and Machine Elements, Faculty of Automotive and Transport Engineering
Lecturers:
Assoc. Prof. Torkom Norair Diulgerian, dept. of Machine Science and Machine Elements, tel. 888-461, E-mail: tomy@ru.acad.bg
Assoc. Prof. Ognian Lyoubenov Alipiev, dept. Of Theory of Mechanisms and Machines and Material Handling Engineering and Technologies, tel. 888-593, E-mail: oalipiev@ru.acad.bg
Abstract:
The goal of the course Machine elements and Machine Science is the study of the basic theories of mechanisms and machine elements, and the methods of their calculation and design.
Course content:
Strength of machine elements under static and variable loads, fatigue limit, permissible stress. Fasteners, welding, force fits, keys, splines and other connections. Axis and shafts. Plain surface and ball bearings. Automated, non-automated and automatic couplings. Mechanical drives. Calculations of cylindrical, planetary, bevel, worm, harmonics and other gear drives. Speed reducers. Chain and belt drives. Frictional drives and variators.
Teaching and assessment:
Lectures are held in front of a group of students. Continuous training is provided through control tests on different aspects of the educational process. Practical classes are held with subgroups in computer laboratories with specialized authors' software. There are posters,a library with standards and leaflets, real samples, etc. At laboratory classes various theories are visualized and proved. The course project is individual and is meant to design a cylindrical single stage speed reducer. While elaborating it students apply most of the lectures subject matter. Lectures are ordered in a way that reflects the stages in the design of a reducer. The topics of the practical classes also comply with the stages in the project develolopment

3606 Information Technologies in Mechanical Engineering

ECTS credits: 4
Weekly classes: 1lec+0sem+0labs+2ps+ca
Assessment: continuous assessment
Type of exam: written
Departments involved:
Dept. of Machine tools & Manufacturing, Faculty of Mechanical & Manufacturing Engineering
Lecturers:
Assoc. prof. Peter Angelov, MEng, PhD, tel.: 888-237, E-mail: pangelov@ru.acad.bg
Pr. Assist. Prof. Iwo Atanasov, MEng, tel. 888-469, E-mail: iwo@roboman.ru.acad.bg
Abstract:
The purpose of the course is to give students knowledge about the application of computers in the design process. Methods of geometrical modeling of parts or assemblies and general questions, connected with the creation of CAD systems, are considered. The course has input connections with the courses Mathematics, Engineering graphics, Informatics I, Machine details, Metals engineering I. The obtained knowledge is used in Metals engineering II, Rapid prototyping, Machining technology and diploma projects.
Course content:
General information about the design of technical objects. 3D-Solid modeling of parts and assemblies. 2D-drawings of the 3D-solid parts and assemblies. Creation of animations.
Teaching and assessment:
The teaching process is divided into lectures and practical classes in a computer lab, using appropriate software. There are individual work places for students. There is an oral test control on basic topics at the beginning of the classes. Self-study during the course is provoked by a course assignment, which is graded. Each student has to solve individual tasks in their assignment.

3607 Engineering Chemistry (Corrosion)

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps+ca
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Diana Vasileva Tzaneva, MSc (Chem), PhD, Dept. of Material Science & Material Technology, tel. 888 317, E-mail: dvc@ru.acad.bg.
Assoc.Prof. Petar Copchev, MEng, PhD, Dept. of Repair, Reliability and Chemical Technologies
Abstract:
The course gives knowledge about types of corrosive damages occurring in metals during their safe-keeping and service use as well as, about ways of restricting corrosive losses. The studied material needs knowledge of physics, chemistry, material science, technology of materials, heat treatment. Students acquire skills for correct choice of materials and methods of their anticorrosive protection in concrete work conditions.
Course content:
Corrosion – nature and types. Chemical and electrochemical corrosion. Corrosion potentials. Passivity. Polarization. Specifics of the corrosion in alloys. Nature of the local corrosion. Corrosive behavior of ferrous and non-ferrous metals. High corrosion resistance materials – polymers, ceramics, cements. Methods of anticorrosive protection: inhibitors, protectors, cathode and anode protection, coatings, correct design.
Teaching and assessment:
Lectures are illustrated with schemes, diagrams, graphics etc.The theoretical knowledge given in them is assimilated, specified and expanded at laboratory classes. Students are divided into groups of 3, each of them using a separate working place. Every class finishes with a written report. Continuous assessment is made using students' reports and on the scores from three tests on the lecture material.

3608 Electrical and Electronic Engineering

ECTS credits: 6 **Weekly classes:** 3lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam:** oral
Departments involved:
Dept. of Theoretic Electrical Engineering and Electrical Measuring,
Faculty of Electrical Engineering, Electronics and Automatics
Lecturers:
Assoc. Prof. Georgi Rashkov Georgiev, MSc, PhD, tel. 888 412, e-mail: grashkov@ru.acad.bg,
Assoc. prof. Svilena Vasileva Todorova, MSc, PhD, tel. 888 224, e-mail: svito@ru.acad.bg,
Pr. Assist. Prof. Docho Rusev Ivanov, tel. 888 501
Abstract:
The subject Electrical and Electronic Engineering is part of the curriculum of the bachelor degree course of non-electrical courses. The aim of the course is for students to get knowledge in the fields of Main Laws of Theoretical Electrical Engineering, Electrical Measurement of Electrical and Non-electrical Quantities, DC and AC Electrical Machines, Electronic semiconductors and schemes. It is necessary for students to have preliminarily knowledge from the courses of Physics and Mathematics. The knowledge of Electrical and Electronic Engineering is used in the next courses and when preparing the graduation paper.
Course content:
Basic elements and magnitudes of electrical circuits - DC and AC, Three-phase and magnetic circuits, Electrical measurements of electrical and non-electrical quantities, DC machines, Transformers, Synchronous and Induction AC Machines, Electronic Devices, the most used diagrams, Operational Amplifiers, Digital networks.
Teaching and assessment:
The teaching process is divided into lectures and laboratory classes. In the laboratory classes students can acquire practical knowledge. There is a test control on basic topics at the beginning of theclasses, which could be either written or oral, having a 15- minute duration. The purpose of test control is to help exam performance.

3610 Technology of materials I-B

ECTS credits: 5
Assessment: exam
Weekly classes: 2lec+0sem+2labs+1ps
Type of exam: written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 211, E-mail: rus@ru.acad.bg.
Abstract:
The course has the aim to acquaint students with materials and technological process for obtaining high quality machine parts via casting. Different types of cast alloys, their properties and opportunities for using them in metal casting are discussed. Interaction processes between casting form and moulding and methods of casting in constant metal forms are also discussed.
Course content:
Preparing cast alloys, physical properties, interaction of molten metals with gases and fire-resistant materials. Bases of the casting technology. Casting properties of metals and alloys. Materials for conventional and special moulding sands for single-casting moulds. Interaction processes between the mould and cast. Cast alloys, different alloys cast production. Special methods of casting. Defects in casts.
Teaching and assessment:
Teaching is done in the form of lectures and laboratory classes. Different visual aids are used for clarifying more complex technological charts. Part of the lecture material is further clarified during the laboratory classes. Some of them have research character.

3612 Material Selection

ECTS credits: 4
Assessment : exam
Weekly workload: 1lec+0sem+2labs+0ps+ca
Type of exam: written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Professor Valentin I. Gagov, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 778, E-mail: gag@ru.acad.bg
Assoc. Prof. Rosen Hristov Radev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 778, E-mail: rrad@ru.acad.bg
Abstract:
The course gives general knowledge and practical skills in the use of data base for the properties of contemporary materials, necessary for material selection of a concrete application. General knowledge of chemistry, physics, material science, strength of materials, informatics and material engineering is required. The subject is fundamental for the elaboration of a course assignment and graduation project.
Course content:
Mechanical, technological and running properties and characteristics of the materials. Selection of material using the Ashby's diagram. Definition of users' properties of products. Selection of material depending on the shape, running conditions and manufacturing technology of products. Economic, ergonomic and aesthetic requirements for the selection of material for a concrete product.
Teaching and assessment:
Lectures and laboratory classes are computer-based and carried out in a special hall. Modern software is used for lecture presentation and solution of standard problems. During the semester students are given assessments and two control tests are carried out. The results of the final assessments and tests are taken into account when forming the final rating.

3613 Metrology and Measurement Equipment

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+cw
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Cwiatko Stanev Korjikov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: korijkov@ru.acad.bg
Assoc. Prof. Boris Borisov Sakakushev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: bsak@ru.acad.bg
Abstract:
The course gives fundamental engineering and technical knowledge to students of Materials Science and Technology. Through various teaching methods it enhances their specific knowledge and practical skills in areas, such as Theoretical and Legislative Metrology, Methods and Equipment for Measuring Machine Parts, and Tolerance design.
Course content:
Theoretical bases of metrology. Legislative bases of metrology. Basic metrological properties of measurement devices. Selection of measurement devices. Primary transformers used in measurement Devices. Measurement of length. Design of geometrical tolerances of machine parts. Methods and measurement devices for cylindrical, conical, thread, key and groove surfaces. Control of gears. Measurement of the quality of a process.
Teaching and assessment:
Lectures are case-based and include the basic principles for tolerance design of machine parts. Each student is given a chance to measure specific typical machine parts with general and special measurement devices and to work with various standards for machine parts geometrical parameters. Each laboratory class starts with a test and includes preparation of a report. Based on a specific design drawing each student designs the fittings in a drawing, specifies and notes down the geometriacal tolerances of a chosen draft drawing of a machine part and chooses a measurement method and device. The course assignment includes explanatory notes and drawings. Continuous assessment is formed as the average of the first and second tests, and the mark of the course assignment.

3614 Crystallography

ECTS credits: 4 **Weekly classes:** 2lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** Test
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Parvoleta Ivanova Docheva, PhD, Department of Physics, tel: 888 306
E-mail: docheva@ru.acad.bg
Abstract:
For the scientific branch of crystallography 2 lectures and 2 practical classes per week are planned for the 4th semester. The course aims at familiarizing students with the fundamentals in contemporary crystallography. Three directions can be distinguished: geometrical crystallography; structural crystallography and chemistry of crystals; physics of crystals.
Course contents:
The course crystallography includes the following topics in three different directions: I direction – symmetry, elements of crystal symmetry; many-faced crystals; classes of symmetry; crystallography categories, classes; sample forms of crystals and their combinations; laws of geometrical crystallography. II direction – space crystal lattice; lattices of Bravais; atom and ion radiuses; coordination numbers; types of bonding in crystals; principles of the best compact packing of particles in structures; isomorphism and polymorphism; defects in crystal structures; reciprocal lattice; methods of crystals investigation. III direction – mechanical properties of crystals; sectility and hardness; thermal properties of crystals; electrical properties of crystals; magnetic properties of crystals; optical properties of crystals. Practical classes correspond to the above-mentioned directions and topics. They cover the following experimental directions: goniometry; X-ray radioscopy; polarization microscopy.
Teaching and assessment:
Lectures give students the chance to be introduced to the theoretical bases of modern crystallography. Pracrical classes bring theory and practice together. A report on every class is required from students. Final grading is given after a test exam.

3615 Physical methods of materials study

ECTS credits: 6 **Weekly classes**: 3lec+0sem+2labs+0ps+ca
Assessment: exam **Test type**: written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Docho Danev Dochev, MEng, PhD, tel. 888 306; 358, E-mail: ddochev@ru.acad.bg.
Abstract:
The goal of the course is to acquaint students with the cardinal methods and most frequently exploited methodical approaches used in lab practice as well as tomake analysis of the structure of used materials and their products. Metallographic, X ray analyses, electron-microscopy and other methods of researching the structure, the phase and chemical composition of materials are discussed. Knowledge of physics, chemistry, material science and crystallography serves as input to the course, and output to all technical courses as well as the practice of future specialists.
Course contents:
Metallographic analysis. Optical Metallographic microscope - arrangement and opportunities. X ray analysis: Basic equations and methods of making X ray diffraction patterns; Arrangement of X ray diffractometer, qualitative and quantitative phase analysis. An X ray method of determination of residual stresses of first class (macro stresses) and second class (micro stresses). An X ray texture analysis. Transmission electron microscopy, preparation of thin foil specimens for electron-microscopic observation, electrographic analysis. Scanning electron microscope. Qualitative micro-X ray analysis of a point, line and area. Quantitative micro-X ray analysis. Electronic and ionic methods of analysis of surfaces and thin layers. Thermal, differential and dilatometric analysis.
Teaching and assessment:
Training is organized in the form of lectures and laboratory classes. At the beginning of each class some minutes are spent expanding the theoretical subject matter by the teacher. Control on the acquired material presented during the semester is carried out by three tests and a course task.

3611 Technology of materials I-B – course project

ECTS credits: 2 **Weekly workload:** 0lec+0sem+0lab+0ps+cp
Assessment: project **Type of exam:**
Departments involved:
Dept. of Material Science & Materials Technology, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Dept. of Material Science & Materials Technology,
tel. 888 211, E-mail: rus@ru.acad.bg.
Abstract:
The course project has the aim to give basic knowledge necessary for the development of a technology of casting a machine part. The project presents the main activity, which must be done by a technological engineer in foundry.
Course content:
The project consists of specification of the casting chemical composition so that definite mechanical characteristics can be obtained; calculation of stress and design of the technology of a cast mould; dimensions of casting patterns and gating system, pattern plates, core boxes and boxes; making cast drawings, pattern and pattern plate drawings in necessary views and core box drawings; a scheme of the cast mould.
Teaching and assessment:
Students use a methodological instruction manual and they are consulted by the lecturer at given stages of the project. The final mark is formed on the basis of the project presentation. Students' active participation during tutorials is also taken into consideration for the final mark.

3623 Quality Management and Control

ECTS credits: 3 **Weekly classes**: 2lec+0sem+1labs+0ps+p
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Tsvyatko Stanev Koriykov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: korijkov@ru.acad.bg
Abstract:
The course is a very important part of the curriculum for Material Science and Technology students. Through various forms of teaching it enhances students' knowledge and skills for applying methods and techniques of quality management and control.
Course content:
Quality of a Product, Service and Process. Quality Management Principles. Ways of Expressing Quality. Process Management Cycle. Levels of Quality Management Processes. Expenses for Quality. Quality Improvement Methods and Techniques. Quality Control Plans and Systems. Quality Planning. Quality Assurance. Product Reliability.
Teaching and assessment:
The teaching process includes lectures and laboratory classes. During the laboratory classes each student works on his/her own while following the tasks, specified in a report sheet, analyzes problems and offers solutions and recommendations for solving them. The final mark is an average of a written exam and laboratory report assessment.

3624 Rapid prototyping in manufacturing technologies

ECTS credits: 3 **Weekly workload:** 2lec+0sem+0labs+2ps+p
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of 'Machine Tools and Manufacturing', Faculty of Mechanical and Manufacturing Engineering
Lecturers:
1. Principal Assistant Aleksandar Kirilov Ivanov PhD, Department of „Machine Tools and Manufacturing",
Tel: 888-714, E-MAIL: akivanov@ru.acad.bg
Abstract:
The main goal of the course is to teach students state of the art methods and constructions, technological capabilities, exploitation and application of the Rapid Prototyping Systems as part of mechanical engineering. With the help of the course students acquire knowledge and skills for rapid tooling, and creating 3D CAD models, using state of the art 3D Scanning Systems.
Course content:
Lectures introduce state of the art Rapid Prototyping Technologies and Equipment. Advantages and disadvantages of the different techniques. Overview of the differences in the 3D modeling according to detail's: shape, configuration and dimensions, when different Rapid Prototyping methods are applied. Lectures give knowledge about future trends in exploitation, improvement and development of the Rapid Prototyping Systems.
Teaching and assessment:
Lectures are carried out in blocks of two classes every week, laboratory classes are carried out in blocks of two periods every other week. The theoretical material from the lectures is applied during the laboratory classes. An output of all classes is a fully functioning prototype. The final grade is based on tests, covering the material from the lectures, as well as the laboratory classes. The process of continuous assessment is done if a minimum of 30 are points gained during the semester.

3626 Computer aided design of the metal working tools

ECTS credits: 3 **Weekly classes:** 2lec+0sem+1labs+0ps+p
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine tools & Manufacturing, faculty of Mechanical & Manufacturing Engineering
Lecturers:
Assoc. Prof. Peter Angelov, MEng PhD, tel.: 888-237, E-mail: pangelov@ru.acad.bg
Annotation:
The purpose of the course is to give students knowledge about some special possibilities of CAD-systems, connected with metal working. On the basis of the knowledge obtained in the course Information Technologies in Mechanical Engineering and specialing courses, students are familiarized with special modules for welding structures design, sheet metal and mold design. Learning process is based on CAD-system SolidWorks, such modules are available in other well-known CAD-systems.
Course content:
Welding structures –peculiarities of sketches, choice of structural members (profiles), corner treatment, weld beads, gussets, end caps, custom profiles creating, specialty of the drawings. Sheet metal modeling – modeling technology, bends creating, Hems, closed corners, corner breaking/trimming, flattening of Sheet metal bends, Forming Tools, specialty of drawings. Mold design – draft analysis and scaling of the part, parting lines and parting surfaces, Shut-off surfaces, interlock surfaces, Tool Split, Side cores.
Teaching and assessment:
The teaching process is divided into lectures and classes in a computer room, using appropriate software. There are individual work places for students. There is an oral test control on basic topics at the beginning of classes. The final course grade is formed on the basis of 3 control tests, one per module, conducted during the term

3617 Materials processing technology II-A

ECTS credits: 6 **Weekly classes:** 2lec+0sem+2labs+0ps+cw
Assessment : exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Valentin I. Gagov, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 778, E-mail: gag@ru.acad.
Abstract:
The course is to give basic knowledge in the theory, technology and practice of plastic deformation of metals allowing planning and over working of both bulk and sheet metal processes. As a pre-requisit, knowledge in Physics, Mathematics I and II, Material Science, Mechanics-II (stress and strain analyses) is required. It is a basic course for the degree courses in Production Engineering and Material Science Engineering. It also assists the final project course and engineering practice.
Course content:
Basic knowledge of Physics and Mechanics of plastic deformation of metals.
Analysis and planning of bulk (forging, closed-die forging, rolling, drawing and extrusion) and sheet-metal forming(shearing, bending and deep-drawing) processes.
Brief introduction into machines for plastic deformation of metals.
Modern varieties of the processes and development of these technologies.
Teaching and assessment:
All modern facilities are applied during lecturing and work in laboratories.At laboratory classes different appliances and computer simulation are used. Twice per semester control tests are carried out and the results are considered at the exam.
The examination is written. According to the student's desire, a conversation aimed at precise score assessment is possible.

3618 Electrophysical technologies

ECTS credits: 5
Weekly classes: 2lec+0sem+2labs+0ps+ca
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof Rusko Ivanov Shishkov, MEng, DSc, PhD, Dept. of Material Science & Material Technology, tel. 888 204, E-mail: rish@ru.acad.bg
Assoc.Prof, Ivan Dimitrov Dermendjhiev, MEng, PhD, Dept. of Material Science & Material Technology, tel. 888 204, E-mail: ivadim@ru.acad.bg
Abstract:
The course is devoted to electrophysical technologies for surface treatment with high-concentrated power beams. It includes laser, electron beam and ion surface heat treatment; plasma assisted surface saturation with metalloids (PACVD); plasma metallizing and plating; ion implantation. The course requires knowledge of physics, material science, electrical engineering and electronics.
Course content:
Laser sources, influence of laser radiation, laser technologies for surface treatment. Electron beam sources, interaction between the beam and the treated surface, electron beam technologies for surface treatment. Ion sources, interaction between ions and the treated surface. Ion technologies for surface heat treatment, surface chemical heat treatment, surface cleaning, metallizing and plating, ion implantation and plasma vacuum diffusive metallizing (PVDM).
Teaching and assessment:
Lectures give theoretical grounds. During laboratory classes students acquire practical skills and carry out experiments. The results are analyzed and summarized in a report. Continuous assessment includes two tests. Training finishes with an exam.

3619 Economics

ECTS credits: 4
Weekly classes: 2lec+2sem+0labs+0ps+p
Assessment: continuous assessment
Type of exam: written
Department involved:
Department of Economics, Faculty of Business and Management
Lecturers:
Assoc. Prof. Dianko Hristov Minchev, MEcon, PhD, Department of Economics, tel: 888 557
E-mail: DMinchev@ru.acad.bg
Assoc.Prof. Emil Georgiev Trifonov, MA, PhD; Department of Economics; tel.: 888 557
Abstract:
The Economics course considers the fundamentals and problems of modern market economy. In this way it creates a basis for all the other economic courses, as well as general economic culture, which is expressed in forming an alternative way of economic thinking and capabilities of making an independent choice in the market environment. These characteristics make it a necessary stage in every economic training of an academic character. Knowledge of mathematics is a prerequisite for Economics that, in its turn, is a prerequisite for some specialist economic courses.
Course content:
Introduction – fundamentals of the economic theory. Market mechanism. Consumer behavior. Production, expenses and income of a firm. Imperfect competition and offering. Priceforming of manufacturing factors. Gross domestic product (GDP) and economic growth. Economic cycle, unemployment and inflation. Budget and monetary policy.
There is a written report presented at the end of the course.
Teaching and assessment:
Teaching is organised on the basis of lectures and classes, which further deepen some of the questions discussed at the lectures. Participation of students in seminars is accomplished by oral reports and essays, prepared by the students as their own choice or assigned as tasks by the lecturer. Assessment is continuous. The semester final mark is an average of the results of the term tests adding up to 0,25 points for the written report and 0,5 for individual performance.

3620 Manufacturing Technologies I

ECTScredits: 4 **Weekly classes:** 2lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Stefan Veselinov Vichev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888451; e-mail: svichev@ru.acad.bg
Abstract:
The course gives general information and skills about the methods, tools, and machines for machining various machine parts. Review of the design stages of technological processes.
Course content:
General information and theoretical bases of metals cutting process, machine tools and cutting tools. Methods and processes of cutting– turning, scraping, slotting, drilling, hole-enlarging, reaming, pull-broaching, push-broaching, boring, milling, grinding, treading, gear-cutting. Design of machining technological processes.
Teaching and assessment:
Lectures inform students theoretically. Individual preparation, based on recommended literature sources and involvement at laboratory classes is of great importance. In order to optimize students' preparation, the exam questions are divided into three groups of difficulty. Depending on the group of questions the student falls in, he/she gets the corresponding grade.

3621 Technology for welding and thermal cutting

ECTS credits: 6 **Weekly classes:** 2lec+0sem+2labs+1ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Mladen Tsvetanov Trifonov, MEng, PhD, tel. (+359 82) 888 206,
E-mail: mtr@ru.acad.bg.
Abstract:
The course is intended to give basic engineering knowledge and skills in the technology of welding and thermal cutting. The most widely used in practice "classical" technologies in welding - gas-plasma, electroresistance and electro arc are considered. Attention is paid to the most frequently used welding technologies related to thermal cutting.
Course content:
Lectures include 15 topics in two sections. In the Welding Technologies section will be considered classical welding technologies, main groups of metal materials and their behaviour in welding and basic concepts of quality control and quality of existing products. In the section Technologies in thermal cutting, gas-plasma technologies, plasma and laser cutting and cutting with water current are included. Laboratory classes include 10 topics, 9 of which cover lecture material on the first section and 1 - on the second. Practical classes are 3 and are held in Ruse-based companies.
Teaching and assessment:
Continuous assessment of the acquisition of the study material is done by 2 control tests on material from both lectures and laboratory classes- through oral questions at the beginning and checking work at the end of eachclass.Final grading is a written examination with possible exemption from it.

3622 Technology for welding and thermal cutting - Course Project

ECTS credits: 2 **Workload per week:** 0l+0s+0labs+0ps+cp
Assessment: **Type of exam:**
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Mladen Tsvetanov Trifonov, MEng, PhD, tel. (+359 82) 888 206,
E-mail: mtr@ru.acad.bg.
Abstract:
The course project aims at developing and applying acquired through lectures, laboratory and practical classes knowledge and skills in the course with the same name, studied in parallel during the semester. To achieve this aim each student receives an assignment to develop a technology for welding a specific detail / unit / part of a standard product /beam, reservoir, etc.
Course content:
The course project includes 2 parts: explanatory note and graphic part. In the explanatory note is selected the type of existing compounds, methods of welding, the shape and dimensions of the source material and parts, methods and tools for cutting, the sequence of assembly and welding tools and the necessary standard equipment for this, the tools and procedures of welding, methods and means of quality control. Standard welding procedures WPS and WPL are drawn up. The graphical part includes drawing up a weld drawing.
Teaching and assessment:
Students are set a schedule of consultations with the Project Manager. He examines and evaluates the implementation of tasks, the accuracy of the results and quality of work done by students in their performance. The final assessment on course project is based on:

- Presentation of the project in front of the Project Manager and the group;
- continuous assessment of the project implementation during the semester.

3616 Dimensional Machining through External Action

ECTS credits: 3 **Weekly classes:** 2lec+0sem+1labs+0ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc Prof. Julian Penchev Mladenov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 405
Pr. Assist. Prof. Dimitar Stefanov Dimitrov, MEng, Department of Machine Tools and Manufacturing,
Tel: 888 653 dimitar@manuf.ru.acad.bg
Assoc. Prof. Milko Dimitrov Enchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 653, milko@manuf.ru.acad.bg
Abstract:
The course teaches students basic issues regarding the implementation of electro-physical methods for dimensional machining of parts. Special attention is paid to the study of technological possibilities, areas of application, influence of processes parameters on the quality and productivity of machining. Inputs are Physics, Chemistry, Electrical Engineering, Materials Science and Manufacturing Technologies. The course provides basic knowledge about machining technologies.
Course content:
Classification and characteristics of electro-physical methods for machining. Laser, electro-erosion, ultrasound and magnet-abrasive machining. Areas of application of the afore mentioned methods. Design of machines (devices) used for electro-physical machining. Process factors and parameters affecting precision, roughness and productivity. Design and manufacturing of non-standardized technological equipment. Programming for numeric machines.
Teaching and assessment:
The theoretical material taught in lectures is tested at laboratory classes. Students should come to laboratory classes prepared beforehand. Regular attendance of laboratory classes and submission of laboratory reports are needed for verifying the semester. Each student is allowed to take two tests if he /she wishes not to sit for an exam. Only certified students are allowed to take the exam. It begins with written answers to two questions and finishes with an oral discussion.

3627 Materials Testing

ECTS credits: 5
Weekly classes: 2lec+0sem+2labs+0ps+p
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rosen Hristov Radev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 778, E-mail: rrad@ru.acad.bg.
Abstract:
The course aims at acquainting students with the properties of materials, classification of these properties, methods of determining their characteristics and ways of presenting and using the results from their experimental determination.
Course content:
Materials, mechanical properties of materials, static tests at normal conditions of load, dynamic tests, short-time tests at high temperatures, physical nature of elasticity, specificities of the elastic behavior of metals and alloys, cyclic load tests, long-time tests at high temperatures, physical nature of brittle fracture, technological tests.
Teaching and assessment:
Lectures are delivered by using a variety of visual aids, like slides. Multimedia packages are also used. Students' knowledge is widened during laboratory classes. Students' active participation is taken into consideration. The course assignment aims at consolidating students' knowledge, connected with the topics of lectures and laboratory classes, it aims also at giving skills for organizing and running a test and for analyzing the obtained results. At the end of the semester there is an oral exam on topics from a questionnaire, which is given in advance. The final mark is formed as a total mark from the marks of the course assignment and the oral exam. Students' perfoemance during the semester is also taken into consideration.

3628 Automation of production processes

ECTS credits: 5
Weekly classes: 2lec+0sem+2labs+0ps+p
Assessment: exam
Type of exam: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Dr. Eng. Veselin Vassilev Zajakov, Dept. of Machine Tools and Manufacturing;
tel. 888-712, E-mail : zajakov@ru.acad.bg
Abstract:
The course gives knowledges about automatization and robotization of technological processes in discrete industrial production. The aim of the course is acquisition of students' ability for design of robot fed devices, automatic test systems, for reasonable choice of automation elements and resources for building "rigid" and "flexible" automatic systems using industrial robots.
Course content:
Technological basis of automated production – productivity's law; influence of overcyclic losses upon the time and the productivity of automated production lines with different schemes of aggregation. Control systems for machines with automated production cycle. Elements of automation. Automated orientation and feed devices. Automation of test systems. Industrial robots – structural schemes, kinematic connections and linkworks, stage of versatility and types of motion, comparative analysis of co-ordinate systems with respect of positioning precision. Flexible automated production systems (FAPS).
Teaching and assessment:
Main education procedures are lectures, laboratory exercises and controlled self-dependent training (course task). During the lectures teacherc can use multimedia and other facilities. For students' needs at laboratory classes corresponding experimental equipment and methodical guides are available. Knowledge of material of lectures and laboratory classes is tested regularly in written form. At the end of the study term a written exam is carried out. A numerical system for students' overall knowledge estimation is developed. The final mark is formed after a discussion with the student.

3629 Technical safety

ECTS credits: 3 **Weekly classes**: 2lec+1sem+0labs+0ps+p
Assessment: continuous assessment **Type of exam**: written
Department involved:
Department of Ecology and Environmental Protection
Lecturers:
Assoc. Prof. Vladimir Tomov Vladimirov;DSc, Dept. of Ecology and Environmental Protection
tel.:888 481 e-mail: vtomov@ru.acad.bg
Abstract:
The course is with social and economic importance. The main objective of students is to acquire skills for analysis and synthesis of technical safety and organizing solutions in production processes and application of safety equipment.The activities to work out in the training course are assimilating the main terms, definitions and categories in risk and safety theory, the principles and methods of risk analysis of technical –production systems, risk sources, characteristics, actions, normalizing, measurements and evaluation of standardized in Bulgaria and internationally risk factors, assimilating the methods for creation of safety technical –production systems.
The course has entrance links with the courses of Physics, Chemistry, Material Science and outgoing links to compulsory and optional courses with specializing directions or with management purposes.
Course content:
Main terms and definitions. Risk management. Ergonomic fundamentals of technical and manufacturing safety systems. Subjective safety. Mechanical safety. Electrical safety. Electro-magnetic safety. Emission safety. Noise and vibration safety. Ray safety. Ecological safety. Fire safety. Damage, rescue and rebuilding technologies. Different safety activities.Social and economic effectiveness of safety.
Teaching and assessment:
Lectures are supported with examples in accordance with the specificities of the course. Laboratory classes are of experimental and investigation character. It is required that students be prepared in advance on the lecture themes , which is checked by questions. They also have to do two written tests on pre-given topics. The final mark is formed considering the results of both tests and successful participation in the practice sessions.

3630 Materials Processing Technology II-B

ECTS credits: 5 **Weekly workload:** 2lec+0sem+2labs+1ps
Assessment : exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Professor Boris I. Tomov, MEng, DSc, PhD, Department of Material Science & Material Technology,
tel. 888 310, E-mail: btomov@ru.acad.bg
Assoc. Professor Valentin I. Gagov, MEng, PhD, Department of Material Science & Material Technology,
tel. 888 778, E-mail: gag@ru.acad.
Abstract:
The course is to give basic knowledge in the theory, technology and practice of plastic deformation of metals allowing planning and over working of both bulk and sheet metal processes. As a pre-requisite knowledge of Physics, Mathematics I and II, Material Science, Mechanics-II (stress and strain analyses) is required. It is a basic course in the degree courses of Production Engineering and Material Science Engineering. It also assists final projects and engineering practice.
Course content:
Flat rolling of continuous products – definition, varieties, analysis of the factors influencing the process. Tube piercing rolling. Rolling of threads and gears. Rolling practice and rolling machines Extrusion-analysis, manufacturing process. Drawing-analysis, dies design and materials, manufacturing process, drawing of tubes. Modern varieties of the processes and development of these technologies.
Teaching and assessment:
All modern facilities are applied at lectures and in laboratories. Different appliances and computer simulation are used during laboratory classes. Twice per semester control tests are carried out and the results are considered at the exam.
The exam is written. According to the student's desire, a conversation aimed at precise score assessment is possible.

3631 Materials Processing Technology II-B- course project

ECTS credits: 2 **Weekly classes :**0lec+0sem+0labs+0pa+cp
Assessment: defense **Type of exam:** oral
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Professor Valentin I. Gagov, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 778, E-mail: gag@ru.acad.bg
Assoc. Prof. Rosen Hristov Radev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 778, E-mail: rrad@ru.acad.bg
Abstract:
The course project in the field of Materials processing technology II-A(Plastic deformation of Metals)is aimed at gaining knowledge and skills when a real process of bulk or sheet metal deformation is under consideration. The necessary pre-requisites are : Engineering graphics, detailed knowledge in Materials processing technology II-A, Heath-Treatment of the metals, and Materials processing Engineering. The course project is a specialized fundament for the Diploma-project and for the Engineering practice.
Course content:
Planning all necessary steps of processing, both in the case of bulk or sheet-metal forming: sequence of operations, assessment of workability, comparing at least two processing varieties of heating (if necessary), technology calculations, designing and drawing of dies and tools requested.
Teaching and assessment:
The course project is typical self-dependent work; every student gets a different case . The project is completed under the guidance and consultations of a tutor. According to the time schedule, every student presents the state-of-art of his project in front of his colleagues, and a discussion is carried out. It is to help the student to get an objective impression of the level of work done.
All results, schemes and calculations, both technical and economic, are inseparable part of the project documentation. Active participation in the discussions and close keeping to the time schedule are taken into consideration in the final assessment of the project.

3632 Manufacturing Technologies 2

ECTS credits: 7 **Weekly classes:** 2lec+0sem+2labs+1ps+cw
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Stefan Veselinov Vichev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-451, e-mail: svichev@ru.acad.bg
Assoc. Prof. Mihail Kolev Karshakov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-508.
Abstract:
The course gives students basic knowledge and skills regarding the methods, means and organization of the processes for machining materials and their transformation into products. Inputs are all previously studied technical courses. Outputs are other courses in the Bachelor's and Master's degree courses, especially the diploma work. There is a course project requiring individual work from students when solving practical problems regarding a concrete technological process.
Course content:
Part II. Manufacturing and technological processes. Elements of the technological system. Technological equipment. Technological tasks, methods and machines for machining and assembling typical parts and units. Technological dimensional calculations. Design of technological processes. Technical and economic analysis of technological processes.
Teaching and assessment:
Basic principles and problems in machining and product manufacturing are covered in lectures and demonstrated and discussed in laboratory classes, conducted in specialized laboratories and visits to manufacturing companies. Individual work of students is stimulated by a system for continuous assessment, that is different for the different semesters, during which the course is taught, allowing partial or full exempt- ion from the exam. To facilitate students' preparation and the exam procedure, there are groups of questions, differing from each other in difficulty and the information given, hence differing in grading. The exam is written with theoretical and practical problems. The final mark is based on the continuous assessment and / or the exam. Students have to attend their laboratory classes regularly for verifying the semester.

3636 Dies for plastic deformation of metals

ECTS credits: 3 **Weekly classes:** 2lec+0sem+1labs+0ps+ca
Assessment: continious assesment **Type of exam:** written
Departments involved:
Department of Material Science and MaterialTechnology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Professor Valentin I. Gagov.PhD, MEng, Department of Material Science and MaterialTechnology
telephone: ++ 359 82 888 778 , E-mail: gag@ru.acad.
Pr. Assist. Prof. Rosen Chr. Radev, MEng, PhD, Department of Material Science and MaterialTechnology
telephone:++ 359 82 888778, E-mail: rradev@ru.acad.bg
Abstract:
The course is to give basic knowledge about function, about the most common structures, and about guidelines of dies design, both for bulk and sheet-metal deformation.Necessary prerequisites are knowledge of engineering graphics, principles of plastic deformation of metals, heat treatment and material processing technology.
This course is the fundamental for the course- and diploma – projects in the field of plastic deformation of metals.
Course content:
Dies for bulk deformation (Closed hot die forging, cold impact forging, Trimming dies, and appliances, supporting the deformation process). Dies for sheet-metal forming (for cutting, bending and deep-drawing. Tools for special purposes: rolling of threads, surface rolling micro deformation. Requirements put to that kind of tools.
Teaching and assessment:
All modern facilities are applied at lectures and in laboratories. At laboratory classes different appliances and computer simulationare used. Plenty of model and real dies and tools are observed and analyzed. In order to assess knowledge, written tests are used and also oral discussions take place. If necessary, a final conversation also takes place.

3638 Organization and Management of a Company

ECTS credits: 5 **Weekly classes:** 3lec+0sem+3labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Yulian Penchev Mladenov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 405, 716, 84 20 07, E-mail: jmladenov@ru.acad.bg.
Abstract:
This is an integral course that encompasses some of the most important issues and problems of managerial sciences, taking into account that it will be studied by engineering students.
The main goal of teaching is to provide basic knowledge of organizing and managing the activities of a modern company and to provide skills to apply those methods in practice.
The course is directly connected with the economic and technical courses of the degree course curriculum.
The knowledge acquired can be used in the diploma project and the future specific work of the engineers.
Course content:
Development of the science of company management. Marketing in a company's activity. Strategic issues in the development of a company. Development of new products. Organizational and legal aspects of a company. Organization of the manufacturing process. Management of manufacturing. Management of a company's personnel. Strategic business planning.
Teaching and assessment:
Lectures aim achieving the goal and main objectives of the course. Seminars are practice and application-oriented and should help students acquire some basic managerial skills.
The final grade is based on a written exam. students come to the exam at the same time and get asked three identical questions. The answers to those questions form the final grade. Students may do three tests during the semester and are marked according to the six-grade system. The final mark is an average of the three tests.

3641 Standardization, Certification and Intellectual Product

ECTS credits: 4 **Weekly classes:** 3lec+0sem+3labs+0ps
Assessment: exam **Type of exam:** written test
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Veselin Ivanov Grigorov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 508, E-mail: VGrigorov@ru.acad.bg
Abstract:
The main goal of the course is to teach the principles and methods of standardization and certification, as well as the forms of existence of intangible assets, the procedures for establishing them, acquiring such assets and the possibilities for their usage by companies.
Course content:
Principles and methods of standardization. Certification procedures. Quality-metric grades. Intellectual projects, procedures for establishing intellectual property and possibilities for its economical application.
Teaching and assessment:
The main issues discussed in lectures, regarding the principles and methods of standardization, certification, the establishing and usage of intangible assets, are illustrated with examples and cases. Continuous assessment is based on two tests, carried out during the semester.

3642 Coating deposition methods

ECTS credits: 4 **Weekly classes:** 3lec+0sem+3labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science and MaterialTechnology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Docho Danev Dochev, MEng, PhD, Dept. of Material Science and MaterialTechnology,
tel. 888 307, E-mail: ddochev@ru.acad.bg.
Assoc.Prof.Mladen Tzvetanov Trifonov, MEng, PhD, Dept. of Material Science and MaterialTechnology,
tel. 888 206, E-mail: mtr@ru.acad.bg.
Abstract:
The course gives knowledge and skills about the technologies for coatings deposition. The studied material needs knowledge of physics, chemistry, material science, technology of materials, electrical and physical technologies. The course is a base for the students' graduation assignment.
Course content:
Part I. Introduction. Classification of coatings and methods for their deposition. Bases of vacuum methods for coatings deposition: thermal evaporation, ion sputtering, ion plating. Means of vacuum deposition and equipment.
Part II. Grounding in surface welding and thermal spraying . Methods and means of surface arc welding, surface gas welding, plasma surface welding, electroslag surface welding, resistance surface welding, special methods of surface welding; gas, explosion, electric arc, plasma and laser spraying. Applications of the methods in the preparation and carrying out of technological processes.
Teaching and assessment:
The theoretical knowledge given in lectures is assimilated, specified and expanded at laboratory classes. The lectures are illustrated with schemes, diagrams, graphics etc.. During the semester students have two control tests forming a continuous assessment. Students having the marks "very good" and "excellent" are exempted from the exam. The exam is written including questions from both parts.

3640 Diploma Practice

ECTS credits: 4 **Weekly classes:** 0lec+0sem+0labs+10ps
Assessment: oral exam **Type of exam**: oral
Departments involved:
Department of Material Science and MaterialTechnology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The diploma practice aims at giving students the opportunity to get acquainted with contemporary scientific and technical achievements in the sphere, in which they develop a diploma project and with the existing condition of the problem in the organization, which has suggested the topic for the diploma project.
Course content:
In relation to the topic of the diploma project, students get acquainted with literature sources, patents, inventions etc., with methods of theoretical and experimental investigations and the results from them; with constructive and technological solutions; with laboratory equipment, measurement devices, tools patterns, machines for mechanical treatment, casting, welding, plastic deformation and thermal treatment; with methodology for constructive and technological calculations; with software packages for solving engineering problems; with quality management systems, etc.
Teaching and assessment:
The diploma practice is carried out in the department laboratories, mechanical and mechanical-mounting workshops, constructive and technological offices or divisions of machine-building companies, libraries, etc. in relation to the topic of the diploma project and the organization, which has suggested it. The tasks of the practice are determined by the tutor of the diploma project and are reported to him. The results from the practice are used in forming the literature reference of the diploma project and the development of its specific sections.

3644 Diploma Project

ECTS credits: 10 **Weekly classes:**
Assessment: defense **Type of exam**: oral
Departments involved:
Department of Material Science and MaterialTechnology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The diploma project aims at giving students the opportunity to apply the obtained knowledge and skills in self-dependent and entire development of engineering projects. The most common topics are connected with design of machine-building technologies, design of technological equipment, design of automation devices, management and control of the technological processes. Students who have excellent achievements are given topics with research character. The Final Year project gives students practical skills and experience for their future engineering practice or for continuing their study in a Master degree course.
Course content:
Review of information regarding the diploma project topic. Formulating the aim and tasks. Analysis of output and work conditions. Idea project or methodology of research. Design of machine-building technologies. Design of necessary equipment and devices. Running tests and processing results. Technical and economic analysis of the developed variants. Development of technical documentation and graphical representation of the results from the research.
Teaching and assessment:
The diploma project is developed following a given routine. Students work individually, using paper or electronically based information, the equipment of the department or other departments, and their instructor's help. The diploma project instructor assesses the level of involvement, the public and moral qualities of the student. The assessor evaluates the diploma project. The student defends the diploma project in front of the State Exam Committee and the open public. The State Exam Committee evaluates both the diploma project and the way it is defended.

UNDERGRADUATE STUDIES IN INDUSTRIAL ENGINEERING

PROFESSIONAL STANDARDS
OF A BACHELOR IN

INDUSTRIAL ENGINEERING

COURSE: **Industrial Engineering**
Educational degree – **Bachelor**
Professional qualification: **industrial engineer**
Term of education: **4 years (8 terms)**

The main objective of the study in the Bachelor degree course in Industrial Engineering is to provide interdisciplinary training, which unites basic knowledge and skills in the area of mechanical systems, production technologies, electrical engineering and electronics, computer technologies and management. Under certain conditions the students have the basis and opportunity to continue their study with 1,5 years more and to receive the MASTER educational-qualification degree.

General and special training– the curriculum is based on the Unified State requirements for the degree course. During the first four semesters some basic and general technical courses are studied, which are the basis of modern engineering education, such as: Mathematics, Physics, Chemistry, Informatics, Mechanical Engineering, Strength of Materials, Fluid Mechanics, Material Science and Material Technology, Heat Technology, Electrical engineering and Electronics, Metrology and Measurement Equipment. Great attention is paid to the special and specializing training during the second two years. The image of this degree course is formed by the compulsory courses of Industrial Production Systems, Measurement Equipment, Basics in Design, Machine Tools, Theory and Management Systems, Mechatronics, Computer Design, CAD/CAM systems, Quality Control, Computer Programming and Power Electrical Engineering.
Apart from the general engineering training, the curriculum gives also the necessary knowledge about the wide use of computer software and technologies both in the process of study and by solving engineering problems, thorough knowledge of a West- European language in view of easy use of contemporary literature sources and software packages, acquainting with the principles of team work, some knowledge in the areas of economy, management, marketing and intellectual products.

The course of study finishes with the development and defense of the Final Year project. It is assigned at the end of the 7^{th} semester and it is developed during the 8^{th} semester. Therefore the 8^{th} semester has a reduced duration of 10 weeks and it does not include active study forms (course assignments and projects).

The practical training of the students (16 ECTS credits) consists of:
- Study practice in Manufacturing Techologies – 5 ECTS.
- Study practice in electrical engineering and electronics – during semester Three, 3 ECTS.
- Technological practice in manufacturing companies – 3 weeks during the summer holiday after semester Four, 4 ECTS.
- Diploma practice – during semester Eight, 4 ECTS.

General and special skills for:
a) Solving integral engineering problems on electronic-mechanical systems;
b) Diagnostics, management and repair of such systems;
c) Organising production activity of parts and knodes;
d) Doing expert and marketing research.

Career prospects:
The engineers, who have graduated the Bachelor degree course in Industrial Engineering, obtain wide profile training, which allows them a quick adaptation to contemporary dynamic economy conditions. They can work in firms, companies, organisations etc, which deal with design, production and maintenance of electrical and mechanical systems; expert research of patents, licenses and know-how, commercial and engineering activity, marketing of the market of such systems. They can work as coordinators of interdisciplinary projects in large program teams, which include mechanical and electrical engineers, software specialists, economists, marketing specialists, designers and other specialists, as well as independent wide-profile engineers in small and medium- sized enterprises. After acquiring experience, they can lead divisions in design, industrial and commercial firms and companies.

CURRICULUM

of the degree course in

INDUSTRIAL ENGINEERING

First year

Code	*First term*	*ECTS*	*Code*	*Second term*	*ECTS*
1668	Mathematics 1	5	1678	Mathematics 2	5
1612	Chemistry	4	1680	Computer aided Modeling 1	3
1613	Physics	5	1615	Material Science	5
0380	Applied Geometry and Engineering Graphics I	5	2070	Applied Geometry and Engineering Graphics II	4
1038	Informatics I	4	2071	Mechanics I	5
1672	Study Practice	2	1609	Visual Programming in MS Office	5
	Elective Foreign Language	5	1002	Study Practice	3
	Total for the term:	***30***		***Total for the term:***	***30***
0461	Sports	1	0461	Sports	1

Second year

Code	*Third term*	*ECTS*	*Code*	*Fourth term*	*ECTS*
2531	Mechanics II	5	3363	Heating engineering	5
3357	Fluid mechanics	6	3364	Manufacturing technologies 1	7
3358	Electrical Engineering I	4	3365	Personality behaviour and communication skills	3
3359	Computer aided Modeling 2	4	3366	Fundamentals of Machine Design	7
3360	Materials Technology I	4	3367	Electrical Engineering II	4
3361	Strength of materials	5	3368	Electronics I	4
3362	Study Practice in Electronics	2			
	Total for the term:	***30***		***Total for the term:***	***30***
0461	Sports	1	0461	Sports	1
			3369	Specialized practice – 3 w.	4

Third Year

Code	*Fifth term*	*ECTS*	*Code*	*Sixth term*	*ECTS*
3370	Electronics II	5	3376	Applied Programming	6
3371	Measuring Equipment 1	6	3377	Manufacturing Technologies 2	5
3372	Power electrical engineering	4	3378	Material Testing and Selection	4
3373	Materials Technology II	6	3379	Mechatronics	5
3374	Industrial Manufacturing Systems 1	4	3381	Control Systems	5
3375	Control Theory	5	3382	Economics	3
			3380	Mechatronics – course project	2
	Total for the term:	**30**		***Total for the term:***	**30**
0461	Sports	1	0461	Sports	1

Forth Year

Code	*Seventh term*	*ECTS*	*Code*	*Eighth term*	*ECTS*
3383	Control of Manufacturing Equipment	7	3389	Standardization, Certification & Intellectual Product	4
3384	Technical Safety	4	3390	Organization & Management of a Company	5
3385	CAD/CAM - systems	5	3391	Quality control and management	3
3386	Industrial Manufacturing Systems 2	5		**Elective courses (students elect a course)**	
3387	Computer aided Design	5	3393	Finances for Non-financial Specialists	4
3388	Measuring Equipment 2	4	3394	Staff Management	4
			3395	Ecology management	4
				Graduation	
			3392	Self-dependent training	4
			3396	Diploma work	10
	Total for the term:	***30***		***Total for the term:***	***30***
0461	Sports	1	0461	Sports	1

Total for the training course: 240 ECTS credits

1668 Higher Mathematics I

ECTS credits: 5 **Weekly classes**: 2lec+1sem+0labs+1ps+ca
Assessment: exam **Type of the exam**: written
Departments involved:
Dept. of Algebra and Geometry, Faculty of Natural Sciences and Education
Lecturers:
Assoc. Prof. Tsetska Grigorova Rashkova, MSc, PhD, Dept. Algebra and Geometry,
phone 888 489, E-mail: tsrashkova@ru.acad.bg
Pr. Assist. Prof. Veselina Stojanova Evtimova, MSc, PhD, Dept. Algebra and Geometry,
phone 888 453, E-mail: vevtimova@ru.acad.bg
Abstract:
The course is fundamental for engineers' education and is based on topics in Mathematics studied at secondary schools. It is very important in students' education for other mathematical courses, as well as for Physics, Mechanics and other basic courses of engineers education.
Course content:
Linear algebra - determinants, matrices, systems of linear equations. Analytical geometry in plane and space – vector calculus, lines and planes in space. Differential calculus – basic theorems, Teylor's formula, applications (extremums, assymptotes, graphics). Integral calculus – definition and basic properties of the primitive function, basic methods of integration, integration of rational functions and some classes of irrational functions. Rieman integral - definition, basic methods for calculation. Ordinary differential equations – definition and geometric interpretation. ODE with separating parts. Linear first order DE. Total DE and integrating factor. Equations of Cleraux and Lagrange. Second order LDE with constant terms. Lagrange methods.
Teaching and assessment:
Students get acquainted with basic mathematical notions at lectures. By rule, theorems do not include proofs but there are many examples and applications. Seminars build up students' technical ability to solve practical problems. Two control tests take place and 5 home assignments have to be written. Students might not solve problems at the exam if their average mark is at least 4.50. Via oral discussion, part of the exam material can be tested earlier but the exam mark is received at the end of the semester.

1612 Chemistry

ECTS credits: 4 **Weekly classes**: 2lec+ 0sem+1labs+0ps
Assessment: exam **Type of exam**: written
Departments involved:
Department of Repair, Reliability and Chemical Technologies, Agro-Industrial Faculty
Lecturer:
Assoc. Prof. Petar Vassilev Kopchev, PhD, Dept. of Repair, Reliability and Chemical Technologies,
tel. 888 228, pkopchev@ru.acad.bg
Abstract:
The course helps students obtain particular knowledge of the structure of substances, chemical phenomena and processes, directly connected with engineering. Laboratory classes simulate these processes and show the way for their use or avoidance in engineering practice. The course achieves levelling of students' previous knowledge of chemistry and provides necessary knowledge and skills for the next courses of Physics, Materials and Manufacturing Engineering, Strength of Materials, etc.
Course content:
Structure of materials, Metals and alloys, Electrochemical processes, Corrosion and metals protection, Dispersions, Surface phenomena.
Teaching and assessment:
Laboratory classes provide students with the opportunity to receive visual notion of important theoretical issues, such as: chemical properties of metals and alloys, the work of electric cells, electrolysis, surface phenomena, etc. There is a test control on basic topics at the beginning of each class, which could be either written or oral, with a duration of about 15 minutes.

1613 Physics

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam**: written
Departments involved:
Department of Physics, Faculty of Electrical Engineering, Electronics and Automation
Lectures:
Assoc. Prof. Nadezhda Marinova Nancheva, PhD, Department of Physics, tel.888 219,
E-mail: nancheva@ru.acad.bg
Assoc. Prof. Parvoleta Ivanova Docheva, PhD, Department of Physics, tel.888 219,
E-mail: docheva@ru.acad.bg
Abstract:
The course aims at familiarizing students with the physical character of processes and phenomena in nature and e methods for their investigation, with the most general properties of matter and material objects. Laboratory classes aim at creating skills for experimental investigation of physical phenomena and solving physical problems.
Course content:
Measuring physical quantities, Kinematics and Dynamics of a material point and rigid body, Interaction in nature, Work and energy, Mechanical preservation laws, Molecular physics and thermodynamics, Transfer phenomena, Periodic processes and waves, Electric field and electric current, Magnetic field and electro-magnetic induction, Optical phenomena, Atoms, atom nuclei, elementary particles.
Teaching and assessment:
Lectures give the main theoretical material, supported by some demonstrations of physical phenomena and processes. At laboratory classes students work independently and investigate particular physical phenomena.
Knowledge of lecture material and laboratory classes is tested regularly. The final mark is formed after an exam in the form of a test.

0380 Applied geometry and engineering graphics 1

ECTS credits: 5 **Weekly classes:** 1lec+0sem+0labs+2ps+cw
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Engineering graphics, Faculty of Automotive and Transport Engineering
Lecturers:
Assoc. Prof. Ventsislav Dimov Dochev PhD. MSc .(Eng.) , dep. of Engineering Graphics , tel.888-437
Abstract:
The course examines methods and means of presentation of three-dimensional objects by plane images and ways of analysis , convertion and optimization of graphic images. A precondition for learning this course is some basic knowledge of geometry and technical drawing . It develops the steric imagination of students and their skills to cope with graphic and technical information .This course is a base of further learning of other technical branches of science.
Course content:
Kinds of projection. Comprehensive drawing . Reciprocal position of principal geometric objects. Converting a comprehensive drawing . Methods of projection. Reciprocal crossing of geometric objects. Images in drawings . Axonometric projection.
Teaching and assessment:
The theoretical subjet matter read in lectures in didactic ways, gives the necessary base for conducting practical classes and course assignments .During the training problems are solved, instructions given,
examples considered. For the course assignment students are required to do a number of plans with different images of steric objects.
The course ends with a continuous assessment, which is formed by the marks of two tests and the score of the course assignment .An attestation is given , according to the academic regulations , when the course assignment is done and the lectures and practical classes are attended.

1038 Informatics I

ECTS credits: 4 **Weekly classes:** 1lec+0sem+ 0labs+2ps+ca
Assessment: continuous assessment **Type of exam:** test
Department involved:
Dept.of Informatics and Information Technologies, Faculty of Natural Sciences and Education
Lecturers:
Assoc. Prof. Margarita Teodosieva, PhD, Dept. of IIT, tel. 888 464, Email: mst@ami.ru.acad.bg
Pr. Assist. Prof. Stoyan Donchev Chernev, PhD, Dept. of IIT, tel. 888 470, E-mail: stenly@ami.ru.acad.bg
Abstract:
The course objective is to introduce students to the computer with its components as technical aid, as well as to the most widely spread software products – operating systems, word processing systems, spreadsheet data processing systems, data bases, information systems, artificial intellect systems, computer graphics systems, computer aided design and manufacturing (CAD/CAM) systems. The workshops aim at providing students with knowledge on the use of the most widely spread application program systems – Windows, Word, Excel.
Course content:
History and classification of computers. Hardware. Operating systems. Application software. Word processing systems. Spreadsheets. Databases: relation database, database management systems, widely spread databases, data exchange and computer networks.
Teaching and assessment:
Lectures are taught in 2 academic classes every other week. Workshops are carried out in computer laboratories to practise theoretical knowledge under the guidance of the teacher. To get a feedback of students' progress the teacher makes a 10-minute-revision of the material taught at the beginning of the workshop giving them a test, or making a concise written or oral testing. Students' practical knowledge of the application of currently studied software product is assessed at the end of every course sections. Through course assignments students reveal whether they are able to apply independently the program systems. Students get assessments on course assignments that are considered for the total grade.
At the end of the semester students' theoretical knowledge is assessed through a test of 100 questions covering the whole material taught.
The semester grade is formed on the basis of the results from the main test, workshop performance and course assignment average grade.

1672 Technological Training Practice

ECTS credits: 2 **Weekly classes:** 0lec+0sem+1labs+2ps
Assessment: oral exam **Type of exam:** practical and discussion
Departments involved:
Department of Material Science and MaterialTechnology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Dept. of Material Science and MaterialTechnology,
tel. 888 211, E-mail: rus@ru.acad.bg.
Sr. Assist. Prof. Peter Stoykov Petrov, MEng, Dept. of Material Science and MaterialTechnology,
tel. 888 316, 206
Abstract:
The course provides preliminary knowledge and practical skills of the main stages of technological processes for metal casting, welding, plastic deformation used in the manufacture organization. The acquired knowledge and skills serve as basis for learning general and specific courses and active educational forms connected with them.
Course content:
Bases of metal casting. Manual and machine moulding. Bases of metal welding. Manual electric arc welding. Plastic deformation processes. Open manual and machine forging.
Teaching and assessment:
Laboratory classes are held in the laboratories of the M&ME department. Practical classes are held in the training work-department, where the working places are prepared in advance. Students are divided into groups, each of which uses a separate working place. Control is carried out through an oral exam. A certain practical assignment is carried out, as well as a short discussion on a theoretical issue.

Foreign Language for the Industrial Engineering Course
1772 English; 1967 German; 1989 French; 2066 Russian

ECTS credits: 5 **Weekly classes:** 0lec+0sem+0labs+5ps
Assessment: continuous assessment **Type of exam:** written and oral
Departments involved:
Department of Foreign Languages, Faculty of Law
Lecturers:
English: Lecturer Elitsa Dimitrova Georgieva, Department of Foregn Languages;
E-mail: edgeorgieva@ecs.ru.acad.bg
German: Senior Lecturer Elmira Maksimova Maksimova, Department of Foreign Languages;
tel.: 888 824 E-mail: sbartenev@ecs.ru.acad.bg
French: Senior Lecturer Roumyana Ivanova Milanova, Department of Foreign Languages;
E-mail: rmivanova@ecs.ru.acad.bg;
Russian: Senior Lecturer Iliyana Gancheva Benina, Department of Foreign Languages;
E-mail: Ibenina@ecs.ru.acad.bg;
Abstract:
The foreign language module is aimed at achieving communicative competence in the area of the subject specialty and the future job. The teaching objectives comprise the development of reading comprehension skills to handle specialist texts and the acquisition of communication skills to interact successfully in professional settings and everyday situations.
Course content:
Meeting people. Talking about the present and the past. Writing instructions. Comparing things. Properties of materials. Describing processes. Searching for information in catalogues. Linking facts and ideas. Applying for a job. Infinitive and gerund. Passive voice. Mathematical symbols in engineering – reading formulae.
Teaching and assessment:
A wide range of authentic and specially constructed texts (articles, diagrams and tables, brochures, catalogues, manuals, etc.), as well as audio, video, and multimedia materials are used to acquire the necessary language knowledge and to develop skills in using the language as a means of communication. Students are offered lessons in computer laboratories, in which multimedia learning packages and on-line materials in Internet are used according to the modern trends in foreign language teaching.
In class students participate in role-plays, pair and group activities. The oral examination covers the topics discussed during the semester. The semester grade is based on the marks from 2 tests administered during the term.

1678 Mathematics 2

ECTS credits: 5 **Weekly classes:** 3lec+2sem+0labs +0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Numerical Methods and Statistics
Lecturers:
Assoc. Prof. Plamen Yalamov, Msc, PhD, Dept. of Numerical Methods and Statistic,
tel: 888 466, E-mail: yalamov@ami.ru.acad.bg
Pr. Assist. Prof. Iliya Aleksiev Brayanov, Msc, PhD, Dept. of Numerical Methods and Statistic,
tel: 888 466, E-mail: brayanov@ ru.acad.bg
Abstract:
The course gives basic knowledge in some areas of theoretical and applied mathematics. The main objectives of the course are: Laplas transform, Stationary points and extremums to functions of two variables, Elements from probabaility theory, Mathematical statistic, (Confidential intervals. Quality control. Decision making), Elements from regression and correlation analysis.
Course content:
Laplas transform. Stationary points and extremums to functions of two variables. Elements from probabaility theory. Mathematical statistic (Confidential intervals. Quality control. Decision making). Elements from regression and correlation analysis.
Teaching and assessement:
Lectures present the material theoretically and illustrated it with appropriate example problems. At e seminars students solve application cases.
Two written tests, 2 hours each, are conducted during the semster.The final mark is formed according to the results in the written tests and a written exam.

1680 Computer Aided Modelling I

ECTS credits: 3
Weekly classes: 0lec+0sem+0labs+2ps
Assesment: continuous assessment
Type of exam: written and oral
Departments involved:
Department of Electronics
Lecturers:
Assoc. Prof. Ivan Borisov Evstatiev, MEng, PhD, Dept. of Electronics, tel.: + 359 82 888 772
E-mail: ievstatiev@ecs.ru.acad.bg
Sr. Assist. Prof. Yavor Branimirov Neikov, MEng, Dept. of Electronics, tel.: + 359 82 888 772
E-mail: yneikov@ecs.ru.acad.bg
Abstract:
The course has the objective to acquaint the students from the degree course Industrial Engineering with the basic principles of analog and digital circuit design. The main point of the course is the synthesis and analysis of electrical and logical circuits by means of computer aided design. Basic models of the most common electrical components, their schematic application are considered and simplified methods of Transient, AC and DC analysis of various electrical signals and parameters are also given.
Course content:
Main electrical parameters, dimensions and their presentment in MicroCap 7.0. Acquaintance with common analog and digital electrical components – tenet of work, schematic application. Exploration of main menus, commands and libraries in MicroCap 7.0. Design and investigation of basic electrical circuits and signals in transforming and amplifying stages. Computer aided simulation of logical processes and analysis of logic schemes in real time processing. Input/output connections with programs for creating PCB layouts.
Teaching and assessement:
Practical classes, course assignment and out-class work accomplish teaching. The practical classes have a duration of 2 hours every week. Theoretical bases are given during the first hour and practical training is carried out during the second hour. The practical classes are performed on computers in a laboratory with a free-access schedule for auxiliary training. Students elaborate a course assignment independently and present it demonstrating their knowledge. Control is held at the time for practice by assessment of students' individual work, results of a written test, evaluation of the course assignment and oral examination at the end of the semester.

1614 Material science

ECTS credits: 5
Weekly classes: 3lec+0sem+2labs+0ps+p
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science and MaterialTechnology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof. Rusko Ivanov Shishkov, MEng, DSc, Dept. of Material Science and MaterialTechnology,
tel. 888 204, E-mail: rish@ru.acad.bg
Assoc.Prof. Penka Dimitrova Etarska, MEng, PhD, Dept. of Material Science and MaterialTechnology,
tel. 888 307, E-mail: etarska@ru.acad.bg.
Abstract:
The course gives basic concepts of the relationships among the composition, structure and properties of materials most often used in practice and also concepts of the changes in them caused by heat and chemical-heat treatment and their service use. The received knowledge makes it possible to select materials and methods of their treatment properly in order to ensure optimal operating properties
Course content:
Crystal structure. Equilibrium diagrams. General concepts of non-equilibrium phase transformations. Crystallisation of pure metals and alloys. Steels – multi component iron-based alloys. Basic structures and basic transformations in steels. Classification and marking steels dependending on their use. Classification of methods for heat treatment. Graphitisation of white irons. Other metals and their alloys. Rock materials, glasses and ceramics. Polymers, glues, paints and varnishes. Metal- and non-metal-based composites.
Teaching and assessement:
The theoretical knowledge given in lectures is assimilated, specified and extended at laboratory classes. These classes are devoted mainly to the structure of materials as well as to the thermal methods of structure changes. During the semester three tests are carried out. The results of the tests are taken into account when forming the final assessment of the exam.

2070 Applied geometry and engineering graphics 2

ECTS credits: 4 **Weekly classes:** 1lec+0s+0labs+2ps+cw
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Engineering graphics, Faculty of Automotive and Transport Engineering
Lecturers:
Assoc. Prof. Ventsislav Dimov Dochev, MEng, PhD, dept. of Engineering graphics, tel: 888-437
Abstract:
The course examines the rules of working out plans,schemes and technical text documents; norms and instructions of Bulgarian and international standards considering drawing up technical documents.It develops steric imagination of students and their skills to cope with technical documents .This course is a base of further learning of other technical branches of science and doing a course projects and a graduation paper.
Course content:
Different connections – threaded , splinted and permanent connections. Drawing of a machinery piece – content , composition , images , measures , tolerance of dimensions ,method of indicating surface texture , text information .Special documentation of some technical products . Drawings of precast units .Item list . Text documents . Schemes . Building drawings.
Teaching and assessement:
The theoretical subject matter read in lectures in didactic ways, gives the necessary base for conducting practical classes and a course assignment .During training problems are solved, instructions given, examples considered. For the course assignment students are required to make technical documents of a precast unit given as axonometric images. The course ends with a continuous assessment , which is formed from the marks of two tests and the score of the course assignment. An attestation is given, according to the academic regulations , when the course assignment is done and the lectures and practical classes are attended.

2071 Mechanics 1

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0lab+2ps+ca
Assessment: exam **Test type:** written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Georgi Gabrovski, MEng, PhD, tel. 888 474, e-mail: ggabrovski@ru.acad.bg;
Assoc. Prof. Venko Vitliemov, MEng, PhD, tel. 888 572, e-mail: venvit@ru.acad.bg;
Assoc. Prof. Stoyan Stoyanov, MEng, PhD, tel. 888 572, e-mail: sgstoyanov@ru.acad.bg
Abstract:
Students get acquainted with methods of investigation of different kinds of rigid body motion, different force transformations, and investigation of mechanical interaction in rigid bodies in equilibrium. The course provides a basis for modeling structures, mechanisms, dynamic processes and applications of computer methods needed for their investigation. Preliminary knowledge of Mathematics, Physics and Informatics is necessary for this course. It is fundamental for the engineering courses in analysis and design of mechanical structures and machines.
Course content:
Particle kinematics. Translational, rotational, and plane rigid body motion. Relative motion of a particle. Equilibrium of a rigid body. Reduction of a system of forces. Equilibrium of a multi-body system. Equilibrium in the presence of friction. Gravity center.
Teaching and assessment:
The theoretical basis of the topics is elucidated in lectures and illustrated with examples. Students solve problems in practical classes by utilizing the software environment of MATLAB. They apply the learned methods in their course assignment which is given individually to each student. The course assignment is controlled and graded. The total score of a student is formed by a system of tests, including two midterm and a final term tests with a reexamination test. The gained grade in the semester is accounted for in the final grade.

1609 Visual Programming in MS Office

ECTS credits: 5 **Weekly classes**: 2lec+0sem+0labs+2ps+ca
Assessment: continuous assessment **Type of exam**: written
Department involved:
Department of Informatics and Information Technologies, Faculty of Natural Sciences and Education
Lecturers:
Assoc. Prof. Margarita Teodosieva, PhD, Dept. of IIT, tel. 888 464 Email: mst@ami.ru.acad.bg
Pr. Assist. Prof. Stoyan Donchev Chernev, PhD, Dept. of IIT, tel. 888 754 E-mail: stenly@ami.ru.acad.bg
Abstract:
The course objective is students to get familiar with MS Office package and prepared for programming with Visual Basic for Application; they become able to efficiently use the applications in Office environment and develop their own applications. Prerequisites for attending the course are students' preparation in Mathematics gained at high schools and the knowledge from studying Informatics 1. The knowledge and skills acquired from studying Visual Programming in Office Environment are the basis for developing course assignments, course tasks and projects and they can be successfully used for diploma projects and students' further work.
Course content:
Introduction. Office programming. Object-oriented programming. VBA and objects in Office. Data types. Macros creation and editing. Constants, variables. Integrated functions and statements. Assignment statements. Control statements. Arrays. Introducing to objects and collections. Procedures and functions. Projects and modules. Interaction design. Menu. Dialogue windows. Dialogue window objects. Events. Methods. Files management. Office applications host control.
Teaching and assessment:
The theory taught by lectures, accompanied with relevant exemplary programs, is consolidated during workshop sessions. Continuous assessment is carried out for controlling students' progress and forming their final grades. Students perform two tests during the semester. The course assignment given to students is the active form of testing their skills for working independently and they get an adequate mark. For estimating students' involvement in the course students may get maximum 100 scores. Semester validation is obtained after students' regular attendance at lectures, active participation in workshop sessions, minimum 70 scores and successfully presented course assignment. The continuous assessment is formed as an average of the grades from the two tests given during the semester, and taking into consideration the grade from the entry test as well as students' performance during workshop sessions.

1002 Practice in Manufacturing Technologies

ECTS credits: 3 **Weekly classes:** 0lec+0sem+1labs+2ps
Assessment: oral exam **Type of exam:** oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Ivan Kolev Ivanov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-544, E- mail: kolev@ru.acad.bg.
Abstract:
The goal of the course is to give students practical skills and knowledge of the main machining processes, the machines and tools that are applied in them as well as various machining and assembling operations.
Course content:
During laboratory classes students are made familiar with the organization, preparation and control of various machine tools, cutting tools, equipment and positioning of parts or cutting tools on machines. During practical classes students carry out independent work on a Lathe, a Milling machine, a Drilling machine and a Shaper. In the bench department students lay out parts and carry out basic bench operations. Practical classes finish with making a test part following a drawing.
Teaching and assessment:
Laboratory classes correspond to practica classes. They are organized so that students can have an access to the machines, tools and equipment and the needed setup. Practical classes are conducted in a training workshop. Each student is assigned a personal work place where he/she can produce test and real parts with relatively simple configuration.
Students' knowledge is assessed though discussions, as well as, during the practical and laboratory classes. The final grade is the result of a colloquium.

2531 Mechanics 2

ECTS credits: 4 **Weekly classes**: 2lec+0sem+0labs+1ps+ca
Assessment: exam **Test type**: written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Georgi Gabrovski, MEng, PhD, tel. 888 474, e-mail: ggabrovski@ru.acad.bg;
Assoc. Prof. Venko Vitliemov, MEng, PhD, tel. 888 572, e-mail: venvit@ru.acad.bg;
Assoc. Prof. Stoyan Stoyanov, MEng, PhD, tel. 888 572, e-mail: sgstoyanov@ru.acad.bg.
Abstract:
Students get acquainted with methods of investigating dynamic processes in mechanical multi-body systems. The course provides a basis for modeling structures, mechanisms, dynamic processes and the application of engineering methods for their investigation. Preliminary knowledge in Mathematics, Physics, Informatics and Mechanics 1 is necessary for this course. It is fundamental for the engineering courses in analysis and design of mechanical structures and machines.
Course content:
Basic problems of particle dynamics. Linear oscillation of a particle. Relative motion dynamics of a particle. Mass inertia moments and centrifugal inertia moments. Theorems of dynamics. Kinetostatics. Dynamics of a body. Analytical mechanics. Impact theory.
Teaching and assessment:
The theoretical basis of the topics is explained in lectures and their application is illustrated with examples. Students solve problems at practical classes by utilizing the software environment of MATLAB. Training of students is provided by a course assignment which is individually given to each student and graded after submission. The total score of a student is formed by a system of tests, including midterm and final tests with a reexamination test. The gained grade in the semester is accounted for in the final grade.

3357 Fluid mechanics in mechanical engineering

ECTS credits: 6 **Weekly workload:** 3lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Department of Thermothechnics, Hydro and Pneumotechnics, Agro-Industrial Faculty.
Lecturers:
Assoc. Prof. Ivanka Mitkova Zheleva, PhD, tel: 082 888 582, home tel: 084/ 662 332
Assoc Prof Ing Gencho Stoikov Popov, PhD, tel: 082 888 580
Department of Thermothechnics, Hydro and Pneumotechnics, Agro-Industrial Faculty
Abstract:
The course introduces students to the main relationships and physical treatment of the phenomena analyzed in hydrostatics, kinematics and fluid dynamics in view of their application in engineering practice. Basic knowledge of Mathematics, Physics, Theoretical Mechanics is a prerequisite for the acquisition of Fluid Mechanics and it, in its turn, is a prerequisite for the acquiring hydraulic and pneumatic machines and drives, agricultural machines, internal combustion engines, etc.
Course content:
Main properties of fluids. Equilibrium of fluids. Kinematics and dynamics of ideal and real fluids. Hydraulic resistances and calculation of pipelines and channels. Resistance of streamlined bodies and wings. Liquid leakage from openings, end-pieces, jets. Turbopumps,
Teaching and assessment:
The topics of lectures provide students with the opportunity to get acquainted with the main laws of fluid mechanics preceding laboratory classes, during which the obtained knowledge is consolidated and its practical application is clarified. For each laboratory class students work out a written statement. Students work out a course assignment by stages, consisting of solving particular tasks from the studied material. The requirement to have a term validated is submission of the course assignment and the written statements from the laboratory classes. The exam is in written form, including short answers to theoretical questions and a solution of a certain number of problems.

3358 Electrical Engineering I

ECTS credits: 4 **Week load:** 2lec+0sem+2labs+0ps+p
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Dept. of Theoretical and Measuring Electrotechnics , Faculty of Electrotechnics, electronics and Automatics
Lecturers:
Assoc. prof. Svilena VasilevaTodorova, MEng, PhD, tel. 888 224, e-mail: svito@ru.acad.bg
Pr. Assist. Docho Rusev Ivanov, tel. 888 501
Abstract:
The course Electrical Engineering I is part of the curriculum of the degree course in Industrial Engineering. The aim of the course is students to get knowledge in the fields of theoretical electrotechnics and electrical measurement of electrical and non-electrical quantities. It is necessary for students to have a preliminarily knowledge of the courses of Phisics , Mathematics and Workshop on Electrotechnics and Electronics. The knowledge of Electrcal Engineering I is used when learning Electrical Engineering II, Electronics I, Electronics II, Strong Current Electrotechnics and when preparing the graduation assignment.
Course content:
Important magnitudes of electrical circuits. Main laws. Voltage- and current sources, resistors, condensors, inductive coins. Electrical circuits analysis methods. Thevenin's theorem, Northon's theorem, superposition principle. Magnetic circuits. Alternative current circuits: analyses, resonances, powers. Three- phase electrical circuits. Electrical measurements - methods; structure diagrams and metrological characterizations of measuring devices; digital measuring devices; electrical measurement of electrical and non-electrical quantities.
Teaching and assessment:
The teaching process is divided into lectures and laboratory classes. An essay must be written and presented by every student. An active and regular participation in the learning process is required for semester validation. There is a test control on basic topics at the beginning of laboratory classes, which could be either written or oral, having a 15-minute duration. Students can get up to 5 points for their presentation during the lectures, 10 points for their work in the laboratory, 5 points for their essays and up to 40 points for each of the two tests. The total number of points (maximum 100) is to be rendered into the 6 –grade evaluation scale. If a supplementary examination is taken, the points from the performance during the semester are not valid.

3359 Computer aided Modeling - Part II

ECTS credits: 4 **Weekly classes:** 0lec+0sem+0labs+3ps+ca
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Petar Nedyalkov Angelov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 487; E-mail: pangelov@ru.acad.bg
Sr. Assist. Svetlana Kolewa Jordanowa, MEng, Department of Machine Tools and Manufacturing,
Tel: 888 469; E-mail: svetla@roboman.ru.acad.bg
Abstract:
The main goal of the course is to teach 2D and 3D modeling of mechanical units and to demonstrate the functional capabilities and limitations of AutoCAD. In-depth study of the basics of 2D modeling, dimensioning, 3D surfaces and solids. AutoCAD and AutoCAD Mechanical are used in the practical classes. Students develop their imagination for 2D and 3D objects. The knowledge and skills acquired can be applied in the later years in course assignments and projects, requiring graphical technical documentation. Inputs: Computer Modeling - Part I, Informatics I. Outputs: Fundamentals of Machine Design, CAD-CAM systems, Computer Aded Design, Mechatronics and Diploma Project.
Course content:
Basic terms. Command line, menus, mouse, tablets, external references. Scales and units. Specific points and geometric modeling. Object modifying. Absolute and relative coordinates. Layers. Editing and working with blocks. Dimensioning. Interface with other software. 3D modeling basics. Surface modeling.
Teaching and assessment:
Teaching is done in the form of practical classes, a course assignment and out-of-class activity. There are individual workstations for every student. Students are allowed free access to a computer room and the technical library of the faculty. A course assignment is given during the first week of the semester and should be completed by the end of the semester. The larger part of the course assignment is done during the practical classes.

3360 Technology of Materials I

ECTS credits: 4 **Weekly classes:** 2lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science and MaterialTechnology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Valentin Ivanov Gagov, PhD, Dept. of Material Science and MaterialTechnology,
tel. 888 778, E-mail: gag@ru.acad.bg
Abstract:
The course aims at giving knowledge about the processes and the main technological methods of casting, forming and welding, as well as about the principles of technological preparation of production.A prerequisite for studying this subject is main knowledge of Physics, Chemistry, Materials Strength and Materials Science. The course is a prerequisite for other specialized courses in the technological field of knowledge.
Course content:
Introduction. Bases of the casting technology: a scheme of the process, making a single-casting mould, metal casting, special methods of casting. Bases of the forming technology: a scheme of the process, main methods of bulk forming and sheet forming, plastic deformation of metals and alloys. Bases of the welding technology: a scheme of the process, methods of melt and pressure welding, special methods of welding; thermal cutting; welding of metals and alloys. Bases of the design of half-finished parts. Methods of joining and cutting materials.
Teaching and assessment:
Lectures include appropriate materials for visualisation and analysis of the more complex technological schemes. The operation of technological equipment with real materials and tools is demonstrated during practical classes. There are three written tests. The finishes finishes with a written exam. It includes two questions. Students can use graphic materials during the exam. The final mark is formed after an oral discussion. Students' active participation at practical classes and the results from the tests are also taken into consideration when forming the final mark.

3361 Strength of Materials

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Dept. of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Ivelin Ivanov, tel. 888 224, MEng, PhD, e-mail: ivivanov@ru.acad.bg
Assoc. Prof. Nedka Stancheva, MEng, PhD, tel. 888 478, e-mail: nedka@ru.acad.bg;
Abstract:
Strength of materials is a general engineering course, playing an important role for students in engineering. The aim of the course is for future engineers to gain basic knowledge and skills to model and calculate the strength of simple structures and structure elements under simple and combined loadings. A preliminary knowledge of Mathematics, Mechanics, and Physics is necessary. The gained knowledge in this course is useful in the following courses of design, technology, and maintenance, as well as for direct application in the engineering practice.
Course content:
Basic terms and assumptions. Real subject and its theoretical model. Tension, compression. Statically indetermined problems in tension and compression. Tension and compression tests of materials. Shear. Torsion of circular bars. Bending. Deflection in bending. Transverse shear bending and 3D bending. Non-axial tension and compression. Buckling of struts. 3D stress and strain. Failure criteria.
Teaching and assessment:
The theoretical subject matter presented in lectures is used in seminar classes to solve problems. The exam consists of test questions and problems for solving. Students can use formulae written by themselves at the exam. An active and regular participation in the learning process is required for semester validation as well as course assignment submission and its defense.

3362 Electric and electronic practice

ECTS credits: 2 **Weekly classes:** 0lec+0sem+0labs+3ps
Assessment: preliminary oral examination **Type of exam:** written

Departments involved:
Department of Automatics, Information and Control Engineering
Faculty of Electrical Engineering, Electronics and Automation

Lecturers:
Assoc. Prof. Venelin Iliev Ykav, MSc, PhD, Department of Automatics, Information and Control Engineering, phone: 082/888 269, E-mail: iacov@ru.acad.bg

Abstract:
In the Electric and electronic practice course students study the basics of electrical engineering: low voltage apparatus; electrical machines – DC and AC motors, converters. They also study electronic components: resistors; capacitors; diodes, transistors; thyristors, processor units, automatics units.

Course content:
Basics and rules of work with electrical machines and apparatuses. Basic electrical and electronic components. Reading of electrical circuitries. Measuring basic electric quantities: voltage, amperes, watts. Check of electronic components: diodes, transistors, thyristors. Electrical machines and apparatuses. Elements of electronic and automatics.

Teaching and assessment:
Basic forms of training are auditory and independent students' work. Auditory work includes lectures and laboratory practice. Industrial models, electrical drive, and particularly developed trial-pieces are used at laboratory classes. They are visualized with prospectuses and company literature. Laboratory practice is conducted in a cycle. Attestation is given when all classes are attended. The final mark is formed from the written exam result and laboratory participation. There is an oral test if needed.

3363 Thermotechnics

ECTS credits: 5 **Weekly classes**: 2lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam**: written

Department involved:
Thermotechnics, Hydro- and Pneumotechnics, Agro-Industrial Faculty

Lecturers:
Assoc. Prof. Valentin Vasilev Bobilov, PhD, Dept. of Thermotechnics, Hydro- and Pneumotechnics, tel.: 082/888 844, E-mail: bobilov@ru.acad.bg

Abstract:
The course provides some fundamental knowledge of the main principles of thermotechnics ; it deals with the structure of heat generating equipment, the most economical methods of heat generation, its conversion and utilization in industry, agriculture and everyday life.
Good knowledge of Mathematics, Physics, Mechanics and Electrical engineering is a prerequisite for working successfully in this course.

Course content:
Basic concepts of thermodynamics. First law of thermodynamics. Formulation of the first law of thermodynamics for open and closed systems. Specific heat capacity, thermodynamic bases of equilibrium conditions. Second fundamental law of thermodynamics. Mathematical expressions of the second law of thermodynamics. Entropy, convertibility and inconvertibility of processes. Thermodynamic consummation of processes, calculation of strength and energy. Thermodynamic processes of real gases. Heat exchange: basic concepts and definitions. Complex heat exchange and heat transmission. Heat insulation. Thermodynamics of a cooling machine.
Basic concepts of the drying process. Drying methods. Ventilation devices. Uncommon energy sources and methods for their utilization. Air conditionings.

Teaching and assessment:
Lectures are meant to provide theoretical knowledge, which is extended at laboratory sessions. Students submit reports with the experimental data compiled during laboratory sessions as well as analysis and conclusions on the experiment results. Assessment is based on students' performance at laboratory sessions and their test results.

3364 Manufacturing Technologies

ECTS credits: 7 **Weekly classes:** 3lec+0sem+2labs+0ps+cw
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Ivan Kolev Ivanov, MSc (Eng), PhD, Department of Machine Tools and Manufacturing,
Tel: 888-544, E- mail: kolev@ru.acad.bg
Pr. Assist. Prof. Tihomir Todorov, tel. 888-654, E- mail: titan_tmt@abv.bg.
Abstract:
The goal of the course is to give students practical skills and knowledge about the main machining processes, the machines and tools that are applied in them, basic terms of manufacturing technologies, tolerance assurance during machining operations.
The course is based on the knowledge acquired in Practice in Manufacturing Technologies, Applied Geometry and Engineering Graphics, Mechanics, Resistance of Materials, Materials Science and Materials Technologies. The course is a prerequisite for specializing courses and the Final Year project.
Course content:
Outlook of materials cutting processes. Tools materials. Technological characteristics, kinematical schemes of cutting, design and geometrical parameters of cutting tools, forces and power of cutting, wear of tools, different regimes of machining. Types, purpose and design specificities of metal cutting machines. Introduction into Production Technologies.
Teaching and assessment:
The theoretical subject matter taught in lectures is practiced at laboratory classes, reports are written and tests are conducted.
The course finishes with a written exam. All students come to the exam at the same time. They solve two problems and answer four relatively short questions. The exam is assessed in points.

3365 Personality behaviour and communication skills

ECTS credits: 3 **Weekly classes**: 1lec+0sem+0labs+1ps+ca
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of European Study, Faculty of Business and Management
Lecturers:
Assoc. Prof. Rada Karshakova, Department of European Study, tel.: 888 811
Abstract:
The course aims at acquainting future engineers with the social dimension of some issues, connected with personality behaviour in modrern industrial society as well as with some basic communication skills, which are necessary at the workplace. Attention is paid to four main sections: work and the individual, organizational behaviour and behaviour of the individual at the workplace, labour employment in production organizations, basic communication skills.
Course content:
Issues like value system and orientation of the individual, labour motivation, problems of the psychological contract between the employer and the labour force, subjective aspects of production technologies and the bureaucratic method of work organization, factors leading to satisfaction with work or to alienation, are discussed.
Different theories about organizations, organizational structure and behaviour, individual, group and organizational strategies and their relationship with the types of organizational control.
Problems, connected with staff recruiting, their socializing and patterns of professional development. Professional roles and the conflict between the separate roles, performed by the individual.
Significance and influence of the psychological factors of the human resources management at the workplace.
Basic communication skills, which are necessary for business communication and team work. Written communication skills. Oral communication skills. Skills for visual presentation of information.
Teaching and assessment:
Teaching is done at seminar classes using actively video materials, case studies and other contemporary teaching methods. Students have the opportunity for additional work in the department library and in the university library. The grade of the course is formed on the basis of students' participation during seminar classes and the fulfillment of a course assignment.

3366 Fundamentals of Machine Design

ECTS credits: 7 **Weekly classes:** 3lec+0sem+1labs+2ps+cw
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine science and Machine elements, Automobile transport faculty
Lecturers:
Assoc. Prof. Antoaneta Ivanova Dobreva, PhD, dept. of MME, ATF, tel: 888 235, E-mail: adobreva@ru.acad.bg
Assoc. Prof. Vasko Iliev Dobrev, PhD, dept. of MME, ATF, tel. 888492, E-mail: vdobrev@ru.acad.bg
Abstract:
The objective of the course is for students to acquire knowledge of the fundamentals and methods of machine design, the theory of machine elements with general application, methods for their calculation and multi variety of their design. Students should obtain theoretical knowledge and skills in the field of generating creative solutions of non-routine design tasks and while finding precise problem solutions in the area of machine elements. The course is a prerequisite for such courses as: Measuring machines, Computer design, CAD/CAM systems and Mechatronics.
Course content:
Technical systems. Approaches and design methods. General principles and criteria of design of machines and systems. Stages of design processes. General technical fundamentals of design. Strength of constructions and machine elements. Fastenings: screws, keys, etc. Shafts. Sliding and rolling bearings Clutches. Transmissions: gear trains, planetary, worm gears. Chain transmissions. Belt transmissions. Variable speed drives.
Teaching and assessment:
Students' knowledge is to be controlled through 3 written tests during he semester. Practical tutorials are carried out in rooms of the department of Machine design and Machine elements with the following facilities: computers, catalogues, technical handbooks, specialized software. For laboratory tutorials special test machines are used. Each laboratory tutorial ends with a test. A course assignment is to be carried out with the help of the lecturer.

3367 Electrical Engineering 2

ECTS credits: 4 **Weekly classes: 2**lec+0sem+1labs+0ps+p
Assessment: exam **Type of exam:** written
Departments involved:
Dept. of Theoretic Electrical Engineering and Electrical Measuring,
Faculty Electrical Engineering, Electronics and Automatics
Lecturers:
Assoc. Prof. Georgi Rashkov Georgiev, tel. 888 412, e-mail: grashkov@ru.acad.bg,
Assoc. Prof. Venelin Iliev Iakov, tel. 888 269, e-mail: iacov@ru.acad.bg,
Pr. Assist. Docho Rusev Ivanov, tel. 888 501, e-mail: divanov@ru.acad.bg
Abstract:
The course Electrical Engineering 2 is part of the curriculum of the degree course Industrial Engineering. The aim of the course is for students to get knowledge in the fields of Electrical Machines, Strong Current Electronical Schemes for control of Machines. It is necessary for students to have a preliminarily knowledge of the courses of Phisics, Mathematics and Electrical Engineering 1. The knowlidge on the Electrical Engineering 2 is used when learning Strong current Electrical Engineering.
Course content:
Constructional details, priciples of operation and supplement of DC Machines, Synchronous and Induction Machines and Transformes. Special Electrical Machines. Strong Current Electronical Schemes for control of machines.
Teaching and assessment:
The teaching process is divided into lectures and laboratory classes. In the laboratory classes students can receive practical knowledge. There is a test control on basic topics at the beginning of the classes, which could be either written or oral, having a 15- minute duration. The test control is meant to help exam presentation.

3368 Electronics I

ECTS credits: 4 **Weekly classes:** 2lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Dept. of Theoretical and Measuring Electrotechnics, Fac. of Electrotechnics, Electronics and Automatics
Lecturers:
Assoc. prof. Svilena Todorova, PhD, dept.of Industrial Management, tel. 888 224, svito@ru.acad.bg
Abstract:
The course Electronics I is presented to undergraduate students from the degree course Industrial Engineering in the fifth semester. It aims at familiarizing students with the fundamentals of digital electronics. It is necessary for the students to have preliminarily knowledge of the courses of Electrotecnics I , Physics and Workshop on Electrical Engineering and Electronics. The knowledge of Electronics I is used when learning Electrical Engineering II , Electronics II Strong Current Electrical Engineering and when preparing the graduation project.
Course content:
Arithmetical base of digital electronics. Main rules and methods for combinational networks design and analysis;. Multi-level gate networks. Multi-output networks. Design with different types of logic gates. Binary adders, decoders, encoders, multiplexers, code converters ROM, PLA. Sequential networks - main concepts. Flip-flops. Sequential networks design. Registers, counters, frequency deviders. Analysis of clocked sequential networks. Principal diagrams of basic digital devices. Logical families of integral devices.
Teaching and assessment:
The teaching process is divided into lectures and laboratory classes. Students also have a course task of two parts. An active and regular participation in the learning process is required for semester validation as well as course assignment submission and its defence. Students can get up to 5 points for their performance during lectures,up to 15 points for their work both in the laboratory and on the two parts of the course task and up to 80 points for their exam performance. The total score is to be rendered into the 6 –grade evaluation scale. If a supplementary examination is taken, the score from the semester performance is not valid.

3370 Electronics II

ECTS credits: 5 **Weekly classes:** 2lec+0sem+1labs+0ps+ca
Assessment: exam **Type of exam:** written
Departments involved:
Department of Electronics, Faculty of Electrical Engineering, Electronics and Automation
Lecturers:
Valentin Yordanov Dimov, PhD, Dept. of Electronics, tel.:++359 82 888772,
E-mail: vdimov@ecs.ru.acad.bg
Anelia Vladimirova Manukova MSc, Dept. of Electronics, tel.:++359 82 888 366,
E-mail: amanukova@ecs.ru.acad.bg
Abstract:
This compulsory course gives students the necessary minimum of knowledge in analog devices. It discusses the factors and methods for the realization of the most often used low-level and power amplifiers and generator stages in a discrete and integral input, methods of DC and AC analysis of the discussed circuits, as well as instructions for their design.
Course content:
Introduction to analogue electronics. Electronic power supply. Amplifiers. Bipolar transistor amplifiers. FET transistor amplifiers. Cascode circuits. Power amplifiers. Differential amplifiers. Operational amplifier. Op-amp linear circuits. Op-amp nonlinear circuits. Harmonic generators. Voltage and current stabilizer circuits.
Teaching and assessment:
Lectures are 2 per week and laboratory classes- 2 every other week. The laboratory classes follow the lecture topics and have practical orientation. Continuous assessment is carried out at the time for practice by oral examination, control and report defense. The laboratory classes are carried out in two stages: analysis, design and measurement of the discussed device and/or computer analysis. Course assignment is involved. Continuous assessment during the classes is made by oral discussions at the beginning of each class. The final test is written and lasts 2 hours.

3371 Measuring Equipment - Part I

ECTS credits: 6 **Weekly classes:** 2lec+0sem+2labs+0ps+cw
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Branko Dushkov Sotirov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: bsotirov@ru.acad.bg
Abstract:
The main goals are to teach students the basic terms, principles and rules for estimation of measurements precision; the theoretical and practical aspects of the SI system; the principles, methods and means for measuring lengths and angles; the basic principles of normalization, tolerance design and the prescription of precision degrees for parts and units, and to create practical skills for using some basic measurement devices.
Course content:
Introduction. Theoretical basics of measurements. Legal metrology. Measurements of length. Methods and means for measuring linear dimensions and angles. Precision of the geometrical quality indexes. Normalization and measurement of shape and positional deviations of surfaces and axes. Roughness of surfaces. Introduction to tolerance design. Quality of rolling bearing units. Normalizing and measurement of: spline and key units, threads, conical parts and units, and gears.
Teaching and assessment:
Lectures are problem- oriented and include basic principles, methods and means for measuring, as well as principles of normalization and measurement of typical machine parts. During laboratory classes each student chooses a scheme, method and means of measurement of a typical part and individually uses technical measurement devices. Laboratory classes begin with current test control. Each laboratory class is documented with a report. Continuous assessment is the average of the following grades: course assignment, practical and measurement skills, the first and the second tests. If just one of the four component grades is 'Failed' (2), the final continuous assessment grade is 'Failed' (2). The final grade also takes into account the results of the current test control.

3372 Electrical power engineering

ECTS credits: 4 **Weekly classes**: 2lec+0sem+2labs+0ps+ca
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of Electrical Power Engineering, Faculty of Electrical and Electronic Engineering
Lecturers:
Assoc. Prof. Nicolai Petrov Mihailov; PhD, Phone: (++359 82) 888 843, E-mail: mihailov@ru.acad.bg;
Mr. Boris Ivanov Evstatiev, Phone: (++359 82) 888 843, E-mail: bevstatiev@ru.acad.bg.
Abstract:
The Electrical Power Engineering course forms knowledge with a practical purpose. The aim of this course is to introduce students to some specific aspects of power engineering. Basic terms and definitions from the area of power supply, electrical loads and electrical power are introduced. Students are acquainted with constructive features of the main types of electrical drives automation, the choice of electrical engines and regimes of operation. The main focus is on the renewable energy and related technologies. Some aspects of energy-efficient control in the industrial sector, are also discussed.
Course content:
Electrical energy production. Electrical plants. Electrical loads. Quality of electrical energy. Electrical drives automation. Heating up and cooling of electrical engines. Regimes of operation. Choosing electrical engines for specific production machines and aggregates – compressors, pumps, fans, etc. Energetic of the electrical drives automation. Renewable energy sources and technologies. Constructive features and regimes of operation of photoelectrical converters. Methods, resources and algorithms for control of electrical power engineering. Energy efficiency in the industrial sector.
Teaching and assessment:
Teaching is based on classical pedagogical methods. For some of the topics slides and videos are shown. Laboratory classes follow lecture topics and have practical orientation. When exploring the properties of semi-conductors, computer modeling is utilized. Test control is written (current control), and the results of the individual work are considered, as well. At the written exam students work on two questions from the lectures, which helps to estimate their level of knowledge.

3373 Technology of materials II

ECTS credits: 6 **Weekly classes:** 2lec+0sem+2labs+0ps+cw
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science and Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. prof. Valentin Ivanov Gagov, PhD, Department of Material Science and Material Technology,
tel. 888 778, E-mail: gag@ru.acad.bg
Abstract:
The course gives basic knowledge about the mechanical behaviour of materials and about the main processes for manufacturing products made of plastics, sintered materials, ceramics and composites. Preliminary knowledge of chemistry, physics, materials science, engineering graphics and technology of materials I es needed to study this course. It builds up special basis for materials selection and gives assistance to technology of manufacturing, industrial production systems and management of industrial production.
Course content:
Principles and basic methods of mechanical testing of materials at static, dynamic and cyclic loading. Backgrounds of structure, properties and application of contemporary nonmetalic materials: plastics, sintered materials, ceramics and composites. Processes and basic technological methods of manufacturing products made of these materials. Principles, application fields and recent development of rapid prototyping.
Teaching and assessment:
Training is carried out through lectures and laboratory classes. In the lectures modern means are in use for presentation and explanation of the subject matter. During the laboratory classes several activities are carried out: laboratory experiments in mechanical testing, observations of technological processes in production as well as solving calculation problems on mechanical properties determination and on process planning design. During the semester three tests are considered as continuous control, the results are rated by a score system and they are taken into account at the final exam. It is written and, if the total result from the control tests is at least good, it may be recognized as a final one.

3374 Industrial Production Systems – Part I

ECTS credits: 4 **Weekly classes**: 2lec+0sem+2labs+0ps+p
Assessment: exam **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Pr. Assist. Prof. Ivanka Peeva, PhD, tel. 888-712, ipeeva@manuf.ru.acad.bg;
Assoc. Prof. Miroslav Stanchev Penchev, PhD, tel. 888-683, E-mail: mpenchev@ru.acad.bg
Abstract:
The course introduces students to basic industrial production, production systems and the main forms of industrial production systems. Flow and automation lines are presented, special attention is given to flexible production systems. As an introduction to flexible manfacturing systems it is required to be familiar with industrial robots, the choice of gripping devices and with the special features of technological preparation and machines, included in flexible manufacturing complexes (FMC).
Course content:
Technological bases of production – definitions, resources, production processes. Structure of a manufacturing firm. The main concepts and systems' design – modeling and optimization. Structure of manufacturing systems. Technical and technological preparation of manufacturing. Technologicity of constructions. Technological design. Organisation forms of manufacturing. Flow lines. Main definitions and stages in the development of automation. Productivity law. Classification and application of automated lines (AL). Main meetings mechanisms in AL. Industrial robots. Gripping mechanisms. Principles of formation of flexible automated manufacturing systems (FAMS). Specific features of technological preparation and machines with flexible manufacturing complexes. Structural scheme of FMC. Computer integrated production.
Teaching and assessment:
The main teaching procedures are lectures, laboratory classes and controlled self-dependent study (paper). During the lectures basic topics of the syllabus are discussed and illustrated with engineering examples, connected with practice. During the exercises industrial robots from the laboratory and special facilities are used for experimental investigations. Every class includes input testing of students' knowledge, estimated by a numerical system. A paper is worked out according to an individual task given at the beginning of thesemester. Finally a written exam istake. A numerical system for overall students' knowledge estimation is developed. The final mark is formed after a discussion with the student.

3375 Control Theory

ECTS credits: 5 **Weekly classes:** 3lec+0sem+0labs+ 2ps+ca
Assessment: exam **Type of exam:** written exam

Departments involved:
Department of Automatics, Information and Control Engineering
Faculty of Electrical Engineering, Electronics and Automation

Lecturers:
Assoc. Prof. Georgi Lyubomirov Lehov, PhD, tel. 082 / 888 745, E-mail: glehov@ru.acad.bg
Department of Automatics, Information and Control Engineering
Principal Assist. Maria Gerasimova Popova, MSc, tel. 082 / 888 745, E-mail: mgpopova@ru.acad.bg
Department of Automatics, Information and Control Engineering

Abstract:
The course aims are to give knowledge and practical skills for modelling, analysis and synthesis of automatic control systems. . Prerequisites for this course are Mathematics, Electrical Engineering and Mechanics courses. The acquired knowledge has application in various fields of engineering. It is a basis for the courses in which control systems and their elements are studied.

Course content:
Control systems: basic concept and definitions, classifications. Mathematical models of linear continuous-time control systems: differential equations, transfer functions, block diagrams. Time-domain and frequency-domain characteristics. Stability analysis. Steady-state errors. Dynamic performance analysis. Control systems design methods. P, PI, PD and PID controllers. Cascade control. Discrete-time control systems. Digital controllers. Auto tuning.

Teaching and assessment:
Lectures present the theoretical aspects of the enumerated problems and illustrate them with appropriate examples. The aim of the practical classes and course assignment is to teach students to apply the acquired knowledge creatively. They are conducted with the aid of MATLAB software system. Students' progress is checked in each class throughout the semester. A different topic for the course assignment is given to each student. The course ends with a written exam which consists of problem solving and question answering. In order to be allowed to take the exam students have to attend all the classes, as well as to write a course assignment. The practical performance mark and the course assignment mark are both taken into consideration when forming the final course grade

3376 Applied programming

ECTS credits:6 **Weekly classes:** 2lec+0sem+0labs+2ps+cw
Assessment: continuous assessment **Type of exam:** written

Department involved:
Informatics and Information Technologies, Faculty of Natural Sciences and Education

Lecturers:
Assoc. Prof. Margarita Teodosieva, PhD, Dept. of IIT, tel. 888 464; E-mail: mst@ami.ru.acad.bg
Pr. Assist. Prof. Valentin Velikov, Dept. of IIT, tel. 888 326, Email: val@ami.ru.acad.bg

Abstract:
The course objective is to give students a basic instrument for applied programming (C language) and to introduce them to main concepts of the Object Oriented programming style (C++). Basic data types are examined, which are in C/C++ program processing, as well as basic operations, which are executed with them. Special attention is paid to algorithm development as a basis for composing a program. C++ ,as it is the language preferably used for composing programs for industrial needs. Workshops aim at acquiring skills for developing application programmes. Examples are realized in Borland C++.

Course contents:
Basic data types and operations in C++ programs. Controlling structures – conditional branches, variant choice, cycles. Arrays and arrays of arrays. Indicators. Arrays of indicators. Functions. Recursive algorithms and recursive functions. Character strings. Structures. Files. Text files. Classes and objects. Components of classes – data members, functions members, constructors and destructors. Objects and functions. Friends of classes. Derivatives of classes, inheritance. Streams. Re-definition of operators.

Teaching and Assessment:
Lectures cover the process of algorithm development and programming in C/C++, referring to a number of examples. In workshop sessions students write programmes and test them. The tutor gives tasks for self-preparation and tests for students' progress feedback. The active form Course Assessment includes self-prepared task by every student. The semester is finished successfully if he/she defends successfully the course assignments. The final grade is a result of continuous assessment, formed from 2 control workshops, the test score and the self-prepared tasks.

3377 Manufacturing Technologies – Part II

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Ivan Zamfirov Ivanov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 822, zamfirov@manuf.ru.acad.bg
Assoc. Prof. Milko Dimitrov Enchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 653, milko@manuf.ru.acad.bg
Abstract:
The main goal of the course is to teach the principles of design of technological processes and the rules of machining and assembling parts. Inputs are: Materials science and heat treatment, Blanks design and technologies, Cutting of metals and Machine tools, Cutting tools, Basics of manufacturing technologies.
Course content:
Technical and economical principles in technological process design for manufacturing and assembly. Basic rules and stages in building the structure of the technological process. Precision, productivity, and cost assurance of the designed technological processes. Technological equipment for machining and assembly of parts. Electro-physical and electro-chemical methods of manufacturing. Assembly technological processes.
Teaching and assessment:
Lectures are structured so that general methods are studied at the beginning of the semester and specific rules of designing technological processes for manufacturing and assembling typical manufacturing products afterwards. The theoretical subject matter taught in lectures is practiced at laboratory classes. Each student may choose to take two tests in order to be exempt from the exam. The average grade from both tests equals an exam grade. Students are allowed to take the exam after their semester is certified. The latter happens if the student has attended classes regularly and if his/her reports have been submitted. The exam begins with a written part answering two questions and finishes with their discussion.

3378 Material Testing and Selection

ECTS credits: 3 **Weekly classes:** 1lec+0sem+0labs+2ps+p
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Material Science and Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Valentin I. Gagov, MEng, PhD, Dept. of Material Science and Material Technology,
tel. 888 778, E-mail: gag@ru.acad.bg
Assoc. Prof. Rosen Hristov Radev, MEng, PhD, Dept. of Material Science and Material Technology,
tel. 888 778, E-mail: rrad@ru.acad.bg
Abstract:
The course gives general knowledge and practical skills for the use of data base of the properties of contemporary materials, necessary for the material selection of a concrete application. General knowledge of chemistry, physics, material science, strength of materials, informatics and material engineering is required. The course is fundamental for the course project and graduation paper.
Course content:
Mechanical, technological and running properties and characteristics of materials. Selection of material using the Ashby's diagram. Definition of the users' properties of products. Selection of material depending on the shape, running conditions and manufacturing technology of products. Economic, ergonomic and aesthetic requirements for the selection of material for a concrete product.
Teaching and assessment:
Lectures and laboratory classes are computer-based and carried out in a special hall. Modern software is used for lecture presentation and solution of standard problems. During the semester students are given assessments and two control tests are carried out. The results of the assessments and tests are taken into account when forming the final grade.

3379 Mechatronics

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Georgi Vsilev Nenov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 653; E-mail: gosho@manuf.ru.acad.bg
Abstract:
The course informs students about the concept of building systems for automated control, based on modern electronics and actuators. Review of local area networks, as a basis of information exchange. Input courses are: Applied electronics, Computer applications in technology – Part II, and Heavy-current electrical engineering, and the output is the engineering practice.
Course content:
Objects, studied by mechatronics. Block scheme of a control device. Primary converters. Measurement interface and noise. Analogue processing of signals. Digital processing of signals. Microprocessor systems. Synchronous and asynchronous connections. Programmable controllers. PC programming. Force converters. Mechanic elements in mechatronic systems. Local computer networks.
Teaching and assessment:
Seminar classes are conducted after an initial discussion and clarification made by the teacher. Assignments and methodical help are handed out to students. The teacher monitors the fulfillment of tasks and consults students in groups or individually (if needed). Computer simulation programs are used during some of the classes. Students develop a course assignment regarding the design of a mechatronic system. The final grade is based on an exam, that consists of two questions, the course assignment results, and students' active participation at seminar classes.

3380 Mechatronics – Course Project

ECTS credits: 2 **Weekly classes:** 0lec+0sem+0labs+0ps+cp
Assessment: defense **Type of exam:**
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Georgi Vsilev Nenov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 653; E-mail: gosho@manuf.ru.acad.bg
Abstract:
The course informs students about the concept of building systems for automated control, based on modern electronics and actuators. Review of local area networks, as a basis of information exchange. Input courses are: Applied electronics, Computer applications in technology – Part II, and Heavy-current electrical engineering, and the output is the engineering practice.
Course content:
Objects, studied by mechatronics. Block scheme of a control device. Primary converters. Measurement interface and noise. Analogue processing of signals. Digital processing of signals. Microprocessor systems. Synchronous and asynchronous connections. Programmable controllers. PC programming. Force converters. Mechanic elements in mechatronic systems. Local computer networks.
Teaching and assessment:
Seminar classes are conducted after an initial discussion and clarification made by the teacher. Assignments and methodical help are handed out to students. The teacher monitors the fulfillment of tasks and consults students in groups or individually (if needed). Computer simulation programs are used during some of the classes. Students develop a course assignment regarding the design of a mechatronic system. The final grade is based on an exam, that consists of two questions, the course assignment results, and students' active participation at seminar classes.

3381 Control Systems

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps+cw
Assessment: exam **Type of exam:** written

Departments involved:
Department of Automatics, Information and Control Engineering
Faculty of Electrical Engineering, Electronics and Automation

Lecturers:
Assoc. Prof. Valentin Bogdanov Stoyanov, PhD, Department of Automatics, Information and Control Engineering, phone: 082 888 372, E-mail: vstojanov@ru.acad.bg
Principal Assistant Nikolaj Petkov Valov, Department of Automatics, Information and Control Engineering, phone: 82/888 372; E-mail: nvalov@ru.acad.bg

Abstract:
Through this course, students are acquainted with principal elements, enabling them to create a wide range of typical systems of control. With the knowledge obtained, students will be competent how to analyze, to design and apply in their engineering practice systems of control. The course utilizes the knowledge of Power Engineering, Measuring Technics, Theory of Control and others, and is necessary for courses such as: Mehatronics, Computer Design, Diploma design and others.

Course content:
Generalized model of closed systems of control. Executive mechanisms. Regulating devices. Types of regulators: positional, linear, impulse, digital. Types of control systems of: position, pressure, flow, temperature, speed. Digital off-line and on-line systems. Systems with direct and indirect digital control. Systems of control with programmable controllers. Systems of control of robots.

Teaching and assessment:
Students are acquainted with the syllabus topics by lectures, visualized with folio grams and slides. The training material is practiced and further developed during practical classes. For each class students will work out a report. They have to defend it when submitting it to the lecturer. The final grade for the semester is formed by an exam which is written. The score of the report defence is also taken into consideration.

3382 Economics

ECTS credits: 3 **Weekly classes:** 3lec+0sem+0labs+1ps
Assessment: continuous assessment **Type of exam:** written

Departments involved:
Department of Economics, Faculty of business and management

Lecturers:
Assoc.Prof. Djanko Hristov Minchev, PhD, Dept. of Economics, tel. 888 557, E-mail: Dminchev@ru.acad.bg
Assoc.Prof. Emil Georgiev Trifonov, Dept. of Economics, tel. 888 557

Abstract:
The course is concerned with the general problems, laws and categories of the contemporary market economy. Thus it creates a certain basis for the remaining economic objects. It also gives general knowledge, which is used in alternative ways of economic viewing and which forms and creates abilities for independent and expert choice in economic surroundings. A course prerequisite is knowledge of mathematics and it is related to concrete branch and functional economic courses.

Course content:
Introduction – the economic system and fundamentals of the economic theory. Main economic issues. Market mechanism. Public sector and taxation. Demand and supply of individual markets. Consumer demand and behavior. Manufacture, company assets and expenses. Imperfect competition and supply. Price formation and incomes depending on production factors: Gross domestic product and economic growth. Economic cycles, unemployment and inflation. Microeconomic balance. Budget policy. Monetary policy. Foreign policy in open-plan economics.

Teaching and assessment:
The subject matter is taught in two ways – lectures and practical classes, which elucidate and develop further some of the issues discussed at lectures. Continuous assessment is carried out. It includes two test assignments and student performance during the semester. Final assessment is the average of the above-mentioned components of evaluation.

3383 Control of Manufacturing Equipment

ECTS credits: 7 **Weekly workload:** 3lec+0sem+2labs+0ps+cw
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Georgi Vsilev Nenov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 653; E-mail: gosho@manuf.ru.acad.bg
Abstract:
The course teaches methods and devices for controlling the machines and equipment, used in manufacturing. Regulators, systems of CNC machines, programmable controllers are discussed. Inputs are: Electrical Engineering, Electronics, and Machine Tools. The course is applied when building and using automated systems.
Course content:
Systems for automatic regulation. Regulation laws and types of regulators. Regulating through interrupted action. Control of resistance and induction furnaces. Thyristor regulators. Electrical equipment. Programming of CNC machine tools. Elements of CNC systems. Electrical drive of the main and the feeding remittance. Execution of external commands. Programmable controller. CNC application for dimensional control. Other CNC machines.
Teaching and assessment:
Laboratory classes start after initial discussion and clarification of the tasks of the class. The very tasks and clues for their fulfillment are handed out to students. Students do some of the exercises, using computer simulation programs. At classes that require the use of a CNC machine one of the students operates on the machine under the supervision of the instructor, while the rest of the students observe. The course assignment consists of developing a program for a CNC machine. The final mark of the exam is based on issues discussed in lectures, the mark of the course assignment and students' active participation at classes

3384 Technical safety

ECTS credits: 4 **Weekly classes**: 2lec+0sem+1labs+0ps
Assessment: continuous assessment **Type of exam**: written
Department involved:
Department of Ecology and Environmental Protection
Lecturers:
Assoc. Prof. Vladimir Tomov Vladimirov;PhD, Dept. of Ecology and Environmental Protection
tel.: 888 481 e-mail: vtomov@ru.acad.bg
Abstracts:
The course is with social and economic importance. The main objective is for students to acquire skills for analysis and synthesis of technical and organizing solutions in production processes and equipment safety application. The activities to work out in the training course are: assimilating the main terms, definitions and categories in risk and safety theory, the principles and methods for technical and producing systems risk analysis, risk sources, characteristics, actions, normalizing, measurements and evaluation of the standardized in Bulgarian and international standards risk factors, assimilating of the methods for creation of safety technical and production systems.
The course has entrance links with the courses of Physics, Chemistry, Material knowledge and outgoing links with compulsory and optional courses in specializing directions and these with management purposes.
Course content:
Main terms and definitions. Risk management. Ergonomic fundamentals of technical and manufacturing systems safety. Subjective safety. Mechanical safety. Electrical safety. Electro-magnetic safety. Emission safety. Noise and vibration safety. Ray safety. Ecological safety. Fire safety. Damage, rescue and rebuilding technologies. Different safety activities.Social and economic effectiveness of safety.
Teaching and assessment:
Lectures are supported with examples in accordance with the specificities of the course. Laboratory classes are of experimental and investigation character. It is required that students be prepared in advance on the lecture themes , which is checked by questions. They also have to do two written tests on pre-given topics. The final mark is formed considering the results of both tests and successful participation in practice sessions.

3385 CAD/CAM Systems

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps+cw
Assessment: current assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Perat Nedyalkov Angelov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 487; E-mail: pangelov@ru.acad.bg
Pr. Assist. Ivo Yordanov Atanasov, MEng, Department of Machine Tools and Manufacturing,
Tel: 888 469; E-mail: iwo@roboman.ru.acad.bg
Abstract:
The main goal of the course is to inform students about the integration of manufacturing design and automated development of technological processes in a common program medium, popular CAD/CAM systems, their technical capabilities, structure, and modules.
Course content:
Basic principles of CAD/CAM systems. Integration of design and development of technological processes. Technical capabilities of universal CAD/CAM systems. Parametric modeling. Parts, devices, and cutting tools libraries. Adding non-geometrical information. Programming of turning operations. Elementary movements. Change of tools. Three- and five-coordinate machining of sculpture surfaces. Turning and milling postprocessors.
Teaching and assessment:
Teaching is done through lectures, practical classes, a course assignment and out-of-class work. During the practical classes students are informed about the possible internet access to the web pages of popular developers. Software used: SolidWorks 2007 EE, CAD/CAM system FeatureCAM 2008. The course assignment is prepared according to a given schedule and instructions. It includes the development of a sculpture surface model, definition of cutting tools, graphical simulation and creation of a NC program for a machine tool center. The sequence of work is documented in an explanatory report of 10 pages. 70% of the final grade is based on the course assignment, and the rest (30%) depends on the student's performane.

3386 Indusctrial Manufacturing Systems – Part II

ECTS credits: 5 **Weekly workload:** 3lec+0sem+2labs+0ps+ca
Assessment: exam **Type of exam:** oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Miroslav Stanchev Penchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 712; E-mail:mpenchev@ru.acad.bg
Prof. Vladimir Denev Vitliemov, MEng, DSc, Department of Machine Tools and Manufacturing,
Tel: 888 713; E-mail:vdv@manuf.ru.acad.bg
Abstract:
The main goal of the course is to reveal the possibilities of application of industrial manufacturing systems and the principles of their design. Special attention is devoted to the main manufacturing subsystems and the possibilities of computer integrated manufacturing.
Inputs: Mechanics, Theory of control, Manufacturing Technologies, Design Basics, Materials Technologies, Industrial Manufacturing Systems – Part I. Outpiuts: Management of Industrial Manufacturing, diploma project.
Course content:
Structure and composition of industrial manufacturing systems. Systems design – main issues, mathematical aparatus, choice of optimal structures. Assembly subsystems. Transport sybsystems. Storage subsystems. Robotization of industrial manufacturing systems. Computer integrated manufacturing systems. Place of man as an operator in the system. Perspectives and trends in the development of industrial manufacturing systems.
Teaching and assessment:
Llectures discuss the principal issues of the course, using examples from the engineering practice. Laboratory classes make use of the equipment in the computer integrated manufacturing systems hall, as well as the creation of technical means of conducting experimental studies. The final mark is based on an oral exam.

3387 Computer Aided Design

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps+cw
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Petar Nedyalkov Angelov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 487; E-mail: pangelov@ru.acad.bg
Pr. Assist. Ivo Yordanov Atansov, MEng, Department of Machine Tools and Manufacturing,
Tel: 888 469; E-mail: iwo@roboman.ru.acad.bg
Abstract:
The objective of the course is to give students knowledge about the application of computers in the design process. Methods of geometrical modeling of parts or assemblies and general questions, connected with the creation of CAD systems, are considered. The course has input connections with the courses: Mathematics, Engineering graphics, Informatics I, Machine details, Metals engineering I. The obtained knowledge is used in Metals engineering II, Rapid prototyping, Machining technology and diploma projects.
Course content:
General information about the design of technical objects. 3D-Solid modeling of parts and assemblies. 2D-drawings from the 3D-solid models of parts and assemblies. Animations and physical simulations.
Teaching and assessment:
The teaching process is divided into lectures and practical classes in a computer room using appropriate software. There are individual work places for students. There is an oral test control on basic topics at the beginning of the classes. Self-study is provoked by a course assignmet , which is graded. Each student has an assignment to solve individual tasks.

3388 Measurement Equipment- Part II

ECTS credits: 4 **Weekly workload:** 3lec+0sem+1labs+0ps+p
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Branko Dushkov Sotirov, MSc (Eng), PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: bsotirov@ru.acad.bg
Abstract:
The course gives fundamental engineering and technical knowledge to students from the degree course Industrial Engineering. The course main goals are to teach students some basic terms, definitions and units for measurement of mechanical, thermal, hydro-static and hydro-dynamic units, physical and chemical units and principles for their measurement and transformation; special measurement devices for mass, force, pressure, vacuum, flow speed and debit, fluid volume and levels, noise and vibrations, viscosity, density, temperature and thermal units; main reasons for faults when measuring the afore-mentioned units and methods for improving the accuracy of measurement; to create practical skills for using measurement devices and equipment
Course content:
Measurement of Mechanical Units – Mass, Force, Moment, Work, Power. Measurement of Rotation Frequency, Velocity and Acceleration, Pressure, Pressure Difference, Vacuum, Flow Speed, Fluid Volume and Levels, Debit of Fluids, Throttling Debit Meters, Noise and Vibrations, Temperature and Thermal Units, Calorimetry. Calorimeters. Heat Flow. pH, Density, Viscosity, Physical and Chemical Units.
Teaching and assessment:
Lectures are case-based and include basic principles, methods and devices for measurement of the afore-mentioned units. Laboratory classes include individual choice of a scheme, method, and measurement device, and acquiring practical skills like setting, measuring and checking basic and special devices, as well as using standards and specifications. The continuous assessment grade is an average of the grades from two tests, that take place in semester weeks 10 and 15. The final mark is formed after an oral interview (if needed).

3389 Standardization, Certification and Intellectual Product

ECTS credits: 4 **Weekly classes:** 4lec+2sem+0labs+0ps
Assessment: current assessment **Type of exam:** written test
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Veselin Ivanov Grigorov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 508, E-mail: VGrigorov@ru.acad.bg
Abstract:
The main goal of the course is to teach the principles and methods of standardization and certification, as well as the forms of existence of intangible assets, the procedures of establishing them, acquiring such assets and the possibilities for their usage by companies.
Course content:
Principles and methods of standardization. Certification procedures. Quality-metric grades. Intellectual projects, procedures of establishing intellectual property and possibilities for its economic application.
Teaching and assessment:
The main issues discussed in the lectures, regarding the principles and methods of standardization, certification, the establishment and usage of intangible assets, are demonstrated by examples and cases. Continuous assessment is based on two tests, carried out during the semester.

3390 Organization and Management of a Company

ECTS credits: 5 **Weekly workload**: 4l+4s+0lab+0p
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Yulian Penchev Mladenov, MEng, PhD, Department of of Machine Tools and Manufacturing,
Tel: 888 405, 716, 84 20 07, E-mail: jmladenov@ru.acad.bg.
Abstract:
This is an integral course and encompasses some of the most important issues and problems among managerial sciences. The course takes into consideration the fact that it will be studied by engineering students. The main goal is to teach the basics in organizing and managing the activities in a modern company, as well as to facilitate using those skills in practice. The course is closely related to economic and technical courses. The knowledge acquired can be applied in the diploma project and the future work of engineers.
Course content:
Development of the science for managing a company. Marketing as part of company's activities. Strategic issues in company's development. Development of new products. Organizational and legal aspects of a company. Organization of the manufacturing process. Manufacturing management. Management of personnel. Strategic business planning.
Teaching and assessment:
Lectures give the knowledge needed for achieving the goal and the main objectives of the course. Seminar classes are practice- and- application- oriented. They aim at teaching students some basic managerial skills. The final grade is a result of a written exam. In order to give students equal chances they come to the exam at the same time and get three identical questions. The final mark depends on their answers. Each student can choose to take three tests during the semester. They are graded according to the six-grade estimation scale. The final mark is an average of the three tests.

3391 Quality Control

ECTS credits: 4 **Weekly classes**: 3lec+0sem+3labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Tsvyatko Stanev Koriykov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: korijkov@ru.acad.bg
Abstract:
The course is an integral part of management sciences, part of the teaching curriculum for the degree course. Through various teaching methods students acquire skills and knowledge about the principles and methods for Quality Control in different stages of a product's lifecycle.
Course content:
Types of control. Principles of quality control. Process approach in quality control. Quality control methods and techniques. Quality control at different stages - marketing, design, supply, manufacturing and delivering the Service. Quality improvement methods.
Teaching and assessment:
Lectures are based on typical cases. Their content, order, presentation and interpretation aim at profound understanding the methods and techniques of quality control of processes, products and services.
During laboratory classes each student works by himself/herself or in a team, in order to do everything prescribed in a report form; using quality management standards, students analyze the specific case, give ideas for improvement and make decisions. The final mark is an average of the written exam and the report assessment.

3393 Finances for Non-financial Specialists

ECTS credits: 4 **Weekly classes**: 2lec+0sem+0labs+2ps
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of Economics, Faculty of Business and Management
Lecturers:
Assoc. Prof. Georgi Valchev, PhD, Department of Economics, tel.: 888-357
Sr. Assist. Milena Koseva, Department of Economics, tel.: 888-347
Abstract:
The subject is an elective one, proposed during semester VIII. It aims at acquainting future Bachelors in industrial engineering with the system of finances of an industrial enterprise and the methods for their management. Attention is paid to long-term and short-term company financing, capital structure, management of expenses, methods of investment analysis and financial analysis of a company activity.
Course content:
The company – main economic subject of the economy activity. Types of enterprises according to their legal form. Main features of finances and financial management of a company. Assets and liabilities, incomes and expenses of a company. Main features and designation of the capital of a company. Own and attracted capital and credit conditions. Shareholder capital. Capital structure of a company. Financial gearing. Market value of a company. Main features, classification and evaluation of long-term assets. Main features and classification of short-term assets.
Teaching and assessment:
Lectures and classes are logically connected and they complement each other. Continuous assesssment is achieved by solving practical problems, tests, case studies, discussions, etc. The final mark is formed on the basis of the personal participation of students at classes and a test.

3394 Staff Management

ECTS credits: 4 **Weekly classes:** 2lec+0sem+0lab+2p
Assessment: continuous assessment **Type of exam**: written and oral
Departments involved:
Department of Business and Managemment, Faculty of Business and Managemment
Lecturers:
Assoc. Prof. Lachesar Stoianov Andreev, PhD, Department of Business and Managemment, tel.: 888-726.
Abstract:
The course Staff Management follows the stages of particularisation of Sociology and Psychology Management. The objective of this course is to give knowledge and skills about the following: who does what and with whom in the organisation for achieving its strategic aims.
Course content:
Gist and application of the scientific course Staff Management. Strategic aims and corporative culture. Organizational design of human resources. Development of the organization of human resources. Motivation of human resources. Management of human resources. Communication. Planning and providing human resources. Management of the quality of work of human resources. Management of remuneration, health-keeping and safety at work. Management of human relationships; team work.
Teaching and assessment:
The proposed theoretical knowledge is consolidated at seminar classes by solving case studies and self application is consolidated by individual presentations and/or course assignment. It is controlled, submitted and assessed at stages by using a score system. Students can voluntarily take part in three written tests, which are also assessed by using a score system. Receiving a total score of over 50% from the maximum, students are exempt from the exam and can receive a mark, which corresponds to their score. The exam includes two questions and a test. The semester is verified if classes are attended regularly.

3392 Diploma Prcatice

ECTS credits: 4 **Weekly workload:** 0lec+0sem+0labs+10ps
Assessment: oral exam **Type of exam**: oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The diploma practice aims at giving students the opportunity to get acquainted with contemporary scientific and technical achievements in the sphere, in which they develop a diploma project and with the existing condition of the problem in the organization, which has suggested the topic for the diploma project.
Course content:
In relation to the topic of the diploma project, students get acquainted with literature sources, patents, inventions etc., with methods for theoretical and experimental investigations and the results from them; with constructive and technological solutions; with laboratory equipment, measurement devices, tools patterns, machines for mechanical treatment, casting, welding, plastic deformation and thermal treatment; with methodology for constructive and technological calculations; with software packages for solving engineering problems; with quality management systems, etc.
Teaching and assessment:
The diploma practice is carried out in the department laboratories, mechanical and mechanical-mounting workshops, constructive and technological offices or divisions of machine-building companies, libraries, etc. in relation to the topic of the diploma project and the organization, which has suggested it. The tasks of the practice are determined by the tutor of the diploma project and reported to him. The results from the practice are used in forming the literature reference of the diploma project and the development of its specific sections.

3396 Diploma Project

ECTS credits: 10 **Weekly classes**
Assessment: defense **Type of exam**: oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The diploma project aims at giving students the opportunity to apply the obtained knowledge and skills in an independent and thorough development of engineering projects. The most common topics are connected with the design of machine-building technologies, design of technological equipment, design of automation devices, management and control of technological processes. Students who have excellent achievements are given topics with research character. The Final Year project gives the students practical skills and experience for their future engineering practice or for continuing their study in a Master degree course.
Course content:
Review of the information regarding the diploma project topic. Formulating the aim and tasks. Analysis of output and work conditions. Idea project or methodology of research. Design of machine-building technologies. Design of necessary equipment and devices. Running tests and processing results. Technical and economic analysis of the developed variants. Development of technical documentation and graphical representation of the results from the research.
Teaching and assessment:
The diploma project is developed following a given routine. Students work individually, using paper or electronically based information, the equipment of the department or other departments, and their instructor's help. The diploma project instructor assesses the level of involvement, the public and moral qualities of the student. The assessor evaluates the diploma project. Student defend the diploma project in front of the State Exam Committee and the open public. The State Exam Committee evaluates both the diploma project and the way it is defended.

POSTGRADUATE PROGRAMS

POSTGRADUATE STUDIES IN TECHNOLOGIES FOR NC MACHINES

PROFESSIONAL STANDARDS
OF A MASTER IN

TECHNOLOGIES FOR NC MACHINES

Course: **Technologies for NC machines**
Educational degree – **Master**
Professional qualification: **mechanical engineer**
Term of education: **1,5 years (3 terms)**

The main objective of the study in this Master degree course is to train specialists for technical preparation, organization and management of machine building.

General and special training – a group of courses, included in the curriculum form the general knowledge, connected with the providing information of manufacturing activities, data processing and analysis, the finite element method, quality management of manufactured products. The specific knowledge and skills are connected with technologies design, software supply setting-up, diagnostics and control of machines, which work autonomously or in flexible production systems, applying of CAD-CAM Systems in engineering activities.

Practical training of students is done by:
- Individual research work during the first and second semesters;
- Practice in companies which use modern production technologies and equipment;
- Final Year Project.

General and special skills for:
- research, analysis and management of technological processes;
- applying CAD-CAM Systems in the design of engineering activities;
- organization and management of activities in production divisions;
- effective exploitation of machines and flexible production systems;
- expert and marketing research for transferring technologies and know-how.

Career prospects:
Managers and organizers of production activities in machine manufacturing firms, as technological engineers, specialists in applying software programmes in engineering activities, consultants and experts in implementation and exploitation of production systems.

CURRICULUM

of the Master's degree course in

TECHNOLOGIES FOR NC MACHINES

First Year

Code	*First term*	*ECTS*	*Code*	*Second term*	*ECTS*
0443	Information Technologies in Mechanical Engineering	6	0451	Applied CAD Systems	6
0445	Finite Element Method	6	0452	Production Management	6
0446	Theory of Experiment	6	0499	Technologies for Digital Devices	6
0492	Digital Control of Technological Equipment	6	0500	Setting-up, diagnostics and control of NC machines	6
0494	Automated Programming	6	0501	Technological modules	6
	Total for the term:	***30***		***Total for the term:***	***30***

Second Year

Code	*Third term*	*ECTS*
0455	Quality Management Systems	5
	Elective courses (students elect a course)	
1061	Information Assurance of Computer Integrated Manufacturing	5
1062	Engineering and Applied Information Technologies	5
0503	CAD/CAM Systems	5
	Elective courses (students elect a course)	
1064	Finish Machining Technologies	5
1067	Gear-cutting	5
1063	Electro-physical and Electro-chemical Technologies	5
	Graduation	
1072	Master thesis	15
	Total for the term:	***30***
Total for the training course: 90 ECTS credits		

0443 Information Technologies In Mechanical Engineering

ECTS credits: 6
Weekly classes: 2lec+0sem+0labs+4ps
Assessment: continuous assessment
Type of exam: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Peter Angelov, MEng, PhD, tel.: 888-237, E-mail: pangelov@ru.acad.bg
Pr. Assist. Iwo Atanasov MEng,tel.:888-469, E-mail: iwo@roboman.ru.acad.bg
Abstract:
The purpose of the course is to give students knowledge about the application of computers in the design process. Methods of geometrical modeling of parts or assemblies and general questions, connected with the creation of CAD systems, are considered. The course has input connections with the courses: Mathematics, Engineering graphics, Informatics, Machine details. The obtained knowledge is used in FEM-analysis, Applied CAD-systems and diploma projects.
Course content:
Mathematical modeling in computer aided design. 2D-modeling. 3D-Solid modeling of parts and assemblies. Parametric design. Creation of drawings of parts and assemblies. 3D-Surface modeling. Architecture and general principles of CAD system creation.
Teaching and assessment:
The teaching process is divided into lectures and practical classes in computer rooms, using appropriate software. There are individual work places for students. Each student has to solve individual tasks. A web-based manual for a similar course can be used for self-training in a free-access computer room. Continuous assessment is formed by two tests, performed in the middle and at the end of the semester, during practical classes. The first test is on 3D-Solid part modeling and the second test is on 3D-Surface modeling.

0445 Finite Element Method

ECTS credits: 6
Weekly classes: 2lec+0sem+0labs+2ps
Assessment: exam
Type of exam: written
Departments involved:
Department of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Marko Todorov, MEng , PhD, Department of Engineering Mechanics,
tel. 888224, e-mail: mtodorov@ru.acad.bg .
Abstract:
The Finite Element Method (FEM) is confirmed to be a powerful method of solving problems of Solid and Structure Mechanics. It is applicable for problems of heat conduction, mass transportation, diffusion, electrical and magnetic fields, as well as fluid mechanics. The aim of the course is to give to students the necessary minimum of knowledge about the principle of FEM in order to use developed software to analyze the strength and strain of engineering objects, which will be designed.
Course content:
After a short introduction, concerning the basic equations of the Theory of elasticity and some rules of Matrix algebra, the basis of FEM is elucidated on the simplest finite element that can be chosen – a bar under tension and compression. Without any detail, the common energy principles of Solid Mechanics and the corresponding equations, valid for a wide range of problems in Solid Mechanics, are given to students. Different types of finite elements that can be used for the discretezation of the objects analyzed, are considered. The essential and nonessential boundary conditions for different types of problems (as plane, plates, shells, axisymmetric, 3-D and so on) are discussed. Great attention is paid to the preparation of a problem for FEM solving.
Teaching and assessment:
The learning material is presented in lectures with the allowable minimum of mathematical proofs and without redundant theory considerations. The assertions are illustrated with examples that could facilitate students at practical classes. It is important that students should work on their own in the practical classes. The aim is to learn how to use the program of FEM, developed in the department. Students have three assignments during the semester. A computer lab is provided for their work. A grading system determines the minimum required for semester validation and the final grade after two written tests. Continuous assessment is based on two tests.

0446 Theory of Experiment

ECTS credits: 6 **Weekly classes**: 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written and oral
Departments involved:
Department of Agricultural Machines, Agro- Industrial Faculty
Lecturers:
Assoc Prof. Todor Tsanev Todorov, MEng, Department of Numerical Methods and Statistics,
tel. 888 536, E-mail: ttodorov@ru.acad.bg
Abstract:
The course includes the main methods for experiment planning in the field of engineering, processing and analysis of results. In this connection the objects are classified according to the number of control factors in three groups – with no control factors, with one control factor and with more than one control factors.
For the first group methods of statistical estimation and of checking statistical hypothesis are considered. For the second and the third group methods of single- and multi-factor regression and variances analysis are considered. The courses of Linear Algebra and Geometry and Mathematical Statistics are a prerequisite for the course Theory of Experiment. It is a prerequisite for the courses of Optimisation Methods, Object Identification, the Final Year Project and others.
Course content:
Cybernetic approach in studying objects experimentally. The role of experiment in research. Types of experiments. Studying objects with no external influence. Studying single-factor objects. Single-factor regression analysis. Single-factor variances analysis. Studying multi-factor objects. Multi-factor regression analysis. Multi-factor variances analysis. Planning regression experiments. First degree plans. Second degree plans. Data processing in planned experiments. Planning experiments for variances analysis. Optimising multi-factor experiments. Statistical optimisation. Software products experimental data processing.
Teaching and assessment:
Lectures follow the traditional ways of delivering. Workshops have investigative character. Laboratory classes on real objects are envisaged, as well. The exam is written and includes two questions and a problem.

0492 Digital Control of Technological Equipment

ECTS credits: 6 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written and oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Georgi Vasilev Nenov, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 653; e-mail: gosho@manuf.ru.acad.bg
Abstract:
The course is aimed at deepening students' knowledge of programming and using CNC machines, as well as programmable controllers in discrete production. Special attention is paid to macro programming in machining and measuring programs. Input disciplines are: Control of Metal Cutting Equipment, Manufacturing Technologies and Metal Cutting Machines, while the outputs are the diploma project and the engineering practice.
Course content:
Programming of the fifth generation of CNC systems. Programming of CNC system Fanuc 6. Editing and testing of control programs. Interactive programming. Using the MACRO language for editing and control programs. Adaptive control for CNC machines. Programming of grinding CNC machines. Other CNC machines. Modern trends in building systems of CNC machines.
Teaching and assessment:
Laboratory classes start after the teacher has discussed and explained the goal of every task. Problems as well as hints for solving them are given to students as handouts. At some of the classes simulation programs are used. At classes requiring the usage of CNC machines one student works under the supervision of the teacher, and for the rest of the students they serve as a demonstration. Students develop programs for CNC machines. The final mark is the result of an exam, covering issues from the lectures, and is affected by the students' active participation during practical classes.

0494 Automated Programming

ECTS credits: 6 **Weekly workload**: 2lec+0sem+0labs+3ps
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Petar Nedyalkov Angelov, MSc (Eng), PhD, Department of 'Machine Tools and Manufacturing',
Tel: 888 237; E-mail: pangelov@ru.acad.bg
Pr. Assist. Ivo Yordanov Atanasov, MEng, Department of Machine Tools and Manufacturing,
Tel: 888 469; E-mail: iwo@roboman.ru.acad.bg
Abstract:
Principles of automated creation of control programs for CNC machines- turning machines, milling machines, machining centers and thread-erosion machines are discussed. Algorithms for geometrical and technological programming, data bases and knowledge bases for cutting tools, machines and CNC systems, principles of typical technological processes design of CNC machines, demo programs and presentations of popular programs.
Course content:
CAD/CAM systems of automated programming. 2D and 3D objects. Automated transfer of CAD and CAM. Information exchange files. Program-and-technical set for automated creation of NC programs 'MHEMO'/MNEMO. Basic and extra capabilities of the set. Editing, graphical simulation and testing of a created program. Principles of MasterCAM 9, SurfCAM, SolidCAM, Power Shape, etc. Demonstrations, based on ppt-files and avi- presentations.
Teaching and assessment:
Teaching is carried out in the form of lectures, practical classes in a computer room, as well as out-of-class work on the Internet with given WEB addresses. The lectures and classes are presented with demo CDs, company documentation of renowned world leaders. A course assignment is submitted according to a schedule and is graded after every stage by a methodology, stated in the main syllabus of the course. Students are encouraged to submit reports on Internet articles, created models and/or working NC program, in connection with their given assignment.

0451 Applied CAD Systems

ECTS credits: 6 **Weekly classes:** 2lec+0sem+0labs+3ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Petar Nedyalkov Angelov, MEng, PhD, Department Machine Tools and Manufacturing,
Tel: 888-237, e-mail: pangelov@ru.acad.bg
Pr. Assist. Ivo Yordanov Atanasov, MEng, Department Machine Tools and Manufacturing,
Tel: 888-469, e-mail: iwo@roboman.ru.acad.bg
Abstract:
The main goal of the course is to teach students the widely spread and used CAD systems in automated design of parts for general and tools manufacturing. There is an in-depth coverage of the stages in designing machine parts and products.
Course content:
Principles of automated design. Presentation of design data and knowledge. Systems for automated design-general principles of building and their possibilities. Standards of interfile graphical exchange. 2D, 3D modeling. Body, surface and solid design.
Teaching and assessment:
Teaching is done by lectures, practical classes, a course assignment and out-of-class work. The software used includes AutoCAD, SolidWorks, Rhino 3D, etc. Students have a chance for extra practice in a free access computer room. The course assignment is prepared according to a pre-defined schedule. The sequence of work is documented in an explanatory note file up to 10 pages. The course assignment mark affects 70% of the continuous assessment. The other 30% are based on students' performance.

0452 Production Management

ECTS credits: 6 **Weekly classes:** 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written
Departments involved:
Department Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Yulian Penchev Mladenov, MEng, PhD, Department Machine Tools and Manufacturing,
Tel: 888 405, 716, 84 20 07, E-mail: jmladenov@ru.acad.bg
Abstract:
The course has an integral character and encompasses some of the most important issues of modern production factories. It is taken into consideration that it will be taught to Bachelors Degree graduate engineering students. The main goal of the course is to teach students about the organization and management of production management of a modern company and acquire skills to be used in practice. The knowledge can be applied in the diploma projects as well as in the future work of the engineers.
Course content:
Introduction. Development of a strategy. Decision making techniques. Prognosis making. Strategic decisions. Production process. Basic principles in organizing the production process. Machines, equipment, technologies. Space and time deployment in a factory. Human resources strategies. Management of material reserves.
Teaching and assessment:
Lectures aim at fulfilling the goal and tasks of the course. Seminars are practice- oriented and designed to help students acquire some basic managerial skills. The final grade is the result of a written exam. To give every student an equal chance, they all come to the exam at the same time and get three identical questions. Each student can take three tests during the semester, which are marked according to the six-grade evaluation scale. In this case the final grade is an average of the three tests.

0499 CNC Technologies

ECTS credits: 6 **Weekly classes**: 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam**: written and oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Georgi Vasilev Nenov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888653, E-mail: gosho@manuf.ru.acad.bg
Pr. Assist. Dimitar Stefanov Dimitrov, MEng, Department of Machine Tools and Manufacturing,
Tel: 888653 E-mail: dimitar@manuf.ru.acad.bg
Assoc. Prof. Milko Dimitrov Enchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888653, E-mail: milko@manuf.ru.acad.bg
Abstract:
The course aims at deepening students' knowledge of the technology and specificities in machining parts by CNC machines. There are additions to Manufacturing Technologies, parts 1 and 2 (Bachelor's Degree). The acquired knowledge and skills the allow design and optimization of technological processes for machining parts and typical surfaces by CNC machines. Input courses include Control of Metal Cutting Machines, Manufacturing Technologies, Metal Cutting Machines and Numeric Control of Technological Equipment; outputs- diploma projects and engineering practice.
Course content:
Technological analysis of the design of parts, manufactured by CNC machines. General prerequisites. Concentration of operations. Complexity of parts. Machining of parts by turning, boring and milling, machining centers, thread-erosion and volume-erosion, laser, plasma and gas-cutting machines. Choice of bases and positioning of blanks. Requirements and specificities of the equipment used. Machining shaft, solids, and plate surfaces. Optimization of machining of typical surfaces. Sets of tools for turning, boring and milling machines for high-speed cutting.
Teaching and assessment:
The theoretical subject matter covered in lectures is practised during laboratory classes. Students should come prepared for each class. Some of the classes take place in production factories, using the respective technological equipment. To have the semester verified students should have attended classes regularly and submitted their reports. Every student is allowed to take two tests as a substitute for the exam. Students are examined only if the semester is verified. The exam begins with a written answer to two questions and finishes with an oral discussion.

0500 Setting, Diagnostics and Control of NC Machines

ECTS credits: 6 **Weekly classes**: 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam**: written and oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Georgi Vasilev Nenov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888653, E-mail: gosho@manuf.ru.acad.bg
Pr. Assist. Dimitar Stefanov Dimitrov, MEng, Department of Machine Tools and Manufacturing,
Tel: 888653 E-mail: dimitar@manuf.ru.acad.bg
Assoc. Prof. Milko Dimitrov Enchev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888653, E-mail: milko@manuf.ru.acad.bg
Abstract:
The course aims at deepening students' knowledge of the methods of dimensional setting, technical diagnostics of machines and processes, the technological capabilities and the means for automated control. Input disciplines include Control of Metal Cutting Machines, Manufacturing Technologies, Electrical Equipment and Electronics, Metrology and Measurement Equipment. The course provides knowledge and skills needed for effective exploitation of CNC machines and automated manufacturing systems.
Course content:
Nature and goals of dimensional setting. Manual, automated and ex-machine setting. Nature and goals of technical diagnostics. Element, system and program/software diagnostics of CNC machines. Automated manufacturing systems' diagnostics. Diagnostics of the parameters of technological processes. Automated control functions. Automated control of parts and cutting tools. Coordinate measurements on CNC machines. Algorithms for dimensional control. Control of the reliability of the technological system.
Teaching and assessment:
The theoretical subject matter covered in lectures is practised during laboratory classes. Students should come prepared for each exercise. Some of the classes take place in factories, applying modern diagnostics and control systems. To have the semester verified students should have attended classes regularly and submitted their reports. Every student is allowed to take two tests as a substitute for the exam. Students are examined only if the semester is verified. The exam begins with a written answer to two questions and finishes with an oral discussion.

0501 Technological Modules and Complexes

ECTS credits: 6 **Weekly classes:** 2lec+0sem+2labs+1ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Miroslav Stanchev Penchev, MEng, PhD, Department Machine Tools and Manufacturing,
Tel: 888 712; E-mail: mpenchev@ru.acad.bg
Abstract:
The main goal of the course is to teach students the models and the methods, used in the development of complexes of automated technological equipment based on industrial robotics. This knowledge is needed for individual solving problems such as the design of effective systems of CNC machines and industrial robots. Inputs are Manufacturing technologies, Manufacturing automatization and robotization, IT in manufacturing, Numeric control of technological equipment, Theory of experiments. Outputsare Informational provision of CIM, CAD/CAM systems, diploma project, engineering practice.
Course content:
Organization of the work of robot complexes. Problems when designing robot complexes. Mathematical models of robot complexes. Auxiliary equipment and composition of complexes. General sequence when designing robot complexes.
Teaching and assessment:
Lectures discuss principal issues, using examples from the engineering practice. Laboratory classes make use of the systems and devices for automatization and robotization existing in the laboratory and the technical devices, created for experimental studies.
The final grade is based on a written exam.

0455 Quality Management Systems

ECTS credits: 5 **Weekly classes**: 2lec+0sem+0labs+2ps
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Tsvyatko Stanev Koriykov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: korijkov@ru.acad.bg
Abstract:
The only proof of real quality in any organization is the introduction and implementation of a Quality Management System (QMS) and having a certificate. The course main goal is for students to acquire skills and knowledge about how to build, document, introduce, and continuously improve a QMS based on ISO 9000.
Course content:
Review of QMS. Types of standards relevant to QMS. Process approach in building QMS. Process interaction networking. Management responsibility. Resources management. Product/service creation. Measurement, analysis and improvement processes. Documentation management processes.
Teaching and assessment:
Teaching is based on lectures and practical classes. Students are allowed to take the exam only if they have kept all the rules of Ruse University 'Angel Kanchev'. Their knowledge is assessed by two tests - in the middle and at the end of the semester.

1061 Information Assurance of Computer Integrated Manufacturing (CIM)

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Petar Nedyalkov Angelov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 487; E-mail: pangelov@ru.acad.bg
Pr. Assist. Ivo Yordanov Atanasov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 469; E-mail: iwo@roboman.ru.acad.bg
Abstract:
The course studies the main principles and structures of applied information systems for design and technological design automation. There is a direct connection with the new possibilities of Internet information exchange, creation and use of unified information systems, data and knowledge bases.
Course content:
General structural algorithms for design and technological design automation. Types of databases and knowledge bases for exchange of conventionally constant information. Standard exchange files. CAD/CAM/CAE/CAQ systems. Structure of a PDM organization. Exemplary packages with the afore-mentioned organization. Expert systems in manufacturing. Organization of total information assurance of computer integrated manufacturing, tool building, etc.
Teaching and assessment:
Teaching is done through lectures, practical classes , course assignment, and individual work. The following software is used: PTK MNEMO, MasterCAM, SurfCAM and other demo software packages. The different stages of the course assignment are done according to a schedule. The sequence of work is documented in an explanatory report of up to 10 pages. The course assignment grade weighs 70% of the final grade. The other 30% are based on students' performance in class.

1062 Engineering and Applied Information Technologies

ECTS credits: 5 **Weekly classes:** 2lec+sem+labs+2ps
Assessment: continuous assessment **Type of exam:** written and oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Petar Nedyalkov Angelov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 487; E-mail: pangelov@ru.acad.bg
Pr. Assist. Ivo Yordanov Atanasov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 469; E-mail: iwo@roboman.ru.acad.bg
Abstract:
Principles of implementation of automated engineering and applied technological processes are discussed - design, automated technological design, production of parts and their automated control. The knowledge summarizes what has been learned in: Applied CAD-systems, Automated programming, CAD/CAM systems, and other computer-oriented courses in the master's degree course curriculum.
Course content:
General principles of engineering and applied information technologies. Transfer of information at different stages of processing. CAD design. CAM systems for automated programming of CNC machines. Automated manufacturing input and output control. Three-coordinate measuring heads. Software applications for manufacturing output control. Non-conventional machining of parts – inscriptions, engraving, thread erosion and volume erosion machining, laser cutting technologies.
Teaching and assessment:
Teaching is done through lectures, practical work in a computer hall, as well as out-of-class work on the Internet using given web addresses. The lectures and seminars are presented using demo CDs, leading design companies' documentation, ppt-files and avi-presentations. Special attention is paid to internet reviews and the automated engineering and technical design model of a part.

0503 CAD/CAM Systems

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Petar Nedyalkov Angelov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 487; E-mail: pangelov@ru.acad.bg
Pr. Assist. Ivo Yordanov Atanasov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 469; E-mail: iwo@roboman.ru.acad.bg
Abstract:
The main goal of the course is to teach students about integrating manufacturing design and automated design in a common program environment, known CAD/CAM systems, their technical capabilities, structure and constituent modules.
Course content:
Basic principles of CAD/CAM systems. Technical capabilities of specialized CAD/CAM systems. Parametric modeling. Parts, equipment and tools libraries. Adding of non-geometrical information. Programming of turning operations. Elementary movements. Change of tools. Three- and five-coordinate machining of sculptured surfaces. Turning and milling machine postprocessors.
Teaching and assessment:
Teaching is done by lectures, practical classes in a computer room, as well as out-of-class work on the Internet with given WEB addresses of renowned program developers. The following software is used PTK MNEMO, MasterCAM, SurfCAM, as well as other demo packages. A course assignment is prepared according to a pre-defined schedule. It includes designing a model of a sculptured surface, defining cutting tools, graphical simulation and creation of a NC program for a machining center. The sequence of work is documented in an explanatory note file up to 10 pages. The course assignment grade takes up 70% of the continuous assessment. The other 30% are based on students'performance at practical classes.

1064 Finish Machining Technologies

ECTS credits: 5
Weekly classes: 2lec+0sem+2labs+0ps
Assessment: exam
Type of exam: written and oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Veselin Ivanov Grigorov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 508 E-mail: VGrigorov@ru.acad.bg
Abstract:
Students broaden their knowledge about the finishing technological processes – through cutting or through different methods, acquired during their bachelor's degree curriculum. Scientific and applied results, achieved abroad or in the department, are discussed.
Course content:
Finishing machining, using tools whose cutting edge has a specific geometry. Abrasive finishing. Finishing through surface plastic deformation (SPD). Features of finishing machining.
Teaching and assessment:
Lectures are based on specific issues, while the details and practical implementation are reviewed during laboratory classes. The written exam consists of written answers to two questions and their oral discussion.

1067 Gear-cutting

ECTS credits: 5
Weekly workload: 2l+0s+2lab+0p
Assessment: exam
Type of exam: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Stefan Veselinov Vichev, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888-451, e-mail: svichev@ru.acad.bg
Abstract:
A specialized technological course that teaches how to produce cylindrical, worm, and conical gears. In-depth study of the stages of the technological process, the specifics in designing gears, parts of the involute gearing theory, gear ring control parameters and their meaning.
Course content:
General information and classification of cylindrical gears. Structure and stages of the technological process. Methods, tools and machines for gear-cutting and finishing of gears. Gear ring control parameters and their meaning. Cutting of worm and conical gears.
Teaching and assessment:
Students acquire the knowledge taught in thecourse attending lectures, through individual work on specified literature sources, and active participation in laboratory classes. They develop an individual project work for designing a technological process for a specific cylindrical gear under their instructor's supervision. The project is graded at the end of the semester. This mark and the result of the written exam form the final mark for the course.

1063 Electro-physical and Electro-chemical Technologies

ECTS credits: 5 **Weekly classes:** 2lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written and oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Julian Penchev Mladenov, MEng, PhD, tel. 888 405,
Pr. Assist. Dimitar Stefanov Dimitrov, MEng, tel. 888653 e-mail: dimitar@manuf.ru.acad.bg
Assoc. Prof. Milko Dimitrov Enchev, MEng, PhD, tel. 888653, e-mail: milko@manuf.ru.acad.bg
Abstract:
The course has the aim to give knowledge about the main issues, connected with the use and application of different electro-physical methods for measurement treatment of parts. Special attention is paid to the study of technological capabilities, application area, influence of the parameters of processes on the quality and the productivity of treatment. The prerequisites for this course are the courses of Physics, Chemistry, Electrical Engineering, Materials Science and Basics in Machine-building Technology. Together with other courses it gives students basic technological knowledge, connected with the treatment of materials.
Course content:
Classification and characteristics of electro-physical methods of treatment. Characteristics of laser, ultra-sound and magnetic abrasive treatment. Application sphere of the discussed methods. Construction of machines (equipment), used by the electro-physical methods of treatment. Factors and parameters of the process, which have influence on the preciseness, roughness of treated surfaces and productivity. Design and manufacturing of non-standard technological equipment. Programming of digital devices.
Teaching and assessment:
The theoretical material, presented at lectures is consolidated at laboratory classes. Students must be prepared for each topic of the laboratory classes. The semester is verified if classes are attended regularly and reports of the laboratory classes submitted. Each student can do two tests voluntarily and if successful, sitting for the exam is not obligatory. The exam starts with a written part on two questions and it finishes with oral discussion.

1072 Master thesis

ECTS credits: 15 **Weekly classes:**
Assessment: defense **Type of exam**: oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The master thesis is the most active form of education during the master's degree curriculum. It gives students practical skills and habits for various problems and the ways for solving them through engineering projects. This inspires creativity that can be applied in the different stages and builds skills to implement studies and deal with information bases.
Course content:
Review of the information regarding the master thesis topic. Theoretical study of the problem. Design of the equipment needed. Design of the specified stages of the manufacturing process. Creation of methods and conduction of studies. Technical and economicl analysis of the results and various technologies applied. Visualization of the master thesis using modern technical means.
Teaching and assessment:
The master thesis is developed following a given routine. Students work individually, using paper or electronically based information, the equipment of the department or other departments, and their instructor's help. The master thesis instructor assesses the level of involvement, the public and moral qualities of the student. The assessor evaluates the diploma project. The student defends the master thesis in front of the State Exam Committee and the open public. The State Exam Committee evaluates both the master thesis and the way it is defended.

POSTGRADUATE STUDIES IN MATERIALS TECHNOLOGY AND MATERIAL SCIENCE

PROFESSIONAL STANDARDS
OF A MASTER IN

MATERIALS TECHNOLOGY AND MATERIAL SCIENCE

COURSE: **Materials Technology and Material Science**
Educational degree – **Master**
Professional qualification: **Master engineer**
Term of education: **1,5 years (3 terms)**

The main objective of the study in this Master degree course is to train specialists in the sphere of technical preparation, organization and management of tools supply for manufacturing.

General and special training – a group of courses, included in the curriculum, form the general knowledge, connected with providing information about manufacturing activities, data processing and analysis, power analysis with the finite element method, quality management of manufactured products.

The specific knowledge and skills are connected with the new contemporary materials and the technologies for their manufacturing and machining.

Practical training of students is carried out by:
- Individual research work during the first and second semesters;
- Practice in companies which use modern production technologies and equipment;
- Final Year Project.

General and special skills for:
Apart from the skills, envisaged for the Bachelor degree, the Master engineer must be able to:
- organise and conduct the tests of materials behavior in exploitation conditions;
- develop strategies for the improvement of the quality of materials;
- do tests of technological processes for materials machining and to develop strategies for their optimization;
- to design and create new types of the common machine building materials, as well as brand-new materials.

Career prospects:
Managers and organizers of production activities in machine manufacturing firms, as technological engineers, heads of technological divisions, expert laboratories, standardization divisions, managers of development bases and expert groups in different organizations.

CURRICULUM

of the Master's degree course in

MATERIALS TECHNOLOGY AND MATERIAL SCIENCE

First Year

Code	*First term*	*ECTS*	*Code*	*Second term*	*ECTS*
0443	Information Technologies in Mechanical Engineering	6	0451	Applied CAD Systems	6
0445	Finite Element Method	6	0452	Production Management	6
0446	Theory of Experiment	6	1161	Special Welding Technologies	6
0492	Digital Control of Technological Equipment	6	1160	Special Technologies for Metal Forming	6
0441	Special Casting Methods	6	0450	Vacuum heat and Chemical heat Treatment	6
	Total for the term:	***30***		***Total for the term:***	***30***

Second Year

Code	*Third term*	*ECTS*
0455	Quality Management Systems	5
1163	Advanced Materials	5
1164	Special Materials, used in Tools Production	5
	Graduation	
1165	Master thesis	15
	Total for the term:	***30***
Total for the training course: 90 ECTS credits		

0443 Information Technologies In Mechanical Engineering

ECTS credits: 6 **Weekly classes:** 2lec+0sem+0labs+4ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Peter Angelov, MEng, PhD, tel.: 888-237, E-mail: pangelov@ru.acad.bg
Pr. Assist. Iwo Atanasov MEng,tel.:888-469, E-mail: iwo@roboman.ru.acad.bg
Abstract:
The purpose of the course is to give students knowledge about the application of computers in the design process. Methods of geometrical modeling of parts or assemblies and general questions, connected with the creation of CAD systems, are considered. The course has input connections with the courses of Mathematics, Engineering graphics, Informatics, Machine details. The obtained knowledge is used in FEM-analysis, Applied CAD-systems and diploma projects.
Course content:
Mathematical modeling in computer aided design. 2D-modeling. 3D-Solid modeling of parts and assemblies. Parametric design. Creation of drawings of parts and assemblies. 3D-Surface modeling. Architecture and general principles of CAD system creation.
Teaching and assessment:
The teaching process is divided in lectures and practical classes in computer rooms, using appropriate software. There are individual work places for students. Each student has to solve individual tasks. A web-based manual of a similar course can be used for self-training in a free-access computer room. Continuous assessment is formed by two tests, performed in the middle and at the end of the semester, during the practical classes. The first test is on 3D-Solid part modeling and the second test is on 3D-Surface modeling.

0445 Finite Element Method

ECTS credits: 6 **Weekly classes**: 2lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written
Departments involved:
Department of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Marko Todorov, MEng , PhD, Department of Engineering Mechanics,
tel. 888224, e-mail: mtodorov@ru.acad.bg
Abstract:
The Finite Element Method (FEM) is confirmed to be a powerful method of solving problems of Solid and Structure Mechanics. It is applicable for problems of heat conduction, mass transportation, diffusion, electrical and magnetic fields, as well as fluid mechanics. The aim of the course is to give to students the necessary minimum of knowledge about the principle of FEM in order to use developed software to analyze the strength and strain of engineering objects, which will be designed.
Course content:
After a short introduction, concerning the basic equations of the Theory of elasticity and some rules of Matrix algebra, the basis of FEM is elucidated on the simplest finite element that can be chosen – a bar under tension and compression. Without any detail, the common energy principles of Solid Mechanics and the corresponding equations, valid for a wide range of problems in Solid Mechanics, are given to students. Different types of finite elements that can be used for the discretezation of the objects analyzed, are considered. The essential and nonessential boundary conditions for different types of problems (as plane, plates, shells, axisymmetric, 3-D and so on) are discussed. Great attention is paid to the preparation of a problem for FEM solving.
Teaching and assessment:
The learning material is presented in lectures with the allowable minimum of mathematical proofs and without redundant theory considerations. The assertions are illustrated with examples that could facilitate students at practical classes. It is important that students should work on their own in the practical classes. The aim is to learn how to use the program of FEM, developed in the department. Students have three assignments during the semester. A computer lab is provided for their work. A grading system determines the minimum required for semester validation and the final grade after two written tests. Continuous assessment is based on two tests.

0446 Theory of Experiment

ECTS credits: 6 **Weekly classes**: 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written and oral
Departments involved:
Department of Agricultural Machines, Agro- Industrial Faculty
Lecturers:
Assoc Prof. Todor Tsanev Todorov, MEng, Department of Numerical Methods and Statistics, tel. 888 536
E-mail: ttodorov@ru.acad.bg
Abstract:
The course includes the main methods for experiment planning in the field of engineering, processing and analysis of results. In this connection the objects are classified according to the number of control factors in three groups – with no control factors, with one control factor and with more than one control factors.
For the first group methods of statistical estimation and of checking statistical hypothesis are considered. For the second and the third group methods of single- and multi-factor regression and variances analysis are considered. The courses of Linear Algebra and Geometry and Mathematical Statistics are a prerequisite for the course Theory of Experiment. It is a prerequisite for the courses of Optimisation Methods, Object Identification, the Final Year Project and others.
Course content:
Cybernetic approach in studying objects experimentally. The role of experiment in research. Types of experiments. Studying objects with no external influence. Studying single-factor objects. Single-factor regression analysis. Single-factor variances analysis. Studying multi-factor objects. Multi-factor regression analysis. Multi-factor variances analysis. Planning regression experiments. First degree plans. Second degree plans. Data processing in planned experiments. Planning experiments for variances analysis. Optimising multi-factor experiments. Statistical optimisation. Software products experimental data processing.
Teaching and assessment:
Lectures follow the traditional ways of delivering. Workshops have investigative character. Laboratory classes on real objects are envisaged, as well. The exam is written and includes two questions and a problem.

0492 Digital Control of Technological Equipment

ECTS credits: 6 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written and oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Georgi Vasilev Nenov, PhD, Department of Machine Tools and Manufacturing, Tel: 888 653;
e-mail: gosho@manuf.ru.acad.bg
Abstract:
The course is aimed at deepening students' knowledge of programming and using CNC machines, as well as programmable controllers in discrete production. Special attention is paid to macro programming in machining and measuring programs. Input disciplines are: Control of Metal Cutting Equipment, Manufacturing Technologies and Metal Cutting Machines, while the outputs are the diploma project and the engineering practice.
Course content:
Programming of the fifth generation of CNC systems. Programming of CNC system Fanuc 6. Editing and testing of control programs. Interactive programming. Using the MACRO language for editing and control programs. Adaptive control for CNC machines. Programming of grinding CNC machines. Other CNC machines. Modern trends in building systems of CNC machines.
Teaching and assessment:
Laboratory classes start after the teacher has discussed and explained the goal of every task. Problems as well as hints for solving them are given to students as handouts. At some of the classes simulation programs are used. At classes requiring the usage of CNC machines one student works under the supervision of the teacher, and for the rest of the students they serve as a demonstration. Students develop programs for CNC machines. The final mark is the result of an exam, covering issues from the lectures, and is affected by the students' active participation during practical classes.

0441 Special method of casting

ECTS credits: 6 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Rusi Minev Minev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 211, E-mail: rus@ru.acad.bg.
Abstract:
The course has the aim to widen and consolidate students' knowledge about casting methods which are different from the classical method of obtaining castings in single sand forms. Due to the great variety of special methods of casting, they are divided into two big groups according to the kind of casting form.
Course content:
Precision casting. Precision casting of large-dimension moulds in shells. Shell casting. Vacuum forming. Casting in metal mould. Die-casting. Requirements to the die construction. Shaping of internal die surfaces. Mould core. Arrangement of casts in metal moulds. Methods for air and gaze outlet from dies and metal mould. Heating and cooling of dies. Pressure casting. Press-forms. Casting under counter pressure. Centrifugal casting.
Teaching and assessment:
Teaching is done in the form of lectures and laboratory classes. Different visual aids are used for clarifying more complex technological charts. Part of the lecture material is further clarified during laboratory classes.

0451 Applied CAD Systems

ECTS credits: 6 **Weekly classes:** 2lec+0sem+0labs+3ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Petar Nedyalkov Angelov, MEng, PhD, Department Machine Tools and Manufacturing,
Tel: 888-237, e-mail: pangelov@ru.acad.bg
Pr. Assist. Ivo Yordanov Atanasov, MEng, Department Machine Tools and Manufacturing,
Tel: 888-469, e-mail: iwo@roboman.ru.acad.bg
Abstract:
The main goal of the course is to teach students the widely spread and used CAD systems in automated design of parts for general and tools manufacturing. There is an in-depth coverage of the stages in designing machine parts and products.
Course content:
Principles of automated design. Presentation of design data and knowledge. Systems for automated design-general principles of building and their possibilities. Standards of interfile graphical exchange. 2D, 3D modeling. Body, surface and solid design.
Teaching and assessment:
Teaching is done by lectures, practical classes, a course assignment and out-of-class work. The software used includes AutoCAD, SolidWorks, Rhino 3D, etc. Students have a chance for extra practice in a free access computer room. The course assignment is prepared according to a pre-defined schedule. The sequence of work is documented in an explanatory note file up to 10 pages. The course assignment mark take up 70% of the continuous assessment. The other 30% are based on students' performance.

0452 Production Management

ECTS credits: 6
Weekly classes: 3lec+0sem+0labs+2ps
Assessment: exam
Type of exam: written
Departments involved:
Department Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Yulian Penchev Mladenov, MEng, PhD, Department Machine Tools and Manufacturing,
Tel: 888 405, 716, 84 20 07, E-mail: jmladenov@ru.acad.bg
Abstract:
The course has an integral character and encompasses some of the most important issues of modern production factories. It is taken into consideration that it will be taught to Bachelors Degree graduate engineering students. The main goal of the course is to teach students about the organization and management of production management of a modern company and acquire skills to be used in practice. The knowledge can be applied in the diploma projects as well as in the future work of the engineers.
Course content:
Introduction. Development of a strategy. Decision making techniques. Prognosis making. Strategic decisions. Production process. Basic principles in organizing the production process. Machines, equipment, technologies. Space and time deployment in a factory. Human resources strategies. Management of material reserves.
Teaching and assessment:
Lectures aim at fulfilling the goal and tasks of the course. Seminars are practice- oriented and designed to help students acquire some basic managerial skills. The final grade is the result of a written exam. To give every student an equal chance, they all come to the exam at the same time and get three identical questions. Each student can take three tests during the semester, which are marked according to the six-grade evaluation scale. In this case the final grade is an average of the three tests.

1161 Special Welding Technologies

ECTS credits: 6
Weekly classes: 3lec+0sem+2labs+0ps
Assessment: exam
Type of exam: written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof.Boris Rusev Mateev, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 316, E-mail: bmateev@ru.acad.bg.
Abstract:
The course has the aim to give knowledge and skills about special welding methods and the technologies, based on them, for obtaining joints between similar and different metals, and between metal and non metal materials. Attention is paid to plastic welding. Nature, specifics and disadvantages, welding materials, welding regimes, apparatus and fields of application are studied for each particular welding method.
Course content:
Mechanism and specifics of welding in solid state and by welding. Specialised welding technologies: nature, specifics and disadvantages, welding materials, welding regimes, apparatus and fields of application. Cold-pressure welding. Ultrasonic welding. Capacitor-discharge resistance welding. Radio-frequency welding. Special methods for welding with coated electrodes. Electric arc welding in controlled atmosphere and vacuum. Electron- beam welding. Plasma-arc welding. Laser welding. Plastics welding.
Teaching and assessment:
Teaching is done via lectures and laboratory classes. Visual aids like slides, tables, charts, patterns, etc., are used during classes, as well. Continuous assessment is done by oral discussion before starting the class and making tests. If the tests are made successfully, the mark is taken into consideration and the students are exempt from the exam.

1160 Special technologies for metals forming

ECTS credits: 6 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof. Boris Ivanov Tomov, DSc, Department of Material Science & Material Technology,
tel. 888 310, E-mail: btomov@ru.acad.bg
Assoc. prof. Valentin Ivanov Gagov, PhD, Department of Material Science & Material Technology,
tel. 888 778, E-mail: gag@ru.acad.bg
Abstract:
The course gives basic knowledge about the technological capabilities of the special methods for metals forming and about theirs application in contemporary production of net-shape or near-net-shape discret parts. Preliminary knowledge of Materials Science, Metals Forming or Materials Technology 2, Heat Treatment and Manufacturing Technology are needed for studying this course. It builds up special basis for diploma projects preparation, for Doctor's degree training and for engineering practice.
Course content:
Technological capabilities for manufacturing net-shape or near-net-shape discret parts by forming. Near-net-shape and net-shape die forging. Precise sheet forming. Rolling of precise discret parts. Finishing by surface plastic deformation. Dies and tools for special techologies. Contemporary achievements and application fields of the special technologies for metals forming in manufacturing precise discret parts.
Teaching and assessment:
Training is carried out through lectures and laboratory classes. In the lectures modern means are in use for presentation and explanation of the teaching matter. During the laboratory classes several activities are carried out: laboratory experiments, computer simulations, inspections of authentic dies and products as well as observations of technological processes in production. During the semester two tests are considered as continuous control and the results obtained are taken into account at the final exam. It is a written one and, if necessary or on students' request, an oral discussion is carried out to specify the final assessment.

0450 Vacuum heat and chemical heat treatment

ECTS credits: 6 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment : exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof. Rusko Ivanov Shishkov, MEng, DSc, PhD, Dept. of Material Science & Material Technology,
tel. 888 204, E-mail: rish@ru.acad.bg
Pr. Assist. Marija Ilieva Nedeva, MEng, PhD, Dept. of Material Science & Material Technology,
tel. 888 307, E-mail: min@ru.acad.bg
Abstract:
The course is to give students basic knowledge about contemporary technologies for heat and chemical heat treatment in vacuum. Students train for self-dependant solutions, connected with the choice of technological equipment, design and running of a technological process for concrete materials and specific requirements. The acquired knowledge is a basis for the graduation paper and future activities of engineers.
Course content:
Basic concepts and characteristics of vacuum. Means of obtaining and control of vacuum. Technological equipment. Heat treatment of ferrous and non-ferrous metals and alloys. Heat treatment of special materials. Chemical heat treatment of metals and alloys in vacuum. Applications of vacuum technologies for heat and chemical heat treatment.
Teaching and assessment:
Lectures give students the theoretical bases of the main topics. During laboratory classes they acquire practical skills. The exam is written and accompanied with a discussion if necessary.

0455 Quality Management Systems

ECTS credits: 5 **Weekly classes**: 2lec+0sem+0labs+2ps
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Tsvyatko Stanev Koriykov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: korijkov@ru.acad.bg
Abstract:
The only proof for real quality in any organization is the introduction and implementation of a Quality management System (QMS) and having a certificate. The course main goal is for students to acquire skills and knowledge about how to build, document, introduce, and continuously improve a QMS based on ISO 9000.
Course content:
Review of QMS. Types of standards relevant to QMS. Process approach in building QMS. Process interaction networking. Management responsibility. Resources management. Product/service creation. Measurement, analysis and improvement processes. Documentation management processes.
Teaching and assessment:
Teaching is based on lectures and practical classes. Students are allowed to take the exam only if they have kept all the rules of Ruse University 'Angel Kanchev'. Their knowledge is assessed with two tests - in the middle and at the end of the semester.

1163 Advanced Materials

ECTS credits: 5 **Weekly classes:** 3lec+0sem+2labs+0ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Diana Vasileva Tzaneva, MSc (Chem), PhD, Dept. of Material Science & Material Technology,
tel. 888 317, E-mail: dvc@ru.acad.bg.
Abstract:
The course gives knowledge about contemporary materials, used in the special areas of techniques and practice which impose extreme requirements to material properties and reliability , combined with reasonable prices and good accessibility.
Course content:
Metals and alloys: special steels; refractory metals; iron-nickel- and cobalt-based super alloys; extra-light and corrosion resistant aluminum-based alloys; titanium-based alloys; metal-based composites; amorphous metals and alloys. Ceramics: silicates, oxides and oxygen-free high-temperature ceramics; functional and engineering ceramics. Special glasses. Organic materials: high-strength, thermo-resistant and corrosion-resistant polymers – polyesters, polyamides, polysulfones, polypheniloxid, elastomers. Functionally-gradient materials.
Teaching and assessment:
Lectures and practical classes are illustrated with schemes, diagrams, graphics, tables, handouts, articles, samples of cross-sections. The exam is a test.

1164 Special Materials, Used in Tool Production

ECTS credits: 5 **Weekly classes:** 2lec+0sem+1labs+0ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Prof. Veliko Kolev Ivanov, MEng, DSc, Department of Machine Tools and Manufacturing, Tel: 888 714, e-mail: vivanov@ru.acad.bg
Abstract:
The course broadens the specialized background of students in the area of application of special materials for tools equipment. The issues studied reflect the special materials application condition and trends, as for tool production. Inputs are: Materials science, Materials technology and Cutting tools.
Course content:
Introduction. General information about tool production. General requirements for tools and materials for tools. Types of tools materials– characteristics, properties. Application of tools steels, hard materials, ceramics and synthetic super-hard materials in instrumental equipment.
Teaching and assessment:
Lectures discuss principal issues of the use of special instrumental materials in tools.
At laboratory classes the topics from the lectures are developed and studied, skills in choosing instrumental materials are acquired. Continuous assessment is based on three tests.

1165 Master Thesis

ECTS credits: 15 **Weekly classes:**
Assessment: defense **Type of exam**: oral
Departments involved:
Department of Material Science & Material Technology
Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project instructors
Abstract:
The master thesis is the most active form of education during the master's degree curriculum. It gives students practical skills and habits for various problems and the ways for solving them through engineering projects. This inspires creativity that can be applied in the different stages and builds skills to implement studies and deal with information bases.
Course content:
Review of the information regarding the master thesis topic. Theoretical study of the problem. Design of the equipment needed. Design of the specified stages of the manufacturing process. Creation of methods and conduction of studies. Technical and economicl analysis of the results and various technologies applied. Visualization of the master thesis using modern technical means.
Teaching and assessment:
The master thesis is developed following a given routine. Students work individually, using paper or electronically based information, the equipment of the department or other departments, and their instructor's help. The master thesis instructor assesses the level of involvement, the public and moral qualities of the student. The assessor evaluates the diploma project. The student defends the master thesis in front of the State Exam Committee and the open public. The State Exam Committee evaluates both the master thesis and the way it is defended.

POSTGRADUATE STUDIES IN QUALITY MANAGEMENT

PROFESSIONAL STANDARDS
OF A MASTER IN

QUALITY MANAGEMENT

COURSE : **Quality Management**
Educational degree – **Master**
Professional qualification: **quality management engineer**
Term of education: **1,5 years (3 terms)**

The main objective of the study in the Master degree course in Quality Management is to prepare specialists in quality management, managers of quality systems and quality auditors according to the European requirements for qualification and registration of quality management staff, accepted in Helsinki in 1993.

General and special training– the Master degree course gives general knowledge and skills with the courses: Data analysis (Theory of Experiment), Finite Element Method, Information Technologies in Mechanical Engineering, Applied CAD Systems, Infrastructure and Transport Systems, Strategic and Production Management.

Speciffic knowledge and skills are given in the courses: Metrology and Quality Assurance, Marketing and Quality, Quality Management Systems, Business Communications, Auditing Quality Management Systems.

Practical training of students is carried out by:
- Individual research work on quality during the first and second semesters;
- Auditing practice during the third semester in organizations, which have implemented quality management systems;
- Final Year Project.

General and special skills for:
- to implement quality management systems according to the requirements of the standards from the series ISO 9000;
- to act as management representatives, who are responsible for the quality in small, medium and large sized organizations;
- to perform auditing quality management of a product, process and system;
- to act as internal quality auditors;
- to perform audit with clients and suppliers.

Career prospects:
- in manufacturing firms as Quality Managers, Representatives of the quality board, Managers of quality systems, Internal quality auditors;
- in cosultant and audit firms.

CURRICULUM

of the Master's degree course in

QUALITY MANAGEMENT

First Year

Code	*First term*	*ECTS*	*Code*	*Second term*	*ECTS*
0443	Information Technologies in Mechanical Engineering	6	1081	Strategy Management	6
0445	Finite Element Method	6	1087	Company Infrastructure and Transport Systems	6
0446	Theory of Experiment	6	1088	Quality Management Systems	6
1075	Metrology and Quality Assurance	6	0451	Applied CAD Systems	6
1079	Marketing and Quality	6	0452	Production Management	6
	Total for the term:	***30***		***Total for the term:***	***30***

Second Year

Code	*Third term*	*ECTS*
1092	Business Communications	5
1093	Auditing Quality Management	5
1097	Auditing Practice	5
	Graduation	
1098	Master thesis	15
	Total for the term:	***30***
Total for the training course: 90 ECTS credits		

0443 Information Technologies In Mechanical Engineering

ECTS credits: 6 **Weekly classes:** 2lec+0sem+0labs+4ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Peter Angelov, MEng, PhD, tel.: 888-237, E-mail: pangelov@ru.acad.bg
Pr. Assist. Iwo Atanasov MEng,tel.:888-469, E-mail: iwo@roboman.ru.acad.bg
Abstract:
The purpose of the course is to give students knowledge about the application of computers in the design process. Methods of geometrical modeling of parts or assemblies and general questions, connected with the creation of CAD systems, are considered. The course has input connections with the courses: Mathematics, Engineering graphics, Informatics, Machine details. The obtained knowledge is used in FEM-analysis, Applied CAD-systems and diploma projects.
Course content:
Mathematical modeling in computer aided design. 2D-modeling. 3D-Solid modeling of parts and assemblies. Parametric design. Creation of drawings of parts and assemblies. 3D-Surface modeling. Architecture and general principles of CAD system creation.
Teaching and assessment:
The teaching process is divided into lectures and practical classes in computer rooms, using appropriate software. There are individual work places for students. Each student has to solve individual tasks. A web-based manual for a similar course can be used for self-training in a free-access computer room. Continuous assessment is formed by two tests, performed in the middle and at the end of the semester, during practical classes. The first test is on 3D-Solid part modeling and the second test is on 3D-Surface modeling.

0445 Finite Element Method

ECTS credits: 6 **Weekly classes**: 2lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written
Departments involved:
Department of Engineering Mechanics, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc. Prof. Marko Todorov, MEng , PhD, Department of Engineering Mechanics,
tel. 888224, e-mail: mtodorov@ru.acad.bg.
Abstract:
The Finite Element Method (FEM) is confirmed to be a powerful method of solving problems of Solid and Structure Mechanics. It is applicable for problems of heat conduction, mass transportation, diffusion, electrical and magnetic fields, as well as fluid mechanics. The aim of the course is to give to students the necessary minimum of knowledge about the principle of FEM in order to use developed software to analyze the strength and strain of engineering objects, which will be designed.
Course content:
After a short introduction, concerning the basic equations of the Theory of elasticity and some rules of Matrix algebra, the basis of FEM is elucidated on the simplest finite element that can be chosen – a bar under tension and compression. Without any detail, the common energy principles of Solid Mechanics and the corresponding equations, valid for a wide range of problems in Solid Mechanics, are given to students. Different types of finite elements that can be used for the discretezation of the objects analyzed, are considered. The essential and nonessential boundary conditions for different types of problems (as plane, plates, shells, axisymmetric, 3-D and so on) are discussed. Great attention is paid to the preparation of a problem for FEM solving.
Teaching and assessment:
The learning material is presented in lectures with the allowable minimum of mathematical proofs and without redundant theory considerations. The assertions are illustrated with examples that could facilitate students at practical classes. It is important that students should work on their own in the practical classes. The aim is to learn how to use the program of FEM, developed in the department. Students have three assignments during the semester. A computer lab is provided for their work. A grading system determines the minimum required for semester validation and the final grade after two written tests. Continuous assessment is based on two tests.

0446 Theory of Experiment

ECTS credits: 6 **Weekly classes**: 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written and oral
Departments involved:
Department of Agricultural Machines, Agro- Industrial Faculty
Lecturers:
Assoc Prof. Todor Tsanev Todorov, MEng, Department of Numerical Methods and Statistics, tel. 888 536
E-mail: ttodorov@ru.acad.bg
Abstract:
The course includes the main methods for experiment planning in the field of engineering, processing and analysis of results. In this connection the objects are classified according to the number of control factors in three groups – with no control factors, with one control factor and with more than one control factors.
For the first group methods of statistical estimation and of checking statistical hypothesis are considered. For the second and the third group methods of single- and multi-factor regression and variances analysis are considered. The courses of Linear Algebra and Geometry and Mathematical Statistics are a prerequisite for the course Theory of Experiment. It is a prerequisite for the courses of Optimisation Methods, Object Identification, the Final Year Project and others.
Course content:
Cybernetic approach in studying objects experimentally. The role of experiment in research. Types of experiments. Studying objects with no external influence. Studying single-factor objects. Single-factor regression analysis. Single-factor variances analysis. Studying multi-factor objects. Multi-factor regression analysis. Multi-factor variances analysis. Planning regression experiments. First degree plans. Second degree plans. Data processing in planned experiments. Planning experiments for variances analysis. Optimising multi-factor experiments. Statistical optimisation. Software products experimental data processing.
Teaching and assessment:
Lectures follow the traditional ways of delivering. Workshops have investigative character. Laboratory classes on real objects are envisaged, as well. The exam is written and includes two questions and a problem.

1075 Metrology and Quality Assurance

ECTS credits: 6 **Weekly classes:** 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam:** written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Branko Dushkov Sotirov, MEng, PhD, Department of Machine Tools and Manufacturing,
Tel: 888 493, E-mail: bsotirov@ru.acad.bg
Abstract:
The course gives fundamental engineering and technical knowledge to the Quality Measurement students-master degree. The course aims at giving specific knowledge about the structure, construction and metrological properties of specialized measurement devices for big and small sizes and angles, one- and multi-coordinated measurement machines, such devices, possessing higher measurement accuracy of noise, vibration temperature, roughness and deviations of form and position. The subject aims at acquainting the students with the structure of ISO10012 (BDS EN 30012) and with the requirements for quality assurance of measurement equipment.
Course content:
Measurement precision. Fault theory. Types of faults. Optical, optical and mechanical, optical and electronic single and multi-coordinate measurement devices and machines. Measurement devices and machines for big angles – mechanical and optical indexing tables and heads. Measurement of noise. Measurement of vibrations. Coordinate measurements. Measurement of surface roughness. Measurement of deviations in shape and position of surfaces. Measurement of temperature. Basics of legislative metrology. Quality assurance of measurement equipment.
Teaching and assessment:
The course includes lectures and practical classes. Traditional methods of presentation of the subject matter are used during lectures and visual aids as slides are used, as well. During the practical classes each student is given the chance to personally choose a scheme, method and a device for measurement. The exam is written and includes two questions based on the lecture course and solving a practical case study, similar to some previously taught at the practical classes. The final mark is formed through an oral interview if necessary.

1079 Marketing and Quality

ECTS credits: 6 **Weekly classes:** 3lec+0sem+0labs+2ps
Assessment: continuous assessment **Type of exam:** written and oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Stefan Veselinov Vichev, PhD, Department of Machine Tools and Manufacturing,
Tel: 888451, E-mail: svichev@ru.acad.bg
Abstract:
The goal of the course is to give students introductory information about the application of marketing approach in manufacturing. Theoretical and practical definitions regarding the marketing of today are considered. Special attention is paid to quality, viewed as a strategic factor for the market economy development and prosperity, hence the ISO 9000 standard series are discussed.
Course content:
Marketing micro- and macro-medium. Types of marketing. Demand and supply. Market segmenting. Development of products. Price formation. Advertising. Strategy, planning and control of company activities. Quality in marketing. Quality standards- series ISO 9000.
Teaching and assessment:
Students acquire their knowledge, attending lectures and through individual work, based on specified literature. Some issues are explored during discussions. Some of the practical classes are taught as seminars, and students need to come prepared for the class. During the last 4 – 5 weeks of the semester, organizational and control marketing procedures are developed. The final grade is based on students' active and precise work during lectures and especially during the practical classes, where creative thinking is very important. Grades are based on the six-grade evaluation scale. Each student is assessed at least three times during the semester and the final grade is an average of the grades.

1081 Strategic Management

ECTS credits: 6 **Weekly classes:** 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam:** written **/** oral
Departments involved:
Department of Business and Management, Faculty of Business and Management
Lecturers:
Prof. Krastyu Ignatov Papazov, MSc (Eng), PhD, Department of 'Business and Management',
Tel: 888-726; E-mail: kpapazov@esc.ru.acad.bg
Assoc. Prof. Emil Krastev Papazov, MSc (Econ), PhD, Department of 'Business and Management',
Tel: 888-518; E-mail: emico@mail.orbitel.bg
Abstract:
The course gives students theoretical and applied knowledge about the integral approach for comparison of goals for development of company activities based on its potential and balancing internal and external factors. The approach encompasses a system of analysis of situations, competitors and the market, coordination of goals, resources and interests through strategic plans, leadership and control.
Course content:
Introduction - essence and scope, features, mission, subject, object and tasks. Economical policy and company strategies. Management structure and company strategies. From strategic planning to strategic management. Choice of strategic position. Methods for strategic analysis. Diversification company strategy. Competition strategies. Strategic management and economic risks.
Teaching and assessment:
Lectures are visualized using slides and multimedia. Seminars are based on solving real-life case studies and problems. Continuous assessment is based on tests. Other methods used are individual consultations and group discussions. The final mark is based on a test, but depends on each student's individual participation in the classes.

1087 Company Infrastructure and Transport Systems

ECTS credits: 6 **Weekly classes**: 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written and oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Department of Industrial Management
Lecturers:
Assoc. Prof. Ivan Hristov Mitev, MEng, PhD, Department of Industrial Management, Tel. 888521,
E-mail: ichmitev@ru.acad.bg
Abstract:
The main goal of the course is for students to acquire knowledge and basic skills for analyzing, designing and organizing effective decisions, regarding the company infrastructure, namely transport and storage systems and technologies in manufacturing, supply companies, etc.
Course content:
Economicl and manufacturing infrastructure – basic terms and parameters, elements, role in the economic process, criteria and methods of assessment. Highway and internal transport systems – types, basic elements and parameters, choice criteria, interaction. Preparation of freights for transportation, manipulation, and storage operations. Freight flows. Storage of freights– goals and tasks, basic operations. Principles and methods of freight storage. Storage technologies and typical freight systems. Design methods and practices for internal company transport and storage systems in a manufacturing company, in conformity with the EN-ISO 9001:2001 requirements.
Teaching and assessment:
Teaching during lectures is visualized by foil diagrams or slides. The basic issues are covered in four practical classes in a laboratory and three practical classes are dedicated to analyzing and design of transport and storage systems in a company, that are finalized by a discussion of the issue. 60% of the grade is formed during the exam –a written answer, followed by its discussion, and 40% - based on the student's work during the semester.

1088 Quality Management Systems

ECTS credits: 6 **Weekly classes:**3lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Tsvyatko Stanev Koriykov, MEng, PhD, Department of Machine Tools and Manufacturing,
tel: 888 493, E-mail: korijkov@ru.acad.bg
Abstract:
The only proof of real quality in an organization is the introduction and implementation of a Quality management System (QMS) and having a certificate. The main goal of the course is for students to acquire skills and knowledge about how to build, document, introduce, and continuously improve a QMS based on ISO 9000.
Course content:
Review of QMS. Types of Standards Relevant to QMS. Process Approach in Building QMS. Process Interaction Networking. Management Responsibility. Resources management. Product/Service Creation. Measurement, Analysis and Improvement Processes. Documentation Management Processes.
Teaching and assessment:
Teaching is based on lectures and practical classes. Students are allowed to take the exam only if they have kept all the rules of Ruse University 'Angel Kantchev'. The assessment of their knowledge is based on two tests- in the middle and at the end of the semester.

0451 Applied CAD Systems

ECTS credits: 6 **Weekly classes:** 2lec+0sem+0labs+3ps
Assessment: continuous assessment **Type of exam:** written
Departments involved:
Department Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Petar Nedyalkov Angelov, MEng, PhD, Department Machine Tools and Manufacturing,
Tel: 888-237, e-mail: pangelov@ru.acad.bg
Pr. Assist. Ivo Yordanov Atanasov, MEng, Department Machine Tools and Manufacturing,
Tel: 888-469, e-mail: iwo@roboman.ru.acad.bg
Abstract:
The main goal of the course is to teach students the widely spread and used CAD systems in automated design of parts for general and tools manufacturing. There is an in-depth coverage of the stages in designing machine parts and products.
Course content:
Principles of automated design. Presentation of design data and knowledge. Systems for automated design-general principles of building and their possibilities. Standards of interfile graphical exchange. 2D, 3D modeling. Body, surface and solid design.
Teaching and assessment:
Teaching is done by lectures, practical classes, a course assignment and out-of-class work. The software used includes AutoCAD, SolidWorks, Rhino 3D, etc. Students have a chance for extra practice in a free access computer room. The course assignment is prepared according to a pre-defined schedule. The sequence of work is documented in an explanatory note file up to 10 pages. The course assignment mark affects 70% of the continuous assessment. The other 30% are based on students' performance.

0452 Production Management

ECTS credits: 6 **Weekly classes:** 3lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written
Departments involved:
Department Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Yulian Penchev Mladenov, MEng, PhD, Department Machine Tools and Manufacturing,
Tel: 888 405, 716, 84 20 07, E-mail: jmladenov@ru.acad.bg
Abstract:
The course has an integral character and encompasses some of the most important issues of modern production factories. It is taken into consideration that it will be taught to Bachelors Degree graduate engineering students. The main goal of the course is to teach students about the organization and management of production management of a modern company and acquire skills to be used in practice. The knowledge can be applied in the diploma projects as well as in the future work of the engineers.
Course content:
Introduction. Development of a strategy. Decision making techniques. Prognosis making. Strategic decisions. Production process. Basic principles in organizing the production process. Machines, equipment, technologies. Space and time deployment in a factory. Human resources strategies. Management of material reserves.
Teaching and assessment:
Lectures aim at fulfilling the goal and tasks of the course. Seminars are practice- oriented and designed to help students acquire some basic managerial skills. The final grade is the result of a written exam. To give every student an equal chance, they all come to the exam at the same time and get three identical questions. Each student can take three tests during the semester, which are marked according to the six-grade evaluation scale. In this case the final grade is an average of the three tests.

1092 Business Communications

ECTS credits: 5 **Weekly classes:** 2lec+0sem+0labs+2ps
Assessment: continuous assessment **Type of exam**: written
Departments involved:
Department of European Studies, Faculty of 'Business and Management'
Lecturers:
Assoc. Prof. Rada Peneva Karshakova, MSc, PhD, Department of European Studies, Tel. 888 810
Rkarshakova@ecs.ru.acad.bg
Sr Assist. Veselina Stefanova Gachevska, Department of European Studies Tel. 888 810
Vgachevska@ecs.ru.acad.bg
Abstract:
The course is obligatory in the master's degree curriculum for specialists in Quality Management. Main goals are the acquisition of knowledge and practical skills for creating, maintaining and developing business communications in a modern company, as well as some behavioral approaches and models of effective communicational practice of individuals. The basic tasks are: studying communicational structures, types of communication, effectiveness of business communications, preparation and conduction of negotiations, management of conflict communications, and public communicational behavior. The course has neither inputs nor outputs to other courses
Course content:
The course includes the following basic topics: general characteristics of communication; essence, functions, types and principles of business communications; communicational channels and networks; basic types of communicational behavior and skills for effective communication practices; rules and etiquette in business communications; basic practices in business communications, negotiations and management of conflict communications, public communicational acts.
Teaching and assessment:
Teaching includes two forms: lectures and seminar classes. The lectures present a system of topics of the course and outline the problems to be discussed and practice interpretations. The seminars develop the capability for interpretation of the learned methods based on the real behavior of individuals and the organization. Discussion of additional literature sources, presented by students, analysis of case studies, re-enactment of cases, taking tests and development of cases. The semester is certified if classes have been attended according to the university rules and based on students' performance. Continuous assessment is based on two tests.

1093 Auditing Quality Management Systems (QMS)

ECTS credits: 5 **Weekly classes**: 2lec+0sem+0labs+2ps
Assessment: exam **Type of exam**: written
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Tsvyatko Stanev Koriykov, MEng, PhD, Department of Machine Tools and Manufacturing,
tel: 888 493, E-mail: korijkov@ru.acad.bg
Abstract:
The main goal of the course is for students to acquire practical skills to perform and manage audits of documentation, specified in ISO 9001:2000 and ISO 19011.
Course content:
Terms and definitions. Auditing principles. Types of audit. Audit schedule. Enacting the audit schedule. Audit schedule monitoring and review. Preparation for an audit. Document auditing. Auditing 'at the site'. Audit analysis. Preparation, approval and publication of the report. Auditors competence and assessment.
Teaching and assessment:
Lectures concentrate on the main ideas of auditing; practical exercises are more specific and connected with real practices in gathering information, such as: questionnaires, interviews, document control, auditing, analyzing information, and creating reports. The final mark is based on a written exam and on each student's individual participation in the Auditing Practice, performed at a specific organization.

1097 Auditing Practice

ECTS credits: 5 **Weekly classes**: 0lec+0sem+0labs+4ps
Assessment: continuous assessment **Type of exam**: oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Assoc.Prof. Tsvyatko Stanev Koriykov, MEng, PhD, Department of Machine Tools and Manufacturing,
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Abstract:
The main objective of the course Auditing practice is for students to acquire practical skills to perform audit of documentation and 'on the site' audits for the activities, specified in ISO 9001:2000.
Course content:
Preliminary meeting. Interview techniques. Proof gathering. Documenting non-conformances. Preparation and contents of the audit report. Reporting the findings of the audit. Publication of the report. Further actions.
Teaching and assessment:
The auditing practice is performed in selected organizations in groups or teams, led by a Leading auditor. Students check the Quality Management Systems documentation, prepare and perform an audit at the site, prepare and present audit reports. The Leading auditor assesses the students' skills and knowledge of performing various methods and techniques of auditing.

1098 Master Thesis

ECTS credits: 15 **Weekly classes:**
Assessment: defense **Type of exam:** oral
Departments involved:
Department of Machine Tools and Manufacturing, Faculty of Mechanical and Manufacturing Engineering
Lecturers:
Diploma project tutors
Abstract:
The master thesis is the most active form of education during the master's degree curriculum. It gives students practical skills and habits for various problems and the ways for solving them through engineering projects. This inspires creativity that can be applied in the different stages and builds skills to implement studies and deal with information bases.
Course content:
Review of the information regarding the master thesis topic. Theoretical study of the problem. Design of the equipment needed. Design of the specified stages of the manufacturing process. Creation of methods and conduction of studies. Technical and economicl analysis of the results and various technologies applied. Visualization of the master thesis using modern technical means.
Teaching and assessment:
The master thesis is developed following a given routine. Students work individually, using paper or electronically based information, the equipment of the department or other departments, and their instructor's help. The master thesis instructor assesses the level of involvement, the public and moral qualities of the student. The assessor evaluates the diploma project. The student defends the master thesis in front of the State Exam Committee and the open public. The State Exam Committee evaluates both the master thesis and the way it is defended.

Erasmus

ECTS

Information Package

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