UNIVERSITATEA TRANSILVANIA DIN BRASOV

FACULTEA DE INGINERIE TEHNOLOGIC

CATEDRA DE
TEHNOLOGIA CONSTRUCȚIILOR DE MAŞINI

SOCRATES INFORMATION PACK

pentru

TEHNOLOGIA CONSTRUCTIILOR DE MASINI
PRODUCTICA
CONSTRUCTII AERONAVE

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0. GENERAL INTRODUCTION

ECTS and "*TRANSILVANIA*" University of Braşov

This information package contains a presentation of "*Transilvania*" University of Braşov and of the courses offered by the Faculty of Technological Engineering at some specialisation coordinated by the Manufacturing Engineering Department, with the view of helping the students who take part in this programme to organise their period of study within the framework of this institution.

What Does ECTS Represent?

ECTS is the abbreviated denomination standing for "European Community Course Credit Transfer System". ECTS was initially introduced as a pilot project as part of the ERASMUS programme ("European Community Action Scheme for the Mobility of University Students". One of the main aims of the ERASMUS Programme was the promotion of academic recognition throughout the European Community. Initiated in the academic year 1992/1993, as a programme between an EC Member State and any country belonging to the European Free Trade Association (EFTA), it enables the students to participate in any phase of the programme of study abroad without affecting their study time. All the programmes for the students' mobility have to be based on the ECTS principles since ERASMUS was integrated in SOCRATES which is a new programme of the European Community.

ECTS is a decentralised system based upon mutual trust in the academic performance between the participating higher education institutions. The few rules of ECTS concerning Information (available courses), Bilateral Agreement (between the home and the host institutions) and the Use of Credit Points (to indicate the student's workload) are set out to reinforce this co-operation on a legal bases. Each ECTS department will present the courses it offers not only in terms of content but also in terms of the credits corresponding to each course.

The Pilot Scheme

ECTS has been introduced for a maximum 6-year pilot phase starting with the academic year 1989/1990 till the academic year 1994/1995. Five subject areas were selected in order to have in view the ECTS mechanisms: Business Administration, Chemistry, History, Mechanical Engineering and Medicine, 145 higher education institutions taking part in the scheme, each of them participating with faculty or department.

ECTS Credits

ECTS is a credit system based on the student's workload involving courses, practical work laboratory work and individual study that is the whole work necessary to the preparation for an examination.

The basic allocation of academic credits in ECTS is 60 credits per year of study, 30 credits per semester or 20 credits per trimester. It is important to emphasise the fact that no supplementary courses will be set up for ECTS purposes, but that all ECTS courses are fundamental courses of the partner institutions as attended by home students under normal regulations. In accordance with the student's workload for the courses offered, it is up to the partner institutions to decide on the distribution of credits for different courses.

The practical placement as production operator and the elective courses integrated in the curriculum also receive credits. The practical placement as production operator and the elective courses that are not an integral part of the curriculum do not receive academic credit. The courses that do not benefit by credits may be mentioned in the registration paper. The credits are awarded only when the course has been completely covered and when all the required examinations have been successfully taken.

ECTS Students

The students taking part in ECTS will receive the entire credit for the whole academic activity successfully carried out at any of the ECTS partner institutions and they will be able to transfer these academic credits from one partner institution to another as long as there is a prior valid agreement between the institutions involved.

All the students of the partner departments, who are willing to take part in the ECTS Pilot Scheme may do so as for as their institution agrees and

within the limit of available places.

The majority of students taking part in the ECTS pilot scheme will go to a single host EC Member State, will study at a host institution for a limited period of time and then they will return to the home institution. Some may decide to go to a third institution to continue their studies. In each of these three cases, the students have to comply with the legal and the institutional requirements of the country and university where they take their degrees.

When the student returns and has successfully completed the study programme agreed between the institutions, the transfer of credits takes place and the student will continue the study at the home university with no loss of time or credit. On the other hand, if the student decides to remain at the host university and to take the degree there, he will adapt his study programme in accordance with the legal, institutional and departmental rules in the host country, institution and department.

The students selected by each university to take part in ECTS may receive a mobility grant if they fulfil the general conditions of eligibility for the ERASMUS grant. These are the following ones:

- The students must be citizens of an European Community Member State or citizens of one of the EFTA countries (or recognised by a Member State or an EFTA country as having official status, or as being refugee or stateless person or permanent resident); as to EFTA citizens, the students will be eligible to receive a mobility, in the framework of the ERASMUS programme, from that particular EFTA home country to an European Community Member State. The EFTA citizens registered as students in the ECTS participating universities in other EFTA countries or in European Community Member States are only eligible to take part in ECTS only in they have been granted the right of permanent residence;
- the students will not pay tuition at the host university, but they will not exempt from the fees they normally pay at the home university in the period of study abroad;
- the grant that the student gets from the home institution may be interrupted or reduced while the student is studying in another country or is receiving an ERASMUS grant;
- the period of study abroad should not last less than three months or more than a year;
- the 1st year students are not eligible for receiving ERASMUS grants.

A. GENERAL INFORMATION ON THE INSTITUTION

Rectorate's building

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Telephone: +40 68 413000,
Fax: +40 68 410525
E-mail: rectorat@unitbv.ro
http//www.unitbv.ro

Rector : Prof.Dr.Eng. Sergiu T. CHIRIACESCU

Deputy- Rectors:

Prof.Dr.Eng. Victor DOGARU (scientific research)
Prof.Dr.Eng. Eleonor CIUREA (teaching area)
Prof.Dr.Eng. Radu IOVĂNAŞ (social area)
Prof.Dr.Eng. Stela DRĂGULIN (international relations)

Scientific Secretary :

Prof.Dr.Eng. Arcadie CIUBOTARU

Institutional ECTS Coordinator:

Prof.Dr.Eng. Adrian DUMITRIU

1. General Description

The beginnings and the development of the higher education in Brasov have their origins in the old cultural traditions and in the intense cultural climate of the city. Here, the technical and engineering scientific creation – already well known – the creative artistic activity in the fields of literature and popular culture as well as the intensive study programmes in numerous schools of all levels blend in a perfect harmony.

Among the most important landmarks regarding the beginning and the development of this cultural centre it is worth to mention the First Romanian School from the "Schei" district of Brasov, which was founded about five centuries ago, Diaconu Coresi's first printings in Romanian, the "Johannes Honterus" German High-School, the activity of keeping up the national spirit led by the famous man of letters, George Barițiu, and "Gazeta de Transilvania", newspaper founded by him, the "Astra" cultural association which played a leading part in the moulding of the national consciousness, the first Romanian trade school, the contributions of personalities such as: Andrei Muresianu, Gheorghe Dima, Iacob Muresanu, Octavian Goga, St. O. Iosif, Sextil Puscariu, Valeriu Braniste, Tiberiu Brediceanu, Ilie Cristea and others.

Brief History of " *Transilvania* "University

1940 the foundations of higher education were laid in Brasov as part of the Academy of Trade and Industrial Study;

1948 the Institute of Sylviculture was founded;

1949 the Institute of Mechanics was created;

1953 the Institute of Sylviculture turns into the Forestry Institute and the merging between this one and the Institute of Mechanics led to the setting up of the Polytechnic Institute of Brasov;

1959 the Department of Wood Technology came into being as part of Polytechnic Institute;

1960 the Pedagogical Institute was founded. It had the following departments: Mathematics, Physics-Chemistry, and Biology. Subsequently, in 1969 the Department of Music was created;

1964 the Department of Production Technologies was founded as part of the Polytechnic Institute;

1971 the University of Brasov came into being by the merging of both institutes, the Polytechnic one and the Pedagogical one;

1991 at the suggestion of the Senate of the University, by the stipulation of the Romanian Government from 04.01.1991 and by the order of the Minister of Education and Science no. 4894/22.03.1991, the new denomination of the University became **"*Transilvania*" University of Braşov**.

At present, "*Transilvania*" University of Braşov functions on the basic of the stipulations of the Romanian Constitution, of the law regarding the official recognition of the higher education institution and the recognition acts concerning the scientific research and the educational process.

"*Transilvania*" University of Braşov was accepted in the European Conference of the Rectors, in 1991, and it adhered to the International Association of the Universities, in 1993. Throughout its entire activity, this university respects and promotes the European conventions and the recommendations of the European Council concerning the university statute unconditionally assuming the provisions of the following documents:

- The ***Lima Declaration on Academic Free Autonomy of Higher Education*** (1988);
- The ***Magna Charta*** of European Universities (Bologna, 1988).

Strategies and Academic Objectives

The medium and long term development strategy of "*Transilvania*" University of Braşov is based on the academic objectives stated in the University Charta oriented towards the following fields of activity: didactic activity, scientific research, postgraduate training co-operation between universities, university duties, social protection of the university community members, the development and modernisation of its equipment.

The graduate training in the university, both long term (4, 5 and 6 years) and short term (3 years for colleges) has always been closely linked to the development strategy of the town of Braşov and Braşov County.

"*Transilvania*" University of Braşov includes ten Faculties, two University Colleges and a Department of Didactic Staff Training:

- Faculty of Mechanics;
- ***Faculty of Technological Engineering***;
- Faculty of Science and Engineering of Materials;
- Faculty of Sylviculture and Forest Exploitation;
- Faculty of Wood Industry;
- Faculty of Science;
- Faculty of Economic Science;
- Faculty of Music;
- Faculty of Medicine;
- Technical University College;
- Forestry, Economics and Information Technology University College;
- Regional Center for Open Learning;
- Department of Didactic Staff Training.

The specialisation can be divided as follows:

- 46 long term specialisation;
- 15 short term specialisation;
- 1 specialisation in the Department of Didactic Staff Training

It is worth mentioning the fact that from 1996 the engineering faculties provide 18 thoroughgoing study (postgraduate) specialisation's.

The didactic activity of the university was carried out in the 36 departments covering 1613 subjects. Out of these 1613 subjects, 531 subjects (33%) are fundamental ones, 920 subjects (57%) are speciality subjects and 162 subjects (10%) are elective subjects.

At the end of the year 1996, the academic community consisted of 683 teachers (covering 52,86% of the positions): 116 professors, 100 senior lecturers, 266 lecturers, 133 assistants and 54 junior assistants. The 14 consulting professors having a high scientific prestige achieved after a long and successful academic activity complete the academic staff. 66 professors are Ph.D. advisers. Over 300 teachers have Ph.D. degrees and other 250 are trainers for a doctor's degree. The executive body for decision making in the university is the Senate. This body consists of the elected representatives of the faculty councils, the directors of the university colleges, the representative of the Didactic Staff Training Department, the general administrative representative of the legally constituted league of the Teaching Staff Union.

2. Brasov's Geographical Background and Its Surroundings

The city of Brasov is situated in the centre of Romania and it is one of the most important cultural, industrial and scientific towns in Transylvania and in the whole country. Situated at 176 km north of Bucharest, the capital city of Romania, Braşov is the capital of the county bearing the same name. The road runs away along the Prahova Valley through the Pass of Predeal, Braşov being one of the Romanian cities situated at high altitude. From Predeal to Braşov, the traveller enjoys a spectacular mountain scenery discovering it settled down in a dipper sheltered by mountains.

View of Brasov from top of Tâmpa

Braşov and its surroundings, the vast Bârsa Land or "Țara Bârsei" as this depression region is called, played an important part during the Middle Ages, three strategical points granting the economic, military and political first order role.

A visit to Braşov is an opportunity of coming in touch directly with the cultural life of this city. Johannes Honterus's statue near the Black Church, made by the Finnish sculptor Haaro Magnusen, represents the image of the humanist involved in the European movement of the ideas of the 16Th century, the image of the man who brought Protestantism in Braşov and who elaborated important pedagogical and geographical writings. Another statue, standing in the yard of St. Nicholas's Church, represents Diaconu Coresi, the first printer of books written in Romanian. His works, published after 1570, circulated all over the territory inhabited by Romanians.

The oldest part of the town, "Scheii Brasovului" or the "Schei" District, is dominated by the slim silhouette of St. Nicholas's Church, a famous Orthodox Cathedral, founded by a series of princes of Wallachia and Moldavia. The still standing old wooden gates and the triptychs built on the

surrounding heights give a unique colour and a peculiar atmosphere to "Scheii Brasovului".

At only 30 km from Brasov, the Bran-Rucar mountain passage, the ancient trade road that once crossed the mountains from Wallachia to Transylvania, the whole year is full of tourists who are attracted not only by the fame of Bran Castle but also by the beauty of the landscape, by the villages spread over the surrounding summits, by the healthy fresh air.

The agro-tourism, that has largely developed lately, offers the tourists the opportunity of testing the excellent cuisine of this region.

In the south-western part, near Zarnesti, "Piatra Craiului", the most spectacular summit in the country, is easy of access to all those who are fond of tourism and travelling, also offering the challenge of difficult ascents to experienced mountaineers.

To the west there rises the massif of the Făgăraş Mountains also called "The Transylvanian Alps" by the famous French geographer Emmanuel de Martonne; these mountains impress by their scenery: the peaks seem to be spires of Gothic Cathedrals hosting glacial lakes at over 2000 m altitude, shadowy valleys where one can sometimes ski even in the month of July.

The County of Braşov has about 650,000 inhabitants (2.8% of the total population of the country) out of which 500,000 inhabitants live in urban centres. The county consists of 9 towns, out of which two are municipalities – Braşov (with 324,104 inhabitants) and Făgăras (with 45,728 inhabitants) and 43 communes with 150 villages. The Romanians represent 86% of the county's population, the Hungarians 9.9%. After 1989, after the emigration of the Saxons from Transylvania and after the Germans' emigration, nowadays they represent 1.55% of the county's population.

3. Registration, Matriculation, Language Courses

Academic Schedule

The academic year is divided into two semesters – the winter semester and the summer one, separated by a holiday week in the month of February. The academic year begins on the 1st October and it has the following structure:

Winter Semester:

- 12 weeks of courses;
- 2 weeks of holiday including Christmas and New Year;
- 2 weeks of courses;
- 4 weeks for the examination session.

1 week of holiday between the winter semester and the summer one;

Summer Semester:

The structure of this semester is different for the 1st to the 4th year undergraduate students, for those in the final (the 5th) year and for those at post-graduate studies.

The 1st and the 4th year:

- 14 weeks of courses;
- 4 weeks for the examination session;
- 3 weeks for practical activity;

Note: Deans can decide, for certain years of study of one or more sections, the order between the examination periods and the practical placement as production operator.

The final (the 5th) year of study:

- 10 weeks of courses and elaboration of diploma paper;
- 3 weeks for the examination session;
- 2 weeks for concluding the diploma paper;
- 2 weeks for preparing the examination to get the university degree;
- 1 to 2 weeks for the graduation examination.

Post-graduate studies (the 6th):

- 12 weeks of courses (lecture period);
- 3 weeks for the examination period;
- 1 week for concluding the dissertation;
- 1 week for the presentation of the dissertation.

Applications for admission as ECTS student should reach "*Transilvania*" University no later than:

- 15.08. of that academic year for the winter semester,
- 15.01. of that academic year for the summer year.

The registration address to which the applications are sent is the following one:

ECTS–Branch of Brasov – Faculty of Mechanics
Dr. Eng. Adrian Dumitriu *(E-mail: adrdum@unitbv.ro)*
2200 Braşov, 17 Vlad Tepeş Street,
Fax/Telephone +40 68 417673

Most of the courses are taught in Romanian. Therefore, a visiting student studying in Braşov has to know the basic vocabulary of the Romanian language. In Romania, some academic centres organise intensive Romanian language courses (3 months). However, from the year 2000, some specialisation in English are provided.

4. Accommodation. Meals.

The university has 12 students' hostels with a total capacity of over 3,800 places and 2 refectories with 1,300 places/series.

The cost for the accommodation in the students' hostels depends on the number of students sharing a room and on the available facilities. The monthly cost prices per room are (prices of 2001):

- Room with its own toilet:
  - 2 places/room - 100$ (USD);
  - 3 places/room - 120$;

- Room with toilet available for two rooms:
  - 3 places/room - 80$;
  - 4 places/room - 90$;

- Room with common toilet at each floor:
  - 2 places/room - 70$;
  - 3 places/room - 80$;
  - 4 places/room - 90$.

The students may also hire privately owned rooms or flats in town. In this case, the cost price for accommodation ranges from 100$ to 200$ per month, depending on the placement, size and facilities.

The present -day cost prices of meals at the two refectories are:

- 1,5 $ /lunch;
- 1,2 $ /dinner, with menu a la carte.

The cost price of a lunch in a decent restaurant in town or at the "*Casa Universitarilor*" (The House of the Members of the Teaching Staff) is approximately 5$).

The exchange rates are, at 1st of July 2001: 1US$ = 29000 lei
1 DM = 13000 lei

The contact person for accommodation in the university campus is:

Mr. Constantin Mărculescu,
Head of the social department
Memorandului Complex, 167 Lungă Street
Telephone: (+40) 68 413794, int.15
Programme: every working day - from 7,00 a.m. to 3,00 p.m.

5. Study Facilities

In 2000 "*Transilvania*" University of Braşov had the following facilities: 10 buildings on the University Hill, 10 buildings in the centre of the city, 12 students' hostels and one under construction, 2 refectories, a hunting range and a dendrological garden, a holiday village. New funds were allotted to the greatest Aula building, under construction, too.

The university facilities are developed and modernised by: State budget financing, sponsorship, self - endowment, TEMPUS programme financing.

The University Library is endowed with 643,000 volumes including around 345,000 books in Romanian and around 162,000 books written in foreign languages. Yearly, 400 periodicals are received, out of these 400 around 300 are in Romanian and about 100 in foreign languages. The reading rooms are quiet and comfortable, suitable to the study activity.

The university provides the following halls for the research and study activities:

- 45 lecture rooms, 39 owned by the university and 6 hired;
- 47 seminar rooms, 41 owned and 6 hired;
- 209 laboratory rooms, 186 owned and 23 hired;
- 9 research spaces, 5 owned and 4 hired.

Most of the laboratories are endowed with computers (PC) which can be used by the students. Each faculty has one or two centres with computer networks.

The students' medical assistance in the university health centre including dental treatment is free of charge for enrolled students. Because of the fact that the Romanian insurance system is not completely elaborated, the university does not request any health insurance fee. It is advisable for the visiting students to have a policy from their country or to negotiate it with a Romanian insurance company.

6. Reaching to "Transilvania" University

➢ *Arrival by plane*

The aeroplanes land on the Otopeni airport, situated near Bucharest, the Capital of Romania. The visitors can get by bus to the "Gara de Nord" – North Railway Station – and choose one of the numerous trains that pass through Braşov. In front of the central station of Braşov there is a bus stop and from here bus no. 4 takes the visiting student to the centre of the city (the Central Park) where several important buildings of the university administration are located.

➢ *Arrival by train*

Most international trains to Bucharest (from Paris, Munich, Vienna etc.) pass through Braşov.

➢ *Arrival by car*

From one of the customs situated at the border with Hungary, the visitors drive along the international roads to Bucharest which pass through Brasov (Nădlac – Arad – Deva – Sibiu – Braşov or Borş – Oradea – Cluj Napoca – Sighişoara - Braşov).

7. Leisure Activities

The university is endowed with two sport halls and four sport fields available for the students' leisure activities.

The cultural activities are organised and offered by the Students' Cultural Centre.

Braşov has a dramatic theatre, a lyrical theatre and numerous sporting teams in different national leagues and team-sports.

One of the most enjoyable ways of spending one's spare time is offered by the wonderful surroundings: Poiana Brasov and the Postăvaru Peak, the Bucegi Mountains, the Piatra Craiului, the Piatra Mare, the Ciucaş Mountains, the Bran Castle, the Peleş Castle (Sinaia) etc.

B. INFORMATION ON THE FACULTY AND THE DEPARTMENT

1. Information on the Faculty of Technological Engineering

The Faculty of Technological Engineering is one of the faculties with an old tradition in the University of Brasov. Having an oldness of over 30 years, the Faculty of Technological Engineering adapted itself during this time to the general strategy of development of the worldwide industry, modifying the structure of specialization according to the newest objectives.

Within its present structure, the faculty provides the training of the future specialists in mechanical engineering, being able to solve all the tasks needed in a modern production system: product design, technology design, tools and devices design, management, design and use of robotics and computer software.

The present specializations of the faculty are:

- Manufacturing Engineering
- Machine-Tools
- Nonconventional Technologies
- Industrial Engineering
- Engineering and Management of the Production Systems
- Aeronautical Engineering
- Industrial Robots
- Product Design (in Romanian and in English)

The specializations mentioned above train engineers with licensee diploma in 5 years of study. After graduation, they can follow, in one year, a postgraduate specialization, from the 6 ones being found in 1995.

The faculty provides also, within its continuos training centers, a various range of postgraduate course units of short time duration for the industry specialists and for the undergraduate teaching staff.

The high level of teaching and scientific activities is guaranteed by the 5 departments of the faculty within are working over 120 academic staff.

The Faculty of Technological Engineering permanently develops national and international cooperation with other universities. This cooperation is carried out in contracts, programs and mobility's within national programs (with the State Ministry of Research and Education, National Council of Research etc) or international ones (Tempus, Socrates, Copernicus etc.) with high reputation universities from Great Britain, France, Germany, Italy, Greece, Spain, Hungary, Slovenia etc.

2. Information on the Department of Manufacturing Engineering

The teaching and administrative activities of the Manufacturing Engineering Dept. take place at the "V" building of the University with the address below:

5, Mihai Viteazul str., RO-2200, Brasov
tel.(068) 412921 / int.200
tel./fax (068) 421318

The Manufacturing Engineering Dept. coordinates 3 long term specialisation (5 years), 2 short term ones (3 years – at college) and 3 postgraduate ones, one being settled under the UNESCO supervising.

The curriculum of the long term specializations have two cycles:

- the first cycle, including the first 2 years of study, which has an identical curriculum for the 3 specializations;
- the second cycle, including the next 3 years of study, which has a specific curriculum for each specialization

The specializations supervised by the Manufacturing Engineering Dept. are presented in the table below:

Specialization	Diploma / Duration of studies	Entrance conditions
Manufacturing Engineering	Diploma Engineer / 5 years	Mathematics & Physics or Mathematics & Economy Grid test High-school grade share: 30%
Aeronautical Engineering	Diploma Engineer / 5 years	
Industrial Engineering	Diploma Engineer / 5 years	
Computer Aided Manufacturing Technologies	Diploma of postgraduate / 1 year	On the graduation results
Modern Equipment&Technologies for Cold-Pressing	Diploma of postgraduate / 1 year	On the graduation results
Quality Management & Engineering (UNESCO)	Master diploma 1, 5 years	On the graduation results
Metal Manufacturing Technologies	Subengineer / 3 years	On the high-school graduation results

Each of these specialization is coordinated by a team of academic staff members, having a specialization coordinator, as below:

Coordinator for "*Manufacturing Engineering*"
Prof.dr.eng.Nicolae Valentin IVAN (nivivan@unitbv.ro)

Coordinator for "*Industrial Engineering*"
Prof.dr.eng.Tudor PĂUNESCU (tpaun@unitbv.ro)
Coordinator for "*Aeronautical Engineering*"
Prof.dr.eng.Ionel MARTINESCU (i.martin.marconi@unitbv.ro)

The ECTS departamental coordinator of the Manufacturing Engineering dept. is:
Lecturer dr.eng. Alexandru C. FILIP
E-mail: filipal@unitbv.ro

The present leading of the Manufacturing Engineering Dept. is composed by 3 members of the teaching staff:

- Head of dept. Prof.dr.ing. Nicolae Valentin IVAN
- Deputy head of dept. Assoc.prof.dr.ing. Gheorghe OANCEA
- Chancellor Assoc.prof.dr.ing. Mircea Viorel DRĂGOI

- The specialization ***Manufacturing Engineering***

It is the oldest specialization of the faculty, having a long tradition and national and international recognition. The students are trained for design, control and management of the optimal manufacture and assembling processes. Computer aided design, manufacture and production planning (CAD/CAM/CAP), quality control assurance, high performance technologies and equipment are some of the major guidelines of study. The specialization provides to the graduates a strong knowledge of the technical field, very good skills in using the computer and also good economics knowledge. Not on the last level, the study of a foreign language is provided in each year. The curricula has been in a continuous adjustment to the newest requirements of the world development in the field. Today, the most important courses are: *Applied informatics in engineering, Strength of materials, 3D modeling, Parametric assisted design, Manufacturing technologies and equipment, CAD/CAM systems, Company creation and marketing, Industrial management*.

The *Manufacturing Engineering* specialization is very inquired because the graduates are needed in most of the industrial fields.

- The specialization ***Industrial Engineering***

This specialization has its source in the high-end development of computer sciences and manufacturing engineering and has the aim to form well-trained specialists in a new field, which implies design, manufacturing and management integration by computer. The students are teached in technical field (manufacturing technologies, mechanics, processing equipment, data acquisition equipment etc.), in computer using field (computer basis, modern software for CAD/CAM, 3D-modeling, databases software, high-level programming software, integrated design and manufacturing computer-aided etc.) and economics field (management, marketing, value-aided engineering, process planning etc.)

This specialization is the one with a great developing potential in the future.

- The specialization ***Aeronautical Engineering***

The objective of this specialization is to prepare engineers for manufacture, exploitation and maintenance of aeronautical components.

Of course, the future engineers must have also good knowledge of design and structure of the airplanes and helicopters, fields in which they are prepared as well.

The main courses are: stability and fly dynamics, airplane mechanics, structure and calculus of airplanes, exploitation, maintenance and repair of

airplanes, Theory and structure of engines, helicopters, specific technologies for aeronautical components.

The students have also in their teaching curriculum courses of computer using knowledge, modern language programming and CAD/CAM software using. The economics are not ignored as well, several courses of this type being provided.

The theoretical ground of students is completed by practical activities at The Aeroclub “Mircea Zorileanu” of Brasov, IAR SA plant and the Aviation School from Medias. From the first year of study the students can follow glider fly training so, when they graduate, the certificate of pilot can be achieved. The students are member of Euroavia European association, the romanian branch.

Facilities for teaching and research

The facilities provided by the “Manufacturing Engineering” dept. are used for teaching activities at the specialization coordinated.

The department has several laboratories for the technical courses such as: manufacturing technologies, basis and design of cutting operations and tools, design of devices for cutting, cold-pressing technologies, quality control. These laboratories are provided with the necessary machine-tools, equipment and apparatus needed for the practical work with students.

There are also 3 laboratories provided with networks of computers (up to Pentium II ones) having Internet access and licensed software needed.

For the high-end use of computers, it is provided a powerful acquisition data system and a high-level flexible production system numerical controlled by computer software. The system includes a lathe, a milling machine tool and a robot.

For the specialization of “*Aeronautical Engineering*” it is provided a laboratory having specific facilities such as an IS29D2 glider, a test glider, a TURMO 4 engine which equips the PUMA helicopters.

For the teaching activities there are course rooms provided with modern instruments of presenting (overhead projectors, computer videoprojectors etc.).

International cooperation of the department

The department is part of several institutional international programs, some of them including the students (such as SOCRATES). Within those, the students can benefit by scholarships and mobility for study abroad. Also, the teaching staff makes exchange visits with the partner universities. Some of the partners are from Germany, Great Britain, France, Ireland and

their number has a continuous increase. In the period 1999-2001 over 50 students have benefited by such scholarships (studies abroad of one semester or one year, fully recognized in the ECTS system).

Scientific research

The scientific research is well sustained by the academic staff and the students, as well.

The research activities of the academic staff is done considering the newest world trends in the field and is carried out by scientific works and articles published in specific revues or International Conferences indoor or abroad. It is almost a tradition for the academic staff to take part at some scientific events, regularly organised.

The achievements of the scientific research of the academic staff is carried out also by cooperations with different production companies, within are included the students in the final year. They have so, the oportunity to be hired after graduation.

A tradition of the Manufacturing Engineering dept. is organising student's research sessions, within the students are initiated in scientific research activities, improving also their basis knowledge achieved at courses.

Other facilities

Under the coordination of the "Manufacturing Engineering" dept. is running a Center of Economic Evaluation and Development on the CAD/CAM Manufacturing, a Center of Continuous Forming in Applied Informatics and Manufacture Development, which provides several postgraduate courses and an AutoCAD Training Center.

The students at the specialization coordinated by the dept. can benefit of those courses free-of-charge (AutoCAD, NC machine-tools programming etc.).

The graduates of the specialization described above are well prepared to face the industry competition. Their success is guaranteed by the tradition of the department meaning competence and proper conditions for the high-level education.

The teaching activities structure

The teaching activities include lectures (C), seminars (S), laboratory works (L) and projects (P). Each activity takes place in specific groups of students, using proper rooms. The examination of the students' knowledge

is performed by different means, such as assignments, projects and practical works during the semester and by final examinations at the end of each semester. These can be oral and/or written.

The studies end with a diploma thesis, performed in the 10th semester, meant to prove the student's ability to solve an engineering problem, according to the scientific methods.

At the end of the 10th semester takes place the final examination, including a test of the common and specific engineering knowledge aquired by the student and the public assertion of the thesis in front of a commission. The promotion of this exam confers on the graduate the title "Diploma Engineer".

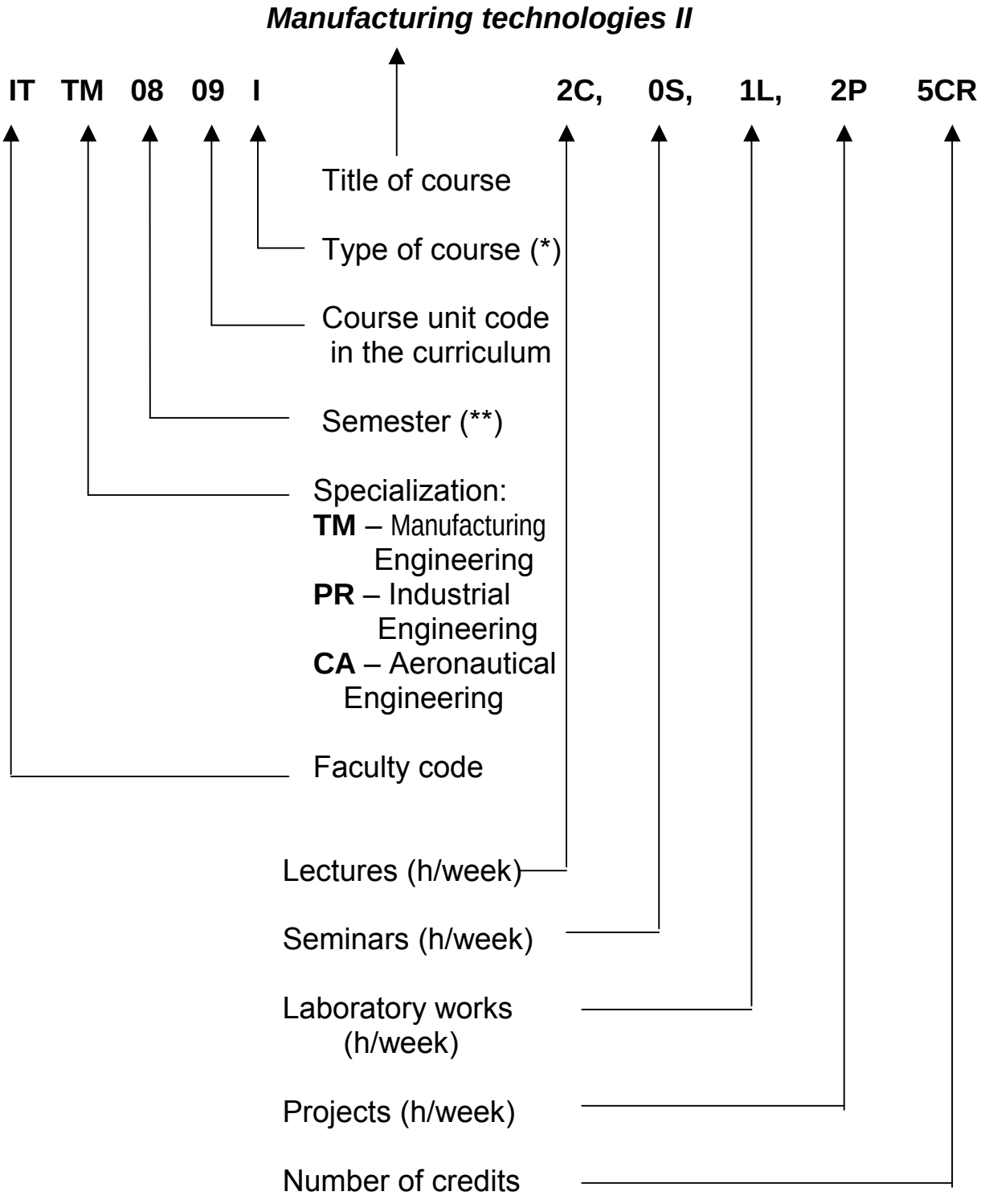
The grades used, during the five years of study, correlated to ECTS grades, are presented in the following table:

Romania	ECTS
10	**A** = Excellent
9	**B** = Very good
7 and 8	**C** = Good
6	**D** = Satisfactory
5	**E** = Bare pass
4	**FX** = Insufficient
From 1 to 3	**F** = Failure

The diploma engineers have the possibility to follow postgraduate studies at specific courses, one of those provided by the engineering faculties. Graduation of these courses offers the chance to reach an academic staff degree or to lead a doctoral programme.

COURSE UNITS CODE STRUCTURE

The code structure of course units is described below:



(*) The type of course can be: **I** – compulsory, **A** – optional, **F** – elective.
(**) The semesters are numbered from 1 to 10, according to the 5 years of study

E. AERONAUTICAL ENGINEERING

E1. CURRICULUM

SPECIALIZATION: ***Aeronautical Engineering***
GRADUATE'S DEGREE: ***Engineer***
DURATION OF STUDIES: **5 years**
EDUCATION FORM: **Full-time courses**

I. Graduation Diploma Requirements

- 257 credits at the compulsory courses (12 credits at "Practical activity" in 1st, 2nd, 3rd and 4th years and 30 credits at "Practical activity" in the 5th year)
- 43 credits at optional courses;
- 30 credits at diploma project;
- passing of "Physical Training" (no credits)

If the student wants, after graduation, to teach in schools, high-schools or universities, he must have the graduation certificate of Teaching Staff Training Department. So, he must follow the courses of this department in all years of study.

II. Selection of Optional Course Units

Groups of minimum 15 students

III. Conditions of Passing the Current Year. Terms of Registration in the Next Year of Study

The condition of registration in the next year of studies is getting a minimum of 40 credits per year. It is considered passed the course at which the minimum grade is 5 (five).

In the first cycle can be repeated once one from the two years. In the second cycle can be repeated once one of the three years.

The passing from the 1st cycle in the 2nd is conditioned by getting 120 credits. For each year of study, from the 1st to the 5th, the passing is conditioned by getting 60 credits.

If not attending the conditions of registration or passing, the student is expelled.

The students which, for some reasons, suspend the studies, enjoy of the credits attended in that cycle, but they must return in maximum 5 academic years.

IV. Graduation Examination

The standing for the graduation examination is conditioned by attending all required credits along the 5 years of study.

The period of the graduation paper elaboration : semesters 9 and 10;

The period of concluding the graduation paper : semester 10;

The period of standing the graduation paper : semester 10;

a. examination of fundamental and technical specific knowledge : 15 credits ;
b. graduation paper contents and presentation : 15 credits.

First Cycle – The 1ST Year

Aeronautical Engineering

No	COURSE UNIT	Course Code	The 1st Semester						The 2nd Semester					
			C	S	L	P	V	Cr	C	S	L	P	V	Cr
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	COMPULSORY													
1	Mathematical Analysis for Engineers	ITTC.01.01.I	4	2			E	7						
2	Technical Physics	ITTC.01.02.I	4		2		E	6						
3	Chemistry	ITTC.01.03.I	2		1		E	4						
4	Descriptive geometry	ITTC.01.04.I	1		2		C	3						
5	Computers Basis for Engineers	ITTC.01.05.I	2		1		E	4						
6	Engineering Drawing I	ITTC.01.08.I	1		1		V	2						
7	Algebra, analytical geometry and differential equations	ITTC.02.06.I							4	2			E	6
8	Mechanics I	ITTC.02.07.I							3	2			E	6
9	Engineering Drawing II	ITTC.02.08.I							1		3		C	4
10	Materials Engineering I	ITTC.02.10.I							3		2		E	5
11	Computers Engineering Applications	ITTC.02.11.I							1		2		V	2
12	Computer Aided Office Writing	ITTC.02.12.I									2		V	2
13	Practical Activity	ITTC.02.13.I	90 h / year										C	3
Total compulsory hours / week, exams, credits			**14**	**2**	**7**	**0**	**6**	**26**	**12**	**4**	**9**	**0**	**7**	**28**
			23						**25**					
	OPTIONAL													
14	*Philosophy or*	ITTC.01.14.A	1	1			C	2						
15	*Politics*	ITTC.01.15.A												
16	*English language or*	ITTC.02.16.A		2			C	2		2			C	2
17	*French language or*	ITTC.02.17.A												
18	*Spanish language or*	ITTC.02.18.A												
19	*German language*	ITTC.02.19.A												
20	*Physical Training I or*	ITTC.02.20.A		1			A/R			1			A/R	
21	*Physical Training II*	ITTC.02.21.A												
Total optional hours / week, exams, credits			**1**	**4**	**0**	**0**	**2**	**4**	**0**	**3**	**0**	**0**	**1**	**2**
			5						**3**					
Total compulsory and optional hours / week, exams, credits			**15**	**6**	**7**	**0**	**8**	**30**	**12**	**7**	**9**	**0**	**8**	**30**
			28						**28**					
	ELECTIVE													
20	*Documentation technique*	ITTC.01.20.F	2				C	2						
21	*Elocution*	ITTC.02.21.F							2				C	2
22	*Aviation history*	ITTC.01.22.F	2				C	2						
24	*Pedagogy module*	ITTC.02.23.F												
Total elective hours / week, exams, credits			**4**	**0**	**0**	**0**	**2**	**4**	**2**	**0**	**0**	**0**	**1**	**2**
			4						**2**					

Note: From optional course units: 14/15 16/17/18/19 must be chosen one unit. At physical training unit can be chosen a sport (athletics, basketball, football, gymnastic, swimming).

First Cycle – The 2nd Year

Aeronautical Engineering

No	COURSE UNIT	Course Code	The 3rd Semester						The 4th Semester					
			C	S	L	P	V	Cr	C	S	L	P	V	Cr
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	COMPULSORY													
1	Special Mathematics	ITTC.03.01.I	3	2			E	6						
2	Mechanics II	ITTC.03.02.I	2	2			E	5						
3	Materials Engineering II	ITTC.03.03.I	2		1		C	3						
4	Strength of Materials I	ITTC.03.04.I	2	2	1		E	6						
5	Computers Engineering Applications	ITTC.03.07.I	2		3		E	5						
6	Industrial Computer Aided Graphics	ITTC.04.05.I							3		2		E	5
7	Strength of Materials II	ITTC.04.06.I							3	1	1		E	6
8	Tolerances and Dimensional Control	ITTC.04.08.I							4		2		E	6
9	Thermotechnics	ITTC.04.09.I							2		2		E	4
10	Electric operating and applied electronics	ITTC.04.10.I							3		2		E	4
11	Practical Activity	ITTC.04.11.I	90 hours / year										C	3
Total compulsory hours / week, exams, credits			**11**	**6**	**5**	**0**	**5**	**25**	**15**	**1**	**9**	**0**	**6**	**28**
			22						**25**					
	OPTIONAL													
12	*General Economics or*	ITTC.03.12.A	2	1			C	3						
13	*Human resources*	ITTC.03.13.A												
14	*English language or*	ITTC.04.14.A												
15	*French language or*	ITTC.04.15.A		2			C	2		2			C	2
16	*Spanish language or*	ITTC.04.16.A												
17	*German language*	ITTC.04.17.A												
18	*Physical Training III or*	ITTC.04.18.A		1			a/r			1			a/r	
19	*Physical Training IV*	ITTC.04.19.A												
Total optional hours / week, exams, credits			**2**	**4**	**0**	**0**	**2**	**5**	**0**	**3**	**0**	**0**	**1**	**2**
			6						**3**					
Total compulsory and optional hours / week, exams, credits			**13**	**10**	**5**	**0**	**7**	**30**	**15**	**4**	**9**	**0**	**7**	**30**
			28						**28**					
	ELECTIVE													
20	*Chemistry of composite materials*	ITTC.04.20.F							2	1			E	3
21	*Second foreign language*	ITTC.03.21.F		2			C	2						
22	*Pedagogy module*	ITTC.04.22.F												
Total elective hours / week, exams, credits			**0**	**2**	**0**	**0**	**1**	**2**	**2**	**1**	**0**	**0**	**1**	**3**
			2						**3**					

Note: From the optional units: 12/13, 14/15/16/17, 18/19 must be chosen one unit. At physical training unit can be chosen a sport (athletics, basketball, football, gymnastic, swimming). For those who want a teaching certificate at graduation the unit 22 is compulsory.

Second Cycle – The 3RD Year

Aeronautical Engineering

No	COURSE UNIT	Course Code	The 5th Semester						The 6th Semester					
			C	S	L	P	V	Cr	C	S	L	P	V	Cr
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	COMPULSORY													
1	Mechanisms for aircrafts	ITCA.05.01.I	2	1	2	1	E	6						
2	Aircrafts mechanics	ITCA.05.03.I	3	2	1	1	E	7						
3	Mechanics of fluids	ITCA.05.06.I	3	1	1		E	5						
4	Mechanical vibrations	ITCA.05.07.I	2		1		C	4						
5	3D Modelling	ITCA.05.08.I	2		2		E	5						
6	Theory and structure of propulsion systems	ITCA.06.04.I							3	1	1		E	4
7	Mechanical parts design	ITCA.06.05.I							3		1	1	E	5
8	Aircrafts aerodynamics	ITCA.06.02.I							3	1	1		E	5
9	Parametric CAD	ITCA.06.09.I							2		2		C	3
10	Basis of Experimental Research	ITCA.06.10.I							2		1		C	3
11	Practical Activity III	ITCA.06.11.I	90 ore/year										C	3
Whole required hours and credits per week			**12**	**4**	**7**	**2**	**5**	**27**	**13**	**2**	**6**	**1**	**6**	**23**
			25						**22**					
	OPTIONAL													
12	*FEM analysis of structures or*	ITCA.06.12.A							1		2		E	4
13	*Databases*	ITCA.06.13.A												
14	*Thermal treatment of metals or*	ITCA.06.14.A							2		1		C	3
15	*Surfaces protection*	ITCA.06.15.A												
16	*Company creation and structure*	ITCA.05.16.A	1	2			C	3						
17	*Company finances*	ITCA.05.17.A												
Whole optional hours and credits per week			**1**	**2**	**0**	**0**	**1**	**3**	**3**	**0**	**3**	**0**	**2**	**7**
			3						**6**					
Whole required and optional hours and credits per week			**13**	**6**	**7**	**2**	**6**	**30**	**16**	**2**	**9**	**1**	**8**	**30**
			28						**28**					
	ELECTIVE													
18	*Creativity and inventics*	ITCA.06.18F							1	1			C	2
19	*Aesthetics in aeronautics*	ITCA.05.19F	1	1			C	2						
20	*Pedagogy module*	ITCA.05.20F												
Whole elective hours and credits per week			**1**	**1**	**0**	**0**			**1**	**1**	**0**	**0**		
			2				**1**	**1**	**2**				**1**	**1**

Note: From optional units: 12/13, 14/15, 16/17 must be chosen one unit. The unit 20 is compulsory for the teaching certificate at graduation.

Second Cycle – The 4TH Year

Aeronautical Engineering

No	COURSE UNIT	Course Code	The 7th Semester						The 8th Semester					
			C	S	L	P	V	Cr	C	S	L	P	V	Cr
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	COMPULSORY													
1	Industrial management	ITCA.07.01.I	1	1			C	3						
2	Manufacturing systems I	ITCA.07.02.I	2		1		C	4						
3	Aircrafts calculus and design	ITCA.07.04.I	2	1		1	E	5						
4	Chip cutting technologies for aeronautical parts	ITCA.07.05.I	2		2	1	E	4						
5	Manufacturing devices	ITCA.07.06.I	2		1		C	3						
6	Reliability and security of the aeronautical systems	ITCA.07.10.I	2		2		E	4						
7	Manufacturing systems II	ITCA.08.03.I							2		2		E	4
8	Aeronautical structures technology	ITCA.08.07.I							2		2	1	E	4
9	Design and calculus of aeronautical structures	ITCA.08.08.I							2			1	E	4
10	Cold pressing technologies for aeronautical parts	ITCA.08.09.I							3		2	1	E	5
11	CAD / CAM systems	ITCA.08.11.I							2		2		E	4
12	Practical Activity	ITCA.08.12.I	90 ore/year										C	3
Total compulsory hours / week, exams, credits			**11**	**2**	**6**	**2**	**6**	**23**	**11**	**0**	**8**	**3**	**6**	**24**
			21						**22**					
	OPTIONAL													
13	High level programming software	ITCA.07.13A	1		2		C	3						
14	Virtual instrumentation	ITCA.07.14.A												
15	Manufacturing of special materials for aeronautics	ITCA.08.15.A							2		1		C	4
16	Composite materials	ITCA.08.16.A												
17	Physical control methods	ITCA.07.17.A	2		2		E	4						
18	Nondistructive control	ITCA.07.18.A												
19	Quality assurance systems	ITCA.08.19.A							1		1	1	C	2
20	Total quality management	ITCA.08.20.A												
Total optional hours / week, exams, credits			**3**	**0**	**4**	**0**	**2**	**7**	**3**	**0**	**2**	**1**	**2**	**6**
			7						**6**					
Total compulsory and optional hours / week, exams, credits			**14**	**2**	**10**	**2**	**8**	**30**	**14**	**0**	**10**	**4**	**8**	**30**
			28						**28**					
	ELECTIVE													
21	*Artificial Intelligence*	ITCA.07.21.F	2	1			C	3						
22	*Piloting technique*	ITCA.08.22.F							2		1		C	3
23	*Pedagogy module*	ITCA.08.23.F												
Total elective hours / week, exams, credits			**2**	**1**	**0**	**0**	**1**	**3**	**2**	**0**	**1**	**0**	**1**	**3**
			3						**3**					

Note: From optional units: 12/13, 14/15, 16/17, 18/19 must be chosen one unit. The unit 23 is compulsory for the teaching certificate at graduation.

Second Cycle – The 5TH Year

Aeronautical Engineering

No	COURSE UNITS	Course Code	The 9th Semester						The 10th Semester					
			C	S	L	P	V	Cr	C	S	L	P	V	Cr
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	COMPULSORY													
1	Stability and dynamics of flight	ITCA.09.01.I	2		1	1	E	5						
2	Aeroelasticity and structure dynamics	ITCA.09.02.I	2	1		1	E	4						
3	Technology of assembling and mounting the aircrafts	ITCA.09.03.I	2		1		E	4						
4	Equipment of command and control in aircrafts	ITCA.09.04.I	2		1		C	4						
5	Aircrafts exploitation and maintenance	ITCA.09.05.I	2		2		E	4						
6	Marketing	ITCA.09.06.I	1	2			C	3						
7	Practical activity	ITCA.09.07.I	300 ore/year										C	30
Total compulsory hours / week, exams, credits			**11**	**3**	**5**	**2**	**6**	**24**	**0**	**0**	**0**	**0**	**1**	**30**
			21						**0**					
	OPTIONAL													
	Optional package I													
8	*High level CAD software*	ITCA.09.08.A	1		2		C	3						
9	*Helicopters*	ITCA.09.09.A	2		2		C	3						
	Optional package II													
10	*Integrated manufacturing systems*	ITCA.09.10.A	2		2		C	3						
11	*Helicopters testing*	ITCA.09.11.A	1		2		C	3						
Total optional hours / week, exams, credits			**3**	**0**	**4**	**0**	**2**	**6**	**0**	**0**	**0**	**0**	**0**	**0**
			7						**0**					
Total compulsory and optional hours / week, exams, credits			**14**	**3**	**9**	**2**	**8**	**30**	**0**	**0**	**0**	**0**	**1**	**30**
			28						**0**					
	ELECTIVE													
12	*Aeronautical navigation*	ITCA.09.12.F	2		1		C	3						
13	*Spaceships elements*	ITCA.09.13.F	2		1		C	3						
14	*Aircraft and environment*	ITCA.09.14.F	2		1		C	3						
Total elective hours / week, exams, credits			**6**	**0**	**3**	**0**	**3**	**9**	**0**	**0**	**0**	**0**	**0**	**0**
			9						**0**					

Note: The 10th semester has 5 weeks of teaching activities.
From the optional packages I and II one must be chosen.

E2. COURSES DESCRIPTION

Note. For the 1st and 2nd years – see specialization "*Manufacturing engineering*", except practical activities

Practical activities for the 1st Year

General knowledge and practice about gliding. Notions of aerodynamics and mechanics of flight. Meteorology fundamentals. Notion of airy navigation. Structure and components of gliders. Command equipment. Paraschute and techniques of jump.

Practical activities for the 2nd Year

Notion of metals and alloys elaboration. Foundry technologies. Heat plastic deformation technologies. Thermic treatments for steel and cast iron.

The 3rd year

ITCA.05.01.I Mechanisms for aircrafts 2C, 1S, 2L, 1P 6CR

Analysis and synthesis of linkages. The structure of the mechanisms, forming of mechanisms with basic kinematic chains. Kinematics and dynamics of linkages. The method of multibody systems. Gears and cam mechanisms.

ITCA.05.03.I Mechanics for aircrafts 3C, 2S, 1L, 1P 7CR

Aircraft motion equations. Aircraft performaces (rectiliniar horizontal steady flight, gliding flight, climbing uniform flight, take-off, landing). Equilibrium and control of an aircraft in longitudinal plane. Forces and moments involved in the longitudinal equilibrium. Longitudinal static stability (normal and relaxed). Helicopters mechanics. Rotor aerodynamics and mechanics. Helicopters performances.

ITCA0506I Mechanics of fluids and operating 3C, 1S, 1L 5CR

Static equilibrium of fluids. Hydrostatic apparatus. Kinematics and dynamics of fluids. Perfect fluids motion equations. Real fluids motion. Calculus of pressure pipes. Oscillations in pipes. Generating hydraulic machines. Hydraulic pumps. Volume rotative and alternative pumps.

ITCA.05.07.I Mechanical vibrations 2C, 1L 4CR

Basic concepts. Time invariable linear systems with one freedom degree. Balancing of rotors. Laplace and Fourrier transformations. Time invariable linear systems with many

variables. Continuous mechanical systems. Vibrations of straight beams. Theory of dynamic testing of structures.

ITCA0508 3D Modelling 2C, 2L 4CR

Fundamentals in 3D modelling with AutoCAD. Coordinate systems : world and user. 3D surfaces. Region modeller. Solids modeller. Solids generating. Commands for modifying solids. Mass properties of solids in AutoCAD. Advanced techniques for processing solids. Projection generating. Making of drawings for manufacturing.

ITCA.06.02.I Aircrafts aerodynamics 3C, 1S, 1L 5CR

Shaped and nonshaped bodies. Aerodynamic loads on an aircraft. Aerodynamic profiles. Aircraft wing. Aerodynamic analysis of the aircraft fuselage. Aerodynamic interferences.

ITCA.06.04.I Theory and structure of propulsion systems 3C, 1S, 1L 4CR

Introduction. Selection of propulsion system type and engines placement. Classification of jet engines. Thrust. Termodynamics cycle of jet engine. Jet engines performance. Air intake. The compressor (centrifugal compressor and axial compressor). The combustion chamber. The turbine. The exhaust diffuser. Lubrication system. Fuel system. Engine noise – Noise reduction – Regulations.

ITCA.06.05.I Mechanical parts design 3C, 1L, 1P 4CR

Screw assemblies. Dismountable assemblies. Elastic assemblies. Shafts and axles. Slide friction bearings. Rolling friction bearings. Gear transmissions. Harmonic reducers. Coupling used in aircrafts. Belt transmissions. Speed variators.

ITCA0609I Parametric CAD design 2C, 2L 3CR

Symbolic expressions. Data types. Defined functions. Entity drawing in AutoCAD using AutoLISP language. Functions for lists, data input-output, used-defined, command-defined, conditional functions and loops, for entity properties access, for file processing, for selection groups.

ITCA0607I Basics of Experimental Research 2C, 2L 3CR

Fundamentals. Classification of measurement methods. Transducers. Electrical circuits for transducer connecting in measurement chains. Wheatstone bridge. Electrical devices for registration of the data in measurement chain. Methods and devices for measurement of mechanical parameters. Experimental programming and modeling. Statistical processing of experimental data.

ITCA.05.12.A FEM analysis of structures 1C, 2L 4CR

Structures problems solvable with FEM. Analysis of mechanical fields of elastic deformable structures. Geometrical modelling. Modelling of physical parameters. Specific methods of determining the parameters of the numerical model and its solving. FEM software.

ITCA.05.13.A Databases 1C, 2L 4CR

Fundamentals of databases. Principles for design of databases. Databases in engineering field. MS Access database software. Data types. Database structure design. Customizing tables. Relationships. Forms. Queries. Reports. Switchboards. Security and maintenance of databases. Engineering applications.

ITCA.06.14.A Thermal treatments of metals 2C, 1L 3CR

Ferrous alloys. Ferrous diagram. Fundamentals of ferrous alloys behavior during heating and cooling. Basic parameters and classification of thermal treatment operations. Annealing. Hardening. Tempering. Thermochemical treatments. Specific treatments for steels, cast iron and several non-ferrous alloys.

ITCA.06.15.A Protection of metallic surfaces 2C, 1L 3CR

Classification of corrosion process types. The corrosion influencial factors. Vapour and gaseous corrosion. Electrochemical corrosion process. Passivating process of metals and alloys. Protection against corrosion. Protection against corrosion methods; (thermochemical treatments, thin film depositions prepared by plating).

ITCA.05.16.A Company creation and administration 1C, 1S 2CR

Market economy. Specific elements. Business forms. Private business setting-up stages. Activities of a company. Company resources. Business plan of a company. Fundamentals of accountancy. Taxes. Incomes and expenses.

Practical activity

Thermic treaments and protection of metallic surfaces. Technology for special materials used in aeronautics. Laboratory tests for metals and alloy properties determination. Welding methods for aircraft components. Structure of aircrafts, gliders and helicopters.

The 4th Year

ITCA.07.01.I Industrial management 1C, 1S 3CR

Company functions. Management functions. General structure of the company management. Organizing structure of the company. Operational management of the production company. Objective laws of the production structure. Fundamentals of decision theory. Planning and optimization.

ITCA.07.02.I Manufacturing systems I 2C, 1L 4CR
ITCA.08.03.I Manufacturing systems II 2C, 2L 4CR

Fundamentals of manufacturing processes. Manufacturing precision. Surface quality of processed parts. The stages of manufacturing processes design. The calculus of processing allowance and of intermediate dimensions. The calculus of cutting regimes. The calculus of time rate settings. Manufacturing methods of different type of surfaces.

ITCA.07.04.I Calculus and structure of aircrafts 2C, 1S, 1P 5CR

Aviation development history. General structure of the aircraft. Common strenght calculus. Optimization of the aeronautical structures. Aircraft wing. Empennage group. Fuselage types. Loads on the fuselage. Strenght calculus of the fuselage. Calculus of the engine support. Calculus and structure of the landing gear.
construcția trenurilor de aterizare.

ITCA.07.05.I Chip cutting technologies for aeronautical parts 2C, 2L, 1P 4CR

Surface generation by chip cutting. Kinematics and parameters of the chip cutting process. Dynamics of chip cutting process. Wear and durability of cutting tools. General model fo cutting tool. Geometry and parameters. Materials used for cutting tools. Cutting tools design for different methods of manufacturing parts by chip cutting.

ITCA.07.06.I Manufacturing devices for aeronautical industry 2C, 1L 3CR

Fundamentals. Blanks orientation and fastening in devices. Structural analysis. Properties and performances. Fixtures used at different manufacturing methods used for aeronautical parts. Devices for tools fastening. Devices for control and assemblying.

ITCA.08.06.I Technology of aeronautical structures 2C, 1L, 1P 4CR

Fundamentals. Main structure of a factory with aircraft production. Classification of assemblying methods used for aircrafts. Rivet structures assemblying. Screws and bolts assemblying. Welded structures. Assemblying structures by glue. Special technologies. Assemblying devices. Dividing into fraction of the aircraft structures.

ITCA.08.08.I Calculus and design of aeronautical structures 2C, 1P 4CR

Generalities. Design concepts. External loads calculus. Safety coeficients calculus. Regulations. Structure modelling. Stability of aeronautical structures. Stress in plastic domain. Calculus and design of structures made of composite materials and sandwich types. Aspects concerning fatigue of aeronautical structures. Joints. Use of FEM.

ITCA.08.09.I Cold-pressing technologies for aeronautical parts 3C, 2L, 1P 5CR

Generalities. Physical basics of plastic deformation process. Laws and surmises of plastic deformation. Materials used for aircrafts which can be manufactured by cold-pressing. Shearing methods. Cropping. Punching. Bending. Shaping. Drawing. Fashioning. Volumetric forming. Extrusion. Nonconventional methods. Stages of design of the manufacturing process by cold-pressing.

ITCA.08.10.I Reliability and security of the aeronautical systems 2C, 2L 4CR

Reliability concepts. Fundamentals of statistical calculus. Presentation of the statistical data. Statistical models. Statistical analysis of the experimental data. Reliability parameters. Reliability tests. Mechanical reliability of the structures. Reliability of systems. Diagnosis and control of reliability. Economic analysis of the reliability.

ITCA.08.11.I CAD-CAM systems 2C, 2L 4CR

CAD/CAM techniques. Fundamentals and theory. CAD-T systems for manufacturing processes : procesors, postprocesors, software applications. CAM systems. Numerical control of manufacturing processes. Computer aided numerical control of machine-tools. PROCN-1 software system used for NC programming of machine-tools.

ITCA.07.13.A High level programming software 1C, 2L 3CR

Delphi software. Projects in Delphi. Units. Blocks in Object Pascal. Standard data types and user data types. Conditional instructions, loops, functions and procedures. Files in

Object Pascal. Object oriented programming. Form Design. Mechanical engineering applications.

ITCA.07.14.A Manufacturing of special materials used in aeronautics **2C, 1L** **4CR**

Classification of special materials. Manufacturing of fiber materials. Matrix materials. Fireproof composites. Sandwich structures. Fabrication of honeycomb structures. Machining of cored composites. Ultrasound process. Beam of electrons process. The plasma spray process. Protective coating applications on turbine blade. SERMETEL coating process. Electrophoretic coating with metallic particles. Intelligent materials. Active fiber composites technologies.

ITCA.07.15.A Composite materials **2C, 1L** **4CR**

Classification of composite materials. Fiber composites: fiberglass, graphite fibers, kevlar. Matrix materials: polymers, ceramics, graphites. Fireproof composites. Sandwich structures. Honeycomb structures. Special composites. Elaboration technologies of composite materials.

ITCA.07.17.A Physical control methods in aeronautics **2C, 2L** **4CR**

Standards and regulations on control by physical methods. Methods for analysis of composition and structure of materials. Visual methods. Use of penetrating fluids. Use of magnetic powders. Ultrasound and penetrating radiations. Control of air-proof, homogeneity and electrical conductivity. Holographic methods. Comparative analysis of different methods.

ITCA.07.18.A Nondestructive control of aeronautical parts **2C, 2L** **4CR**

Specific regulations on nondistructive control. Control by visual methods, by use of penetrating liquids, of magnetic powders and ultrasound. Methods by acoustic emission. Control methods at tightness, homogeneity and electrical conductivity. Design of nondistructive control plans for aeronautical parts.

ITCA.08.19.A Quality assurance systems **1C, 1L, 1P** **2CR**

Fundamentals. Required documents. Quality instruments used for design and manufacturing. Quality documentation management. Quality control. Authentication of quality assurance systems. Quality diagnosis. Data management in quality assurance.

ITCA.08.19.A Total quality management 2C, 1L 2CR

Fundamentals on total quality management (TQM). Quality planning. Quality costs. Authentification of quality systems. Instruments and techniques used in TQM. TQM for aeronautical industry.

Practical activity

Manufacturing technologies by chip cutting and by cold-pressing, CAD/CAM systems. Technologies for mounting the aircraft structure. The propulsion system. The command components of an aircraft. Study of helicopters. Maintenance of aircrafts.

The 5th year

ITCA.09.01.I Stability and dynamics of flight 2C, 1L, 1P 5CR

Generalities. Static longitudinal stability (stick fixed). Static lateral stability (stick fixed). Static directional stability (stick fixed). Aircraft flight dynamics (equations of motion). Longitudinal stability derivatives. Lateral – directional stability derivatives. Tail design and sizing. Regulations (FARs and JARs) related to stability and control.

ITCA.09.02.I Aeroelasticity and structures dynamics 2C, 1S, 1P 4CR

Static aeroelasticity. Deformation of the aeronautical structures under static loads. Aeroelastic distribution of lift. Dynamic aeroelasticity. Periodic dynamic phenomena. Equilibrium equations. Free vibrations. Flutter phenomenon. Transitory dynamic phenomena. Aeroelastic effects on the aircraft stability.

ITCA.09.03.I Technology for assembling and mounting of the aircraft 2C, 1L 4CR

Classification of assemblying and mounting. Mounting lines. Assemblies equipping. Final mounting lines. Mounting technological documentation. Structure of final mounting sections. Aspects of factory internal airdroms.

ITCA.09.04.I Equipment for command and control of aircrafts 3C, 1L 4CR

Aircraft components and command surfaces. Hydraulic equipment. Fuel delivery equipment. Electrical equipment. Secondary systems for aircraft protection. Propulsion equipment command. On board apparatus. Equipment for communication and radio-navigation. Understructure elements and civil aviation regulations.

ITCA.09.05.I Aircrafts exploitation and maintenance 2C, 1L 4CR

General concepts on aircrafts maintenance. Maintenance of aircraft structure. Degradation and corrosion phenomena. Fatigue aspects. Procedures and documents of a maintenance plan. Structure of maintenance base. Maintenance of propulsion systems. Maintenance of board equipment.

ITCA.09.06.I Marketing 1C, 1S 3CR

Fundamentals. Marketing plan. Internal and external analysis. Open market and its structures. Marketing strategies. Marketing mix method. Expenses estimation and budget. Programming and control. Marketing research methods. Applications.

ITCA.09.08.A High level CAD software 1C, 2L 3CR

Parametric modelling with Mechanical Desktop. Creating parametric sketch. 3D models creation by surfaces combining. Manufacturing drawing creation on the 3D models. Creation and editing of surfaces. Surface wireframe models. Assembly drawings.

ITCA.09.09.A Helicopters 2C, 2L 3CR

Classification of flying machines with rotary wings. Elementary motion of the propeller blade. Helicopter aerodynamics. Aspects on the helicopter performances. Vibrations on helicopters. Elements of piloting the helicopters. Noise aspects and ways to decrease it inside the cockpit.

ITCA.09.10.A Integrated manufacturing systems 2C, 2L 3CR

Classification of the manufacturing systems. Principles of integration of components for design, manufacturing and control. NC use in manufacturing systems. Use of computer and adequate software in integrated manufacturing systems.