University of Debrecen
Faculty of Engineering

Professional Pilot BSc Program

2021

TABLE OF CONTENTS

DEAN'S WELCOME

Welcome to UD's Faculty of Engineering!

The Faculty of Engineering of the University of Debrecen has become an outstanding centre of education and research in the Eastern Hungarian region. Following the footsteps of our predecessors, the academic and administrative staff of the Faculty work hand in hand to make our training programmes and researches meet both national and international standards.

The Faculty of Engineering is one of Hungary's most significant institutions of higher-education, and its 3000 students make it a dominant faculty of the University of Debrecen which - having the most international students, offering the most academic programmes among Hungarian universities and having been classified as a research university, the highest of qualifications - is officially listed among the best universities in the country.

We welcome the most outstanding and inquisitive students of the region with an enthusiastic and professional team of academics and researchers, and a set of laboratories unique in the country. We consciously aspire to develop the quality of education and research further, based on a close cooperation between the Faculty and the industry. Our students enter many prestigious competitions and they are becoming increasingly successful and acclaimed, while our instructors are working on a growing number of national and international projects of basic and applied research.

The Faculty bridges the gap between theory and practice and provides a high-quality theoretical background merged into practice-oriented training based on industrial relations. We do our best to maintain the high prestige of the engineering diplomas awarded by the University of Debrecen and to make sure that the knowledge and achievements of students who graduate from our Faculty continue to be recognised in the labour market.

All things considered, you are kindly advised to read this bulletin which hopefully reflects our endeavours appropriately and provides all the information you need to know about your chosen training programme. We are looking forward to supporting the personal and professional growth of our future engineers.

With the best of wishes for the years to come,

Géza Husi

Dean

HISTORY OF THE UNIVERSITY

The history of Debrecen's higher education dates back to the 16th century. The Calvinist Reformed College, established in 1538, played a central role in education, teaching in the native language and spreading Hungarian culture in the region as well as in the whole country. The College was a sound base for the Hungarian Royal University, founded in 1912. Apart from the three academic faculties (arts, law, theology) a new faculty, the Faculty of Medicine was established, and the University soon became one of the regional citadels of Hungarian higher education. Today, University of Debrecen is classified as "University of National Excellence" and offers the highest number of academic programs in the country, therefore it is considered to be one of the best universities in Hungary. Its reputation is the result of its quality training, research activities and the numerous training programs in different fields of science and engineering in English. With 14 faculties and a student body of almost 30.000, out of which about 3700 are international students, the University of Debrecen is one of the largest higher education institutions in Hungary.

The history of the Faculty of Engineering dates back to 1965, when the Technical College was established. In 1972 it was renamed Ybl Miklós Polytechnic and in 1995 it became part of Kossuth Lajos University. In 2000 the Faculty of Engineering became part of the integrated University of Debrecen.

In 2005 the Bologna System was introduced which supports the competitiveness of qualifications received at the University of Debrecen against universities all over Europe.

The Faculty of Engineering is practice-oriented and develops skills required for the current needs of the national and international labour market. The teaching staff is involved in numerous domestic and international research and design projects. The recently-opened new building wing with its ultra-modern design hosts several lecture halls, seminar rooms and laboratories equipped with the latest technology. Our students are provided with practical knowledge, training and field practice from numerous prestigious domestic and multi-national industry partners. The internship periods are excellent opportunities for students to experience how theory is put into practice at the most renowned industry representatives and become more successful in the labour market of this highly competitive sector. Students learn how to work in the working environment of multi-national companies and adapt to challenges easily. After graduation they will be able to work at a strategic decision-making level, giving priority to efficiency and engineering ethics.

The Faculty of Engineering offers a great variety of BSc, MSc courses and post-graduate training courses tailored to the needs of the rapidly changing world of engineering and focusing on European and international trends. In 2011 the Faculty of Engineering launched engineering trainings in English. In order to optimize the quality of training, the Faculty continuously strives to expand the number of industrial and educational partners at home and abroad.

The Faculty of Engineering has been a pioneer in the introduction of Quality Management System at faculty level to measure and evaluate the efficiency of its education and

teaching staff in order to improve the quality of education and training from the feedback received.

The Faculty of Engineering has a vivid student life. There is a film club waiting for movie buffs and the door of the Faculty library is always open. The library is not only the host to the latest technical books, exhibitions and tea afternoons with invited speakers, but students can also purchase theatre and concert tickets from the librarians. The Borsos József Dormitory is also a hub of activities for students.

The increasing number of international students brings cultural and ethnic diversity to the faculty.

Our aim is to aid students to become efficient members of the labour market and enrich the world of engineering in Hungary and abroad with their knowledge and expertise.

ADMINISTRATION UNITS FOR INTERNATIONAL PROGRAMMES

COORDINATING CENTER FOR INTERNATIONAL EDUCATION

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Administrative Assistant	Ms. Annamária Rácz

The Coordinating Centre for International Education supports the international degree programmes of the University of Debrecen in giving new students information on admission and entrance exam. It has tasks in promoting and is in charge of tasks like enrolment, study contracts, modifying student status or degree programme, activating student status, modifying students' personal data, requesting and updating student cards, providing certificates for the Immigration Office (for residence permit), issuing student status letters and certificates on credit recognition, concluding health insurance contract and providing Health Insurance Card, helping students with visa process application.

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The International Office has been functioning since 2014 in order to ensure the smooth running of the international degree courses. The office is responsible for student administration (full-time students, full-time transfer students, visiting/Erasmus students), providing certificates for students, considering and accepting requests, solving problems related to course registration, giving information about internship, final exam, thesis, etc.

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Department of Building Services and Building Engineering
Department of Civil Engineering
Department of Engineering Management and Enterprise
Department of Environmental Engineering
Department of Mechanical Engineering
Department of Mechatronics
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ACADEMIC CALENDAR

General structure of the academic year:

Study period	1st week	Registration*	1 week
	2nd – 7th week	Teaching Block 1	6 weeks
	8th week	1st Drawing Week	1 week
	9th – 14th week	Teaching Block 2	6 weeks
	15th week	2nd Drawing Week	1 week
Exam period	directly after the study period	Exams	7 weeks

*Usually, registration is scheduled for the first week of September in the fall semester, and for the first week of February in the spring semester.

ACADEMIC CALENDAR OF THE FACULTY OF ENGINEERING 2021/2022

Opening ceremony of the academic year	5 September 2021 (Sunday)
Registration week	30 August - 3 September 2021
Revision week (exams in Exam courses may be scheduled during this week)	30 August - 3 September 2021
1st semester study period in MSc and BSc programs	6 September - 10 December 2021 (14 weeks) In case of finalist courses: 6 September 2021 - 5 November 2021 (9 weeks)
Reporting period I (Drawing week I)	18 - 22 October 2021 (4 working days without scheduled lessons, consultation schedule announced previously)
Conferences, Career Days	27-29 October 2021
Faculty Conference of Scientific Students' Association	11 November 2021
Reporting period II (Drawing week II)	6-10 December 2021 (5 working days without scheduled lessons, consultation schedule announced previously)

1st semester examination period	13 December 2021 - 28 January 2022 (7 weeks) In case of finalist courses: 8 November - 10 December 2021 (5 weeks)
Thesis (BSc, MSc) submission deadline	As defined by the departments; max. 14 days of the beginning of the final examination period.
Final examination period	As defined by the departments; at least one occasion between 13 December 2021 and 28 January 2022.
Registration week	31 January - 4 February 2022
2nd semester study period in MSc and BSc programs	7 February - 13 May 2022 (14 weeks) In case of finalist courses: 7 February - 8 April 2022 (9 weeks)
Reporting period I (Drawing week I)	21 - 25 March 2022 (5 working days without scheduled lessons, consultation schedule announced previously)
Conferences	30 March – 1 April 2022
Career Days – "Industry Days in Debrecen 2021" (working days without teaching for Mechanical Eng. BSc, Mechanical Eng. MSc, Environmental Eng. MSc, Mechatronics Eng. BSc, Mechatronical Eng. MSc, Civil Eng. BSc students)	30 March – 1 April 2022
Career Days and Exhibition in Building Services Engineering (organised by the Department of Building Services and Building Engineering)	5 May 2022
Reporting period II (Drawing week II)	9 – 13 May 2022 (5 working days without scheduled lessons, consultation schedule announced previously).
2nd semester examination period	16 May - 1 July 2022 (7 weeks)

	In case of finalist courses: 11 April - 13 May 2022 (5 weeks)
Thesis (BSc, MSc) submission deadline	As defined by the departments; max. 14 days of the beginning of the final examination period.
Final examination period	As defined by the departments; at least one occasion between 16 May and 17 June 2022. The departments shall announce the date of the final examination until 15 February 2022.

THE PROFESSIONAL PILOT UNDERGRADUATE PROGRAM

INFORMATION ABOUT THE PROGRAM

Name of undergraduate program:	Professional Pilot Undergraduate Program
Specialization available:	-
Field, branch:	Engineering
Level:	BSc
Qualification:	Professional Pilot
Mode of attendance:	Full-time
Faculty:	Faculty of Engineering
Program coordinator:	Géza Husi PhD habil associate professor
Program length:	7 semesters
Credits total:	210 credits

The aim of the program is to train professional pilots who are familiar with air transportation, able to fulfil the job of a professional pilot at firms and organizations, and to operate aircrafts. Also, they are able to carry out tasks related to air operation, ground handling, quality assurance, organizing and solving the transportation of cargo. They have completed the requirements of the ATP(A) (Airline Transport Pilot, Aircraft) integrated program. The degree offers the opportunity to advance to master's level study.

Professional competences to be acquired

a) knowledge

He/She knows

- and applies English aviation terminology defined for professional pilot training according to EU Act 1178/2011 (03/11/2011).
- the conceptual system, the most essential relations and theories relating to his/her professional field.
- the main problem-solving and learning methods of the main theories in the field of aviation.
- the risk of fire and accidents and the scope of their prevention and avoidance.
- the international and domestic organizations of aviation, the regulations (ICAO Annex, the regulations of the European Union, EASA standards).
- the factors influencing aviation safety, the basics of Safety Management System (SMS).
- the basics of informatics (word processing, spread sheet and database management).
- and applies the theoretical basis of navigation and performance calculation.
- the basic concepts and phenomena of meteorology, their effect on flight and the atmospheric processes endangering flight.
- flight rules and procedures, the basics of developing procedures.
- and is able to apply the procedures of visual and instrumental navigation.
- and is able to apply the rules of radio communication.

b) skills

He/She is able to

- fly an aircraft in civil aviation by using his/her personal competences (responsibility, exactitude, stamina, stress tolerance, visual-spatial ability, movement coordination, manual skills, psychomotor functions, communication skills, divided attention, decisiveness).
- fly an aircraft in civil aviation by using his/her social competences (interpersonal skills, management skills, conflict resolution skills, teamwork, and cooperation).
- fly an aircraft in civil aviation by using his/her competences in methods [analytic thinking, self-control (self-checking skills), problem-solving, troubleshooting, situation awareness, thinking in systems, seeing the essence (understanding), decisiveness, prioritising].
- pass the theoretical and practical exams of ATP(A) integrated training.
- identify routine problems related to his/her profession, explore and describe the theoretical and practical background to solve them (with the practical application of standard procedures).
- understand literature and documentations written in English.
- carry out engineering tasks related to air operation and control.
- complete first mate tasks after type training on multi-crew aeroplanes.

- manage flights as an instrument-rated commercial pilot (with Commercial Pilot Licence/Instrument Rating, CPL/IR) in accordance with aviation regulations and rules in air.
- plan a flight and make the required navigation and performance calculation.
- create and submit a flight plan.
- operate airframes, engines, instruments and their systems in accordance with the instructions of Aircraft Flight Manual, recognize and handle hazards.
- operate the flight deck radio equipment and the radio-navigation system.
- navigate visually according to his/her individual limits under Visual Meteorological Conditions (VMC) on the basis of his/her geographical knowledge, map reading skills, visual and terrain objects identification skills and his/her proficiency.
- navigate with on-board instruments according to his/her individual limits under Instrument Meteorological Conditions (VMC) on the basis of his/her radio-navigation knowledge and proficiency.
- apply the rules of radiotelephony in English.
- analyse, assess meteorological situations and take all the necessary measures.
- interpret meteorological messages, charts and reports, consider them by flight planning and during flight.
- obey aviation safety rules.
- hold a management position in a department (e.g. flight operations, ground operations, flight safety, or compliance manager) after further training and considerable amount of practice.
- endure the monotony of work to complete practical tasks.

c) attitude

He/she

- aims for continuous self-development in the field of aviation in accordance with his/her professional endeavours.
- aims to solve problems and make leadership decisions relying on the opinions of his/her inferiors and in cooperation with them.
- shares his/her experience with his/her co-workers to promote his/her development.

d) his/her autonomy and responsibility

He/she

- supervises the work of personnel he/she is in charge of according to the instructions of his/her superior,and monitors the operation of machines and facilities.
- evaluates the effectiveness, efficiency and security of his/her inferiors' work.
- monitors the development of his/her co-workers and promotes their professional development.

- monitors the changes of law, technique, technology and administration in his/her professional field.

Program Specifications

Entry requirements for the undergraduate training programme:

- Language exam in English level B2, type: complex or GCSE exam or a certificate of the same level and type.
- Class 1 medical certificate pursuant to Commission Regulation (EU) No. 1178/2011 (03/11/2011) Medical (MED) requirements.

A professional pilot bachelor's detree itself does not entitle anyone to provide activities of a professional pilot. The requirement of issuing a certificate of basic qualification is to obtain a pilot licence. A professional pilot and pilot licences can be acquired after passing accredited theoretical and practical exams at Aviation Administration of National Transport Authority. The requirement of issuing a certificate of basic qualification is to obtain a pilot licence for professional pilot activities.

Credit System

Majors in the Hungarian Education System have generally been instituted and ruled by the Act of Parliament under the Higher Education Act. The higher education system meets the qualifications of the Bologna Process that defines the qualifications in terms of learning outcomes: statements of what students know and can do on completing their degrees. In describing the cycles, the framework uses the European Credit Transfer and Accumulation System (ECTS).

ECTS was developed as an instrument of improving academic recognition throughout the European Universities by means of effective and general mechanisms. ECTS serves as a model of academic recognition, as it provides greater transparency of study programs and student achievement. ECTS in no way regulates the content, structure and/or equivalence of study programs.

Regarding each major, the Higher Education Act prescribes which professional fields define a certain training program. It contains the proportion of the subject groups: natural sciences, economics and humanities, profession-related subjects and differentiated field-specific subjects.

The following professional fields define the Professional Pilot BSc training programme:

Natural Sciences: 40-46 credits;

Economics and Humanities: 14-26 credits;

Field-specific professional skills for professional pilots: 70-95 credits.

Minimum of credit points assigned to optional subjects: 10

Credit points assigned to thesis: 15

Credits total: 210

Guideline (Lisf of Subjects/Semesters)

The total number of credit points (210) of the training program can be obtained by completing the subjects of the curriculum. There is a certain degree of freedom in the order students can complete the subjects. However, it is recommended to follow the suggested order because some subjects can only be taken after the completion of the prerequisite subject(s), and/or can be the prerequisites for other subjects.

The list of subjects you have to complete in the semesters according to the model curriculum of Professional Pilot BSc programme:

1st semester	
Faculty of Engineering	ATP(A)
Aviation Terminology I	Basics of Aviation I
Engineering Physics	Theoretical Knowledge of Airline Transport Pilot Licence I (ATPL)
Informatics for Engineers I	
Mathematics I	
Statics and Strength of Materials	
Thermodynamics and Fluid Mechanics I	
2nd semester	
Faculty of Engineering	ATP(A)
Aircraft Technology	Basics of Aviation II
Aviation Terminology II	Communication VFR (ATPL)
Dynamics and Vibration	Internship I
Mathematics II	Meteorology I (ATPL)
Mathematics Comprehensive Exam	

Thermodynamics and Fluid Mechanics II	Theoretical Knowledge of Airline Transport Pilot Licence II (ATPL)
Optional Subject I	
3rd semester	
Faculty of Engineering	ATP(A)
Descriptive Geometry	Flight Training I
Electrotechnics and Electronics	General Navigation (ATPL)
Mechanical Machines and Machine Elements	Meteorology II (ATPL)
Mechatronic Devices (Sensors, Actuators, Motors)	Theoretical Knowledge of Airline Transport Pilot Licence III (ATPL)
Optional Subject II	
4th semester	
Faculty of Engineering	ATP(A)
Economics for Engineers	Aircraft General Knowledge I - Airframe, Systems, Power Plants (ATPL)
Manufacturing Technologies	
Materials Engineering	Aircraft General Knowledge – Instrumentation (ATPL)
Technique of Measurement	
Optional Subject III	Communication IFR (ATPL)
	Flight Training II
	Internship II
	Radionavigation (ATPL)
5th semester	
Faculty of Engineering	ATP(A)
Environmental Protection and Dangerous Goods	Air Law (ATPL)
Microeconomics and Economical Processes of Enterprises	Aircraft General Knowledge II - Airframe, Systems, Power Plants (ATPL)
Quality and Technical Management	Flight Planning and Monitoring (ATPL)
Optional Subject IV	Flight Training III
6th semester	

Faculty of Engineering	ATP(A)
Environment, Health and Safety, Ergonomics (Basics of EHS)	Flight Training IV
Thesis I	Human Performance (ATPL)
Optional Subject V	Internship III
	Mass and Balance (ATPL)
	Operational Procedures (ATPL)
	Performance (ATPL)
7th semester	
Faculty of Engineering	ATP(A)
Thesis II	Flight Training V
	Type Rating

About the prerequisites of each subject please read the chapter “Course Descriptions for Professional Pilot BSc”!

Work and Fire Safety Course

According to the Rules and Regulations of the University of Debrecen, students must complete the online course for work and fire safetyin the first semester of their studies. Registration for the course and its completion are necessary for graduation. Registration in the Neptun system by the subject: MUNKAVEDELEM

Students have to watch/read an online material to get the signature on Neptun for the completion of the course. The link of the online course is available on the website of the Faculty.

Special emergency, safety and compliance requirements apply to the flight training at the Department of Aviation Engineering. These rules are set and communicated by the Department.

Internship

Professional Pilot BSc students have to do internship in three parts (3, 4 and 5 weeks) as described in the model curriculum. Internship courses are offered in the second, fourth and sixth semester.

Internships involve daily flights during the relevant 3-4-5-week period in summer. Number of credit points assigned to internship: 10. Internship can be undertaken at an external internship place (ATO, Approved Training Organization) with which the higher education institution has an agreement and which has been approved and monitored by the National Transport Authority.

Special prerequisites of the internship:

- ICAO level 4 language exam or above level,
- EASA Class 1 medical certificate pursuant to Commission Regulation (EU) No. 1178/2011 (03/11/2011) Medical (MED) Requirements.

Physical Education

According to the Rules and Regulations of the University of Debrecen, students must complete Physical Education course at least in two semester during his/her BSc studies. Our University offers a wide range of facilities to complete them. Further information is available from the Sport Centre of the University, its website: http://sportsci.unideb.hu.

Optional Courses

According to the Rules and Regulations of the University of Debrecen, students must complete elective courses during their BSc studies. These elective courses are opened by the Departments at the Faculty of Engineering at the beginning of the actual semester. Students can also select optional courses offered by other faculties of University of Debrecen to complete.

Optional subjects can be completed in any semester and with any number of subjects but in the Professional Pilot BSc programme you have to gain at least 10 credits by completing optional subjects.

The list of the actual semester's optional subjects can be found under "Current Students">"Useful Information about your Study">"Optional subjects".

Pre-degree Certification

A pre-degree certificate is issued by the Faculty after completion of the bachelor (BSc) program. The pre-degree certificate can be issued if the student has successfully completed the study and exam requirements as set out in the curriculum, the requirements related to Physical Education, internship (mandatory) – with the exception of preparing thesis – and gained the necessary credit points (210). The pre-degree certificate verifies (without any mention of assessment or grades) that the student has fulfilled all the necessary study and exam requirements defined in the curriculum and the requirements for Physical Education. Students who obtained the pre-degree certificate can submit the thesis and take the final exam.

Thesis

Thesis is the creative elaboration of a professional task (engineering, design, development, research or research development) in written form as defined in the requirements of the training program. By solving the task, the student relies on his/her studies utilizing national and international literature under the guidance of an internal and external supervisor (if needed). By preparing and defending thesis students - who complete the Professional Pilot undergraduate program - prove that they are capable of the practical applications of the acquired skills, summarizing the work done and its results in a professional way, creatively solving the tasks related to the topic and doing individual professional work.

Students in the BSc program must write a thesis as a prerequisite of the final exam. Requirements of the training program contain the content requirements for thesis, general aspects of the evaluation and the number of credit points assigned to thesis (15).

Thesis topics are announced by the departments no later than the end of the fourth week of the study period of the last but one semester. Students may also offer a topic for the thesis, which the competent head of department may accept or reject. The conditions on the acceptance of a SSS (Student Scientific Society) paper as a degree thesis are defined by the Faculty. SSS papers are supposed to meet the requirements of a thesis both in form and content. Furthermore, it is necessary that the committee of the Pre-SSS make suggestions on the SSS papers to be accepted as theses.

Formal requirements of thesis shall be designated by the Department of Air- and Road Vehicles and must be announced in writing together with other thesis-related assignments.

The preparation of a thesis shall be overseen by an internal supervisor approved by the department, and may be assisted by an external supervisor (also approved by the department).

The faculty academic calendar (issued by the Vice-Rector for Education) sets the thesis submission deadline, for want of this the deadline is the 14. day 12 noon before the first day of the final exam.

The thesis submission deadline is defined in the academic calendar of the Faculty (issued by the Vice-Rector for Education) or, failing that, it is 12 a.m. on the 14th day before the first day of the final exam. The thesis can be submitted only if both the internal and the external supervisors approve. It is evaluated by an independent external reviewer, and the Head of the Department of Air- and Road Vehicles makes a suggestion to the final examination board on its classification based on a five-grade scale.

If the reviewer evaluates the thesis firmly as fail, the student may not take the final exam and must create a new thesis. Students must be informed about it. Conditions on resubmitting the thesis are designated by the head of the relevant educational unit responsible for the major or specialization.

Final exam

After receiving the pre-degree certificate, students conclude their studies by taking the final exam of Professional Pilot undergraduate (BSc) program. The final exam shall test and assess the knowledge, skills and abilities requisite to the award of the degree, whereby students shall also prove their ability to apply the acquired knowledge in

practice. The conditions for taking the final exam and the parts of the final exam itself shall be defined in the requirements for the training program.

The final exam shall be taken in the first exam period following the award of the pre-degree certificate or within 2 years after the termination of student status in any exam period according to the requirements of the training program. After the fifth year of the termination of student status, the candidate is not allowed to take the final exam. Only students who do not have outstanding charges are allowed to take the final exam.

In each academic year, there are two final exams: one at the beginning of January, another one at the end of June. The final exam shall be taken in front of a board on the previously announced exam dates. If the candidate fails to take the final exam until the termination of his/her student status, then he/she is allowed to take the exam any time after the termination of his/her student status on the dates according to the regulations which applied when the candidate was supposed to take the final exam for the first time.

Final exam board:

The final exam board consists of the chair, the vice-chair, the members and the examiners. The chairperson final examination board shall be delegated and commissioned with the consent of the Faculty Council by the dean of the faculty. He/she is selected from the acknowledged external experts of the professional field. Traditionally, a chairperson and, in case of his/her absence or indisposition, a vice-chair shall be commissioned. The exam board consists of – besides the chair or the vice-chair – at least one member (university professor, college professor or associate professor) and at least two examiners (associate professor /college level/, senior lecturer, junior lecturer, dept. teacher). In case of equal division of the votes, the chairperson shall be given the casting vote.

The length of the appointment of membership in the final exam board shall be three years. The Faculty's Education Office will publish the order of candidates taking the final exam with the committees assigned.

Conditions on taking the final exam:

- obtaining the credit points defined in the requirements and the curriculum of the program,
- fulfilling requirements to which no credit points have previously been assigned,
- thesis reviewed and accepted by the referees
- holding licences, passing the exams of the Hungarian Aviation Authority.

Final exam process

Final exam consists of two parts:

- Thesis presentation and defence,

- The candidate is expected to select a topic randomly from the subjects of the final exam and will be examined after preparation.

The final exam shall start if the thesis has previously been accepted unanimously both by the reviewer and the department. The two parts of the final exam shall not be separated.

Both parts of the final exam shall be assessed on a five-grade scale by the members of the final examination board. The board shall then consult behind closed doors and vote about the final grade for the final exam. The result of the final exam shall be announced by a member of the board. A grade is awarded for the thesis, its defence and the answers to the questions related to the thesis respectively. Minutes shall be taken during the final examination.

Final exam topics:

- Aircraft General Knowledge:
  - Aircraft General Knowledge I-II (Airframe/Systems/Power plants) ATPL
  - Aircraft General Knowledge – Instrumentation
- Communication:
  - Communication VFR
  - Communication IFR

Improving failed final exam:

If any part of the final exam is evaluated as fail, according to the existing rules of the university, it can be retaken. If a thesis is evaluated unanimously as fail, the student may not take the final exam and shall write a new, modified thesis. The retake of the final exam may be attempted in the following examination period at the earliest.

Final exam grade:

The grade of the final exam is the average of the grades awarded for the oral part of the final exam and thesis. Therefore, it is calculated as follows:

$$x = \frac{b + c}{2}$$

where

x= final exam grade

b= average of the grades awarded for the oral part of the final exam, rounded down to two decimal places,

c= grade awarded for thesis.

Diploma requirements:

Langauge exam in English (level: B2, type: complex) or GCSE exam or a certificate of the same level and type and a good command of Professional English according to Commission Regulation (EU) No. 1178/2011 (03/11/2011) which lays down the conditions on professional pilot training.

The chief forms of testing and assessing knowledge are included in Article 18 of Rules and Regulations of the University of Debrecen, the order of examinations is specified in Article 19. The supplement, along with special provisions for the Faculty of Engineering, is included in the Rules and Regulations, as well. The course requirements of the training programme have previously been specified.

SPECIAL INFORMATION RELATED TO THE INTEGRATED ATP(A) COURSE

1. General rules of integrated ATP(A) course

1.1 Compliance of EU regulations

The rules and requirements of the aviation related theoretical and flight trainings are compliant with the valid EU and EASA approved manuals and rules of operation (the manuals and policies in force are available to students during the training). The training institution is obliged to provide training, which is compliant with the current EU regulations, therefore, the conditions and requirements of the training may be modified unilaterally during the training, if the legal requirements change. The most important EU regulations are:

- COMMISSION REGULATION (EU) No. 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EU) No. 2018/1139 of the European Parliament and of the Council,
- COMMISSION REGULATION (EU) No. 290/2012 of 30 March 2012 amending Regulation (EU) No. 1178/2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No. 216/2008 of the European Parliament and of the Council,
- COMMISSION REGULATION (EU) No. 2016/539 of 6 April 2016 amending Regulation (EU) No. 1178/2011 as regards pilot training, testing and periodic checking for performance-based navigation.

1.2 Rules of CAA exams and skill test

The CAA exams are regulated by the „Rules for Theoretical Knowledge Examination" of the Civil Aviation Authority of Hungary, published on its website, which covers the critical items concerning the exams and the retake of an exam.

Applicants for a CPL(A) license with IR(A)/ME rating and MEP class rating shall pass two skill tests in accordance with Appendix 4,7 and 9 to COMMISSION REGULATION (EU) No. 1178/2011 to demonstrate the ability to perform, as PIC of a multi-pilot aeroplane under IFR, the relevant procedures and manoeuvres with the competency appropriate to the privileges granted. The skill test is conducted by a designated examiner of the Hungarian Civil Aviation Authority.

1.3 Licenses, ratings

Students will receive the following license with rating upon completion of the course: CPL(A) license, IR(A)/ME rating, MEP class rating, ATPL theory credit note. The license will be awarded after the skill tests, which is due at the end of the 6th Semester. No other licenses and/or ratings will be awarded before that.

1.4 Physiological examination, special support

As a special feature of the course, beside the mandatory medical assessment, students can regularly have (e.g. before flight or theoretical session) a special physiological test, condition check.

1.5 Condition

Each person is required to perform their duties to the best of their knowledge. Students shall be well rested. It is strictly forbidden to undertake any duty if a person knows or suspects that he or she is suffering from fatigue, as referred to (EU) No. 2018/1139, or feels otherwise unfit to perform his/her duties; when being under the influence of psychoactive substances or alcohol, or for other reasons as referred to (EU) No. 2018/1139. Taking drugs for any minor reason must be reported. Anyone caught violating the above rules will be dismissed immediately.

1.6 Verifying identity

Students must always be ready to identify themselves. Only a passport or a Hungarian national ID card can be used for identification purposes – other types of documents (student card, UniPass card, residence permit, driving licence, etc.) are not accepted. Students unable to identify themselves cannot attend the lessons meaning that the lack of a valid passport or Hungarian national ID card generates absence automatically.

1.7 Uniform

In order to make the students fully prepared for the pilot's lifestyle, the ATO introduced a dresscode applying to all students. Just like at an airline, it is obligatory to wear uniforms at any aviation-related event (e.g.: theoretical lessons, flight training, exam, exam paper reviewing and any other type of occasions related to the profession) at the ATO site and at the airports as well. Students represent the society of pilots – even on the streets. For example, arriving without a tie and putting it on in the classroom is unacceptable.

Students can only attend the training in accordance with the dresscode. Students not wearing a uniform or wearing it inappropiately cannot attend the lessons meaning that the lack of the uniform generates absence automatically.

The general requirement for dressing is to suit the occasion, season and weather under any circumstances. Thus, in the summertime, it is not obligatory to wear a tie and shirt during the practical lessons; T-shirts provided by the ATO are sufficient. For the rest of the garment, the general rules are to be followed, meaning long dark canvas pants and dark, closed-toe shoes.

Students have to wash and iron their uniform, and they need to show up in a clean and orderly uniform at every theoretical and practical lesson.

Hand and hair care is an important part of the look, so students need to make sure that their nails are always well cared for and that their hair is clear and orderly. Personal hygiene includes well-groomed appearance, cleaned and ironed clothing, clean and impeccable shoes.

It applies to both ladies and gentlemen that tattoos and piercings cannot be visible, the navel and the waist shall be covered and underwear cannot be seen. Ladies can wear makeup but is should be subtle, and their perfume should not be intense.

For all students, regardless of gender, shoes must be closed-toe ones and, if possible, made of leather and not rubber. Students are required to keep the uniforms and shoes clean and orderly. The badge must be worn symmetrically above the left front pocket. If a student is wearing a sweater, the epaulet must be placed on the shoulder bars of the

sweater. Shirtt must be tucked into the trousers. T-shirts can be worn only during flight trainings in the summer.

1.8 Property Handle

The property of the ATO and airport(s) must be handled with care. In case of damaging any property, please, inform your flight coordinator. This also applies for noticing damaged property. Manuals (such as: training manuals, personal operating handbooks, operating manuals, syllabi, etc.) belonging to the ATO may not be copied or distributed. Copying or distributing manuals results in a fine of 750.000 HUF.

1.9 Complaints

Serious complaints can be discussed with the Head of Training after filling out and filing a complaint form. This form is available in the classrooms and briefing rooms.

1.10Smoking policy

Smoking is allowed only in the designated areas.

1.11Safety and calamities

In case of an emergency or calamity, call the corresponding phone number(s) below:

- Central emergency number: 112,
- Ambulance: 104,
- Fire brigade: 105,
- Police: 107.

(These phone numbers can be contacted 24 hours a day.)

1.12Communication

To make the communication between students and coordinators effective during the whole course, the following means are required from all students:

- an e-mail address which is frequently checked by the student (mandatory),
- a phone number that can be called in case of urgency (mandatory),
- a chat application on a smartphone with internet access (desired).

The preferred general method of communication is sending messages via e-mail, and the fllowing time limitations shall be respected considering the various periods of a university year:

- study period (check your e-mails every 24 hours),
- exam period (check your e-mails every 48 hours),
- internships (check your e-mails every 24 hours).

In special and unexpected cases (e.g. schedule's change of internship and flight training, getting sick, problems of public transport) it is required from the student and the assigned instructor or office assistant to inform each other directly. To provide this prompt channel, a chat application has been chosen, however, in case of urgeny, calling the relevant person by phone is still acceptable. Inappropriate communication will automatically result in a warning as described below in 1.13.

1.13 Warnings

In order to maintain the standard of normal everyday operation, it is essential to build up a warning system. Students are required to read and learn it before joining the ATO to avoid possible future conflicts. The attitude, behaviour, preparation, communication and absences of students will be monitored during the whole course of their studies based on the rules of the Professional Pilot Program's Bulletin and the internal ATO rules.

Violating the rules during any kind of operations (ground school lectures, flight trainings) automatically resultsin a warning according to the following system:

- for the first time: warning recorded by the instructor,
- for the second time: warning recorded by the instructor,
- for the third time: warning recorded by the instuctor and also sent via e-mail to the Chief Theoretical Knowledge Instructor (CTKI) and Chief Flight Instructor (CFI),
- in case of further occasions, warning is recorded by the instructor and the responsible person (CTKI or CFI) informs the Head of Training who has the right to consider further measures regarding the student's academic progress. In order to clarify the given situation students are provided with the option of a personal meeting: in this case students should contact the CTKI or CFI directly via e-mail.

Warnings are repealed at the end of every academic year (31st of August).

1.14 Recordings

During trainings cameras can be used only for training purposes with the following premises:

- recording of audio or any sound of trainings is not allowed,
- during theoretical classes and simulator sessions, taking videos or pictures is strictly forbidden,
- on flight trainings video recordings can only be done with the written consent of the instructor,
- when flying, the camera must be securely fixed during the entire flight and the camera must not damage the aircraft equipment, shall not interfere with the completion of exercises or the free view,
- recordings are confidential and shall not be shared on any platform,
- transferring recordings to a third party is forbidden, unless ordered otherwise by the training organization,
- recordings of trainings can only be done on dataloggers, remote sharing shall not be used.

2. Regulations of Ground School Classes (theoretical education)

The theoretical part of the ATP(A) integrated course is built up compliant with the following rules of Part-FCL:

- the course comprises at least 750 hours of theoretical instruction,
- the MCC course shall comprise at least 25 hours of theoretical knowledge instruction and exercises,
- theoretical knowledge instruction in UPRT shall comprise at least 5 hours.

During their academic studies, students will face 4 types of theoretical course:

a) Basics of Aviation I and II are prerequisites of flight trainings and internships and provide basic knowledge regarding aviation.
b) Theoretical courses organized within the framework of the flight trainings or internships (e.g. type-knowledge course, UPRT, MCC),
c) ATPL(A) subjects which have to be fulfilled by successfully passing official exams,
d) Type rating (A320 or B737 depending on the decision of the ATO).

2.1 Absences and retakes

According to international law, only a pilot student who has completed the minimum number of theoretical instruction hours required for ATP(A) integrated course can take an authorized exam. The ATO does not have to provide more than the prescribed hours, which means that lessons must be attended, otherwise students will not be able to take the exams verified by the authority. Being late also counts as an absence. 1 session covers 3 instruction hours. Any absence without a proper reason will automatically result in a warning as described above in 1.13. In case of not being able to be on time or not being able to attend a class at all (this includes absences due to illness as well), contact your flight instructor by sending a message (by phone, chat application or e-mail using training@pharmaflight.hu) before the start of the class on the day of the absence latest, and wait for the answer.

The ATO will give all support to the students in case of an absence due to sickness or any compelling reason. However, students have to accept that if there is no way to reschedule the lessons; extra courses have to be organized for which students will be charged due to their absence. The amount of the fee will be 5000 HUF/instruction hour/student. This price covers theoretical retakes only.

a) ***Basics of Aviation I (30 hours):*** according to standard university regulations, a maximum of 3 sessions can be skipped by a student due to sickness or any compelling reason. No make-up classes are provided, however, the ATO reserves the right to organize any extra class financed by students if needed (e.g. long lasting sickness proved by a medical certificate).

b) ***Basics of Aviation II (50+20 hours):*** according to standard university regulations, a maximum of 5 sessions out of the 50 hours can be skipped by a student due to sickness or any compelling reason. No make-up classes are provided, however,

the ATO reserves the right to organize any extra class financed by students if needed (e.g. long lasting sickness proved by a medical certificate).
The additional 20 hours will be held on the first week of Internship I. (4 or 5 hours per day) where no absences are allowed. If a make-up class is needed (sickness or any other reason) the instructor must be notified as soon as possible and the student will be rescheduled to another group. If it is not possible, the student will be charged as described in 2.1.

c) ***Theoretical courses organized within the framework of the flight trainings or internships:*** due to the required basic knowledge the ATO will organize ground school lectures before some special flight tasks or phases (e.g. night VFR flights, UPRT, MCC). No absences are allowed in these courses. If a make-up class is needed (sickness or any other reason) the instructor must be notified as soon as possible and the student will be rescheduled to another group. If it is not possible, the student will be charged as described in 2.1.

a) ***ATPL(A) subjects:*** complying with the regulations developed by the ATO 750, theoretical instruction hours shall be respected and no absences are allowed. Considering that there will always be missing students, make-up classes are organized for them according to the following rules:

- 1 missed session (3 instruction hours) per semester can be made up free of charge,
- 2 separate missed days (2x6 instruction hours) per semester can be made up free of charge,
- 3 consecutive missed days (3x6 instruction hours) can be made up for no charge per semester.

In the last two cases a medical or any other official certificate must be presented to prove that your absence has a compelling reason, otherwise it counts as a causeless absence and the student will be charged. Not more than 18 hours/6 sessions/3 days per semester can be made up by the student even he/she is willing to be charged. Exceptions can only be made with the special approval of the Head of the Training. Make-up classes will be held on the second drawing week of the semester.

b) ***Type rating:*** to comply with Part-FCL rules the minimum instruction hours shall be respected (described by the type rating training manual). No absences are allowed. If a make-up class is needed (sickness or any other reason) the instructor must be notified as soon as possible and the student will be rescheduled to another group. If it is not possible, the student will be charged as described in 2.1.

2.1 Arrival

Since the first session starts at 08:30, students are not allowed to enter the building after that. If students are late, it counts as an absence from the morning session. The same rule applies to afternoon classes that start at 13:00.

2.2 Breaks, mobile phones, electrical devices

Students are not allowed to leave the classroom during the lessons; please keep in mind that this is why there are breaks between two sessions. Furthermore, it is forbidden to use mobile phones so all devices must be put to into a container (box on the teacher's desk) upon arrival. During classes, laptops and tablets can be used for educational purposes only.

2.3 Documentation: exams and attendance sheets

The documents of integrated ATP(A) courses must be written in blue ink. Students are not allowed to use pencils or pens in other colours: the exams and attendance sheets that are not written in blue are automatically made invalid. Leaving out any requested mandatory detail has the same consequences. Signing the attendance sheet is always the student's responsibility! The number of students present and the numbers of signatures are always checked. If there are more signatures than students present, the people responsible for the mismatch will be held accountable.

2.4 Training schedule

The schedule of the subjects which are part of the program curriculum will be published well ahead of the starting date of ground lectures via an e-mail. Those theoretical courses which are part of the flight trainings and other small group works will be organized and scheduled directly by your assigned instructor.

2.5 Exams

In order to pass the theoretical exams, students must reach 75% in all units of the tests respectively.

a) ***ATPL (A) subjects:*** considering that these subjects have to comply with Part-FCL and university regulations, these exams are the most complex ones. According to EASA, there are 13 ATPL (A) subjects which have to be completed in an ATP (A) integrated course. Certain complex subjects are divided into more university courses (I., II., III.) during the semesters. All courses have to be completed by writing two mid-term tests per semester. If an ATPL (A) subject is divided into more than one course, students shall complete all courses (I., II.,III.) before the ATO considers the subject fully completed. Additionally, as soon as all courses of a subject are successfully completed, students have to pass a final test of the subject that covers all the relevant topics. After passing this final test (called a home exam) successfully, we let students attempt an official exam. All stages of this testing system use an online platform, except for the official exams.

b) ***Basics of Aviation I:*** according to university standards, there will be mid-term tests during the semester which are developed by the ATO.

c) ***Basics of Aviation II:*** according to university standards, there will be mid-term tests during the semester in addition to the one at the end of the course. Within the time frame of an intensive one week theoretical camp, few progress tests

should be successfully completed so that students may start Internship I. which is their first chance to fly.

d) *Theoretical courses which will be organized within the framework of the flight trainings:* many parts of the training (type knowledge, Night VFR, UPRT, MCC) require special knowledge from students. It means that there is a very intensive and concise theoretical instruction just before the flight task to make the training effective. During this intensive ground school trainings (1-2 weeks) there will be progress tests to measure students' level of theoretical knowledge. The required minimum knowledge, the timeframe and the difficulty of these tests may vary but all tests are developed by the ATO complying with Part-FCL.

e) *Type rating course:* due to its complexity the type rating course will be held in the last semester. All progress tests and exams will be fully compliant with Part-FCL and other related rules and regulations.

3. Regulations of Internship and Flight Training (practical classes)

Flight trainings are the most complex parts of the training as they are depending on the actual weather and the progress of each individual; as a result, deviations from the planned training program will always occur. The training programme consist of flight exercises that will cover the whole knowledge necessary to become a professional pilot and to pass the official skill test of the Hungarian Civil Aviation Authority. The actual training program may vary from person to person, as the instructors are always free to customize the training to students' needs. The flight trainings will be held both during the semesters on dedicated flight training lessons, and during the summer breaks on Internship weeks. Flight trainings are designed in a way ensuring that, by the beginning of the 7th semester, the required 200 hours total time (including flight time and simulator sessions) are accomplished successfully having passed skill tests. Theoretical lessons will be located solely at the ATO partner. The primary base for the flight trainings is Debrecen International Airport, but other airports will also be used depending on the actual training exercises. Flight trainings may take place on all days of the week (including weekends) from sunrise to sunset, and for certain exercises, night-trainings will be organised. The number of hours spent with flight trainings are compliant with the rules and regulations regarding the allowed flight time and rest. In accordance with the regulations, flight simulators are used as a training aid for some exercises.

3.1 Internal exams and progress checks

The practical part of ATP (A) integrated course contains flight and simulator hours depending on the task given. The flight training covers all phases required according to the rules of Part-FCL. Within and between the phases there are some progress tests the aim of which is to assess the level of the students' flying skill and their improvement. These checks will be attempted when students are found ready by their instructors. All checks will be performed by the Head of Training, the Chief Flight Instructor or an experienced flight instructor who is assigned by them.

When the ATP (A) integrated course and all progress checks are successfully completed by a student, the ATO will recommend him/her to the required skill tests which will be held by an assigned examiner of the Civil Aviation Authority of Hungary.

3.2 Training schedule

A high level personal flight training schedule has been made with the help of flight instructors. The schedule is published via e-mail or a chat application directly by the assigned instructor. The ATO shall not be liable for possible changes in the schedule due to factors unforeseen (such as: personal progress, attendance, weather, etc.).

3.3 Absences

Students must arrive on time and be prepared for the lessons. Being late or absent without a reason will automatically result in a warning as described above in 1.13. Additionally, students have to pay:

- for the second time 10.000 HUF/planned hours to flight/student,

- for any further occasions the rental fee of the aircraft/planned hours to fly/student, plus 10.000 HUF/planned hours to flight/student.

In order to complete the training successfully, students must attend all of the sessions. Missed sessions (due to an absence) will need to be made up for later, before the student is awarded a certificate of the training.

In case of not being able to be on time or not being able to attend a class at all (this includes absences due to illness as well), flight instructors shall be contacted by sending a message (by phone, chat application or e-mail using training@pharmaflight.hu) as soon as possible, before 6:30 a.m. on the day of being absent latest, and wait for the answer.

Being absent might mean that your flight training will not end within the agreed timeframe. The fees can be avoided if the absent student sends a replacement (another student) instead of him/her to the training and if the exchange does not set the schedule back. Modifications must be communicated towards the ATO no later than a day before the training.

3.4 Private communication and electric devices

During preparation and flying, students must switch their phones to flight mode. For the success of the training, during the training (briefing/debriefing, around the airplane and in the cockpit) using mobile/cell phones, cameras and video cameras is strictly forrbidden, the only exception is when their use has a training purpose and the relevant ATO's rules are followed (with the flight instructor's approval).

3.5 Preparation for the flight task

Use your time wisely when being at the airport either by learning or by preparing for one of your flights. While using the preparation room, try not to disturb others. Getting prepared for your task is essential for your training. Instructors check your knowledge and preparation level prior to the flight exercise. If the preparation does not prove to be satisfactory, the session will be cancelled. Should your instructor find your preparation incomplete out of neglect, it will automatically result in a warning as described above in 1.13.

COURSE DESCRIPTIONS FOR PROFESSIONAL PILOT BSC

1st semester

Mathematics I

Subject group: Basic Natural Sciences – Faculty of Engineering
Model curriculum number: 1
Code: MK3MAT1A08GX17_EN, MK3MAT1A08EX17_EN, MK3MAT1A08RX17_EN
ECTS Credit Points: 8
Evaluation: mid-semester grade
Year, Semester: 1st year/1st semester
Its prerequisite(s): -
Further courses are built on it: Yes/No
Number of teaching hours/week (lecture + practice): 4+4

Topics:

The basic notions of linear algebra, differentiation and integration for real functions; some applications in physics.

Part A - Linear algebra: real numbers, coordinate systems, sets, sequences of real numbers and their limit, series of real and complex numbers, series of real functions, vector geometry, vector algebra and applications, the set of the complex numbers, complex series, approximation of real functions, matrices, determinants, vector spaces, systems of linear equations, linear functions

Part B - Differential and integral calculus: real functions, elementary functions, limit and continuity of real functions, differentiation, L'Hospital's rule, Taylor polynomial, analysis of differentiable functions, primitive function (antiderivative), indefinite integral, the Riemann integral, the Newton-Leibniz theorem, numerical integration, improper integral, applications of the integral

Literature:

Required:

Recommended:

- Thomas' Calculus, Addison Wesley (11th edition, 2005), ISBN: 0-321-24335-8
- S. Minton, Calculus Concept and Connections, McGraw Hill (2006), ISBN 0-07111200-6

Recommended textbook:

Schedule

1st week Registration week	
2nd week: Lecture: Part A: Real numbers, coordinate systems Part B: Real functions Practice: Part A: Sets Part B: Real functions	3rd week: Lecture: Part A: Sequences of real numbers and their limit Part B: Elementary functions Practice: Part A: Vector geometry, vector algebra Part B: Rational fractions, inverse functions
4th week: Lecture: Part A: Series of real numbers Part B: Limits of real functions, continuity of real functions Practice: Part A: Vector geomety, vector algebra Part B: Calculations of limits of real functions	5th week: Lecture: Part A: Series of real functions Part B: Differentiation Practice: Part A: The set of the complex numbers Part B: Differentiation
6th week: Lecture: Part A: Approximations of real functions Lagrange interpolation. Linear regression. Part B: Differentiation: L'Hospital's rule, Taylor polynomials. Practice: Part A: Sequences of real numbers. Part B: Differentiation: L'Hospital's rule. Taylor polynomials.	7th week: Lecture: Part A: Series of real numbers Part B: Mean value theorems. Investigation of differentiable functions. Practice: Part A: Summary, sample test Part B: Summary, sample test

8th week: 1st drawing week	
9th week: **Lecture:** Part A: Matrices Part B : Primitive function (antiderivative), indefinite integral **Practice:** Part A: Matrices Part B: Determinations of primitive functions.	**10th week:** **Lecture:** Part A: Vector spaces Part B: Riemann integral **Practice:** Part A: Vector spaces Part B: Determinations of primitive functions
11th week: **Lecture:** Part A: Systems of linear equations Part B: Improper integrals. Numerical integration. **Practice:** Part A: Solutions of systems of linear equations Part B: Determination of Riemann integral	**12th week:** **Lecture:** Part A: Linear functions Part B: Applications of the integration in geometry and physics **Practice:** Part A: Linear transformations of the plane and the space Part B: Improper integrals. Numerical integration
13th week: **Lecture:** Part A: Linear functions Part B – Plane curves **Practice:** Part A: Determinations of eigenvalues, eigenvectors. Part B: Calculations for plane curves	**14th week:** **Lecture:** Part A: Mathematical software Part B: Mathematical software **Practice:** Part A : Summary, sample test Part B : Summary, sample test
15th week: 2nd drawing week	

Requirements

A, for a signature and mid-semester grade:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. The final grade can be obtained in the following way:

- students write a mid-term test (Test I, A) from the linear algebra part of the material in the first drawing week; maximum 50 points can be achieved
- students write a mid-term test (Test I, B) from the differential and integral calculus part of the material in the first drawing week; maximum 50 points can be achieved
- students write an end-term test (Test II, A) from the linear algebra part of the material in the second drawing week; maximum 50 points can be achieved
- students write an end-term test (Test II, B) from the differential and integral calculus part of the material in the second drawing week; maximum 50 points can be

Mark ranges after the four tests:

- 175-200 points: excellent (5)
- 150-174 points: good (4)
- 125-149 points: satisfactory (3)
- 100-124 points: sufficient (2)
- 0-99 points: insufficient (1)

Those who fail, or do not accept their marks, can write a Test in any of the first three weeks of the exam period. This Test is a combination of the previous four tests, maximum 50 points can be achieved, and the mark ranges are proportional to the above table. For exam dates see Neptun. If someone does not accept her/his mark, it is possible to get any mark (better, the same, or worse) than the original mark by writing this Test.

Statics and Strength of Materials

Subject group: Basic Natural Sciences – Faculty of Engineering

Model curriculum number: 4

Code: MK3STSZG04XX17-EN

ECTS Credit Points: 6

Evaluation: mid-semester grade

Year, Semester: 1th year, 1th semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Introduction to engineering mechanics. Newton's laws of motion. Force, moment, and couples. Statics of a particle. Statics of rigid body. Planar force systems. Statics of planar structures. Internal force systems of rigid bodies. Loading of beams (cantilevers, freely supported beams, fraction lined beams). Determination of stress resultant diagrams (normal force, shear force and bending moment diagrams). Statically determined beam structures (hinged-bar systems, compound beams, truss systems). Fundamentals of Strength of Materials. Physical interpretation of strain terms. State of deformation. State of stresses. Constitutive equation (Hooke's law). Simple loadings (tension, compression, bending, torsion, shear). Sizing methods. Mohr's circle. Combined loadings (tension and bending, inclined bending, excentrical tension, tension and torsion, bending and torsion). An introduction to the finite element method.

Literature:

Compulsory:

- Russel C. Hibbeler (2006): Engineering Mechanics – Statics and Dynamics, Prentice Hall, 2006. ISBN-13 9780132215091
- Ladislav Cerny (1981): Elementary Statics and Strength of Materials, McGraw-Hill, ISBN 0070103399, 9780070103399
- László Kocsis (1988): Brief Account of the Lectures of Mechanics, Strength of Materials, BME
- Ferdinand P. Beer, E. Russel Johnston, Jr., John T. DeWolf (2006): University of Connecticut Mechanics of Materials, 4th Edition, © 2006, ISBN-13 9780073107950

Recommended:

- Stephen Timoshenko (1955): Strength of Materials: Elementary Theory and Problems, Van Nostrand
- Jacob Pieter Den Hartog (1961): Strength of Materials, Courier Dover Publications, ISBN 0486607550, 9780486607559

Schedule

1st week Registration week	
2nd week: **Lecture:** Mathematical preliminaries (vector-, matrixalgebra). Introduction to engineering mechanics. Statics of a particle **Practice:** Calculation the resultant of 2 and 3 dimensional force systems acting on particles.	3rd week: **Lecture:** Statics of rigid bodies. Moments. Equilibrium state of a rigid body. Planar force systems. **Practice:** Calculation of moments. Examples for equilibrium state of rigid bodies and for planar force systems.
4th week: **Lecture:** Statics of planar structures. Supports and reaction forces. **Practice:** Practical examples for the determination of the reaction forces of statically determined structures.	5th week: **Lecture:** Internal force systems of rigid bodies. Loading of beams. **Practice:** Practical examples for the determination of the normal force, shear force and bending moment functions of beams.
6th week: **Lecture:** Determination of stress resultant diagrams of beams. **Practice:** Practical examples for the determination of the normal force, shear force and bending moment diagrams of beams.	7th week: **Lecture:** Statically determined beam structures. **Practice:** Analysis of hinged-bar systems and truss systems. **1st test.**
8th week: 1st drawing week	
9th week: **Lecture:** Fundamentals of Strength of Materials. Displacement-, strain- and stress field. Constitutive equation (Hooke's law). **Practice:** Practical examples for strain and stress calculations.	10th week: **Lecture:** Simple loadings I: tension, compression and bending of prismatic beams. Fundamentals of sizing and control. **Practice:** Practical examples for tension, compression and bending.
11th week: **Lecture:** Simple loadings II: torsion of prismatic beams with circular and ring cross sections. Mohr's circle. Shear. **Practice:** Practical examples for torsion and shear.	12th week: **Lecture:** Combined loadings I: tension and bending, inclined bending, excentrical tension. **Practice:** Practical examples for combined loadings.
13th week:	14th week: **Lecture:** The finite element method.

Lecture: Combined loadings II: tension and torsion, bending and torsion. Sizing methods. **Practice:** Practical examples for combined loadings.	**Practice:** Case studies for numerical calculation of engineering structures. **2nd test.**
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at **lectures** is recommended, but not compulsory.

Participation at **practice** is compulsory. Students must attend the practice classes and may not miss more than three classesduring the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is counted as an absence. In case of more than three absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Students are required to bring the drawing tasks and drawing instruments to the course with them to each practice class. Active participation is evaluated by the teacher in every class. If a student's behaviour or conduct does not meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class.

During the semester there are two tests: the 1st test in the 7th week and the 2nd test in the 14th week. Students have to sit for the tests.

B, for a grade:

The course ends in a **mid-semester grade** based on the test results.

The minimum requirement for both mid-term and end-term tests is 50%. Based on the score of the tests separately, the grade for the tests is given according to the following table:

Score=Grade

0-39 = fail (1); 40-52 = pass (2); 52-63 = satisfactory (3); 64-71 = good (4); 72-80 = excellent (5)

If the score of the sum of the two tests is below 40, the student once can take a retake test of the whole semester material.

Engineering Physics

Subject group: Basic Natural Sciences – Faculty of Engineering

Model curriculum number: 5

Code: MK3MFIZA04RX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Geometrical optics, kinematics and dynamics of particles, concept of mechanical work, kinetic and potential energy, electrostatics, electric fields around conductors, transport processes, steady-state transport of electric charge, steady-state heat transfer (conduction, convection and radiation)

Literature:

Compulsory:

- Alvin Halpern: 3,000 Solved Problems in Physics, SCHAUM'S SOLVED PROBLEM SERIES (2011), ISBN-13: 978-0071763462
- Jerry S. Faughn, Raymond A. Serway, Chris Vuille, Charles A. Bennett: Serway's College Physics, Published 2005 by Brooks Cole Print, ISBN 0-534-99723-6

Schedule

1st week Registration week	
2nd week: **Lecture:** Geometrical (ray) optics. Concept of geometrical optics, law of reflection and refraction (Snell's law), Brewster's angle, Optics of prisms and lenses, imaging properties and magnification, aberrations, compound lenses. **Practice:** Solving problems for the reflection and refraction of light beams and for the imaging of lenses and compound lenses.	**3rd week:** **Lecture:** Kinematics of a particle I. Description of the motion by scalar quantities: Scalar position, velocity and acceleration. Example: uniform and uniformly varying motion **Practice:** Solving problems for uniform and uniformly varying motions.

4th week:	5th week:
Lecture: Kinematics of a particle II. Description of the motion by vector quantities: Position vector, vector velocity and acceleration. Example: throwing problems, circular motion. Practice: Solving throwing and circular motion problems.	Lecture: Kinetics of particles I. Inertial frame of reference, Newton's Laws, force formulas. Application of Newton's Laws in static and dynamic problems. Practice: Application of Newton's laws in kinetic problems.
6th week:	7th week:
Lecture: Kinetics of particles II. Concept of work and kinetic energy, work-energy theorem. Application of work-energy theorem in dynamic problems. Practice: Application of Newton's laws and the work energy theorem in kinetic problems.	Lecture: Electrostatics I. Electric field strength and flux, Gauss's law for electricity (Maxwell's first equation), potential energy in electric fields. Practice: Calculation of the electric field strength and its flux in the electrostatic fields of different charge arrangements.
8th week: 1st drawing week Test 1	
9th week:	10th week:
Lecture: Electrostatics II. Electric voltage and potential, capacitance, capacitance of planar, cylindrical and spherical capacitors, the energy of capacitors, capacitor circuits. Practice:Calculating the capacitance and stored energy of different types of capacitors and capacitor connections.	Lecture: Transport processes Concept of physical system, current intensity and source strength, extensive and intensive physical properties, conduction and convection current. Equation of balance and steady-state conduction. Thermal conductivity and conductive resistance. Conductive resistance circuits. Practice: Application of the equation of balance and steady-state conduction in different physical problems.
11th week:	12th week:
Lecture: Steady state transport of electric charge (Direct electric current). Electric current intensity, electrical conductivity and resistance, Ohm's law, electric work and power, characteristics of DC sources, Kirchhoff's circuit laws, solution of DC circuits Practice: Solution of DC circuits	Lecture: Steady-state heat transfer I - Thermal conduction. Concept of heat current and thermal conduction, equation of steady-state thermal conduction, thermal conductivity and resistance, steady state temperature distribution in a one dimensional wall of thermal conductivity Practice: Solving thermal conduction problems

13th week: **Lecture:** Steady-state heat transfer II - Thermal convection. Concept of thermal convection and heat transfer, equation of steady-state heat transfer, heat transfer coefficient and resistance, overall heat transfer coefficient and resistance **Practice:** Calculating the steady state temperature distribution in a one-dimensional wall of thermal conductivity.	14th week: **Lecture:** Steady-state heat transfer III - Thermal radiation. Thermal radiation characteristics, concept of black body radiation, fundamental laws of thermal radiation (Planck distribution, Wien displacement law, Stefan-Boltzmann and Kirchhoff's law), gray body radiation **Practice:** Solving thermal radiation problems.
15th week: 2nd drawing week Test 2	

Requirements

A, for a signature:

Participation at lectures is compulsory. Students must attend lectures and may not miss more than three of them during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded by the lecturer. Being late counts as an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor.

Students have to write two midterm tests during the semester. The first (40 points max) in the 8th, the second (40 points max) in the 14th week. At the end of the semester everybody will get a seminar grade on the basis of the table below:

0-39 = Fail (1); 40-50 = Close fail (2); 51-60 = Improvement needed (3); 61-70 = Very good (4); 71-80 = Excellent (5)

If somebody fails then he has to write both tests in the 1st week of the exam period again. If the result is 40 points (50%) or better, then he can take an exam. If somebody has to repeat his midterm tests then his seminar grade cannot be better than (2).

There will be homework from week to week. Only students who have handed in all their homework at the time of the midterm test will be allowed to write it. The problems in the midterm tests will be selected from the homework assignments.

B, for a grade:

Students get an exam grade for their exam. The final grade will be the average of the seminar and exam grade. If it is for example (3.5) then the lecturer decides if it is (3) or (4).

Thermodynamics and Fluid Mechanics I

Subject group: Basic Natural Sciences – Faculty of Engineering

Model curriculum number: 7

Code: MK3THE1R06HX17-EN

ECTS Credit Points: 6

Evaluation: exam

Year, Semester: 1st year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Definitions and Fundamental Ideas of Thermodynamics. Changing the State of a System with Heat and Work. Zeroth Law of Thermodynamics. The isotherm, isochor, isobar, adiabatic and polytrophic process. The First Law of Thermodynamics: Conservation of Energy. Corollaries of the First Law. Generalized Representation of Thermodynamic Cycles. The Carnot Cycle. Entropy. The second law of Thermodynamics. Reversibility and Irreversibility in Natural Processes. Technical work. Enthalpy. Exergy. Mixtures: Partial pressure, Dalton's laws. Gas mixtures. Gas mixtures. Real gases. Steam. Humid air. T-s diagram. Energy cycles.

Heat transfer. Basic forms of heat transfer. Fundamental equations. General differential equation of heat conduction. Steady state and transient conduction. Thermal resistance. Conduction (plane walls, cylindrical walls, spherical walls). Convection: concepts and basic relations, boundary layers, similarity concept. Free convection, forced convection (the Reynolds, Grasshof, Prandtl, Nusselt numbers).

Literature:

Compulsory:

- Lakatos Á. Basics of Heat Transfer and Fluid Mechanics. 2014, Terc Kft.
- Robert Balmer (2006) Thermo-dynamics, Jaico Publishing House, ISBN: 817224262X, 868 pages
- James R. Ogden (1998) Thermodynamics Problem Solver, Research and Education Association, ISBN: 0878915559, 1104 pages.
- Warren M. Rohsenow, James P. Hartnett, Young I. Cho (1998), Handbook of Heat Transfer, McGraw-Hill New York, ISBN: 0070535558 / 9780070535558, 1344 pages.

Schedule

1st week Registration week	
2nd week: **Lecture:** Definitions and Fundamental Ideas of Thermodynamics. Changing the State of a System with Heat and Work. Zeroth Law of Thermodynamics **Practice:** Solving problems in the theme of the lecture	3rd week: **Lecture:** The isotherm, isochor, isobar, adiabatic and polytrophic process. The First Law of Thermodynamics: Conservation of Energy **Practice:** Solving problems in the theme of the lecture
4th week: **Lecture**: Corollaries of the First Law. Generalized Representation of Thermodynamic Cycles. **Practice:** Solving problems in the theme of the lecture	5th week: **Lecture:** The Carnot Cycle. Entropy. The second law of Thermodynamics. **Practice:** Solving problems in the theme of the lecture
6th week: **Lecture:** Reversibility and and Irreversibility in Natural Processes. Technical work. Enthalpy. Exergy. **Practice:** Solving problems in the theme of the lecture	7th week: **Lecture:** Mixtures: Partial pressure, Dalton's laws. Gas mixtures. Gas mixtures. Real gases. **Practice:** Solving problems in the theme of the lecture
8th week: 1st drawing week	
9th week: **Lecture:** Steam. Humid air. T-s diagram. **Practice:** Solving problems in the theme of the lecture	10th week: **Lecture:** Energy cycles. Carnot's Cycle, Joule's cycle. **Practice:** Solving problems in the theme of the lecture
11th week: **Lecture:** Heat transfer. Basic forms of heat transfer **Practice:** Solving problems in the theme of the lecture threaded joints in section and on view.	12th week: **Lecture**: Fundamental equations. General differential equation of heat conduction. Steady state and transient conduction. **Practice:** Solving problems in the theme of the lecture
13th week: **Lecture:** Thermal resistance. Conduction (plane walls, cylindrical walls, spherical walls). Convection: concepts and basic	14th week: **Lecture:** Free convection, forced convection (the Reynolds, Grasshof, Prandtl, Nusselt numbers).

relations, boundary layers, similarity concept. **Practice:** Solving problems in the theme of the lecture	**Practice:** Solving problems in the theme of the lecture
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance on the lectures is recommended, but not compulsory.

Participation at practice is compulsory. Student must attend the practices and my not miss more than three practice during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. Student cannot make up a practice with another group. The attendance on practice will be recorded by the practice leader. Being late is counted as an absence. In case of more than three absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date previously discussed with the tutor. Students are required to bring the drawing tasks and drawing instruments for the course with them to each practice. Active participation is evaluated by the teacher in every class. If student's behavior or conduct does not meet the requirements of active participation, the teacher may evaluate their participation as an absence due to the lack of active participation in class.

During the semester, there are two tests: the mid-term test is in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.

B, for grade:

The course ends with exam grade. Based on the average of the test results x 0.3 + the exam grade from the theory x 07 the mid-semester grade is calculated as an average of them:

The minimum requirement for the mid-term, end-term tests and for the exam is 50%. Based on the score of the tests separately, the grade for the tests is given according to the following table:

Score / Grade

0-50 = fail (1); 51-60 = pass (2); 61-74 = satisfactory (3); 75-89 = good (4); 90-100 = excellent (5);

Aviation Terminology I

Subject group: Economics and Humanities – Faculty of Engineering

Model curriculum number: 14

Code: MK3AVT1R01HX17-EN

ECTS Credit Points: 2

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes

Number of teaching hours/week (lecture + practice): 0+2

Topics:

The course aims to provide future pilots with the English language proficiency needed for clear, accurate and problem-free communication without misunderstandings both in voice-only and face-to-face situations even in case of unexpected events. To achieve this, the improvement of General English and the sound acquisition of ICAO phraseology are both required.

Course content:

1. Introduction to air communication (clear communication, asking for repetition, questions-short answers, time expressions, ICAO)
2. Pre-flight (checks, delays, local conditions)
3. Ground movements (asking for more time, giving a reason,
4. Departure, climbing and cruising
5. Enroute events (explaining changes, unusual events, stating a problem)
6. Contact and approach (descent, saying what you are going to do)
7. Landing (landing hazards)
8. On the ground (getting to the gate)

Literature:

Compulsory:

Sue Ellis-Terence Gerighty: English for Aviation for Pilots and Air Traffic Controllers. Express Series. Oxford Business English. OUP. 2008.ISBN: 978 0 19 457943 8

Philip Shawcross: Flightpath, Aviation English for Pilots and ATCos. Cambridge Professional English. CUP. 2011.ISBN: 978-0521178716

Recommended:

Henry Emery - Andy Roberts: Aviation English Macmillan 2008. ISBN: 978 0 23 002757

Schedule

1st week Registration week	
2nd week: **Practice:** Introduction to air communication : ICAO alphabet and numbers. Basics of radiocommunication, asking for repetition.	3rd week: **Practice:** Introduction of non-routine situations, imaginary situations. Pre-flight checks, asking for more time.
4th week: **Practice:** Delays and problems: giving a reason. Pre-flight: local conditions, requesting actions.	5th week: **Practice:** Ground movements: airport markings and airside vehicles. Taxiing and holding.
6th week: **Practice:** Weather problems. Departure, climbing and cruising: take-off, checking and asking for an alternative.	7th week: **Practice:** Encountering traffic, prepositions of positions. Warnings about hazards, giving reasons.
8th week: 1st drawing week	
9th week: **Practice:** En route events: explaining changes, operational situations, comparing things. Unusual events, stating a problem.	10th week: **Practice:** Medical situations. Contact and approach :descent, saying what you are going to do.
11th week: **Practice:** Weather conditions, explaining changes in plans. Approach and landing problems, requests.	12th week: **Practice:** Landing: landing incidents. Circuit joining.
13th week: **Practice:** Landing hazards. On the ground, incidents between landing and arrival at the stand.	14th week: **Practice:** Getting to the gate. Clear communication, the future of flight.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at **practice classes** is compulsory. Students must attend the practice classes and may not miss more than three classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up any practices with other groups. Attendance at practice classes will be recorded by the practice leader. Being late counts as an absence. In case of more than three absences, a medical certificate needs to be presented. Missed practice classes should be made up for at a later date previously discussed with the tutor.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor.

Informatics for Engineers I

Subject group: Specific Compulsory Subjects – Faculty of Engineering

Model curriculum number: 18

Code: MK3INFEA04RX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

History of computers, Number systems, number representations, bit, byte, ASCII, Unicode, Hardware, CPU, I/O, Operating systems (BIOS, DOS…), Network architectures (topologies, router, gateway, DNS, IP address), Internet security (https, digital signature…), Databases (basic concepts, database model,DBMS …), Databases (SQL) , Data structures (datatypes, array, list, stack, tree…), Algorithms (sorting, searching…), Computer programming (history of programming, programming languages, Pseudo code, flowchart, development models), Computer programming (variable declarations, datatypes (C), control structures, loops…)

Literature:

Compulsory:

- Microsoft Excel 2016 Bible: The Comprehensive Tutorial Resource
- Microsoft Access 2016 Bible: The Comprehensive Tutorial Resource

Schedule

1st week Registration week	
2nd week: **Lecture:** History of computers **Practice: Excel 1.** Introducing Excel. Basics concepts and functionalities: • Parts of the user interface (workbook, worksheet, cell, range…)	**3rd week: Excel 2.** **Lecture:** Number systems, number representations, bit, byte, ASCII, Unicode **Practice:** Formatting and editing Worksheet: • Font type and size. • Align Text. • Number Format. • Column With, Row Height. • Borders.

- Entering and editing data, data types.
- Fill a Range with Series.

Basic functions:

- SUM, AVERAGE, COUNT, COUNTA, COUNTIF, MIN, MAX

Trigonometric functions:

- SIN, COS, TAN, PI, RADIANS

Logical functions:

TRUE, FALSE, AND, OR

- Wrap Text.

AutoSum functionality.

Conditional formatting.

4th week: Excel 3.

Lecture: Hardware, CPU, I/O

Practice: Formulas:

- Building Formulas.
- Move or copy a Formula.
- Reference another Range in a Formula.
- Naming groups of data.

Conditional and database functions:

- IF, SUMIF, CHOOSE
- VLOOKUP, HLOOKUP

5th week: Excel 4.

Lecture: Operating systems (BIOS, DOS…)

Practice: Analyzing data:

- Ordering, summarizing, a range.
- Filter a Range.

Summarize data with subtotals.

6th week: Excel 5.

Lecture: Network architectures (topologies, router, gateway, DNS, IP address)

Practice: Graphical representation in Excel:

- Creating Charts.
- Chart types.
- Chart Elements.
- Format and customize Excel Charts.

7th week: Excel 6.

Lecture: Internet security (https, digital signature…)

Practice: Practice for the test.

8th week: 1st drawing week: Excel test

9th week: Acces 1.

Lecture: Databases (basic concepts, database model,DBMS …)

Practice: Database basics, relational database model

Tables, records, fields, keys, primary keys, indexes.

10th week: Acces 2.

Lecture: Databases (SQL)

Practice: User interface of the software.

Database manipulation:

- Create a new database.
- Data types.
- Create and import tables.

Relationship between tables, relationship types.

Design and create a database from a dataset.

- Insert, delete, update records, fields.

Create relation between tables, referential Integrity.

11th week: Acces 3.

Lecture: Data structures (datatypes, array, list, stack, tree…)

Practice: Data manipulation:

Format.
Input masks.

- Fast finding, filtering, and sorting data.

SQL basics.

Select query:

- WHERE, AND, OR, ORDER BY, GROUP BY

12th week: Acces 4.

Lecture: Algorithms (sorting, searching…)

Practice: Queries:

- Crosstab
- Make table
- Append
- Update
- Delete

Calculated fields.

Summarizing data.

13th week: Acces 5.

Lecture: Computer programming (history of programming, programming languages, Pseudo code, flowchart, development models)

Practice: Forms.

Reports.

14th week: Acces 6.

Lecture: Computer programming (variable declarations, datatypes (C), control structures, loops…)

Practice: Practice for the test.

15th week: 2nd drawing week: Acces test

Requirements

A, for a signature:

- participation on the practices,
- at least satisfactory result on both midterm tests.

B. Requirements for the grade:

- same as above,

final grade = average of the two grades of the midterm tests.

Basics of Aviation I

Subject group: Specific Compulsory Subjects – ATP(A)

Model curriculum number: 25

Code: MK3PPL1R02HX17-EN

ECTS Credit Points: 2

Evaluation: mid-semester grade

Year, Semester: 1st year, 1stsemester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+1

Topics:

The course teaches the basic knowledge of aviation in order to assist students in understanding the key subsystems and their interrelations. The aim is to prepare the students for conducting the first flight trainings while having the relevant basic information about the environment the pilots are working in.

Part I of the course covers the following main areas and with airport and PHARMAFLIGHT training center visits give practical thorough information on: the most important stakeholders (airline, airport, airspace, air traffic management, maintenance, training organizations), international organizations and the regulatory environment, the tasks of the individual players, the basic requirements applying to them, airlines and airport organizational structures and their main operational documents

By completing both parts of the course, students will have a basic theoretical and practical knowledge necessary for the first summer flying where they will have the opportunity to make an intense flight programme.

Literature:

Recommended:

- Alexander T. Wells, Ed.D. & Seth Young, Ph.D. (2011): Airport Planning and Management, 6th Edition, ISBN-13: 978-0071750240, ISBN-10: 007175024X
- Massoud Bazargan (2016): Airline Operations and Scheduling, 2nd Edition, ISBN-13: 978-0754679004, ISBN-10: 0754679004

1st week Registration week	
2nd week: **Practice:** Basics of Air Law: Conventions, Agreements, Organizations	**3rd week:** **Practice:** Basics of Air Law: Airworthiness of aircraft, Aircraft nationality and Registration marks, Personnel licensing

4th week: Basics of Air Law: Rules of the air, Air Traffic Services and Air Traffic Management	5th week: Practice: Basics of Air Law: Aerodromes
6th week: Practice: Basics of Operational Procedures: General Requirements I.	7th week: Practice: Basics of Operational Procedures: General Requirements II.
8th week: 1st drawing week	
9th week: Practice: Basics of Operational Procedures: Special operational procedures and hazards	10th week: Practice: Basics of Human Performance and Limitations: Human factors I.
11th week: Practice: Basics of Human Performance and Limitations: Human factors II.	12th week: Practice: Basics of Human Performance and Limitations: Basics of flight psychology
13th week: Practice: Basics of Human Performance and Limitations: Basic aviation psychology	14th week: Practice: Basics of Human Performance and Limitations: First aid
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor. This course is a prerequisite of the flight training and internship courses.

Theoretical Knowledge of Airline Transport Pilot Licence I (ATPL)

Subject group: Specific Compulsory Subjects – ATP(A)

Model curriculum number: 27

Code: MK3TKA1R03HX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 1stsemester

Its prerequisite(s): -

Further courses are built on it: Yes/no

Number of teaching hours/week (lecture + practice): 6+0

Topics:

The course (Part I, II and III together) teaches the basic knowledge of Principle of Flight to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

Part I of the course covers the following main areas and give thorough information on:

The basic aerodynamic theory, subsonic aerodynamics, drag and wake, the lift coefficient Cl, the drag coefficient Cd, the stall, flaps and spoilers.

By conducting all Part of the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the complex low speed aerodynamics of aeroplanes.

Learning Objectives (LOs) published by the European Commission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course aims to contribute to the achievement of safe flight during their proposed pilot career. It is crucial for a pilot to be able to recognize hazards during a flight and to apply the right procedures in such cases.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Principles of Flight, 2015, ISBN: 978 1 90620 276 7

Schedule

1st week Registration week	
2nd week:	3rd week: **Lecture and Practice:** The atmosphere

Lecture and Practice: Basics, laws and definitions	
4th week: **Lecture and Practice:** Basic Aerodynamic theory	**5th week:** **Lecture and Practice:** Subsonic airflow
6th week: **Lecture and Practice:** Lift	**7th week:** **Lecture and Practice:** Drag
8th week: 1st drawing week	
9th week: **Lecture and Practice:** Stall	**10th week:** **Lecture and Practice:** C_{Lmax} augmentation
11th week: **Lecture and Practice:** High lift devices	**12th week:** **Lecture and Practice:** Airframe contamination
13th week: **Lecture and Practice:** Propellers	**14th week:** **Lecture and Practice:** Summary and revision questions
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor.

2nd semester

Mathematics II

Subject group: Basic Natural Sciences – Faculty of Engineering
Model curriculum number: 2
Code: MK3MAT2A06GX17_EN, MK3MAT2A06EX17_EN, MK3MAT2A06RX17_EN
ECTS Credit Points: 6
Evaluation: mid-semester grade
Year, Semester: 1st year/2nd semester
Its prerequisite(s): Mathematics I
Further courses are built on it: Yes/No
Number of teaching hours/week (lecture + practice): 2+4

Topics:

Differentiation and integration of multivariable and vector-valued functions, differential equations.

Part A: Differentiation and integration of multivariable vector-valued functions (2 hours lecture+2 hours practise/week): Metric, topology, sequences in the space. Linear functions. Parametric curves. Notions of differentiation, linear approximation, curvature, torsion. Parametric surfaces, tangent plane, linear approximation. Surfaces of revolution, ruled surfaces. Scalar field, gradient. Young's theorem. Directional derivative. Local and global extrema. Vector fields. Derivatives. Divergence and curl. Potential function. The notion of double and triple integrals on 2 and 3 dimensional intervals. The extensions of the integrals. Integrals over general regions. The arc length of curves, surface area. Line and surface integrals. The theorems of Gauss and Stokes, Green's formulae. Applications in physics.

Part B: Differential equations (2 hours practise/week): Notions of differential equations, classification of differential equations, initial value problem. Problems leading to differential equations. First order linear differential equations (homogeneous and inhomogeneous, method of variation). Determination of solutions of inhomogeneous first order linear differential equations. Higher order linear differential equations. Solution of linear homogeneous differential equations of order two having constant coefficients. Method of undetermined coefficients. Special second order differential equations. The Laplace transform and its applications. Slope fields, numerical methods. (Euler, Runge-Kutta).

Literature:

Required:

Recommended:

- Thomas' Calculus, Addison Wesley (11th edition, 2005), ISBN: 0-321-24335-8
- S. Minton, Calculus Concept and Connections, McGraw Hill (2006), ISBN 0-07111200-6
- M. D. Greenberg, Fundamentals of engineering analysis, Cambridge University Press, ISBN 978-0-521-80526-1

Recommended textbook:

Schedule

1st week Registration week	
2nd week: Lecture: Part A: Metric, topology, sequences in $\mathbb{R}^n$. Practice: Part A: Limits of vector sequences Part B: Notions of differential equations	3rd week: Lecture: Part A: Parametric curves I. Practice: Part A: Differentiation. Part B: Problems leading to differential equations.
4th week: Lecture: Part A: Parametric curves II. Practice: Part A: Curvature, torsion Part B: First order linear differential equations	5th week: Lecture: Part A: Differentiable functions of type $\mathbb{R}^n \to \mathbb{R}^m$. Practice: Part A: Derivatives of functions of type $\mathbb{R}^n \to \mathbb{R}^m$. Part B: Higher order linear differential equations.
6th week: Lecture: Part A: Parametric surfaces Practice: Part A: Surfaces of revolution	7th week: Lecture: Part A: Scalar field, gradient. Young's theorem. Directional derivative. Practice:

Part B: Solution of linear homogeneous differential equations of order two having constant coefficients	Part A: The domains of functions of type $\mathbb{R}^2 \to \mathbb{R}$. Directional derivative and gradient. Part B: Summary, sample test
8th week: 1st drawing week	
9th week: **Lecture:** Part A: Local and global extrema **Practice:** Part A: Local extremas of functions of type $\mathbb{R}^2 \to \mathbb{R}$, $\mathbb{R}^3 \to \mathbb{R}$. Part B: Method of undetermined coefficients	**10th week:** **Lecture:** Part A: Vector fields **Practice:** Part A: Vector fields Part B: Special second order differential equations.
11th week: **Lecture:** Part A: Double and triple integrals **Practice:** Part A: Integrals on 2 and 3 dimensional intervals Part B: Laplace transform	**12th week:** **Lecture:** Part A: Integrals over general regions **Practice:** Part A: Applications Part B: Slope fields, numerical methods.
13th week: **Lecture:** Part A: Line and surface integrals. **Practice:** Part A: arc length of curves, surface area. Line and surface integrals Part B: Potential functions	**14th week:** **Lecture:** Part A: Mathematical software **Practice:** Part A : Summary, sample test Part B : Summary, sample test
15th week: 2nd drawing week	

Requirements

A, for a signature and mid-semester grade:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented.

The final grade can be obtained in the following way:

- students write a mid-term test (Test I, B) from differential equation part of the material in the first drawing week; maximum 30 points can be achieved
- students write a mid-term test (Test I, A) from the differential and integral calculus part of the material in the first drawing week; maximum 50 points can be achieved
- students write an end-term test (Test II, B) from the differential equation part of the material in the second drawing week; maximum 30 points can be achieved
- students write an end-term test (Test II, A) from the differential and integral calculus part of the material in the second drawing week; maximum 50 points can be achieved

Mark ranges after the four tests:

144-160 points: excellent (5)

128-143 points: good (4)

104-127 points: satisfactory (3)

80-103 points: sufficient (2)

0-79 points: insufficient (1)

Those who fail, or do not accept their marks, can write a Test in any of the first three weeks of the exam period. This Test is a combination of the previous four tests, maximum 80 points can be achieved, and the mark ranges are proportional to the above table.

For exam dates check the Neptun system. If someone does not accept her/his mark, it is possible to get any mark (better, the same, or worse) than the original mark by writing this Test.

Mathematics Comprehensive Exam

Subject group: Basic Natural Sciences – Faculty of Engineering

Model curriculum number: 3

Code: MK3MATSA00RX17-EN

ECTS Credit Points: 0

Evaluation: exam

Year, Semester: 1th year, 2nd semester

Its prerequisite(s): Mathematics I, Mathematics II at the same time

Further courses are built on it: Yes/No

Subjects of the comprehensive exam: Mathematics I and II

Dynamics and Vibrations

Subject group: Basic Natural Sciences – Faculty of Engineering

Model curriculum number: 6

Code: MK3MREZG04XX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): Engineering Physics, Mathematics I

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Motion of a particle:

Position, velocity and acceleration and the mathematical relations between them, description of the motion of the particle in Cartesian coordinate system and Frenet-frame, Newton's laws and differential equation of the motion of the particle, theorems of kinetics, force fields, kinetic, potential and mechanical energy, constrained motion along a two or three dimensional curve

Motion of a rigid body:

Description of the translational, rotational and general plane motion of a rigid body, the concept and determination of the instantaneous centre of zero velocity and acceleration, rolling motion without slipping, description of the plane motion of a rigid body in a time interval, centre of mass, momentum and angular momentum, moment of inertia and its calculation, mechanical work, Newton's laws and theorem of kinetics for rigid bodies, rotating and swinging of the body about an axis, rolling without slipping

Vibrations:

Description and classification of vibratory motions and vibrating systems. Basic definitions and properties of vibratory motion. Investigation of the elements of vibrating systems: masses and inertial elements, flexible and damping elements. Investigation of the dynamic models. Two ways for the generation of motion equations: the D'Alembert's principle and the Lagrange equations of motion. Investigation and properties of the free vibrations of single DOF undamped and damped systems. Solution of the homogenous motion

equation. Investigation and properties of the forced vibrations of single DOF undamped and damped systems. Basic types of forced vibrating systems. Multiple DOF systems: introduction, basic properties, natural frequencies and modes, modal transform and decoupling.

Literature:

Compulsory:

- Russel C. Hibbeler: Engineering Mechanics – Statics and Dynamics, Prentice Hall, 2006. ISBN-13 9780132215091
- Jerry Ginsberg: Engineering Dynamics, 3rd edition, Cambridge University Press, 2007. ISBN-13: 978-0521883030
- Lakshmana C. Rao, J. Lakshminarasimhan, Raju Sethuraman, Srinivasan M. Sivakumar: Engineering Mechanics: Statics and Dynamics, PHI Learning Pvt. Ltd., 2004. ISBN 8120321898, 9788120321892
- Meirovitch, Leonard: Fundamentals of Vibration, McGraw-Hill Publishing Company, 2000. ISBN 0071181741

Recommended:

- Ferdinand P. Beer, E. Russell Johnston, Jr.: University of Connecticut, Mechanics for Engineers: Statics and Dynamics (Package), 4th Edition, ©1987, ISBN-13 9780070045842
- Joseph F. Shelley: 700 solved problems in vector mechanics for engineers, Volume II: Dynamics. (SCHAUM'S SOLVED PROBLEM SERIES), McGraw-Hill, 1990. ISBN 0-07-056687-9

Schedule

1st week Registration week	
2nd week: Lecture: Kinematics of a particle Scalar and vector position, velocity and acceleration and the mathematical relations between them. Description of the motion in Cartesian coordinate system and Frenet-frame. Special motion types: Motion with constant acceleration, circular motion. Practice: Particle kinematics problems	3rd week: Lecture: Kinetics of a particle I Newton's laws and differential equation of the motion of the particle. Theorems of kinetics (impulse-momentum, work-energy and angular impulse-angular momentum theorems). Mechanical Power. Force fields (homogeneous, central and conservative). Kinetic, potential and mechanical energy. Practice: Particle kinetics problems
4th week: Lecture: Kinetics of a particle II Formulas for work and potential energy in homogeneous and central force fields.	5th week: Lecture: Kinematics of a rigid body I Basic concepts (rigid body and disc, planar, translational, rotational and general plane

Motion of the particle in gravitational and elastic spring force fields. Constrained motion along a two or three-dimensional curve. **Practice:** Particle kinetics problems II	motion). Connections between the velocity and acceleration of the different points of a rigid body undergoing translational, rotational and general plane motion. Instantaneous centre of zero velocity, acceleration, and procedure for the determination of them with calculation and construction. **Practice:** Rigid body kinematics problems
6th week: **Lecture: Kinematics of a rigid body II** Rolling motion without slipping. Description of the plane motion of a rigid body in a time interval. Pole curves. **Practice:** Rigid body kinematics problems	7th week: **Lecture: Kinetics of a rigid body I** Basic concepts: centre of mass, momentum and angular momentum, moment of inertia and its calculation, parallel axis theorem, mechanical work. **Practice:** Rigid body kinetics problems
8th week: 1st drawing week	
9th week: **Lecture: Kinetics of a rigid body II** Newton's laws and theorem of kinetics for rigid bodies (impulse-momentum, angular impulse-angular momentum and work-energy theorems). Special motion types: Rotating and swinging about an axis, rolling without slipping. **Practice:** Rigid body kinetics problems	10th week: **Lecture:** Description and classification of vibratory motions and vibrating systems. Basic definitions and properties of vibratory motion. Investigation of the elements of vibrating systems: masses and inertial elements, flexible and damping elements. **Practice:** Reduction of masses. Replacement of rigid bodies by lumped masses. Reduction of springs and damping elements.
11th week: **Lecture:** Investigation of the dynamic models. Two ways for the generation of motion equations: the D'Alembert's principle and the Lagrange equations of motion. **Practice:** Generating the equations of motion for single- and multiple degrees of freedom (DOF) systems.	12th week: **Lecture:** Investigation and properties of the free vibrations of single DOF undamped and damped systems. Solution of the homogenous motion equation. **Practice:** Calculation problems related to the free vibrations of single DOF undamped and damped systems.
13th week: **Lecture:** Investigation and properties of the forced vibrations of single DOF undamped	14th week: **Lecture:** Multiple DOF systems: introduction, basic properties, natural

and damped systems. Basic types of forced vibrating systems. **Practice:** Calculation examples of several kinds of forced vibrations in case of single DOF undamped and damped systems.	frequencies and modes, modal transform and decoupling. **Practice:** Calculation problems related to the free and forced vibrations of multiple DOF undamped and damped systems.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at lectures and seminars is compulsory. Students must attend lectures and seminars and may not miss more than three of them during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures and seminars will be recorded by the lecturer. Being late counts as an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor.

Students have to write two midterm tests during the semester. The first (40 points max) in the 8th, the second (40 points max) in the 14th week. At the end of the semester everybody will get a seminar grade on the basis of the table below:

0-39 = Fail (1); 40-50 = Close fail (2); 51-60 = Improvement needed (3); 61-70 = Very good (4); 71-80 = Excellent (5)

If somebody fails then he has to write both tests in the 1st week of the exam period again. If the result is 40 points (50%) or better, then he can take an exam. If somebody has to repeat his midterm tests then his seminar grade cannot be better than (2).

There will be homework from week to week. Only students who have handed in all their homework at the time of the midterm test will be allowed to write it. The problems in the midterm tests will be selected from the homework assignments.

B, for a grade:

Everybody will get an exam grade for their exam. The final grade will be the average of the seminar and exam grade. If it is for example (3.5) then the lecturer decides if it is (3) or (4).

Thermodynamics and Fluid Mechanics II

Subject group: Basic Natural Sciences – Faculty of Engineering

Model curriculum number: 8

Code: MK3THE2R04HX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): Thermodynamics and Fluid Mechanics I

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Introduce concepts, principles, laws, observations, and models of fluids at rest and in motion. Provide basis for understanding fluid behavior and for engineering design and control of fluid systems. Develop competence with mass, energy and momentum balances for determining resultant interactions of flows and engineered and natural systems. Develop basis for correlating experimental data, designing tests, and using scale models of fluid flows. Learn nature of rotation, circulation, resistance (viscous, turbulent), boundary layers, and separation with applications to drag and lift on objects.Wing profile. Mach number. Principles of flights. Learn methods for computing headlosses and flows in simple pipes and channels.

Literature:

Compulsory:

- Lakatos Á. Basics of Heat Transfer and Fluid Mechanics. 2014, Terc Kft.
- Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, (2009) Fundamentals of Fluid Mechanics, John Wiley and Sons, ISBN 978-0470262849, 776 pages
- Robert W. Fox, Alan T. McDonald, Robert W Fox, (1998) John Wiley and Sons, ISBN 978-0471124641, 762 pages
- Shashi Menon (2004) Piping Calculations Manual, ISBN 978-0071440905 666 pages

Schedule

1st week Registration week	
2nd week: Introduce concepts, principles, laws, observations, and models of fluids at rest and in motion Lecture: Provide basis for understanding fluid behavior and for engineering design and control of fluid systems. Practice: Solving problems in the theme of the lecture	3rd week: Lecture: Develop competence with mass balances for determining resultant interactions of flows and engineered and natural systems. Practice: Solving problems in the theme of the lecture
4th week: Lecture: Develop competence with energy balances for determining resultant interactions of flows and engineered and natural systems.	5th week: Lecture: Develop competence with momentum balances for determining resultant interactions of flows and engineered and natural systems.

Practice: Solving problems in the theme of the lecture	**Practice:** Solving problems in the theme of the lecture
6th week: **Lecture:** Develop basis for correlating experimental data, designing tests, and using scale models of fluid flows. **Practice:** Solving problems in the theme of the lecture	**7th week:** **Lecture, practice:** Solving problems in the theme of the lecture
8th week: 1st drawing week	
9th week: **Lecture:** Learn nature of rotation, circulation, resistance (viscous, turbulent), boundary layers, and separation with applications to drag and lift on objects. Mach number **Practice:** Solving problems in the theme of the lecture	**10th week:** **Lecture:** Learn methods for computing headlosses and flows in simple pipes and channels. **Practice:** Solving problems in the theme of the lecture
11th week: **Lecture:** Navier- Stokes equation **Practice:** Solving problems in the theme of the lecture.	**12th week:** **Lecture**: Losses in pipes. Dag. Lift. **Practice:** Solving problems in the theme of the lecture
13th week: **Lecture:** Bernoulli equation. Wing profile. **Practice:** Solving problems in the theme of the lecture	**14th week:** **Lecture:** Law of impulse and momentoum. **Practice:** Solving problems in the theme of the lecture
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance on the lectures is recommended, but not compulsory.

Participation at practice is compulsory. Student must attend the practices and my not miss more than three practice during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. Student cannot make up a practice with another group. The attendance on practice will be recorded by the practice leader. Being late is counted as an absence. In case of more than three absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date previously discussed with the tutor. Students are required to bring the drawing tasks and drawing instruments for the course with them to each practice. Active participation is evaluated by the teacher in every class. If student's behavior or

conduct does not meet the requirements of active participation, the teacher may evaluate their participation as an absence due to the lack of active participation in class.

During the semester there are two tests: the mid-term test is in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.

B, for grade:

The course ends with exam grade. Based on the average of the test results x 0.3 + the exam grade from the theory x 07 the mid-semester grade is calculated as an average of them:

The minimum requirement for the mid-term, end-term tests and for the exam is 50%. Based on the score of the tests separately, the grade for the tests is given according to the following table:

Score / Grade

0-50 = fail (1); 51-60 = pass (2); 61-74 = satisfactory (3); 75-89 = good (4); 90-100 = excellent (5);

Aviation Terminology II

Subject group: Economics and Humanities – Faculty of Engineering

Model curriculum number: 15

Code: MK3AVT3R01HX17-EN

ECTS Credit Points: 2

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): Aviation Terminology I

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 0+2

Topics:

The course aims to provide future pilots with the English language proficiency needed for clear, accurate and problem-free communication without misunderstandings both in voice-only and face-to-face situations even in the case of unexpected events. To achieve this the improvement of General English and the sound acquisition of ICAO phraseology are both required.

Course content:

1. Runway incursion, airport layout,ground operations
2. Co-ordinates, topographical features
3. Technology: datalink, flight control systems, instrument panel
4. Animals: wildlife on the ground, animals on the loose, bird strike
5. Gravity: manoeuvring an aircraft, hydraulic loss
6. Health: medical emergencies

7. Fire, on-board fire
8. Meteorology
9. Landings
10. Fuel
11. Pressure: blast, emergency descent
12. Security

Literature:

Compulsory:

Sue Ellis-Terence Gerighty: English for Aviation for Pilots and Air Traffic Controllers. Express Series. Oxford Business English. OUP. 2008.ISBN: 978 0 19 457943 8

Philip Shawcross: Flightpath, Aviation English for Pilots and ATCos. Cambridge Professional English. CUP. 2011.ISBN: 978-0521178716

Recommended:

Henry Emery - Andy Roberts: Aviation English Macmillan 2008. ISBN: 978 0 23 002757

Schedule

1st week Registration week	
2nd week:	3rd week:
Practice: Avoiding miscommunication, asking for information,airport layout. Ground operations, describing actions and position.	Practice: Explaining abbreviations, co-ordinates words. Confirming and disconfirming, topographical features.
4th week:	5th week:
Practice: Technology: datalink, flight control systems. The instrument panel, instrument blackout.	Practice: Animals: wildlife on the ground, animals on the loose. Bird strike, cargo words.
6th week:	7th week:
Practice: Gravity: manoeuvring an aircraft, comparing and contrasting. Aerobatics: units of measurement, hydraulic loss.	Practice: Health: medical emergencies vocabulary. Symptoms of stress, making suggestions and giving advice.
8th week: 1st drawing week	
9th week:	10th week:
Practice: Fire: words for describing fire, collocations related to fire. On-board fire: identifying and responding problems, electrical problems vocabulary.	Practice: Meteorology: microburst. Airport disruption, weather words.
11th week:	12th week:
Practice: Landings: touchdown, describing sensory impressions, landing gear and	

braking words. Describing 3-D position and movement, undercarriage: resolving misunderstanding.	**Practice:** Aviation and global warming, suggesting solutions to problems. Fuel icing, fuel collocations.
13th week:	**14th week:**
Practice: Pressure: blast, emergency descent. Damage, types of damage, expressing consequences.	**Practice:** Security: air rage, focusing on actions. Suspicious passengers, words for strange behaviour, unlawful interference.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at **practice classes** is compulsory. Students must attend the practice classes and may not miss more than three classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up any practices with other groups. Attendance at practice classes will be recorded by the practice leader. Being late counts as an absence. In case of more than three absences, a medical certificate needs to be presented. Missed practice classes should be made up for at a later date previously discussed with the tutor.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor.

Aircraft Technology

Subject group: Specific Compulsory Subjects – Faculty of Engineering

Model curriculum number: 17

Code: MK3AIRCR04HX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): Engineering Physics, Basics of Aviation I

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

The course teaches the basic knowledge of Aircraft technology in order to gain the prerequisite knowledge for Aircraft General Knowledge — Airframe/Systems/Powerplant I and II subjects.

The course covers the following main areas and give basic information on system design, loads, stresses and maintenance, airframe, hydraulics, landing gear, wheels, tyres and brakes, flight controls, pneumatics: pressurisation and air conditioning, anti and de-icing systems, fuel system, protection and detection systems, oxygen systems.

By completing the course, students will gain a basic knowledge necessary to commence Aircraft General Knowledge — Airframe/Systems/Powerplant I and II subjects described by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the basic technological background, structures, simple solutions used in airframes, systems and powerplants in aviation.

Learning Objectives (LOs) published by the European Comission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course aims to contribute to the achievement of safe flight during their proposed pilot career. It is crucial for a pilot to be able to recognize hazards during a flight and to apply the right procedures in such cases.

Literature:

Compulsory:

CAE OXFORD AVIATION ACADEMY (UK), Airframes and Systems, 2015, ISBN: 978 1 90620 265 1

CAE OXFORD AVIATION ACADEMY (UK), Electrics and electronics, 2015, ISBN: 978 1 90620 266 8

CAE OXFORD AVIATION ACADEMY (UK),Powerplant,2015,ISBN: 978 1 90620 267 5

Schedule

1st week Registration week	
2nd week: **Lecture:** Systems, loads, stress, maintenance, Structure **Practice:** Lab demonstration, Loads and stresses	3rd week: **Lecture:** Wings, empennage, control surfaces, Fuselage, doors, floor, windshield, windows, Control surface types **Practice:** Site visit, aircraft demonstration
4th week: **Lecture:** Hydraulic, Hydraulic systems, Nose wheel steering: structure and operation **Practice:** Lab demonstration, hydraulic fluids	5th week: **Lecture:** Brakes, Wheels and tyres **Practice:** Lab demonstration, simplified systems
6th week: **Lecture:** Controls, Secondary controls, De-ice systems, Fuel systems	7th week:

Practice: Site visit, aircraft demonstration	**Lecture:** Electric systems basics, Battery, Static electricity: general, Electric parts, Distribution **Practice:** Lab demonstration and examples
8th week: 1st drawing week	
9th week: **Lecture:** Piston engines: general, Fuel, Carburetor and injector systems, Air conditioning **Practice:** Site visit, aircraft demonstration	10th week: **Lecture:** Lubrication, Ignition, Mixture **Practice:** Lab demonstration
11th week: **Lecture:** Propellers **Practice:** Performance examples	12th week: **Lecture:** Gas turbine engines: general, Fuel (jet), Engine components, Further components and systems **Practice:** Site visit, aircraft demonstration
13th week: **Lecture:** Performance aspects **Practice:** Performance examples	14th week: **Lecture:** Detection and protection systems, Other systems **Practice:** Operations presentation
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at **lectures** is recommended, but not compulsory.

Participation at **practice classes** is compulsory. Students must attend the practice classes and may not miss more than three classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up any practices with other groups. Attendance at practice classes will be recorded by the practice leader. Being late counts as an absence. In case of more than three absences, a medical certificate needs to be presented. Missed practice classes should be made up for at a later date previously discussed with the tutor.

B, for grade:

The course ends in an examination.

Basics of Aviation II

Subject group: Specific Compulsory Subjects – ATP(A)

Model curriculum number: 26

Code: MK3PPL2R03HX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): Basics of Aviation I

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 4+3

Topics:

The course teaches the basic knowledge of aviation in order to assist students in understanding the key subsystems and their interrelations. The aim is to prepare students for conducting the first flight trainings while having the relevant basic information about the environment the pilots are working in.

By completing Part II of the course, students will be acquainted with airport and airline environments, training regulations, dispatch procedures, pre-flight planning, training aircrafts, and post flight requirements including logbook maintenance and emergency procedures. In the first flight training hours, students will become familiar with the training aircraft, its operating characteristics, flight controls, basic instruments and system, general good operating techniques and safety procedures. After completing the course, students shall be able to conduct a pre-flight with assistance, use the checklist, perform a run-up check of engine and systems, and know how to use the controls to move the airplane about its respective axis. They will be familiar with the controls of the aircraft and the effect of them during flight and learn how to taxi for take-off and to the parking area after landing.

By completing both parts of the course, students will have a basic theoretical and practical knowledge necessary for the first summer flying where they will have the opportunity to make an intense flight programme.

Literature:

Recommended:

- CAE OXFORD AVIATION ACADEMY (UK), General Navigation, 2015, ISBN: 978 1 90620 273 6
- CAE OXFORD AVIATION ACADEMY (UK), Operational Procedures, 2015, ISBN: 978 1 90620 275 0
- CAE OXFORD AVIATION ACADEMY (UK),Mass and Balance - Performance, 2015, ISBN: 978 1 90620 269 9

Schedule

1st week Registration week	
2nd week:	3rd week:

Practice: Basics of Instrumentation: Sensors and instruments, Measurement of air data parameters, Gyroscopic instruments	**Practice:** Basics of Mass and Balance: Purpose of Mass and Balance considerations, Loading, Fundamentals of CG calculations
4th week:	5th week:
Practice: Basics of Mass and Balance: Mass and Balance details of aircraft, determination of CG position	**Practice:** Basics of Performance: General
6th week:	7th week:
Practice: Basics of Performance: Single engine airplanes	**Practice:** Basics of Flight planning and monitoring: Flight planning for VFR flights
8th week: 1st drawing week	
9th week:	10th week:
Practice: Basics of Flight planning and monitoring: Fuel planning	**Practice:** Basics of General Navigation: Basics of navigation, magnetism and compasses, Charts
11th week:	12th week:
Practice: Basics of Radio Navigation: Basic radar principles, Radio aids	**Practice:** Basics of VFR Communication: Definitions, General operating procedures, Distress and Urgency procedures
13th week:	14th week:
Practice: Basics of Meteorology: The atmosphere, Wind, Thermodynamics	**Practice:** Basics of Meteorology: Clouds and fog, Precipitation, Flight hazards, Meteorological information
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor. This course is a prerequisite of the flight training and internship courses.

Theoretical Knowledge of Airline Transport Pilot Licence (ATPL) II

Subject group: Specific Compulsory Subjects – ATP(A)

Model curriculum number: 28

Code: MK3TKA2R02HX17-EN

ECTS Credit Points: 2

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): Theoretical Knowledge of Airline Transport Pilot Licence (ATPL) I

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 1+0

Topics:

The course (Part I, II and III together) teaches the basic knowledge of Principle of Flight to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

Part II of the course covers the following main areas and give thorough information on:

Stability, Neutral point, Location of centre of gravity, The Cm–α graph, Cn–β graph, Cl–β graph, Control, Yaw (directional) control, Roll (lateral) control, Mass balance, Trimming

By conducting all Part of the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the complex high speed aerodynamics of aeroplanes.

Learning Objectives (LOs) published by the European Commission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course is aimed to contribute to the achievement of safe flight during their proposed pilot career. It is crucial that a pilot could be able to recognize the hazard and apply for the well-known procedures in this matter during a flight.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Principles of Flight, 2015, ISBN: 978 1 90620 276 7

Schedule

1st week Registration week	
2nd week:	**3rd week:**
Lecture: Static stability	**Lecture:** Dynamic stability
6th week:	**7th week:**

Lecture: Dynamic lateral stability	**Lecture:** Dynamic directional stability
8th week: 1st drawing week	
9th week: **Lecture:** Control - General	**10th week:** **Lecture:** Pitch (longitudinal) control
11th week: **Lecture:** Roll (lateral) control	**12th week:** **Lecture:** Means to reduce control forces
13th week: **Lecture:** Mass Balance	**14th week:** **Lecture:** Trimming
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor.

Meteorology I (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 40

Code: MK3MET1R02HX17-EN

ECTS Credit Points: 2

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

The course (Part I and II together) teaches the basic knowledge of Meteorology to demonstrate a level that grants a succesfull authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

Part I of the course covers the following main areas and give thorough information on:

The atmosphere, pressure, density, pressure systems, synoptic charts, altimetry, temperature, humidity, adiabatics and stability, turbulence, wind, thermodynamics, clouds and fog, precipitation

By conducting both Part of the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the complex knowledge of meteorological conditions, different atmospheric structure and activities.

Learning Objectives (LOs) published by the European Comission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course is aimed to contribute to the achievement of safe flight during their proposed pilot career. It is crucial that a pilot could be able to recognize the hazard and apply for the well-known procedures in this matter during a flight.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Meteorology, 2015, ISBN: 978 1 90620 272 9

Schedule

1st week Registration week

2nd week:

Lecture: The atmosphere, Composition, extent, vertical division of the atmosphere, Air temperature, Definition and units, Vertical distribution of temperature, Transfer of heat, ICAO Standard Atmosphere (ISA), Altimetry, Terminology and definitions, Altimeter settings, Calculations, Effect of accelerated airflow due to topography

Practice: Calculation examples

3rd week:

Lecture: Wind, Definition and measurement of wind, Primary cause of wind, pressure gradient, Coriolis force, gradient wind, Variation of wind in the friction layer, Effects of convergence and divergence, General global circulation

Practice: Wind gradient calculations

4th week:

Lecture: Wind, Local winds, Anabatic and katabatic winds, mountain and valley winds, Venturi effects, land and sea breezes, Mountain waves (standing waves, lee waves), Origin and characteristics

Practice: Case studies on wind

5th week:

Lecture: Wind, Turbulence, Description and types, Formation and location of turbulence, Clear-Air Turbulence (CAT): Description, cause and location, Jet streams, Description, Formation and properties of jet streams, Location of jet streams and associated CAT areas, Jet stream recognition

Practice: Case studies on wind

6th week: **Lecture:** Thermodinamics, Humidity, Water vapour in the atmosphere, Mixing ratio, Temperature/dew point, relative humidity, Change of state of aggregation, Condensation, evaporation, sublimation, freezing and melting, latent heat, Adiabatic processes, Adiabatic processes, stability of the atmosphere **Practice:** Case studies on thermodynamics	7th week: **Lecture:** Clouds and fog, Cloud formation and description, Cloud types and cloud classification, Influence of inversions on cloud development, Flying conditions in each cloud type **Practice:** Classification examples
8th week: 1st drawing week	
9th week: **Lecture:** Clouds and fog, Fog, mist, haze, General aspects, Radiation fog, Advection fog, Steam fog, Frontal fog, Orographic fog (hill fog) **Practice:** Case studies on clouds and fog	10th week: **Lecture:** Precipitation, Development of precipitation, Types of precipitation, relationship with cloud types **Practice:** Airport meteorological center site visit
11th week: **Lecture:** Air masses and fronts, Air masses, Description, classification and source regions of air masses, Modifications of air masses **Practice:** Case studies on air masses and fronts	12th week: **Lecture:** Air masses and fronts, Fronts, General aspects, Warm front, Cold front, Warm sector associated clouds and weather, Weather behind the cold front **Practice:** Case studies on air masses and fronts
13th week: **Lecture:** Air masses and fronts, Occlusions, associated clouds and weather, Stationary front, associated clouds and weather, Movement of fronts and pressure systems, life cycle, Changes of meteorological elements at a frontal wave **Practice:** Case studies on air masses and fronts	14th week: **Lecture:** Pressure systems, principal pressure areas, Location of the principal pressure areas, Anticyclone, types, general properties, cold and warm anticyclones, ridges and wedges, subsidence, Non-frontal depressions, Thermal, orographic, polar and secondary depressions; troughs, Tropical revolving storms, **Practice:** Case studies on storms
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor.

Communication VFR (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 49

Code:

ECTS Credit Points: 1

Evaluation: official exam

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 1+0

Topics:

The course teaches the basic knowledge of Communication VFR to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

General operating procedures, relevant weather information terms (VFR), action required to be taken in case of communication failure, distress and urgency procedures, general principles of VHF propagation and allocation of frequencies, morse code

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the legal background and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Communications, 2015, ISBN: 978 1 90620 277 4

Schedule

1st week Registration week	
2nd week:	**3rdweek:**
Lecture:	**Lecture:**
VFR COMMUNICATIONS, CONCEPTS	VFR COMMUNICATIONS, CONCEPTS

Associated terms:	*Associated terms*:
Meanings and significance Air Traffic Services abbreviations, **Practice:** practical examples	Q-code groups commonly used in radiotelephony (RT) air – ground communications, Categories of messages **Practice:** practical examples
4th week:	**5th week:**
Lecture:	**Lecture:**
VFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES	VFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES
Transmission standards:	*Transmission standards*:
Transmission of letters Transmission of numbers Transmission of time **Practice:** practical examples	Transmission techniques Standard words and phrases (relevant RTF phraseology included) **Practice:** practical examples
6th week:	**7th week:**
Lecture:	**Lecture:**
VFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES	VFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES
Transmission standards:	*Transmission standards*:
RT call signs for aeronautical stations including use of abbreviated call signs **Practice:** practical examples	RT call signs for aircraft including use of abbreviated call signs Transfer of communication Test procedures including readability scale **Practice:** practical examples
8th week: 1st drawing week	
9th week:	**10th week:**
Lecture:	**Lecture:**
VFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES	VFR COMMUNICATIONS, RELEVANT WEATHER INFORMATION
Transmission standards:	*Aerodrome weather*:
Read-back and acknowledgement requirements Radar procedural phraseology Level changes and reports	Aerodrome weather terms, Weather broadcast **Practice:** practical examples

Data link messages

Practice: practical examples

11th week:	**12th week:**
Lecture:	**Lecture:**
VFR COMMUNICATIONS, VOICE COMMUNICATION FAILURE	VFR COMMUNICATIONS, DISTRESS AND URGENCY PROCEDURES
Required action:	*Signals and procedures*:
Action required to be taken in case of communication failure	Distress Urgency
Practice: practical examples	**Practice:** practical examples
13th week:	**14th week:**
Lecture:	**Lecture:**
VFR COMMUNICATIONS, VHF PROPAGATION AND ALLOCATION OF FREQUENCIES *General Principles*:	VFR COMMUNICATIONS, OTHER COMMUNICATIONS *Weather observations, Morse code*:
Spectrum, bands, range	Meteorological observations, Use of Morse code
Practice: practical examples	**Practice:** practical examples
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

3rd semester

Electrotechnics and Electronics

Subject group: Basic Natural Sciences – Faculty of Engineering

Model curriculum number: 9

Code: MK3ELTER06RX17-EN

ECTS Credit Points: 6

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): Mathematics I, Engineering Physics

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Introduction to DC circuits: voltage, current, basic components. Network analysis: Ohm's Law, Kirchhoff's Law, current and voltage divider, superposition, Thevenin and Norton's Law. Alternating current circuits: sinusoidal wave, calculation on the complex plane, power and effective values. Transient signals in the AC circuits: series and parallel RLC circuits. 3 phases circuit.

Introduction to electronics: features of electronic circuits, solid state devices. Transistors, unipolar and bipolar transistors. Operation, characteristics, and basic circuits. Amplifiers: 4 port theory, transfer functions, feedback: positive and negative. Semiconductors, diode, special diode. Common emitter amplifier. Differential amplifier: operational modes, circuit. Class A and AB amplifiers. Power amplifiers. Operational amplifiers: inverting and non-inverting type. Filters: Low and high pass filter, band pass filter.

Literature:

Compulsory:

- Electronic Circuits: Handbook for Design and Application, U. Tietze, Ch. Schenk, 2nd edition, 2008, ISBN-10: 3540004297

Schedule

1st week Registration week	
2nd week:	3rd week:
Lecture: Electrostatics, DC networks: basic electrical concepts of electric charge, electric current (amperage), electric field,	**Lecture:** Power source (ideal real), Power Source (ideal for real), Consumer, Ohm's Law, Resistance - design, characteristic data, division, marking according to IEC

electric field work, electric voltage (potential), electric circuit **Practice:** General description, laboratory regulations, Safety regulations and safety instruction	standard. Passive resistance of bipolar networks, Star-delta, delta-star conversion, Electrical work, electric power, efficiency **Practice:** introduction to measurements and instrumentation (measuring error, power supply, digital multimeter, signal generator)
4th week: **Lecture:** Network analysis: Kirchhoff's laws, Voltage divider, potentiometer, extending measuring range of a Volt meter current divider, extending measuring range of an Amp meter, Wheatstone bridge. Nodal analysis, Mesh analysis. **Practice:** 1st measurement: measuring the characteristics of DC voltage (U, I, RB, P) using Ohm's Law. Measuring the values of DC circuit. Using Kirchhoff's lows. Report writing.	**5th week:** **Lecture:** Network analysis: superposition theory, Northon and Thevenin theory. **Practice:** Perform a complex DC measurement and calculation task. Report writing.
6th week: **Lecture:** AC circuit, complex number, AC circuit mean value (RMS). Behavior of a resistance in AC circuit, inductance behavior in AC circuit, capacitance behavior in AC circuit. **Practice:** introduction to AC measurements and instrumentation (AC type digital multimeter, signal generator, oscilloscope, LRC meter). Report writing.	**7th week:** **Lecture:** Performance of AC circuits, power factor correction, Three-phase systems **Practice:** measurements of AC power. Report writing.
8th week: 1st drawing week	
9th week: **Lecture:** Pure and doped semiconductor characteristics, PN junction behavior at forward and reverse bias conditions. **Practice:** Silicon diode opening and closing characteristics measurements. Analysis of rectifier circuits. Report writing.	**10th week:** **Lecture:** Characteristics and applications of semiconductor diodes, the rectifier circuit operation, the one-way, two-way rectifier circuits operation. **Practice:** Analysis of rectifier circuits. Report writing.
11th week:	**12th week:**

Lecture: Bipolar transistor structure, gain, transistor parameters and characteristics, the FE connection, adjusting the set point. Areas of application of bipolar transistor, circuits transistor basic (CB, CC circuits), **Practice:** Analysis of common emitter basic circuit. Report writing.	**Lecture:** Principles of operation of field-effect transistors. **Practice:** Analysis of common source basic circuit. Report writing.
13th week: **Lecture:** Operation and characteristics of basic operational amplifier circuits (inverting, non-inverting, follower, summing, differential, differentiator and integrator basic circuit) **Practice:** Analysis of summing operational amplifier basic circuit. Report writing.	14th week: **Lecture:** Filters: Low and high pass filter, band pass filter. **Practice:** Analysis of filters basic circuit. Report writing.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must attend the practice classes and may not miss more than three classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student cannot make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late counts as an absence. Missed practice classes must be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If student's behavior or conduct does not meet the requirements of active participation, the teacher may evaluate his/her participation as absence because of the lack of active participation in class. During the semester there are one test. Students have to sit for these tests.

Preparing measurement reports until deadline.

B, for grade:

At the end of the course a test must be taken. The minimum requirement for end-term test is 41%. Score Grade 0-40 fail (1) 41-55 pass (2) 56-70 satisfactory (3) 71-85 good (4) 86-100 excellent (5)

Descriptive Geometry

Subject group: Specific Compulsory Subjects – Faculty of Engineering

Model curriculum number: 18

Code: MK3DEGRR04HX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Descriptive geometry is a branch of geometry in which the three-dimensional figures (spatial objects) are represented on a plane using one of the projecting methods and we must solve some geometrical problems of them in the image plane. The consisting positions, intersecting positions, metrical problems will be investigated.

Introduction to the Monge's method of projecting, projection of the space-elements. Points and lines in the plane. Intersection of a line with the plane. Intersection of two planes. Method of the replacing image-planes (transformation of views). Metric tasks. New views of a polyhedron (using transformation). Intersection of the polyhedrons with lines and planes. Intersection of two polyhedrons. Curved surfaces

Literature:

Compulsory:

- Church, A. E.: Elements of Descriptive Geometry, American Book Company, University of Michigan
- Ledneczky, P.: Descriptive Geometry I., BUTE
- Pare, E. G.,- Loving, R. O. - Hill, I. L. - Pare, R. C.: Descriptive Geometry, Amazon

Schedule

1st week Registration week	
2nd week:	3rd week:
Practice: Axonometry, perspective; Introduction to multiview projection	**Practice: Introduction to the Monge's method of projecting** Projection of the space-elements (points, lines, segments, planes), Relative position of two straight lines, Special positions of a

	straight line to image planes, Special positions of the planes to the image planes
4th week: **Practice: Points and lines in the plane** Line in a plane, point in a plane First mainline and second mainline in a plane Point in a first/second projecting plane	5th week: **Practice: Intersection of a line with the plane** Intersection of a line with the projecting plane Intersection of a line with the plane (in general position). Visibility
6th week: **Practice: Intersection of two planes** The intersection line of projecting planes The intersection line of planes, if one of them is in projecting position Intersection line of two planes	7th week: **Practice: Method of the replacing image-planes** (transformation of views) Introduction of new image planes, the method of the replacing of an image plane with a new plane
8th week: 1st drawing week	
9th week: **Practice: Metric tasks I. Determining distances and angles of the objects** Distance between two points. Lenght of the line-segment. Distance from a point to a plane. Distance from a point to a line. Angle of inclination of a line to the image-planes. Angle formed by two planes. Perpendicularity	10th week: **Practice: Metric tasks II. Determining distances and angles of the objects** Distance between two parallel lines. Distance between two skew lines. Distance between two parallel planes. Angle formed by two lines.
11th week: **Practice: Intersection of the polyhedrons with lines and planes** Prisms and pyramids	12th week: **Practice: Intersection of two polyhedrons I.** Intersection of prisms and pyramids
13th week: **Practice: Intersection of two polyhedrons II.** Intersection of prisms and pyramids	14th week: **Practice: Curved surfaces** (Cylinders, Cones, Spheres) Intersection of the Curved surfaces with planes. Development of a curved surfaces and intersections, Kochanski's Approximation.
15th week: 2nd drawing week	

Requirements

A, for a signature: Regular attendance (Minimum 70 %). Successful accomplishment of three drawings.

B, for grade: Grades will be a composite of homework (30%), mid-term test (35%), end-term test (35%). The homework will be issued five times in the semester. Minimum requirements to pass the semester: successful accomplishment of the drawings and tests (minimum 50%).

Mechanical Machines and Machine Elements

Subject group: Specific Compulsory Subjects – Faculty of Engineering

Model curriculum number: 19

Code: MK3MGEPG04RX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): Aircraft Technology

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

The series of lectures are based on the topics of mechanics. It reviews the standardised presentation of machine elements and tolerance and fit systems; the set-up of a machine group, the connection of its elements and their operation. In the course students acquire the features of prime mowers, machines; the different types of clutches and couplings; the bearing support of shafts and the most widely applied rolling bearings; different types of frictional and positive connection drives; types of brakes and application fields. In practice, the different machines and machine elements are introduced and the selection of them from brand catalogues: rolling bearings, couplings, belt and pulley, chain and sprocket.

Literature:

Compulsory:

- Ansel Ugural, NEW JERSEY INSTITUTE TECH: Mechanical Design: An Integrated Approach, 1st Edition Hardcover with access card, ©2004, ISBN-13 9780072921854
- Tiba Zsolt: Machine Drawing, Debrecen University Press 2010. ISBN 978-963-318-066-2,

- Tiba Zsolt: Drivetrain Optimization, Lambert Academic Publishing, 2016. (ISBN: 9783659859274)
- Tiba Zsolt: Basic constructions of machine design, Lambert Academic Publishing, 2017. (ISBN: 978-3-330-34649-9)

Recommended:

- Optibelt: Technical Manual V-belt drives

  http://www.optibelt.com/fileadmin/content/pdf/Produkte/EN/Optibelt-TH-v-belt-drives.pdf
- Rexnord: Roller Chains

  http://www.rexnord.com/ContentItems/TechLibrary/Documents/7010_Rexnord-and-Link-Belt-Rollerchains_Catalog-p.aspx
- SKF General Catalogue

  http://www.skf.com/group/knowledgecentre/subscriptions/displayfactbox.html?itemid=tcm:12-121486

Schedule

1st week Registration week	
2nd week: **Lecture:** Tolerance and fit systems **Practice:** Calculation of tolerance types and fits	**3rd week:** **Lecture:** Set-up of a machine group, operation and operation requirements **Practice:** Characteristicsand operation features of prime mowers,machines and precondition of stabile running
4th week: **Lecture:** Linkage mechanisms, types of constraints. Statically determinate, indeterminate and unstable constructions **Practice:** Analyzing linkage mechanisms: suspension systems of vehicles and airplanes.	**5th week:** **Lecture:** Construction details of shafts and its parts, functions. Keyed and splined joints of shafts transmitting the peripheral force. **Practice:** Construction of keyed and splined joints, sizing.
6th week: **Lecture:** Shaft bearing systems. Most widely applied rolling bearings and their features. **Practice:** Introduction of different types of rolling bearings and choosing them from brand catalogue.	**7th week:** **Lecture:** Bearing arrangements. Locating, non-locating bearing arrangement. Cross-located bearing arrangements with adjusted or floating bearings. Selection of ball and roller bearings for service life. **Practice:** Explanation of shaft bearing constructions.

8th week: 1st drawing week	
9th week: **Lecture:** Seals, operation principles. Contacting and non -contacting seals and their application fields. **Practice:** Showing the different types of seals, choosing them from brand catalogues.	**10th week:** **Lecture:** Clutches and couplings. Types, operation features, application fields. **Practice:** Stiff, flexible and universal joints. Introduction in lab and choosing from catalogues.
11th week: **Lecture:** Heat balance of braking. Types of brakes, actuation of them, operation method. **Practice:** Showing brakes. Analyzing the operation of them.	**12th week:** **Lecture:** Types of belt drives, operation features, application fields. **Practice:** Pulley constructions, belt sections, design of belt drive, applying design charts.
13th week: **Lecture:** Types of chain drives, operation features, application fields. **Practice:** Sprocket and chain constructions. Design of chain drive, applying design charts.	**14th week:** **Lecture:** Types of gear drives. Operation and their application fields. **Practice:** Explanations of gear drive constructions. Ratio calculation.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at **lectures** is recommended, but not compulsory.

Participation at **practice classes** is compulsory. Students must attend the practice classes and may not miss more than three classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up any practices with other groups. Attendance at practice classes will be recorded by the practice leader. Being late counts as an absence. In case of more than three absences, a medical certificate needs to be presented. Missed practice classes should be made up for at a later date previously discussed with the tutor.Students are required to bring the drawing tasks and drawing instruments of the course to each practice class. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct does not meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class.

Students have to **submit all the designing tasks** as scheduled minimum at a sufficient level.

During the semester, there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.

B, for a grade:

The course ends in an **examination**. Based on the average of the grades of the designing tasks and the examination, the exam grade is calculated as an average of them:

- the average grade of the two designing tasks
- the result of the examination

The minimum requirement for the mid-term and end-term tests and the examination respectively is 60%. Based on the score of the tests separately, the grade for the tests and the examination is given according to the following table:

Score / Grade

0 - 59 % = fail (1); 60 – 69 % = pass (2); 70 – 79 % = satisfactory (3); 80 - 89 % = good (4); 90 - 100 % = excellent (5)

If the score of any test is below 60, students can take a retake test in conformity with the EDUCATION AND EXAMINATION RULES AND REGULATIONS.

An offered grade: it may be offered for students if the average grade of the designing tasks is at least good (3) and the average of the mid-term and end-term tests is at least good (3). The offered grade is the average of them.

Mechatronic Devices (Sensors, Actuators, Motors)

Subject group: Specific Compulsory Subjects – Faculty of Engineering

Model curriculum number: 24

Code: MK3ERZBR04RX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): Engineering Physics

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Types of sensors, categories of measurable quantities, static characteristics of the sensors. Typical applications of sensor systems. Sensors for high temperature measurement (infrared radiometers, pyrometers). Different level sensors (capacitance, thermal, floating, microwave, rotary paddle, etc.). Different flow sensors (induction, calorimetry, ultrasonic, thermal conductance, electromagnetic, rotameters, etc.). Measurement of kinematic quantities based on different principles: distance, speed, acceleration, vibration. The role of actuators. Types of actuators. Pneumatic actuators, valves, latches

and actuators. Piezoelectric actuators. Contactors and electrical contactors. Midget motors.

Literature:

Compulsory:

- Robert H Bishop, The Mechatronics Handbook, CRC Press, 2007, ISBN 9780849392573 - CAT# 9257

Recommended:

- Sabrie Soloman, Sensors Handbook, Mac-Grow Hill Company, 2010, ISBN : 978-0-07-160571-7, Available on-line at: http://ailab.ijs.si/~blazf/kro/SL/Soloman%20-%20Sensors%20Handbook%202nd%20Edition%20-%202010.pdf

Schedule

1st week Registration week	
2nd week: Lecture: Definition, types of sensors, main error sources of transducers. Practice: Application of ultrasonic distance sensor.	3rd week: Lecture: Static and dynamic sensor characteristics, environmental impacts on characteristics. Practice: Application of pressure sensor.
4th week: Lecture: Position sensors. Practice: Application of color sensors.	5th week: Lecture: Level sensors. Practice: Application of level sensors.
6th week: Lecture: Flowmeters. Practice: Application of temperature and humidity sensors.	7th week: Lecture: High temperature measurement. Practice: Application of gas sensor.
8th week: 1st drawing week	
9th week: Lecture: Chemical sensors: humidity, gas sensor, etc. Practice: Application of light sensors.	10th week: Lecture: Measurement of kinematic quantities. Practice: Application of acceleration sensor.
11th week: Lecture: Force and torque measurement. Practice: Application of vibration sensor.	12th week: Lecture: Role of actuators, types of actuators. Practice: QNET Mechatronics sensor trainer.

13th week: **Lecture:** Electromechanical Actuators: DC Motors, AC Motors, Linear Motors, Stepper Motors, Midget Motors. **Practice:** QNET HVAC trainer.	14th week: **Lecture:** Piezoelectric actuators, magnetostriction actuators, magneto hydrodynamic activators, memory metal actuators. **Practice:** QNET motors trainer.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must attend the practice classes and may not miss more than three classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student cannot make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late counts as an absence. Missed practice classes must be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. The student has to prepare measurement report on every practise and has to submit the reports until deadline.

B, for a grade:

For the mid-semester grade the student has to write two tests. The mid-semester grade is received in scoring system (total 100) by the following:

- 1st test with 40 points
- 2nd test with 40 points
- quality of the measurement reports with 20 points

The mid-semester grade is given according to the following table:

Score	0-59 %	60-69%	70-79 %	80-89 %	90-100 %
Grade	fail (1)	pass (2)	satisfactory (3)	good (4)	excellent (5)

Theoretical Knowledge of Airline Transport Pilot Licence (ATPL) III

Subject group: Specific Compulsory Subjects – ATP(A)

Model curriculum number: 29

Code: MK3TKA3R02HX17-EN

ECTS Credit Points: 2

Evaluation: official exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): Theoretical Knowledge of Airline Transport Pilot Licence (ATPL) II

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 1+1

Topics:

The course (Part I, II and III together) teaches the basic knowledge of Principle of Flight to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

Part II of the course covers the following main areas and give thorough information on:

Controls, high speed aerodynamics, limitations, maneuvering envelope, gust envelope, flight mechanics, forces acting on an airplane, asymmetric thrust

By conducting all Part of the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the complex high speed aerodynamics of aeroplanes.

Learning Objectives (LOs) published by the European Commission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course is aimed to contribute to the achievement of safe flight during their proposed pilot career. It is crucial that a pilot could be able to recognize the hazard and apply for the well-known procedures in this matter during a flight.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Principles of Flight, 2015, ISBN: 978 1 90620 276 7

Schedule

1st week Registration week	
2nd week: **Lecture and practice:** Controls – moments, balancing.	3rd week: **Lecture and practice:** Controls – longitudinal and lateral control
4th week: **Lecture and practice:** Controls – speed brakes, directional control	5th week: **Lecture and practice:** Controls – secondary effects of controls, trimming
6th week: **Lecture and practice:** High speed aerodynamics - speeds	7th week: **Lecture and practice:** High speed aerodynamics - shockwaves

8th week: 1st drawing week	
9th week: Lecture: Lecture and practice: High speed aerodynamics – critical Mach number	10th week: Lecture and practice: High speed aerodynamics – Buffet and buffet margin
11th week: Lecture and practice: Limitations – Manoeuvring envelope	12th week: Lecture and practice: Limitations – Gust envelope
13th week: Lecture and practice: Flight mechanics – forces acting on an aeroplane	14th week: Lecture and practice: Flight mechanics – asymmetric thrust
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

Meteorology II (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 41

Code: MK3MET1R02HX17-EN

ECTS Credit Points: 2

Evaluation: official exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): Meteorology I

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+3

Topics:

The course (Part I and II together) teaches the basic knowledge of Meteorology to demonstrate a level that grants a succesfull authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

Part II of the course covers the following main areas and give thorough information on:

Visibility, icing, air masses and fronts, documentation, weather and wind charts, area route climatology, flight hazards, meteorological information, metars, tafs, warning messages

By conducting both Part of the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the complex knowledge of meteorological conditions, different atmospheric structure and activities.

Learning Objectives (LOs) published by the European Comission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course is aimed to contribute to the achievement of safe flight during their proposed pilot career. It is crucial that a pilot could be able to recognize the hazard and apply for the well-known procedures in this matter during a flight.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Meteorology, 2015, ISBN: 978 1 90620 272 9

Schedule

1st week Registration week	
2nd week: Lecture: Climatology, Climatic zones, General circulation in the troposphere and lower stratosphere, Climatic classification Practice: Climatic classification examples	3rd week: Lecture: Climatology, Tropical climatology, Cause and development of tropical showers and thunderstorms:humidity, temperature, tropopause, Seasonal variations of weather and wind, typical synoptic situations Practice: Intertropical Convergence Zone (ITCZ), general seasonal movement, Monsoon, sandstorms, cold-air outbreaks, Easterly waves
4th week: Lecture: Climatology, Typical weather situations in the mid-latitudes, Westerly situation (westerlies), High-pressure area, Flat-pressure pattern, Cold-air pool (cold-	5th week: Lecture: Flight hazards, Icing, Conditions for ice accretion, Types of ice accretion, Hazards of ice accretion, avoidance, Turbulence, Effects on flight, avoidance,

air drop), Local winds and associated weather **Practice:** Foehn, Mistral, Bora, Scirocco, Ghibli and Khamsin, Harmattan	Clear-Air Turbulence (CAT): effects on flight, avoidance **Practice:** Case study, avoidance techniques
6th week: **Lecture:** Flight hazards, Wind shear, Definition of wind shear, Weather conditions for wind shear, Effects on flight, avoidance **Practice:** Case study, avoidance techniques	**7th week:** **Lecture:** Flight hazards, Thunderstorms, Conditions for and process of development, forecast, location, type specification, Structure of thunderstorms, life history, Electrical discharges, Development and effects of downbursts **Practice:** Thunderstorm avoidance, Tornadoes, Properties and occurrence
8th week: 1st drawing week	
9th week: **Lecture:** Flight hazards, Inversions, Influence on aircraft performance, Stratospheric conditions, Influence on aircraft performance **Practice:** Aircraft performance influence examples	**10th week:** **Lecture:** Flight hazards, Hazards in mountainous areas, Influence of terrain on clouds and precipitation, frontal passage, Vertical movements, mountain waves, wind shear, turbulence, ice accretion, Development and effect of valley inversions, Visibility-reducing phenomena **Practice:** Reduction of visibility caused by precipitation and obscurations, Reduction of visibility caused by other phenomena
11th week: **Lecture:** Meteorological Information, Observation, Surface observations, Radiosonde observations, Satellite observations, Weather-radar observations, Aircraft observations and reporting **Practice:** Airport meteorological center site visit	**12th week:** **Lecture:** Meteorological Information, Weather charts, Significant weather charts, Surface charts, Upper-air charts **Practice:** Charts examples
13th week: **Lecture:** Meteorological Information, Information for flight planning, Aviation weather messages, Meteorological broadcasts for aviation, Use of meteorological documents, Meteorological warnings	**14th week:** **Lecture:** Meteorological Information, Meteorological services, World area forecast system and meteorological offices, International organisations **Practice:** Meteorological offices in operation

Practice: Aviation weather messages examples	

15th week: 2nd drawing week

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

General Navigation (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 46

Code: MK3GENAR04HX17-EN

ECTS Credit Points: 4

Evaluation: official exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 3+4

Topics:

The course teaches the basic knowledge of General Navigation to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

Basics of navigation, magnetism and compasses, charts, dead reckoning navigation, in-flight navigation, direction latitude and longitude, great circles rhumb lines, the vector triangle, topographical maps, pilot navigation, wind components, convergency and conversion angle, departure, scale, charts, general navigation problems, gyroscopes, the direct indicating compass, remote indicating compass, flight management systems, area navigation systems

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the legal background and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), General Navigation, 2015, ISBN: 978 1 90620 273 6

Schedule

1st week Registration week	
2nd week: Lecture: Basics of navigation, The solar system, Earth's orbit, seasons and apparent movement of the sun, The Earth, rhumb line, Convergency, conversion angle, Latitude, difference of latitude, Longitude, difference of longitude Practice: Great circle, small circle, Use of latitude and longitude coordinates to locate any specific position	3rd week: Lecture: Basics of navigation, Time and time conversions, Apparent time, Universal Time Coordinated (UTC), Local Mean Time (LMT), Standard times (STs), Dateline, Determination of sunrise (SR), sunset (SS) and civil twilight Practice: Time conversion examples
4th week: Lecture: Basics of navigation, True north, Terrestrial magnetism: magnetic north, inclination and variation, Compass deviation, compass north, Isogonals, relationship between true and magnetic north, Gridlines, isogrives Practice: True and magnetic north examples	5th week: Lecture: Basics of navigation, Distance, Units of distance and height used in navigation: nautical miles, statute miles, kilometres, metres, feet, Conversion from one unit to another, Relationship between nautical miles and minutes of latitude and minutes of longitude Practice: Distance and height coversion examples
6th week: Lecture: Magnetism and compasses, Knowledge of the principles of the direct-reading (standby) compass, The use of this compass, Serviceability tests, Situations requiring a compass swing Practice: Compass instrument demonstration	7th week: Lecture: Charts, General properties of miscellaneous types of projections, representation of meridians, parallels, great circles and rhumb lines, Direct Mercator, Lambert conformal conic, Polar stereographic Practice: Example on charts, reading
8th week: 1st drawing week	

9th week: **Lecture:** Charts, The use of current aeronautical charts, Plotting positions, Methods of indicating scale and relief, Conventional signs, Measuring tracks and distances, Plotting bearings **Practice:** Example on charts, measuring	10th week: **Lecture:** Dead reckoning (DR) navigation, Basis of dead reckoning, Track, Heading (compass, magnetic, true, grid), Wind velocity, Airspeed (IAS, CAS, TAS, Mach number), Ground speed,ETA, Drift, wind correction angle, Use of the navigational computer,Speed, Time, Distance, Fuel consumption, Conversions, Airspeed, Wind velocity, True altitude, The triangle of velocities **Practice:** Track examples, calculations
11th week: **Lecture:** Dead reckoning (DR) navigation, Determination of DR position, Confirmation of flight progress (DR), Lost procedures, Measurement of DR elements, Calculation of altitude, adjustments, corrections, errors, Determination of temperature, Determination of appropriate speed, Determination of Mach number **Practice:** Calculation examples	12th week: **Lecture:** In-flight navigation, Use of visual observations and application to inflight navigation, Navigation in climb and descent, Average airspeed, Average wind velocity (WV), Ground speed/distance covered during climb or descent, Gradients versus rate of climb/descent **Practice:** Calculation examples
13th week: **Lecture:** In-flight navigation, Navigation in cruising flight, use of fixes to revise navigation data, Off-track corrections, Calculation of wind speed and direction, Estimated Time of Arrival (ETA) revisions **Practice:** Case studies for in-flight navigation	14th week: **Lecture:** In-flight navigation, Flight log **Practice:** Flight log examples
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

4th semester

Economics for Engineers

Subject group: Economics and Humanities – Faculty of Engineering

Model curriculum number: 10

Code: MK3KOZMM04XX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+0

Topics:

Measuring Economic Output and National Income. The Keynesian Theory of consumption. The Government and Fiscal policy. Open Economy. Money market. The aggregate demand and aggregate supply. The labour market. Unemployment. Inflation.

Literature:

Compulsory:

- Mankiw, Gregory: Principles of Economics. Fifth Edition. South-Western, Mason, USA, 2009. ISBN: 9780324589979.
- Mankiw, Gregory (2015): Principles of Economics. Study Guide. Seventh Edition. Cengage Learning, ISBN-13:978-1-285-86421-1.
- Judit T. Kiss (2014): Introduction to Macroeconomics for Engineers and Technical Managers. Debrecen University Press. ISBN: 978-963-318-416-5.

Recommended:

- K. E. Case – R. C. Fair – S. M. Oster (2012): Principles of Macroeconomics, Tenth Edition. Prentice Hall, ISBN 13: 978-0-13-139140-6.
- Samuelson P.A., Nordhaus W.D.: Economics, 18th edition, Academic Internet Publishers Inc., 2006. ISBN: 0072872055
- Parkin, M., Powell, M. & Matthews, K. (2008) Economics. 7th ed. Harlow: AddisonWesley. ISBN-13: 9780132041225
- Parkin, M (2005) Economics, 7th edn, Addision Wersley: Pearson. ISBN: 0321248449.

Schedule

1st week Registration week	
2nd week: **Lecture:** The Scope and Method of Economics Introduction to economics. The method of economics. Microeconomics and Macroeconomics. Models in Economics. Introduction to Macroeconomics. The components of the Macroeconomics. The circular flow Diagram. Market sectors. Calculation/team problems: The circular flow Diagram. Case study examination.	**3rd week:** **Lecture:** Measuring national output and national income (Gross Output, Gross Domestic Product, calculating GDP, real versus nominal GDP, the components of the GDP, the expenditure approach, the income approach, GDP deflator, Gross National Income, and Gross National Disposable income). Measuring the cost of living (GDP and Social Welfare, the Consumer Price Index, GDP deflator versus CPI, real and nominal interest rate). Calculation/team problems: The expenditure approach. The difference between real GDP and nominal GDP. Macroeconomic indicators.
4th week: **Lecture:** Market demand and supply, equilibrium. The Keynesian Theory of consumption, consumption function, marginal propensity to consume, planned investment, saving function, marginal propensity to saving, aggregate output, determination of equilibrium output, the multiplier, IS curve. Calculation/team problems: Market demand and supply, equilibrium. Two sector model.	**5th week:** **Lecture:** The government and fiscal policy. Government purchases, taxes, disposable income, government budget deficit and surpluses, determination of equilibrium output, fiscal policy, the government spending multiplier, the tax multiplier. Average tax rate, tax wedge, and marginal tax rate. Calculation/team problems: Fiscal policy and the equilibrium. Average tax rate, tax wedge, and marginal tax rate.
6th week: **Lecture:** Demand and supply in an open economy. Equilibrium output in an Open Economy, net exports. Imports and exports and Trade Feedback effect. Measurement of openness. Exchange rates. Calculation/team problems: Demand and supply in an open economy. Equilibrium output in an Open Economy, net exports.	**7th week:** **Lecture:** The meaning of money, the functions of money, measuring the supply of money. The creation of money, required reserve ratio. The money multiplier. Open market operations. Fisher effect (nominal and real interest rate). Banking system, Commercial banking. Calculation/team problems: The money multiplier. Fisher effect (nominal and real interest rate).
8th week: 1st drawing week	Mid-Term Test I

9th week: **Lecture:** The demand for money. Supply and demand in the money market. The equilibrium interest rate. The LM curve. The equilibrium price-level.	10th week: **Lecture:** Aggregate demand curve and aggregate supply curve. The effects of a shift in aggregate demand, the Equilibrium. The IS-LM model. Fiscal and monetary policy. Calculation/team problems: The demand for money. Supply and demand in the money market. The equilibrium interest rate.
11th week: **Lecture:** The demand for labour, the supply of labour. The labour force, working-age population, active and inactive population, labour participation rate. Supply curve and demand curve, equilibrium. Calculation/team problems: Examination of the fiscal and monetary policy.	12th week: **Lecture:** Unemployment, the unemployment rate, the activity rate. Types of unemployment (voluntarily and involuntarily unemployment; structural, frictional and cyclical unemployment), Okun law. Social and economic effect. Calculation/team problems: The labour force, working-age population, active and inactive population, labour participation rate.
13th week: **Lecture:** Inflation; (Price level, inflation rate, definition and measuring of inflation, types and causes of inflation, demand-pull inflation and cost-push inflation, The Philips curve: unemployment rate and inflation rate). Calculation/team problems: Supply curve and demand curve, equilibrium. Disequilibrium in the labour market.	14th week: **Lecture:** Growth (sources of economic growth, human capital, education and skills), Economic growth around the World. Sustainable development. Calculation/team problems: demand-pull inflation and cost-push inflation.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late counts as an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

During the semester there are two tests: the mid-term test on the 7th week and the end-term test on the 15th week. Students must sit for the tests.

B, for a grade:

The minimum requirement of the mid-term, the end-term test and the teamwork is 50% separately. Based on the score of the tests separately, the grade for the tests and the examination is given according to the following table:

0-49 %= fail (1); 50-62 % = pass (2); 63-75 % = satisfactory (3); 76-89 % = good (4); 90-100 % = excellent (5)

If the score of any test is below 50%, the student once can take a retake test of the whole semester material.

Materials Engineering

Subject group: Specific Compulsory Subjects – Faculty of Engineering

Model curriculum number: 20

Code: MK3ANISG06RX17-EN

ECTS Credit Points: 6

Evaluation: mid-semester grade

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): Aircraft Technology

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 3+2

Topics:

The aim of the course is to give a basic and useful material science knowledge to our students, through the presentation of special materials and its tangible analysis. Additionally, students can get closer to medical materials, which are currently being developed at a remarkable scale.

Literature:

Compulsory:

- Chawla, Krishan K. Composite Materials Science and Engineering 3rd ed. Springer 2012
- Nicolais, Luigi; Meo, Michele; Milella, Eva: Composite Materials: A Vision for the Future, 2011 Springer Verlag
- C.P. Poole, F.J. Owens: Introduction to nanotechnology, Wiley Interscience, 2003

Schedule

1st week Registration week	
2nd week: **Lecture:** Overview of the groups of engineering materials and presentation of the latest material science results **Practice:** Preparation of a metallographic sample for semester task	3rd week: **Lecture:** Metals I - overview and presentation of metallic alloys **Practice:** Preparation of a metallographic sample for semester task
4th week: **Lecture:** Metals II - manufacturing technology of metals **Practice:** Preparation of a metallographic sample for semester task	5th week: **Lecture:** Metals III – Material testing and qualification **Practice:** Preparation of a metallographic sample for semester task
6th week: **Lecture:** Metals IV – Theoretical background f metal alloys **Practice:** Microscopic analysis to complete the semester task	7th week: **Lecture:** Polymer I - Overview of Industrial Polymers, Production Technology **Practice:** Microscopic analysis to complete the semester task
8th week: 1st drawing week	
9th week: **Lecture:** Polymer II - Certification procedures for industrial polymers, case studies **Practice:** Microscopic analysis to complete the semester task	10th week: **Lecture:** Ceramics I - Overview **Practice:** Microscopic analysis to complete the semester task
11th week: **Lecture:** Ceramics II - Production technology **Practice:** Measurement of toughness toughness and theoretical strength calculation of the ceramic coating of the neural implant.	12th week: **Lecture:** Ceramics III - Qualification procedures **Practice:** Measurement of toughness toughness and theoretical strength calculation of the ceramic coating of the neural implant.
13th week: **Lecture:** Composite materials. **Practice:** Presentation of semester task	14th week: **Lecture:** Special and Biocompatible materials. **Practice:** Microscopic analysis of human implants
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late counts as an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

During the semester there are two tests: the mid-term test is on the 8th week and the end-term test is on the 15th week. Students must sit for the tests.

B, for a grade:

The course ends in a mid-semester grade based on the average grade of the two tests.

The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following table:

Score / Grade

0 - 59 = fail (1); 60 - 69 =pass (2); 70 - 79 =satisfactory (3); 80 - 89 = good (4); 90 - 100 =excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Manufacturing Technologies

Subject group: Specific Compulsory Subjects – Faculty of Engineering

Model curriculum number: 21

Code: MK3GYARG04RX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): Aircraft Technology

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

During this semester, the students learn the types of cutting machines, devices and tools. The students will know the types of basic cutting technologies (turning, drilling, milling, planning, grinding, etc.) and their characteristics. Introduction of the basic industrial

design- and operation documentation procedure in manufacturing. Primary forming processes (casting, powder metallurgy, metallurgical, hot forming processes). After that, students will learn designing basic manufacturing tasks and calculating the necessary technological parameters for a given workpiece.

Literature:

Compulsory:

- Fritz Klocke:*Manufacturing Processes I, Cutting,*RWTH Edition, RWTH Aachen University, p. 524, ISBN 978-3-642-11978-1
- John A. Schey:*Introduction to Manufacturing Processes,*McGraw – Hill Book Company, 1977., p. 392., ISBN 0-07-055274-6
- Prakash M. Dixit, Uday S. Dixit: *Modelling of Metal Forming and Machining Processes,* Springer-Verlag, 2008, ISBN 978-1-84996-749-5
- Heinz Tschaetsch: *Metal Forming Practise: Processes - Machines – Tools,* Springer-Verlag Berlin Heidelberg, 2006., ISBN 978-3-642-06977-2

Recommended:

- James G. Bralla: *Handbook of Manufacturing Processes,* First Edition, Industrial Press Inc., New York, 2007, ISBN 0-831 1-3179-9
- Helmi A. Youssef, Hassan El – Hofy: *Machining Technology, Machine tools and operations,* CRC Press, United States of Amerika, p. 672, ISBN 978-1-4200-4339-6
- J. Beddoes, M. J. Bibby: *Principles of Metal Manufacturing Processes,* 1999, p. 337, ISBN 0 340 73162 1

Schedule

1st week Registration week	
2nd week:	3rd week:
Lecture: The basic definitions of manufacturing processes, the types of machine tools Practice: Introducing of the cutting laboratory and machine tools *(cutting laboratory)*	Lecture: Process of chip formation, tool wear and tool life Practice: Calculation tasks for tool wear and tool life
4th week:	5th week:
Lecture: The process and tools of turning technologies Practice: Designing of turning technology	Lecture: The process and tools of drilling and counterbore technologies Practice: Designing of drilling and counterbore technologies
6th week:	7th week:

Lecture: The process and tools of milling technologies	**Lecture:** The process and tools of grinding technologies
Practice: Designing of milling technologies	**Practice:** Designing of grinding technology
8th week: 1st drawing week : Test I on cutting technologies	
9th week:	**10th week:**
Lecture: History of metal forming. Definitions, advantages of metal forming. Bulk deformation processes. Sheet metal forming processes.	**Lecture:** Properties ofmaterials. Industrial materials. The uniaxial tensile test. Upsetting test.
Practice: The basic studies of technological planning on CNC machines, cutting tool selection.	**Practice:** Basic studies of Computer Aided Manufacturing (CAM). The types of manufacturing systems
11th week:	**12th week:**
Lecture: Classification of manufacturing processes (casting, forming, material removal, joining). Advantages of casting. Casting terminology. Sand casting.	**Lecture:** Classification of different forming processes. Types of rolling. Rolling operations. Equipment of rolling, rolling mills. Thread rolling, ring rolling.
Practice: Planning and finite element simulation of cold rolling technology (SolidWorks and Simufact Forming).	**Practice:** Planning and finite element simulation of cold rolling technology (SolidWorks and Simufact Forming).
13th week:	**14th week:**
Lecture: Classification of forging operations. Types of forging dies. Overview of metal forming of sheet metals. Bending and deep drawing.	**Lecture:** Manufacturing of polymers. Major processes (extrusion, injection molding, blow molding, thermoforming, rotomolding).
Practice: Planning and finite element simulation of die forging technology (SolidWorks and Simufact Forming).	**Practice:** Planning and finite element simulation of die forging technology (SolidWorks and Simufact Forming).
15th week: 2nd drawing week: Test II on metal forming technologies	

Requirements

A, for a signature:

Students have to visit the lectures and seminars. Three absences are acceptable during the seminar. Students have to write two tests from the two parts of the lectures and seminars (cutting technologies and metal forming technologies). They have to write them for minimum at a sufficient level. Based on these result they will get the final practice mark.

B, for a grade:

The course ends in **mid-semester grade**. Based on the average of the marks of the planning task and the average of the test results, the mid-semester grade is calculated as an average of them:

- grade of the planning task
- average grade of the two tests

The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table:

0 - 59 % = fail (1); 60 – 69 % = pass (2); 70 - 79 % = satisfactory (3); 80 - 89 % = good (4); 90 - 100 % = excellent (5)

If the score of any test is below 60, a student once can take a retake test covering the whole semester material.

Technique of Measurement

Subject group: Specific Compulsory Subjects – Faculty of Engineering

Model curriculum number: 22

Code: MK3TEMER04HX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade, measurement report

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): Electrotechnics and Electronics

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Detectors (sensors) and transducers. Grouping the sensors. The measuring device structure and characteristics. Unit of measurement systems. Measurement error. Measurement methods. Electro-mechanical - and electronic instruments. Digital instruments. Microelectronic sensors. Elastic deformation measuring devices. Temperature, light and radiation detectors. Thermocouples, thermometers metal, semiconductor thermometers-; Optical gates-; Capacitive proximity switches-; Ultrasonic sensors-; structure, operating principles and properties. Foil Version strain gauges, semiconductor strain gauges, strain sensor wire, one, two and four-sensor bridge circuit. Fiber optic sensors. Signal processing systems. Pressure, temperature, strain and measurement of rotary motion using National Instruments LabVIEW software.

Literature:

Compulsory:

- Aciatore, David G.: Introduction to mechatronics and measurement systems, Boston, 2007, ISBN:007 125407 2
- Ed. Robert H. Bishop: The Mechatronics Handbook, Section III: Sensors and actuators

Recommended:

- David G. Alciatore, Michael B. Histand: Introduction to mechatronics and measurement systems 1st. McGraw-Hill, 2013. ISBN: 978-0073380230
- U. A. Bakshi – V.U. Bakshi: Electronic Measurement and Instrumentation 1st. Technical Publications Pune, 2009. ISBN: 9788184315295

Schedule

1st week Registration week

2nd week:

Lecture: Basic concepts of measurement. Sensors (sensors) and transducers. The sensors are grouped. The structure and characteristics of the measuring apparatus. Measurement Systems. Measurement errors. Measurement methods. **Practical:** General description about laboratory regulations. Accident prevention and safety education.

3rd week:

Lecture: Theoretical basis of Light electric effect sensors. The photodiode and photovoltaic structure, modes of operation and application. Multi-color LEDs. The structure and characteristics of optical interfaces. The scanner structure and characteristics of CCD sensors.

Practical: Examination of solar cell.

4th week:

Lecture: Types of photo resist and application. The structure and features of a phototransistor. The structure and use of a light pencil. The structure, characterization and application of a liquid crystal display.

Practical: Measurement of LED characteristics.

5th week:

Lecture: Measuring elastic deformation instruments. Piezoelectric and piezoresistive sensors. Elastic deformation measuring instruments. Bellows. Microelectronic capacitive pressure sensors. PN-gradient sensors and the MOSFET structure.

Practical: Measurement of elastic deformation

6th week:

Lecture: Thermoelectric sensors. The operating principles, construction and characteristics of an infrared motion sensor. Thermoelectric transducer coupling, the PVDF film. Thermocouples, semiconductor structure, function and

7th week:

Lecture: An optical gate. Its structure, working principle and characteristics, and application areas.

Practical: Measurement of an optical gate.

features of metal thermometers and other thermometers. **Practical:** Measurement of temperature.	
8th week: 1st drawing week	**Mid-term test**
9th week: **Lecture:** A capacitive proximity switch. Its structure, working principle, characteristics and application areas. **Practical:** Measuring of capacitive proximity switch.	**10th week:** **Lecture:** Ultrasonic sensors. Their structures, working principles, characteristics, and application areas. **Practical:** Measuring of an ultrasonic distance sensor.
11th week: **Lecture:** Strain gages. Foil strain gauges, semiconductor strain gauge, strain sensor wires, one, two and four-sensing bridge circuits. **Practical:** Measuring of strain gages.	**12th week:** **Lecture:** The Reed switch and magneto inductive sensors. Their structures, working principles, characteristics and Application areas. **Practical:** Measuring of reed switch.
13th week: **Lecture:** Description of the main features of the NI LabVIEW software. **Practical:** National Instrumnets with hardware and software. Edit VI. Measuring system construction, Troubleshooting practice	**14th week:** **Lecture:** Structure of the NI data acquisition systems. DAQ connecting to your computer. **Practical:** Recording and evaluation of data measured by National Instruments Hardware
15th week: 2nd drawing week: End-term test	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must attend the practice classes and may not miss more than three classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student cannot make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with absence. Missed practices should be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct does not meet the requirements of active participation, the teacher may evaluate his or her participation as an absence because of the lack of active participation in the class. Students have to submit all the twelve reports as scheduled minimum at a sufficient level. During the semester, there are two tests: the mid-term test is in the 8th week and the end-term test in the 15th week.

B, for grade:

Based on the average of the grades of the reports and the test results, the mid-semester grade is calculated as an average of them: - the average grade of the twelve reports (50 %) - the grade of the tests (50 %). The minimum requirement for end-term test is 60%. Based on the score of the test separately, the grade for the test is given according to the following table:

0-59 % = fail (1); 60-69 % = pass (2); 70-79 % = satisfactory (3); 80-89 % = good (4); 90-100 % = excellent (5)

Aircraft General Knowledge I - Airframe, Systems, Power Plants (ATPL)

Subject group: Specific Compulsory Subjects – ATP(A)

Model curriculum number: 30

Code: MK3AGK1R04HX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+0

Topics:

The course (Part I and II together) teaches the comprehensive knowledge of Aircraft General Knowledge — Airframe/Systems/Powerplant to demonstrate a level that grants a succesfull authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

Part I of the course covers the following main areas and give thorough information on:

System design, loads, stresses and maintenance, airframe, hydraulics, landing gear, wheels, tyres and brakes, flight controls, pneumatics: pressurisation and air conditioning

By conducting both Part of the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the complex technological background, structures, solutions used in airframes, systems and powerplants in aviation.

Learning Objectives (LOs) published by the European Comission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course aims to contribute to the achievement of safe flight during their proposed pilot career. It is crucial for a pilot to be able to recognize hazards during a flight and to apply the right procedures in such cases.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Airframes and Systems, 2015, ISBN: 978 1 90620 265 1
- CAE OXFORD AVIATION ACADEMY (UK), Electrics and electronics, 2015, ISBN: 978 1 90620 266 8
- CAE OXFORD AVIATION ACADEMY (UK),Powerplant,2015, ISBN:978 1 90620 267 5

Schedule

1st week Registration week	
2nd week: Lecture and practice: Fuselage, wings and stabilizing surfaces	3rd week: Lecture and practice: Landing gear
4th week: Lecture and practice: Aircraft wheels, tyres, brakes	5th week: Lecture and practice: Basic hydraulics
6th week: Piston engines – General, lubrication, cooling Lecture and practice: Piston engines – Icing, fuel injection, performance, propellers	7th week: Piston engines – Ignition, fuel, Mixture, carburettors Lecture and practice: DC electrics – Basics, switches, circuit protection, capacitros
8th week: 1st drawing week	
9th week: DC electrics – Batteries, magnetism, generators, alternators	10th week: DC motors, aircraft electrical power systems, screening
11th week: Pneumatic system	12th week: Pressurization
13th week: Oxygen system	14th week: Smoke detection, fire detection and protection
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor.

Aircraft General Knowledge – Instrumentation (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 32

Code: MK3AGKIR04HX17-EN

ECTS Credit Points: 4

Evaluation: official exam

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 4+3

Topics:

The course teaches the basic knowledge of Aircraft General Knowledge — Instrumentation to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

Sensors and instruments, measurement of air data parameters , magnetism: direct reading compass and flux valve, gyroscopic instruments, inertial navigation and reference systems, aeroplane: automatic flight control systems, trims, yaw damper and flight envelope protection, autothrottle: automatic thrust control system, communication systems, fms, alerting systems and proximity systems, integrated instruments: electronic displays, maintenance, monitoring and recording systems, digital circuits and computers

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the complex knowledge of instrumentation used in general and professional aviation by simple, complex and jet airplanes.

Learning Objectives (LOs) published by the European Comission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course is aimed to contribute to the achievement of safe flight during their proposed pilot career. It is crucial that a pilot could be able to recognize the hazard and apply for the well-known procedures in this matter during a flight.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Instrumentation, 2015, ISBN: 978 1 90620 268 2

Schedule

1st week Registration week	
2nd week: **Lecture:** Sensors and instruments, Pressure gauge, Temperature sensing, Fuel gauge, Fuel flowmeters, Tachometer, Thrust measurement, Engine torquemeter, Synchroscope,Engine-vibration monitoring, Time measurement **Practice:** Lab demonstration	**3rd week:** **Lecture:** Measurement of air-data parameters, Pressure measurement, Definitions, Pitot/static system: design and errors, Temperature measurement, Angle-of-attack measurement, Altimeter, Vertical Speed Indicator (VSI), Airspeed Indicator (ASI), Machmeter, Air-Data Computer (ADC) **Practice:** Site visit, aircraft demonstration
4th week: **Lecture:** Magnetism – direct-reading compass and flux valve, Earth's magnetic field, Aircraft magnetic field, Direct-reading magnetic compass, Flux valve **Practice:** Magnetism examples	**5th week:** **Lecture:** Gyroscopic instruments, Gyroscope: basic principles, Rate-of-turn indicator — Turn coordinator — Balance (slip) indicator, Attitude indicator (artificial horizon), Directional gyroscope, Remote-reading compass systems **Practice:** Lab demonstration
6th week: **Lecture:** Inertial navigation and reference systems (INS AND IRS), Inertial Navigation Systems (INS), Inertial Reference Systems (IRS), Basic principles, Design, Errors, accuracy, Operation, (strappeddown) **Practice:** System presentation	**7th week:** **Lecture:** Aeroplane: automatic flight control systems, General: Definitions and control loops, Autopilot system: design and operation, Flight Director: design and operation, Aeroplane: Flight Mode Annunciator (FMA), Autoland: design and operation **Practice:** Site visit, simulator demonstration
8th week: 1st drawing week	
9th week: **Lecture:** Trims-Yaw Damper — Flight-envelope protection, Trim systems: design and operation, Yaw damper: design and operation, Flight-Envelope Protection (FEP) **Practice:** Operations example	**10th week:** **Lecture:** Auto-Throttle-Automatic thrust control system, operation of an AT system, take-off/go-around;, climb or Maximum Continuous Thrust (MCT): N1 or EPR targeted; speed;, idle thrust; landing, control loop of an AT system **Practice:** Site visit, simulator demonstration
11th week: **Lecture:** Communication systems, Voice communication, data link transmission, Definitions and transmission modes, Future	**12th week:** **Lecture:** Alerting systems, Proximity systems, General, Flight Warning Systems (FWS), Stall Warning Systems (SWS), Stall

Air Navigation Systems (FANS), Flight Management System (FMS), Navigation database, aircraft database, Operations, limitations, Man–machine interface (Multifunction Control Display Unit (MCDU)) **Practice:** Site visit, simulator demonstration	protection, Ground-proximity warning systems (GPWS), Terrain-Avoidance Warning System (TAWS), Enhanced GPWS (EGPWS), ACAS/TCAS **Practice:** Case studies
13th week: **Lecture:** Integrated instruments — Electronic displays, Electronic display units, Mechanical integrated instruments: Attitude and Director Indicator (ADI)/Horizontal Situation Indicator (HSI), Electronic Flight Instrument Systems (EFIS), Primary Flight Display (PFD), Electronic Attitude Director Indicator (EADI), Navigation Display (ND), Electronic Flight Bag (EFB) **Practice:** Site visit, simulator demonstration	**14th week:** **Lecture:** Maintenance, Monitoring and recording systems, Cockpit Voice Recorder (CVR), Flight Data Recorders (FDR), Maintenance and monitoring systems, Integrated Health & Usage Monitoring System (IHUMS), Aeroplane Condition Monitoring System (ACMS) **Practice:** Case studies

15th week: 2nd drawing week

Requirements

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

Radionavigation (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 47

Code: MK3RANAR04HX17-EN

ECTS Credit Points: 4

Evaluation: official exam

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 4+4

Topics:

The course teaches the basic knowledge of Radio Navigation to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

Basic radio propagation theory, radio aids, radar, doppler radar, VDF, NBD and ADF, VOR, ILS, MLS, ground ATC radar, airborne weather radar, secondary surveillance radar, DME area navigation systems and RNAV or FMS, GNSS

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the legal background and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Radio Navigation, 2015, ISBN: 978 1 90620 274 3

Schedule

1st week Registration week	
2nd week: **Lecture:** Basic radio propegation theory, Basic principles, Electromagnetic waves, Frequency, wavelength, amplitude, phase angle, Frequency bands, sidebands, Pulse characteristics, Carrier, modulation, Kinds of modulation (amplitude, frequency, pulse, phase) **Practice:** Lab demonstration	3rd week: **Lecture:** Radio aids, Ground D/F, Non-Directional Beacon (NDB)/ Automatic Direction Finder (ADF), Principles, Presentation and interpretation, Coverage and range, Errors and accuracy, Factors affecting range and accuracy **Practice:** Site visit, NDB/ADF demonstration
4th week: **Lecture:** Radio aids, VOR and Doppler VOR, DME, Landing System (MLS), Principles,Presentation and interpretation, Coverage and range, Error and accuracy, Factors affecting range and accuracy **Practice:** Site visit, DME demonstration	5th week: **Lecture:** Basic radio propegation theory, Antennas, Characteristics, Polarisation, Types of antennas, Wave propagation, Structure of the ionosphere, Ground waves, Propagation with the frequency bands, Doppler principle, Factors affecting propagation **Practice:** Lab demonstration
6th week:	7th week:

Lecture: Radar, Pulse techniques and associated terms, Ground radar, Principles **Practice:** Presentation and interpretation	**Lecture:** Radar, Airborne weather radar, Principles, Secondary surveillance radar and transponder, Principles, Modes and codes, , Errors and accuracy **Practice:** Presentation and interpretation
8th week: 1st drawing week	
9th week: **Lecture:** Area navigation systems, General philosophy and definitions, Basic RNAV (B-RNAV), Precision RNAV (P-RNAV), RNP-PNAV, Principles of 2D RNAV, 3D RNAV and 4D RNAV, Required Navigation Performance (RNP) in accordance with ICAO Doc 9613 **Practice:** RNAV examples	**10th week:** **Lecture:** Area navigation systems, Simple 2D RNAV, Flight-deck equipment, Navigation computer, VOR/DME navigation, Navigation computer input/output, 4D RNAV, Flight-deck equipment, Navigation computer, VOR/DME navigation, Navigation computer input/output **Practice:** Site visit, Flight deck demonstration
11th week: **Lecture:** Area navigation systems, Flight Management System (FMS) and general terms, Navigation and flight management, Flight management computer, Navigation database, Performance database, Typical input/output data from the FMC, Determination of the FMS position of the aircraft **Practice:** Site visit, Flight deck demonstration	**12th week:** **Lecture:** Area navigation systems, Typical flight-deck equipment fitted on FMS aircraft, Control and Display Unit (CDU), EFIS instruments (attitude display, navigation display), Typical modes of the navigation display, Typical information on the navigation display **Practice:** Site visit, Flight deck demonstration
13th week: **Lecture:** Global navigation satellite systems, GPS, GLONASS, GALILEO, Principles, Operation NAVSTAR GPS, GLONASS, Errors and factors affecting accuracy **Practice:** System presentation	**14th week:** **Lecture:** Global navigation satellite systems, Ground, satellite and airborne-based augmentation, systems, Ground-Based Augmentation Systems (GBAS), Satellite-Based Augmentation Systems (SBAS), European Geostationary Navigation Overlay Service (EGNOS), Airborne-Based Augmentation Systems (ABAS) **Practice:** System presentation
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

Communication IFR (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 50

Code: MK3COMMR02HX17-EN

ECTS Credit Points: 1

Evaluation: official exam

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 1+0

Topics:

The course teaches the basic knowledge of Communication IFR to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

General operating procedures, relevant weather information terms (IFR), action required to be taken in case of communication failure, distress and urgency procedures, general principles of VHF propagation and allocation of frequencies, morse code

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the legal background and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Communications, 2015, ISBN: 978 1 90620 277 4

Schedule

1st week Registration week	
2nd week:	3rdweek:
Lecture:	Lecture:
IFR COMMUNICATIONS, CONCEPTS	IFR COMMUNICATIONS, CONCEPTS
Associated terms:	*Associated terms*:
Meanings and significance	Q-code groups commonly used in radiotelephony (RT) air – ground communications,
Air Traffic Services abbreviations,	Categories of messages
Practice: practical examples	Practice: practical examples
4th week:	5th week:
Lecture:	Lecture:
IFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES	IFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES
Transmission standards:	*Transmission standards*:
Transmission of letters	Transmission techniques
Transmission of numbers	Standard words and phrases (relevant RTF phraseology included)
Transmission of time	Practice: practical examples
Practice: practical examples	
6th week:	7th week:
Lecture:	Lecture:
IFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES	IFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES
Transmission standards:	*Transmission standards*:
RT call signs for aeronautical stations including use of abbreviated call signs	RT call signs for aircraft including use of abbreviated call signs
Practice: practical examples	Transfer of communication
	Test procedures including readability scale
	Practice: practical examples
8th week: 1st drawing week	
9th week:	10th week:

Lecture:	**Lecture:**
IFR COMMUNICATIONS, GENERAL OPERATING PROCEDURES	IFR COMMUNICATIONS, RELEVANT WEATHER INFORMATION
Transmission standards:	*Aerodrome weather*:
Read-back and acknowledgement requirements	Aerodrome weather terms,
Radar procedural phraseology	Weather broadcast
Level changes and reports	**Practice:** practical examples
Data link messages	
Practice: practical examples	
11th week:	**12th week:**
Lecture:	**Lecture:**
IFR COMMUNICATIONS, VOICE COMMUNICATION FAILURE	IFR COMMUNICATIONS, DISTRESS AND URGENCY PROCEDURES
Required action:	*Signals and procedures*:
Action required to be taken in case of communication failure	Distress
Practice: practical examples	Urgency
	Practice: practical examples
13th week:	**14th week:**
Lecture:	**Lecture:**
IFR COMMUNICATIONS, VHF PROPAGATION AND ALLOCATION OF FREQUENCIES	IFR COMMUNICATIONS, OTHER COMMUNICATIONS
General Principles:	*Weather observations, Morse code*:
Spectrum, bands, range	Meteorological observations, Use of Morse code
Practice: practical examples	**Practice:** practical examples
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

5th semester

Microeconomics and Economical Processes of Enterprises

Subject group: Economics and Humanities – Faculty of Engineering

Model curriculum number: 11

Code: MK3MIKVM04XX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 3rd year, 1st semester

Its prerequisite(s): Economics for Engineers

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 1+2

Topics:

Basic concepts of Economics and Microeconomics. Consumers Preferences and the Concept of Utility. Consumer's demand, types of elasticity of demand. Examination of Firm Behaviour. Production and cost theory. Perfectly competitive markets. Imperfect competition and market structures. Strategic behaviour at the market.

Literature:

Compulsory:

- Besanko, David – Breautigam, Ronald R. (2014): Microeconomics. Fifth Edition (International Student version). John Wiley and Sons, Inc., New York. ISBN: 978-1-118-71638-0
- Besanko, David – Breautigam, Ronald R.: Microeconomics. Study Guide. Third Edition. John Wiley and Sons, Inc., New York, 2008.
- Judit T. Kiss (2015): Introduction to Microeconomics for Engineers and Technical Managers. Debrecen University Press. ISBN: 978-963-318-469-1.
- or
- N. Gregory Mankiw – Mark P. Taylor (2011): Microeconomics, 2nd edition. South-Western Cenagage Lerrning.
- Gregory Mankiw (2006): Principles of Microeconomics - Study Guide. South-Western College Pub.
- Nellis, J. G. – Parker, D. (2006): Principles of Business Economics. Pearson Education, 2006. 2nd edition. ISBN: 0273693069, 9780273693062.

Recommended:

- Samuelson P.A., Nordhaus W.D.: Economics, 18th edition, Academic Internet Publishers Inc., 2006. ISBN: 0072872055
- Parkin, M., Powell, M. & Matthews, K. (2008) Economics. 7th ed. Harlow: Addison Wesley. ISBN-13: 9780132041225

Schedule

1st week Registration week

2nd week:

Lecture: Microeconomics and Macroeconomics, models in Economics. Resources. Key analytical tools. Efficiency. Market mechanism, Demand and supply analysis. Demand curves, Supply curves; shift in demand and supply.

Practice: Calculation/team problems: equilibrium price and quantity; market demand and individual demand; shifts versus movements along the demand curve (supply curve); market supply and individual supply; shifts versus movements along the supply curve.

3rd week:

Lecture: Consumer theory, consumer preferences, Utility theory. Cardinal ranking. Total utility, marginal utility. Principle of diminishing marginal utility. Utility and demand. Individual and market demand functions. Consumer surplus. Condition of optimal choice.

Practice: Calculation/team problems: Relationship between utility and demand. Individual and market demand functions. Consumer surplus

4th week:

Lecture: Demand and supply together, market equilibrium. The elasticity of demand (price elasticity of demand, cross price elasticity of demand, income elasticity of demand). The elasticity of supply. Total revenue and the price elasticity of demand. Application of elasticity of demand. Energy and price elasticity. Types of goods (substitutes, complements, independents).

Practice: Calculation/team problems: Calculation of elasticity of demand, relationship between price elasticity of demand and total revenue.

5th week:

Lecture: Business organizational structures. Business objectives. Types of corporation, forms of business. Market environment (domestic, international environment, markets of products, services and labour). Models of the firm's pricing decisions, costs estimation and decision. Sources of Cost efficiency. Business performance, business strategy.

Practice: Calculation/team problems and case study examination: Firm's pricing decisions, costs estimation and decision. Sources of Cost efficiency.

6th week:

Lecture: Production. Inputs and production function. Total product function. Marginal product of labour and average product of labour.

7th week:

Lecture: Costs of production. (Total, fixed and variable costs, marginal and variable cost). The relationship between marginal and average cost. Total revenue, total profit curves. Calculating problems (types of cost,

Practice: Calculation/team problems: Average product of labour (capital), marginal product of labour (capital), relationship between marginal product and average product.	relationship between cost and profit. opportunity cost). **Practice:** Calculation/team problems: Total, fixed and variable costs; marginal and average costs. The relationship between marginal cost and average cost.
8th week: 1st drawing week	
9th week: **Lecture:** Main characteristics of perfect competition, marginal cost, average costs of production, profit-maximizing output, shut down and breakeven point, the competitive firm's supply curve. Calculating problems (marginal average, total revenue, average and marginal profit, profit-maximizing output, marginal cost curve and supply curve). **Practice:** Mid-Term Test I	**10th week:** **Lecture:** Individual and market supply curve, main condition of the profit maximization and cost minimization, Cost-benefit analysis, economical examinations. **Practice:** Calculation/team problems: Profit maximization condition for competitive market.
11th week: **Lecture:** Why Monopoly arise, Monopoly (the profit-maximization condition; average revenue, marginal revenue, total revenue curves). Problems (calculation of the profit-maximization output and price. Relationship between marginal revenue and linear demand curve). **Practice:** Calculation/team problems: Profit maximization condition for monopoly.	**12th week:** **Lecture:** *Capturing surplus – Price discrimination* First-degree price discrimination, second-degree price discrimination and third- degree price discrimination. Consumer surplus, producer surplus, deadweight loss. The welfare cost of Monopoly. **Practice:** Calculation/team problems: Monopoly versus perfect competition. Producer surplus and deadweight loss.
13th week: **Lecture:** Main characteristics of oligopoly and monopolistic competition. Markets with a few sellers, product differentiation. **Practice:** Calculation/team problems: Oligopoly market behaviour.	**14th week:** **Lecture:** *The markets for the factors of production*. Taxes and efficiency. Earnings and discrimination. Game theory. **Practice:** Calculation/team problems: Monopoly, Oligopoly and perfect competition. Taxes and efficiency.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late counts as an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

During the semester, there are two tests: the mid-term test on the 7th week and the end-term test on the 15th week. Students must sit for the tests.

B, for a grade (ESE):

The minimum requirement of the mid-term, the end-term test and the teamwork is 50% separately. Based on the score of the tests separately, the grade for the tests and the examination is given according to the following table:

0-49 % = fail (1); 50-62 % = pass (2); 63-75 % = satisfactory (3); 76-89 % = good (4); 90-100 % = excellent (5)

If the score of any test is below 50%, the student once can take a retake test of the whole semester material.

Quality and Technical Management

Subject group: Economics and Humanities – Faculty of Engineering

Model curriculum number: 12

Code: MK3MINMM04XX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 3rd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 1+2

Topics:

The aim of the course is to provide students with a comprehensive picture of an organization's operations and the associated management and organizational roles and tasks. The aim of the course is to give students the opportunity to share with the company's quality management techniques, the application of which in the European Union, as well as in Hungary, is an essential element of market competitiveness.

Literature:

Compulsory:

- Nick Milton, Patrick Lambe: The Knowledge Manager's Handbook, Kogen Page, London, 2016
- Ranulfo P. Payos, Ernesto G. Espinosa, Orlando S. Zorilla: Organization and Management, K12, 2016
- Ramani S: Improving Business Performance: A Project Portfolio Management Approach, CRC Press, 2016

Schedule

1st week Registration week	
2nd week: Lecture: Basics of Quality management Practice: Analyze examples	3rd week: Lecture: The role of quality management in the industry Practice: PDCA project
4th week: Lecture: Process Management Practice: Create a flowchart	5th week: Lecture: Quality Planning Practice: Developing a Quality Plan
6th week: Lecture: Quality Management Methods I Practice: Ishikawa, Pareto Analysis, 5W	7th week: Lecture: Quality Management Methods II Practice: QFD, Kano model, 5s, 8D report
8th week: 1st drawing week	
9th week: Lecture: Engineering management Practice: Case study	10th week: Lecture: Company and its surroundings Practice: SWOT, Pestle analyzes
11th week: Lecture: Management functions, manager roles, tasks Practice: Situational tasks	12th week: Lecture: Organization Theory Practice: Process Development, Project Management
13th week: Lecture: Human Resource Management Practice: Recruitment, selection, work planning	14th week: Lecture: Innovation Management Practice: Business Plan
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at lectures is compulsory. Students must attend lectures and may not miss more than three of them during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded by the lecturer. Being late counts as an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor.

Students have to write two midterm tests during the semester. The first (40 points max) in the 8th, the second (40 points max) in the 14th week. At the end of the semester everybody will get a seminar grade on the basis of the table below:

0-39 = Fail (1); 40-50 = Close fail (2); 51-60 = Improvement needed (3); 61-70 = Very good (4); 71-80 = Excellent (5)

If somebody fails then he has to write both tests in the 1st week of the exam period again. If the result is 40 points (50%) or better, then he can take an exam. If somebody has to repeat his midterm tests then his seminar grade cannot be better than (2).

There will be homework from week to week. Only students who have handed in all their homework at the time of the midterm test will be allowed to write it. The problems in the midterm tests will be selected from the homework assignments.

B, for a grade:

Everybody will get an exam grade for their exam. The final grade will be the average of the seminar and exam grade. If it is for example (3.5) then the lecturer decides if it is (3) or (4).

Environmental Protection and Dangerous Goods

Subject group: Economics and Humanities – Faculty of Engineering

Model curriculum number: 13

Code: MK3EPDGK04RX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 3rd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 0+2

Topics:

According to the environment protection part of subject, the most important topics of environmental protection are introduced to the students. It includes the general

knowledges and global issues of environmental protection and managements: air quality, water protection, soil protection, noise protection, and waste management side topics.

The environmental issues of air transport. Environmental policies of International Civil Aviation Organization (ICAO) and International Air Transport Association (IATA). IATA goals to assist airlines in improving their environmental performance: alternative fuels, carbon offset program, environmental assessment, fuel and emission data, cargo sustainability.

Dangerous goods: It involves the basics of safety and transportation of dangerous goods (basics of dangerous goods, hazard and handling labels, etc.) ICAO Dangerous Panel and Dangerous Goods Regulations (DGR) of IATA: global reference for shipping dangerous goods by air, shipment features and documentation.

Literature:

Recommended:

- Gilbert M. Masters, Wendell P. Ela: Introduction to Environmental Engineering and Science, Pearson New International Edition, 3/E, Pearson, 2013, ISBN:9781292025759
- Jerry A. Nathanson, Richard A. Schneider: Basic Environmental Technology, Pearson, 2015, ISBN:978-0-13-284014-9
- ICAO, IATA standards, manuals, and guidelines

Schedule

1st week Registration week	
2nd week: Basics of Environmental Protection and Environmental Management Practice: Introduction to environmental protection; Global issues on environmental protection, the environmental issues of air transport	3rd week: Air Quality and Air Quality Control Practice: Basics of air pollution control, processes in the atmosphere, greenhouse gases, ozone layer, smog, acid rain
4th week: Water and Soil Protection Practice:Water protection and quality, pollutants Protection of soil quality	5th week: Environmental Noise, Waste Management Practice: The basics of environmental noise, measuring devices and techniques Waste management, possibilities, disposal, techniques and hazardous waste
6th week: The environmental issues of air transport Practice: Environmental policies of International Civil Aviation Organization (ICAO).	7th week: The environmental issues of air transport Practice: Environmental policies of International Air Transport Association (IATA)
8th week: 1st drawing week	

9th week: Air transport safety and security **Practice:** Main goals of air transport safety and security	**10th week:** Transportation of dangerous goods **Practice:** Transportation of dangerous goods (basics of dangerous goods, hazard and handling labels, etc.)
11th week: Transportation of dangerous goods **Practice:** DG shipment features and documentation	**12th week:** Transportation of dangerous goods **Practice:** ICAO Dangerous Panel
13th week: Transportation of dangerous goods **Practice:** IATADangerous Goods Regulations (DGR)	**14th week:** Mid-semester TEST
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance to the practices (absence up to the permissible level)

B, for grade:

The final grade will be the average of the tests. Each test hast to be at least 50%.

Aircraft General Knowledge II - Airframe, Systems, Power Plants (ATPL)

Subject group: Specific Compulsory Subjects – ATP(A)

Model curriculum number: 31

Code: MK3AGK2R04HX17-EN

ECTS Credit Points: 4

Evaluation: official exam

Year, Semester: 3rd year, 1st semester

Its prerequisite(s): Aircraft General Knowledge I - Airframe, Systems, Power Plants (ATPL)

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 5+0

Topics:

The course (Part I and II together) teaches the comprehensive knowledge of Aircraft General Knowledge — Airframe/Systems/Powerplant to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

Part II of the course covers the following main areas and give thorough information on:

Anti and de-icing systems, fuel system, smoke and fire protection and detection systems, AC electrics, switches, generators and alternators, aircraft electric power system, turbine engines, air inlets, compressors, combustion chambers, exhaust, thrust, auxiliary power units, bleed air.

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the complex technological background, structures, solutions used in airframes, systems and powerplants in aviation.

Learning Objectives (LOs) published by the European Comission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course is aimed to contribute to the achievement of safe flight during their proposed pilot career. It is crucial that a pilot could be able to recognize the hazard and apply for the well-known procedures in this matter during a flight.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Airframes and Systems, 2015, ISBN: 978 1 90620 265 1
- CAE OXFORD AVIATION ACADEMY (UK), Electrics and electronics, 2015, ISBN: 978 1 90620 266 8
- CAE OXFORD AVIATION ACADEMY (UK),Powerplant,2015, ISBN:978 1 90620 267 5

Schedule

1st week Registration week	
2nd week: Lecture and practice: Flight control systems	3rd week: Lecture and practice: Flight controls
4th week: Lecture and practice: Powered flying controls	5th week: Lecture and practice: Ice and rain protection
6th week: Lecture and practice: Fuel systems	7th week: Lecture and practice: AC electrics – Basics, alternators
8th week: 1st drawing week	
9th week:	10th week:

Lecture and practice: AC electrics – Aircraft systems, transformers	**Lecture and practice:** AC electrics – AC motors, semiconductors, logic gates
11th week:	**12th week:**
Lecture and practice: Gas turbines – Basic principles	**Lecture and practice:** Gas turbines – Main engine components
13th week:	**14th week:**
Lecture and practice: Gas turbines – Additional components and systems	**Lecture and practice:** Gas turbines – Engine operation and monitoring
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

Air Law (ATPL)

Subject group: Specific Compulsory Subjects – ATP(A)

Model curriculum number: 33

Code: MK3AIRLR04HX17-EN

ECTS Credit Points: 4

Evaluation: official exam

Year, Semester: 3rd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 3+0

Topics:

The course teaches the comprehensive knowledge of Air Law to demonstrate a level that grants a succesfull authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on: rules of the air, procedures for air navigation services: aircraft operations, air traffic services and air

traffic management, aeronautical information service, aerodromes or heliports, facilitation, search and rescue, security, aircraft accident and incident investigation, international law: conventions, agreements and organisations, airworthiness of aircraft, aircraft nationality and registration marks, personnel licensing

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the legal background and basis of aviation, learn the structure and sources of the rules.

Learning Objectives (LOs) published by the European Comission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course aims to contribute to the achievement of safe flight during their proposed pilot career. It is crucial for a pilot to be able to recognize hazards during a flight and to apply the right procedures in such cases.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Air Law, 2015, ISBN: 978 1 90620 264 4

Schedule

1st week Registration week	
2nd week: Lecture and practice: International Law: conventions, agreements and organisations	3rd week: Lecture and practice: Airworthiness of aircraft, aircraft nationality and registration marks
4th week: Lecture and practice: Personnel licencing	5th week: Lecture and practice: Rules of the air
6th week: Lecture and practice: Procedures for air navigation services – aircraft operations	7th week: Lecture and practice: Air traffic services and air traffic management – ICAO Annex 11 – Air traffic services
8th week: 1st drawing week	
9th week: Lecture and practice: Air traffic services and air traffic management – ICAO Doc 4444 – Air Traffic Management	10th week: Lecture and practice: Aeronautical Information service
11th week: Lecture and practice: Aerodromes – General, physical characteristics, aerodrome design	12th week: Lecture and practice: Aerodromes – Visual aids for navigation, aerodrome operations

13th week: **Lecture and practice:** Aerodromes – facilitation	14th week: **Lecture and practice:** Aerodromes –Search and rescue, Security

15th week: 2nd drawing week

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

Flight Planning and Monitoring (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 45

Code: MK3FLPMR03HX17-EN

ECTS Credit Points: 3

Evaluation: official exam

Year, Semester: 3rd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 4+2

Topics:

The course teaches the basic knowledge of Flight Planning and Monitoring to demonstrate a level that grants a succesfull authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

Air information publications, topographical chart, weather chartsflight planning for VFR flights, flight planning for IFR flights, fuel planning, pre-flight preparation, ATS flight plan, flight monitoring and in-flight re-planning, point of no safe return, critical point gp-equal time point

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the legal bacnground and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), FlightPlanning and Monitoring, 2015, ISBN: 978 1 90620 270 5

Schedule

1st week Registration week	
2nd week: Lecture: Flight planning for VFR flights, VFR navigation plan, Routes, airfields, heights and altitudes from VFR charts, Courses and distances from VFR charts Practice: VFR planning examples	3rd week: Lecture: : Flight planning for VFR flights, Aerodrome charts and aerodrome directory, Communications and radio-navigation planning data Practice: Completion of navigation plan VFR flights
4th week: Lecture: : Flight planning for IFR flights, IFR navigation plan, Airways and routes, Courses and distances from en route charts, Altitudes, Standard Instrument Departures (SIDs) and Standard Arrival Routes (STARs) Practice: IFR planning examples	5th week: Lecture: Flight planning for IFR flights, IFR navigation plan, Instrument-approach charts, Communications and radio-navigation planning data Practice: Completion of navigation plan IFR flights
6th week: Lecture: Fuel planning, General, Pre-flight fuel planning for commercial flights, Taxiing fuel, Trip fuel, Reserve fuel and its components, Extra fuel, Calculation of total fuel and completion of the fuel section of the navigation plan (fuel log) Practice: Fuel calculation examples	7th week: Lecture: Fuel planning, Specific fuel-calculation procedures, Decision-point procedure, Isolated-aerodrome procedure, Predetermined point procedure, Fuel-tankering, Isolated-heliport procedure Practice: Procedure examples, case studies
8th week: 1st drawing week	
9th week: Lecture: Pre-flight preparation, NOTAM briefing, Ground facilities and services, Departure, destination and alternate	10th week: Lecture: Pre-flight preparation, Meteorological briefing, Extraction and analysis of relevant data from meteorological documents, Extraction and

aerodromes, Airway routings and airspace structure **Practice:** NOTAM examples, case studies	analysis of relevant data from meteorological documents, Update of navigation plan using the latest meteorological information, Update of mass and balance, performance data, fuel log **Practice:** Meteorological briefing examples, case studies
11th week: **Lecture:** Pre-flight preparation, Point of Equal Time (PET) and Point of Safe Return (PSR), Point of Equal Time (PET), Point of Safe Return (PSR) **Practice:** Team work, case presentation	**12th week:** **Lecture:** ICAO flight plan (ATS Flight Plan), Individual Flight Plan, Format of Flight Plan, Completion of an ATS Flight Plan (FPL), Repetitive Flight Plan, Submission of an ATS Flight Plan (FPL) **Practice:** Airport Tower visit, Flight Plan examples
13th week: **Lecture:** Flight monitoring and in-flight replanning, Flight monitoring, Monitoring of track and time, In-flight fuel management, Monitoring of primary flight parameters, In-flight replanning in case of deviation from planned data **Practice:** Case studies	**14th week:** **Lecture:** Flight monitoring and in-flight replanning II, Flight monitoring, In-flight replanning in case of deviation from planned data **Practice:** Case studies
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.**B, for grade:**

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

6th semester

Environment, Health, Safety and Ergonomics (Basics of EHS)

Subject group: Specific Compulsory Subjects – Faculty of Engineering

Model curriculum number: 23

Code: MK3EHSAK04RX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 3rd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

The subject covers three main topics:

Environment (E): The most important topics related to environmental protection are introduced to students. The subject includes air quality, noise protection, water protection, soil protection, and waste management side topics.

Health (H): The basic concepts of labor and health are discussed. The impact of work on health and the health impact on working ability is also a side topic. The fundamentals of occupational health and work hygiene are also involved.

Safety (S): It involves the basics of labor safety and fire protection. The lectures discuss the personal, material and organizational requirements for safe work, ergonomic fundamentals, personal protective equipment, work safety reviews, employer checks, and workplace risk assessment. Industrial safety and security is also a side topic.

The lectures introduce the most important aspects and the practices focus on examples and plant visits.

Literature:

Recommended:

- Gilbert M. Masters, Wendell P. Ela: Introduction to Environmental Engineering and Science, Pearson New International Edition, 3/E, Pearson, 2013, ISBN:9781292025759
- David L. Goetsch, Occupational Safety and Health for Technologists, Engineers, and Managers, 8th Edition, Pearson, 2015, ISBN:9780133484175
- Richard T. Wright, Environmental Science, Pearson, 2017, ISBN:9780134011271

Schedule

1st week Registration week	
2nd week: Basics of Environmental Protection and Environmental Management **Lecture:** Introduction to environmental protection **Practice:** Global issues on environmental protection	3rd week: Air Quality Control **Lecture:** Basics of air pollution control, processes in the atmosphere, greenhouse gases, ozone layer, smog, acid rain **Practice:** Exercises in connection with air pollution
4th week: Environmental Noise **Lecture:** The basics of environmental noise **Practice:** Noise measuring devices and techniques	5th week: Water Protection **Lecture:** Water protection and quality, pollutants **Practice:** Practice in connection with water protection (plant visit: wastewater treatment plant)
6th week: SoilProtection **Lecture:** Protection of soil quality **Practice:** Practice in connection with soil protection	7th week: Waste Management **Lecture:** Waste management, possibilities, disposal, techniques and hazardous waste **Practice:** Practice in connection with waste management (plant visit)
8th week: 1st drawing week	
9th week: Basics of labor safety and fire protection **Lecture:** Personal, material and organizational requirements for safe work, ergonomic fundamentals **Practice:** Practice in connection with labor safety I. (plant visit)	10th week: Occupational Safety **Lecture:** Personal protective equipment, work safety reviews, employer checks, workplace risk assessment **Practice:** Practice in connection with labor safety II. (plant visit)
11th week: Labor and Health **Lecture:** The impact of work on health and the health impact on working ability **Practice:** Practice in connection with occupational health I.	12th week: Occupational Health and Work Hygiene **Lecture:** Fundamentals of occupational health and work hygiene **Practice:** Practice in connection with occupational health II.
13th week: Industrial Safety and Security **Lecture:** Main goals of industrial safety and security **Practice:** Practice in connection with industrial safety and security	14th week: Mid-semester TEST

15th week: 2nd drawing week

Requirements

A, for a signature:

Attendance to the practices (absence up to the permissible level)

B, for grade:

The final grade will be the average of the tests. Each test hast to be at least 50%.

Human Performance (ATPL)

Subject group: Specific Compulsory Subjects – ATP(A)

Model curriculum number: 34

Code: MK3HUMPR03HX17-EN

ECTS Credit Points: 3

Evaluation: official exam

Year, Semester: 3rd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 3+0

Topics:

The course teaches the basic knowledge of Human Performance to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

Human factors: basic concepts, basic aviation physiology and health maintenance, basic aviation psychology, the circulatory system, oxygen and respiration, the eye and vision, flying and health, stress, behaviour and motivation, cognition in aviation, sleep and fatigue, communication and co -operation, man and machine, decision-making and risk

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the complex knowledge of human physiology and health, risks, fatigue and decision making process under different flight conditions.

Learning Objectives (LOs) published by the European Comission are used when developing the Part-FCL theoretical knowledge elements of the course.

The course aims to contribute to the achievement of safe flight during their proposed pilot career. It is crucial that a pilot could be able to recognize the hazard and apply for the well-known procedures in this matter during a flight.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), Human Performance and limitations, 2015, ISBN: 978 1 90620 271 2

Schedule

1st week Registration week	
2nd week: Lecture: Human factors – basic concepts, Human factors in aviation, Becoming a competent pilot Practice: Factors in training that ensures the future competency of the individual pilot	3rd week: Lecture: Safety, Accident statistics, Flight safety concepts, Safety culture Practice: Accident investigation studies
4th week: Lecture: Basics of flight psychology, The atmosphere, Respiratory and circulatory system, High-altitude environment Practice: Site visit, demonstration of measurements for Respiratory and circulatory system	5th week: Lecture: Man and environment, the sensory system, Central, peripheral and autonomic nervous systems, Vision, Hearing, Equilibrium, Integration of sensory inputs Practice: Site visit, demonstration of measurements for Central, peripheral and autonomic nervous systems, Vision, Hearing
6th week: Lecture: Health and hygiene, Personal hygiene, Body rhythm and sleep, Problem areas for pilots, Common minor ailments, Intoxication, Incapacitation in flight Practice: Case studies of sleep problems and incapacitation	7th week: Lecture: Basic aviation psychology, information processing, Attention and vigilance, Perception, Memory, Response selection Learning principles and techniques, Motivation Practice: Site visit, demonstration of measurements for Attention and vigilance, Perception, Memory, Response selection
8th week: 1st drawing week	
9th week: Lecture: Human error and reliability, Reliability of human behaviour, Mental models and situation awareness, Theory	10th week: Lecture: Decision-making, Decision-making concepts, nature of bias and its influence on the decision-making process,

and model of human error, Error generation **Practice:** Case studies	relationship between risk assessment, commitment and pressure of time on decisionmaking strategies, general idea behind the creation of a model for decision-making; **Practice:** Decision making case studies
11th week: **Lecture:** Avoiding and managing errors, cockpit management, Safety awareness, Coordination (multi-crew concepts), Cooperation, Communication **Practice:** Site visit, coordination examples	**12th week:** **Lecture:** Human behavior, Personality, attitude and behaviour, Individual differences in personality and motivation, Identification of hazardous attitudes (error proneness) **Practice:** Team work, presentation
13th week: **Lecture:** Human overload and underload, Arousal, Stress, Fatigue and stress management **Practice:** Measurement techniques of fatigue	**14th week:** **Lecture:** Advanced cockpit automation, advantages and disadvantages, Automation complacency, Working concepts **Practice:** Site visit, demonstration of automation
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

Mass and Balance (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 43

Code: MK3MASSR03HX17-EN

ECTS Credit Points: 3

Evaluation: official exam

Year, Semester: 3rd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

The course teaches the basic knowledge of Mass and Balance to demonstrate a level that grants a successful authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

Purpose of mass and balance considerations, loading, fundamentals of cg calculations, mass and balance details of aircraft, determination of cg position, general principles take off, climb and descent, general principles landing, single engine, multi-engine class b take off, climb, cruise, landing, class a aircraft take off, additional take off procedures, take off climb, en route, landing, cargo handling

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the legal background and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK),Mass and Balance - Performance, 2015, ISBN: 978 1 90620 269 9

Schedule

1st week Registration week	
2nd week: **Lecture:** Purpose of mass-and-balance considerations, limitations, Importance with regard to structural limitations, Importance with regard to performance, Centre-of-gravity (CG) limitations, Importance with regard to stability and controllability, Importance with regard to performance **Practice:** Stability calculation	3rd week: **Lecture:** Loading, Terminology, Mass terms, Load terms (including fuel terms), Mass limits, Structural limitations, Performance limitations,-compartment limitations **Practice:** Documentation examples
4th week: **Lecture:** Loading, Mass calculations, Maximum masses for take-off and landing, traffic load and fuel load, Use of standard masses for passengers, baggage and crew	5th week: **Lecture:** Fundamentals of centre-of-gravity calculations, Definition of Centre of Gravity (CG), Conditions of equilibrium (balance of forces and balance of moments)

Practice: Mass calculation examples	
	Practice: Basic calculations of CG
6th week:	**7th week:**
Lecture: Mass-and-balance details of aircraft, Contents of mass-and-balance documentation, Datum, moment arm, CG position as distance from datum, CG position as percentage of Mean Aerodynamic Chord (% MAC), Longitudinal-, Lateral CG limits, passenger and cargo compartments, fuel system relevant to mass-and balance considerations	**Lecture:** Mass-and-balance details of aircraft, Determination of aircraft empty mass and CG position by weighing, Weighing of aircraft (general aspects) **Practice:** Calculation of mass and CG position of an aircraft using weighing data
Practice: Airport visit, demonstration of compartments, fuel system	
8th week: 1st drawing week	
9th week:	**10th week:**
Lecture: Mass-and-balance details of aircraft, Extraction of basic empty mass and CG data from aircraft documentation, Basic empty mass (BEM) and/or dry operating mass (DOM), CG position and/or moment at BEM/DOM, Deviation from standard configuration **Practice:** Documentation examples	**Lecture:** Determination of CG position, Methods, Arithmetic method, Graphic method, Index method **Practice:** Methods examples
11th week:	**12th week:**
Lecture: Determination of CG position, Load and trim sheet, General considerations **Practice:** Load and trim sheet examples, case studies	**Lecture:** Determination of CG position, Load sheet and CG envelope for light aeroplanes and for helicopters **Practice:** Load and trim sheet examples, case studies
13th week:	**14th week:**
Lecture: Determination of CG position, Load sheet for large aeroplanes, Trim sheet for large aeroplanes, Last-minute changes, Repositioning of CG by shifting the load, by additional load or ballast **Practice:** Load and trim sheet examples, case studies	**Lecture:** Cargo handling, Types of cargo (general aspects), Floor-area load and running-load limitations in cargo compartments, Securement of load **Practice:** Airport visit, handling demonstration
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

Performance (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 44

Code: MK3PERFR04HX17-EN

ECTS Credit Points: 4

Evaluation: official exam

Year, Semester: 3rd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 3+3

Topics:

The course teaches the basic knowledge of Performance to demonstrate a level that grants a succesfull authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

Performance Class B: SE aeroplanes, performance Class B: ME aeroplanes, performance Class A : aeroplanes certificated under CS-25 only

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the legal background and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK),Mass and Balance - Performance, 2015, ISBN: 978 1 90620 269 9

Schedule

1st week Registration week	
2nd week: **Lecture:** General information, Performance legislation, Airworthiness requirements according to CS-23 and CS-25, Operational regulations, General performance theory, Stages of flight, Definitions, terms and concepts, Variables influencing performance **Practice:** Airworthiness and operations requirements interpretation examples	3rd week: **Lecture:** Performance class B single-engine aeroplanes, Definitions of speeds used, Effect of variables on single-engine aeroplane performance, Take-off and landing **Practice:** effects of flap-setting on the ground-roll distance, effects of the different recommended power settings on range and endurance
4th week: **Lecture:** Performance class B single-engine aeroplanes, Climb, cruise and descent, Use of aeroplane performance data, Take-off, Climb, Cruise, Landing **Practice:** Performance data examples for single engine aeroplanes	5th week: **Lecture:** Performance class B multi-engine aeroplanes, Definitions of terms and speeds, Effect of variables on multi-engine aeroplane performance, Take-off and landing, Climb, cruise and descent, Landing **Practice:** Performance data examples for multi engine aeroplanes
6th week: **Lecture:** Performance class B multi-engine aeroplanes, Use of aeroplane performance data, Take-off, Climb, Cruise and descent, Landing **Practice:** Performance data examples	7th week: **Lecture:** Performance class A aeroplanes certified according to CS-25 ony, Take-off, Definitions of terms used, Take-off distances, Accelerate-stop distance **Practice:** Distance calculations
8th week: 1st drawing week	
9th week: **Lecture:** Performance class A, Balanced field length concept, Unbalanced field length concept, Runway Length-Limited Take-Off Mass (RLTOM), Take-off climb, Obstacle-limited take-off **Practice:** Concept examples	10th week: **Lecture:** Performance class A, Climb, Climb techniques, Influence of variables on climb performance, Use of aeroplane flight data **Practice:** Climb examples
11th week: **Lecture:** Performance class A, Cruise, Cruise techniques, Maximum endurance, Maximum range, Long-range cruise, Influence of variables on cruise	12th week: **Lecture:** Performance class A, En route one engine inoperative, Drift down, Influence of variables on the en route one engine inoperative performance

performance, Cruise altitudes, Cost Index (CI),Use of aeroplane flight data **Practice:** Cruise techniques examples	**Practice:** Determination of en route flight path data, speed during drift down
13th week: **Lecture:** Performance class A, Descent, Descent techniques, Influence of variables on descent performance, Use of aeroplane flight data **Practice:** Descent techniques examples	**14th week:** **Lecture:** Performance class A, Approach and landing, Approach requirements, Landing field-length requirement, Influence of variables on landing performance, Quick turnaround limit, Use of aeroplane flight data **Practice:** Effect of temperature and pressure altitude on approach and landing-climb performance, landing distance calculations
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

Operational Procedures (ATPL)

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 48

Code: MK3OPPRR02HX17-EN

ECTS Credit Points: 2

Evaluation: official exam

Year, Semester: 3rd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 1+2

Topics:

The course teaches the basic knowledge of Operational Procedures to demonstrate a level that grants a succesfull authority exam according to FCL.515 ATPL — Training course and theoretical knowledge examinations.

The course covers the following main areas and give thorough information on:

Operator certification and supervision, operational procedure general requirements, special operational procedures and hazards (general aspects), all weather operations requirements, instrument and equipment, comms and navigation equipment, aeroplane maintenance, transoceanic and polar flight, fire and smoke, pressurisation failure, windshear and microburst, wake turbulence, emergency and precautionary landings, transport of dangerous goods by air, contaminated runways, north atlantic mnps airspace operation

By conducting the course the student will have the knowledge recommended by the EU legislation (AMC1 FCL.310; FCL.515 (b); FCL.615 (b) and will understand the legal bacnground and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

- CAE OXFORD AVIATION ACADEMY (UK), OperationalProcedures, 2015, ISBN: 978 1 90620 275 0

Schedule

1st week Registration week	
2nd week: Lecture: General requirements, ICAO Annex 6, Definitions, General, Operational requirements, Operator certification and supervision Practice: Certification and supervision procedures	3rd week: Lecture: General requirements, Operational procedures (except long-range flight preparation), All-weather operations, Instruments and equipment, Communication and navigation equipment, Flight crew, Cabin crew/crew members other than flight crew Practice: Low-visibility operations, VFR operating minima, RVR
4th week: Lecture: General requirements, Manuals, logs and records, Flight and duty-time limitations and rest requirements, Transport of dangerous goods by air Practice: Flight and duty-time calculation, rostering examples	5th week: Lecture: General requirements, Long-range flights, Flight management, Transoceanic and polar flight, MNPS airspace, ETOPS Practice: Selection of cruising altitude, alternate aerodrome, Polar navigation

6th week: **Lecture:** Special operational procedures and hazards (general aspects), Operations Manual, Operating procedures, Aeroplane/helicopter operating matters — type-related **Practice:** Operation manual presentation	7th week: **Lecture:** Special operational procedures and hazards, Icing conditions, On ground de-icing/anti-icing procedures, types of deicing/ anti-icing fluids, Procedure to apply in case of performance deterioration, on ground/in flight **Practice:** Usage of de-icing/anti-icing fluids holdover time table, pre-take-off check
8th week: 1st drawing week	
9th week: **Lecture:** Special operational procedures and hazards, Bird-strike risk and avoidance, Noise abatement, , Influence of the flight procedure (departure, cruise, approach), Influence by the pilot (power setting, low drag) **Practice:** Noise-abatement procedures	10th week: **Lecture:** Special operational procedures and hazards, Fire and smoke, Carburettor fire, Engine fire, Fire in the cabin, cockpit, cargo compartment, Smoke in the cockpit and cabin, Actions in case of overheated brakes, Decompression of pressurised cabin, Slow decompression, Rapid and explosive decompression **Practice:** Aircraft Rescue Fire Fighting (ARFF) Training Facility and training demonstration
11th week: **Lecture:** Special operational procedures and hazards, Wind shear and microburst, Actions to avoid and actions to take during encounter, Wake turbulence, Cause, List of relevant parameters, Actions to be taken when crossing traffic, during take-off and landing **Practice:** Wind shear, microburst, wake turbulance case studies	12th week: **Lecture:** Special operational procedures and hazards, Security (unlawful events), ICAO Annex 17, Use of Secondary Surveillance Radar (SSR), Security, Emergency and precautionary landings, Definition, Cause, Passenger information, Action after landing, Evacuation **Practice:** Unlawful events case studies
13th week: **Lecture:** Special operational procedures and hazards, Fuel jettisoning, Safety aspects, Requirements, Transport of dangerous goods, ICAO Annex 18, Technical Instructions (ICAO Doc 9284), Transport of dangerous goods by air **Practice:** Dangerous goods loading examples	14th week: **Lecture:** Special operational procedures and hazards, Contaminated runways, Kinds of contamination, Estimated surface friction, friction coefficient, Hydroplaning principles and effects, Procedures, Snowtam **Practice:** Friction tester in operation, snowtam examples

15th week: 2nd drawing week

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends with an official examination as set out in the regulations of 1178/2011/EU, Part-FCL.

7th semester

Type Rating

Subject group: Field-Specific Vocational Subjects – ATP(A)

Model curriculum number: 42

Code: MK3CREWR04HX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 4th year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+3

Topics:

The course has been designed to provide all necessary (training theoretical knowledge instruction about aircaft systems and procedures, furthermore synthetic flight instruction in normal, abnormal and emergency situations) for the issue of a type rating course completion certificate. By conducting the course the student will have the knowledge recommended by the EU legislation FCL.720.A.

Theoretical training: airplane limitaions; performance; flight planning and monitoring; load, balance and servicing, emergency procedures.

Synthetic flight training: jet orientation training, normal procedure training, abnormal and emergency procedures training, line oriented flight training (LOFT).

Literature:

Compulsory:

- THE AIRBUS A320 PROCEDURES HANDBOOK Vol. 1
- AIRBUS A320: AN ADVANCED SYSTEMS GUIDE
- Airbus A320 Flight Crew Operating Manual (FCOM)
- Airbus A320 Flight Crew Training Manual (FCTM) and Quick Reference Handbook (QRH)

Schedule

1st week Registration week	
2nd week: **Lecture and Practice:** general, SOP, task sharing, cross check information, general callouts and crew coordination, abbreviation, conversations, callouts for deviations, relevant speeds, setting of speed indicators, using VHF-radio, normal and abnormal operation of aircraft systems, use of checklists	3rd week: **Lecture and Practice:** Pre-flight preparation, Take-off data sheet, briefing before take-off, before take-off checks including powerplant checks, safety preparations before take-off, normal start-up cooperation, taxi cooperation and callouts
4th week: **Lecture and Practice:** take-off, normal take-off and climb cooperation and callouts, normal take-offs with different flap settings, setting of altimeters, Take-off and climb, normal takeoffs	5th week: **Lecture and Practice:** take-off, rejected takeoffs, take-offs with abnormal and emergency situations included, rejected take-offs; crosswind take-offs; take-offs at maximum take-off mass; engine failure after v1
6th week: **Lecture and Practice:** Cruise, normal cruise cooperation and callouts, flying in turbulence, holding, icing emergency descent, early recognition of and reaction on approaching stall in differing aircraft configurations	7th week: **Lecture and Practice:** approach, cooperation and callouts, briefing before landing, descent cooperation and callouts, descent techniques, descent and approach, instrument flight procedures, holding
8th week: 1st drawing week	
9th week: **Lecture and Practice:** approach, precision approach using raw data, precision approach using flight director, precision approach using autopilot, one-engine inoperative approach, non-precision and circling approaches, computation of approach and landing data	10th week: **Lecture and Practice:** go around, all engines go around, go-around with one engine inoperative, go-around cooperation and callouts, wind shear during approach
11th week: **Lecture and Practice:** landing, cooperation and callouts, landings, normal, crosswind and with one engine simulated inoperative, transition from instrument to visual flight on reaching decision altitude	12th week: **Lecture and Practice:** emergency situations, actions to be taken by incapacitation, emergency and abnormal procedures, emergency descent, landing and evacuation prcedures

or height or minimum descent altitude or height	
13th week: **Lecture and Practice:** emergency situations, minor complex system failures (electrical, hydraulic, fuel, pneumatic, flight contorols) and abnormal procedures, emergency descent, after landing and post flight procedures	14th week: **Lecture and Practice:** Line Oriented Flight Training (LOFT), Low Visibility Operation (LVO) in different flight phases, complex failures on LOFT
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor.

Flight Training I

Subject group: Specific Compulsory Subjects – ATP(A)
Model curriculum number: 35
Code: MK3FLT1R02HX17-EN
ECTS Credit Points: 2
Evaluation: mid-semester grade
Year, Semester: 2nd year, 1st semester
Its prerequisite(s): Basics of Aviation II
Further courses are built on it: Yes/No
Number of teaching hours/week (lecture + practice): 0+6

Flight Training II

Subject group: Specific Compulsory Subjects – ATP(A)
Model curriculum number: 36
Code: MK3FLT2R02HX17-EN
ECTS Credit Points: 2
Evaluation: mid-semester grade
Year, Semester: 2nd year, 2nd semester
Its prerequisite(s): Basics of Aviation II
Further courses are built on it: Yes/No
Number of teaching hours/week (lecture + practice): 0+5

Flight Training III

Subject group: Specific Compulsory Subjects – ATP(A)
Model curriculum number: 37
Code: MK3FLT3R02HX17-EN
ECTS Credit Points: 2
Evaluation: mid-semester grade
Year, Semester: 3rd year, 1st semester
Its prerequisite(s): Basics of Aviation II
Further courses are built on it: Yes/No
Number of teaching hours/week (lecture + practice): 0+8

Flight Training IV

Subject group: Specific Compulsory Subjects – ATP(A)
Model curriculum number: 38
Code: MK3FLT4R02HX17-EN
ECTS Credit Points: 2
Evaluation: mid-semester grade
Year, Semester: 3rd year, 2nd semester
Its prerequisite(s): Basics of Aviation II
Further courses are built on it: Yes/No
Number of teaching hours/week (lecture + practice): 0+8

Flight Training V

Subject group: Specific Compulsory Subjects – ATP(A)
Model curriculum number: 39
Code: MK3FLT4R02HX17-EN
ECTS Credit Points: 2
Evaluation: mid-semester grade
Year, Semester: 4th year, 1st semester
Its prerequisite(s): Basics of Aviation II
Further courses are built on it: Yes/No
Number of teaching hours/week (lecture + practice): 0+12

Topics and Scedule

The flying instruction is divided into six phases:

Phase 1: Exercises up to the first solo flight comprise a total of at least 10 hours dual flight instruction on an SE aeroplane including:

- pre-flight operations, mass and balance determination, aeroplane inspection and servicing;
- aerodrome and traffic pattern operations, collision avoidance and precautions;
- control of the aeroplane by external visual references;
- normal take-offs and landings;
- the basic UPRT exercises as specified in point (b) of AMC2 to Appendix 3; AMC1 to Appendix 5;
- simulated engine failure.

Phase 2: Exercises up to the first solo cross-country flight comprise a total of at least 10 hours of dual flight instruction and at least 10 hours solo flight including:

- maximum performance (short field and obstacle clearance) takeoffs and short-field landings;
- flight by reference solely to instruments, including the completion of a 180 ° turn;
- dual cross-country flying using external visual references, DR and radio navigation aids, diversion procedures;
- aerodrome and traffic pattern operations at different aerodromes;
- crosswind take-offs and landings;
- abnormal and emergency procedures and manoeuvres, including simulated aeroplane equipment malfunctions;
- operations to, from and transiting controlled aerodromes, compliance with ATS procedures, R/T procedures and phraseology;
- knowledge of meteorological briefing arrangements, evaluation of weather conditions for flight and use of AIS.

Phase 3: Exercises up to the VFR navigation progress test comprise a total of at least 5 hours of dual instruction and at least 40 hours as PIC. The dual instruction and testing up to the VFR navigation progress test should comprise:

- repetition of exercises of phases 1 and 2;
- VFR navigation progress test conducted by an FI not connected with the applicant's training;
- night flight time including take-offs and landings as PIC.

Phase 4: Exercises up to the instrument rating skill test comprise:

- at least 55 hours instrument flight, which may contain up to 25 hours of instrument ground time in an FNPT I or up to 40 hours in an FNPT II or FFS which should be conducted by an FI or an authorised SFI;
- 20 hours instrument time flown as SPIC;
- pre-flight procedures for IFR flights, including the use of the flight manual and appropriate ATS documents in the preparation of an IFR flight plan;
- procedures and manoeuvres for IFR operation under normal, abnormal and emergency conditions covering at least: (A) transition from visual to instrument flight on take-off; (B) SIDs and arrivals; (C) en-route IFR procedures; (D) holding procedures; (E) instrument approaches to specified minima; (F) missed approach procedures; (G) landings from instrument approaches, including circling;

- in-flight manoeuvres and specific flight characteristics and the basic UPRT exercises as specified in Sections A, B, C and D of Table 2 in point (b) of AMC2 to Appendix 3; AMC1 to Appendix 5;
- operation of an ME aeroplane in the exercises of (iv), including operation of the aeroplane solely by reference to instruments with one engine simulated inoperative, and engine shut-down and restart (the latter training should be conducted at a safe altitude unless carried out in an FSTD).

Phase 5: Advanced UPRT in accordance with point FCL.745.A;

Phase 6:

- instruction and testing in MCC comprising the relevant training requirements;
- type rating.

Requirements

A, for a signature:

Participation is compulsory and attendance will be recorded. In case of violation of absence rules (details: 2.1 and 3.3 of Special information related to the integrated ATP(A) course) the subject will not be signed and the student must repeat the course.

B, for grade:

The course ends in mid-semester grade based on the assessment of the instructor.

DIPLOMA

Within 30 days of the receipt of the certificate on the successful final exam and the language exam in English the diploma is issued and given out by the Faculty at the graduand's special request. Otherwise, the diploma will be awarded to him/her at the graduation ceremony of the Faculty.

Award requirements: Language exam in English (level: B2, type: complex) or GCSE exam or a language certificate of the same level and type and a good command of Professional English according to Commission Regulation (EU) No. 1178/2011 (03/11/2011) which lays down the conditions on professional pilot training.

The Professional Pilot Bachelor's degree alone does not entitle its holder to pursue a career as a professional pilot. One of the award requirements is holding a pilot licence. This licence can be gained after having passed the theoretical and practical exam within the accredited examination system of the Aviation Authority of the National Transport Authority.

The diploma is an official document decorated with the coat of arms of Hungary which verifies the successful completion of studies in the Professional Pilot undergraduate program. The diploma contains the following data: name of HEI (higher education institution); institutional identification number; serial number of diploma; name of diploma holder; date and place of his/her birth; level of qualification; training program; specialization; mode of attendance; place, day, month and year issued. Furthermore, it has to contain the original signature of the Dean (or in case of his/her indisposition the Vice-Dean for Education) and the seal of HEI.

If the candidate does not hold the certificate on the successful completion of the language exam in English in the final exam period, the diploma will be issued after the final exam period. In this case instead of the Dean, the Vice-Dean for Education is also allowed to sign the diploma. The University keeps a record of the diplomas issued.

If the candidate has failed to present the certificate on the successful language exam in English, a certificate on the completion of studies will be issued by the Faculty. The document does not contain any reference to qualification, it merely proves that the candidate has taken a successful final exam. The Faculty keeps a record of the certificates issued.

Calculating diploma grade

$$\frac{a+b+c}{3}$$

, where

a = weight grade average, rounded down to two decimal places,

b= average of the grades awarded for the oral part of the final exam, rounded down to two decimal places,

c= grade awarded for thesis

Classification of the diploma

Outstanding	4,81 – 5,00
Excellent	4,51 – 4,80
Good	3,51 – 4,50
Satisfactory	2,51 – 3,50
Pass	2,00 – 2,50

Diploma with Honours

An award with Distinction is permitted where a student obtained grade 5 in all subjects of the final exam. The average of thesis grade, his/her exam grades and mid-semester grades during his/her studies is at least 4.

MODEL CURRICULUM OF PROFESSIONAL PILOT BSC

The curriculum of the program is available in excel format on the webpage of the Faculty of Engineering (https://eng.unideb.hu/en).

University of Debrecen | **Faculty of Engineering** | **Curriculum** | **Full-Time**

Professional Pilot (BSc)

Nr.	Subject groups	Subject	Code	1st semester				2nd semester				3rd semester				4th semester				5th semester				6th semester				7th semester				Prerequisite
				L	P	E	C	L	P	E	C	L	P	E	C	L	P	E	C	L	P	E	C	L	P	E	C	L	P	E	C	
1	Basics of Natural Sciences	Mathematics I	MK3MAT1A08RX17-EN	4	4	m	8																									
2		Mathematics II	MK3MAT2A06RX17-EN					2	4	m	6																					Mathematics I
3		Mathematics Comprehensive Exam	MK3MATSA00RX17-EN					0	0	c	0																					Mathematics I, Mathematics II (parallel)
4		Statistics and Strength of Materials	MK3STSZG06XX17-EN	2	2	m	6																									
5		Engineering Physics	MK3MFIZA04RX17-EN	2	2	e	4																									
6		Dynamics and Vibration	MK3MREZG04XX17-EN					2	2	e	4																					Engineering Physics, Mathematics I
7		Thermodynamics and Fluid Mechanics I	MK3THE1R06HX17-EN	2	2	e	6																									
8		Thermodynamics and Fluid Mechanics II	MK3THE2R04HX17-EN					2	2	e	4																					Thermodynamics and Fluid Mechanics I
9		Electrotechnics	MK3ELTER06RX17-EN									2	2	m	6																	Mathematics I, Engineering Physics
10	Economics and Humanities	Economics for Engineers	MK3KOZEM04XX17-EN													2	0	e	4													
11		Microeconomics and Economical Processes of Enterprises	MK3MIKVM04XX17-EN																	1	2	e	4									Economics for Engineers
12		Quality and Technical Management	MK3MINMM04XX17-EN																	1	2	e	4									
13		Environmental Protection and Dangerous Goods	MK3EPDGK04RX17-EN																	0	2	m	4									
14		Aviation Terminology I	MK3AVT1R01HX17-EN	0	2	m	2																									
15		Aviation Terminology II	MK3AVT2R01HX17-EN					0	2	m	2																					Aviation Terminology I
16	Professional Compulsory Subjects	Informatics for Engineers I	MK3INFEA04RX17-EN	2	2	m	4																									
17		Aircraft Technology	MK3AIRCR04HX17-EN					2	2	e	4																					Engineering Physics, Basics of Aviation I
18		Descriptive Geometry	MK3DEGRR04HX17-EN									2	2	m	4																	
19		Mechanical Machines and Machine Elements	MK3MGEPG04RX17-EN									2	2	e	4																	Aircraft Technology
20		Materials Engineering	MK3ANISG06RX17-EN													3	2	m	6													Aircraft Technology
21		Manufacturing Technologies	MK3GYARG04RX17-EN													2	2	m	4													Aircraft Technology
22		Technique of Measurement	MK3TEMER04HX17-EN													2	2	m	4													Electrotechnics and Electronics
23		Environment, Health and Safety, Ergonomics (Basics of EHS)	MK3EHSAK04RX17-EN																					2	2	m	4					
24		Mechatronic Devices (Sensors, Actuators, Motors)	MK3ERZBR04RX17-EN									2	2	m	4																	Engineering Physics
25		Basics of Aviation I	MK3PPL1R02HX17-EN	2	1	m	2																									
26		Basics of Aviation II	MK3PPL2R03HX17-EN					4	3	m	4																					Basics of Aviation I
27		Theoretical Knowledge of Airline Transport Pilot Licence I (ATPL)	MK3TKA1R03HX17-EN	6	0	m	4																									
28		Theoretical Knowledge of Airline Transport Pilot Licence II (ATPL)	MK3TKA2R02HX17-EN					1	0	m	2																					Theoretical Knowledge of Airline Transport Pilot Licence I (ATPL)
29		Theoretical Knowledge of Airline Transport Pilot Licence III (ATPL)	MK3TKA3R02HX17-EN									1	1	OE	2																	Theoretical Knowledge of Airline Transport Pilot Licence II (ATPL)
30		Aircraft General Knowledge I - Airframe, Systems, Power Plants (ATPL)	MK3AGK1R04HX17-EN													2	0	m	4													
31		Aircraft General Knowledge II - Airframe, Systems, Power Plants (ATPL)	MK3AGK2R04HX17-EN																	5	0	OE	4									Aircraft General Knowledge I - Airframe, Systems, Power Plants (ATPL)
32		Aircraft General Knowledge - Instrumentation (ATPL)	MK3AGKIR04HX17-EN													4	3	OE	4													
33		Air Law (ATPL)	MK3AIRLR04HX17-EN																	3	0	OE	4									
34		Human Performance (ATPL)	MK3HUMPR03HX17-EN																					3	0	OE	3					
35		Flight Training I	MK3FLT1R02HX17-EN									0	6	m	2																	Basics of Aviation II
36		Flight Training II	MK3FLT2R02HX17-EN													0	5	m	2													Basics of Aviation II
37		Flight Training III	MK3FLT3R02HX17-EN																	0	8	m	2									Basics of Aviation II
38		Flight Training IV	MK3FLT4R02HX17-EN																					0	8	m	2					Basics of Aviation II
39		Flight Training V	MK3FLT5R02HX17-EN																									0	12	m	2	Basics of Aviation II
40	Field-specific Vocational Subjects	Meteorology I (ATPL)	MK3MET1R02HX17-EN					2	2	m	2																					
41		Meteorology II (ATPL)	MK3MET2R02HX17-EN									2	3	OE	2																	Meteorology I (ATPL)
42		Type Rating	MK3CREWR04HX17-EN																									2	3	m	4	
43		Mass and Balance (ATPL)	MK3MASSR03HX17-EN																					2	2	OE	3					
44		Performance (ATPL)	MK3PERFR04HX17-EN																					3	3	OE	4					
45		Flight Planning and Monitoring (ATPL)	MK3FLPMR03HX17-EN																	4	2	OE	3									
46		General Navigation (ATPL)	MK3GENAR04HX17-EN									3	4	OE	4																	
47		Radionavigation (ATPL)	MK3RANAR04HX17-EN													4	4	OE	4													
48		Operational Procedures (ATPL)	MK3OPPRR02HX17-EN																					1	2	OE	2					
49		Communication VFR (ATPL)	MK3COMVR01HX20-EN					1	0	OE	1																					
50		Communication IFR (ATPL)	MK3COMIR01HX20-EN													1	0	OE	1													
51		Thesis I	MK3THE1R05HX17-EN																					0	4	m	5					Aircraft General Knowledge I - Airframe, Systems, Power Plants (ATPL), Mechatronic Devices (Sensors, Actuators, Motors)
52		Thesis II	MK3THE2R10HX17-EN																									0	8	m	10	Thesis I
53	Optional Subjects*	Optional Subject I									2																					
54		Optional Subject II													2																	
55		Optional Subject III																	2													
56		Optional Subject IV																					2								
57		Optional Subject V																									2				
58		Internship I	MK3INT1R02HX17-EN					3 weeks		m	2																					Basics of Aviation II (parallel)
59		Internship II	MK3INT2R03HX17-EN													4 weeks		m	3													Basics of Aviation II
60		Internship III	MK3INT3R05HX17-EN																					5 weeks		m	5					Basics of Aviation II
				L	P	E	C	L	P	E	C	L	P	E	C	L	P	E	C	L	P	E	C	L	P	E	C	L	P	E	C	
		Total / semester:		20	15		36	16	17		33	14	22		30	20	18		38	14	16		27	11	21		30	2	23		16	**Total:**
		number of exam subjects				2				3				1				1				2				0				0		number of exam subjects 9
		number of mid-semester grade subjects				6				6				4				6				2				4				3		number of mid-semester grade subjects 31
		number of comprehensive exam subjects				0				1				0				0				0				0				0		number of comprehensive exam subjects 1
		number of Official Exam subjects				0				1				3				3				3				4				0		number of Official Exam subjects 14
		number of subjects				8				11				8				10				7				8				3		number of subjects 55
		number of teaching hours / semester		35				33				36				38				30				32				25				number of teaching hours 229
																																number of optional credits 10
																																total number of credits 210

Abbreviations:

L = Number of Lectures / week

P = Number of Practices / week

E = Evaluation

c = comprehensive exam

e = exam

m = mid-semester grade

OE = Official Exam

C = Credits

Criterion subjects:

*Optional Subjects (Rules and Regulations XIII. Faculty of Engineering 10. § (2)). Minimum of credits assigned to optional subjects: 10 credits. The suggedted order and credit number in the curriculum is only a recommendation.

Internship I (lenght: 3 weeks after the 2nd semester; students must register for the subject in the 2nd semester)
Internship II (lenght: 4 weeks after the 4th semester; students must register for the subject in the 4th semester)
Internship III (lenght: 5 weeks after the 6th semester; students must register for the subject in the 6th semester)

Work and Fire Safety (requirement: signature, students must register for the subject in the 1st semester based on Rules and Regulations XIII. Faculty of Engineering 5. § (6))

Physical Education (requirement: signature, Rules and Regulations 10. §)