Informatics for Engineers I

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.

- 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

- Borders.
- 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.

Aircraft Technology

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 IIsubjects.

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 conducting the course the student will have the basic prerequisite knowledge in order to be able 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 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 szám: 978 1 90620 265 1
- CAE OXFORD AVIATION ACADEMY (UK), Electrics and electronics, 2015, ISBN szám: 978 1 90620 266 8
- CAE OXFORD AVIATION ACADEMY (UK),Powerplant,2015,ISBN szám: 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 **Practice:** Site visit, aircraft demonstration	**7th week:** **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. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

The course ends in an examination.

Descriptive Geometry

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 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: Practice: Axonometry, perspective; Introduction to multiview projection	3rd week: 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	12th week: Practice: Intersection of two polyhedrons I. Intersection of prisms and pyramids

Prisms and pyramids	
13th week:	**14th week:**
Practice: Intersection of two polyhedrons II. Intersection of prisms and pyramids	**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

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:	7th 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.	**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. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be 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 doesn't 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.

Materials Engineering

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 the 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	7th week: **Lecture:** Polymer I - Overview of Industrial Polymers, Production Technology

Practice: Microscopic analysis to complete the semester task	**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 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. 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

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 the 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: **Lecture:** The basic definitions of manufacturing processes, the types of machine tools **Practice:** Introducing of the cutting laboratory and machine tools *(cutting laboratory)*	3rd week: **Lecture:** Process of chip formation, tool wear and tool life **Practice:** Calculation tasks for tool wear and tool life
4th week: **Lecture:** The process and tools of turning technologies **Practice:** Designing of turning technology	5th week: **Lecture:** The process and tools of drilling and counterbore technologies **Practice:** Designing of drilling and counterbore technologies
6th week: **Lecture:** The process and tools of milling technologies **Practice:** Designing of milling technologies	7th week: **Lecture:** The process and tools of grinding technologies **Practice:** Designing of grinding technology
8th week: 1st drawing week : Test I on cutting technologies	
9th week: **Lecture:** History of metal forming. Definitions, advantages of metal forming. Bulk deformation processes. Sheet metal forming processes. **Practice:** The basic studies of technological planning on CNC machines, cutting tool selection.	10th week: **Lecture:** Properties ofmaterials. Industrial materials. The uniaxial tensile test. Upsetting test. **Practice:** Basic studies of Computer Aided Manufacturing (CAM). The types of manufacturing systems
11th week: **Lecture:** Classification of manufacturing processes (casting, forming, material removal, joining). Advantages of casting. Casting terminology. Sand casting.	12th week: **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

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	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.

regulations. Accident prevention and safety education.	
4th week:	5th 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.	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:	7th 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 features of metal thermometers and other thermometers. Practical: Measurement of temperature.	Lecture: An optical gate. Its structure, working principle and characteristics and application areas. Practical: Measurement of an optical gate.
8th week: 1st drawing week	Mid-term test
9th week:	10th week:
Lecture: A capacitive proximity switch. Its structure, working principle, characteristics and application areas. Practical: Measuring of capacitive proximity switch.	Lecture: Ultrasonic sensors. Their structures, working principles, characteristics, and application areas. Practical: Measuring of an ultrasonic distance sensor.
11th week:	12th 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.	Lecture: The Reed switch and magneto inductive sensors. Their structures, working principles, characteristics and Application areas. Practical: Measuring of reed switch.
13th week:	14th week:
Lecture: Description of the main features of the NI LabVIEW software. Practical: National Instrumnets with hardware and software. Edit VI. Measuring	Lecture: Structure of the NI data acquisition systems. DAQ connecting to your computer. Practical: Recording and evaluation of data measured by National Instruments Hardware

system construction, Troubleshooting practice	
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. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't 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 doesn't 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)

Environmental, Health, Safety and Ergonomy (Basics of EHS)

Code: MK3EHSAK04RX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 3rd year, 2nd semester

Its prerequisite(s): Environmental Protection and Dangerous Goods

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): In connection with environment protection the most important topics are introduced to the students. The subject includes air quality, noise protection, water protection, soil protection, and waste management side topics.

Health (H): Basics 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	7th week: Waste Management **Lecture:** Waste management, possibilities, disposal, techniques and hazardous waste

Practice: Practice in connection with soil protection	**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%.

Mechatronic Devices (Sensors, Actuators, Motors)

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:	**3rd week:**
Lecture: Definition, types of sensors, main error sources of transducers.	**Lecture:** Static and dynamic sensor characteristics, environmental impacts on characteristics.
Practice: Application of ultrasonic distance sensor.	**Practice:** Application of pressure sensor.
4th week:	**5th week:**
Lecture: Position sensors.	**Lecture:** Level sensors.
Practice: Application of color sensors.	**Practice:** Application of level sensors.
6th week:	**7th week:**
Lecture: Flowmeters.	**Lecture:** High temperature measurement.
Practice: Application of temperature and humidity sensors.	**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. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with 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)

Basics of Aviation I

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): 0+1

Topics:

The course teaches the basic knowledge of Aviation in order to assist the students to understand 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 that apply to it, airlines and airport organizational structures, their main operational documents

By conducting both Part of the course the student will have the basic theoretical and practical knowledge to carry on with the first summer flying where they 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

Schedule

1st week Registration week	
2nd week:	3rd week:
Practice: PHARMAFLIGHT VISIT: The system of Aviation, stakeholders and their relationships (airline, airport, airspace, air	Practice: PHARMAFLIGHT VISIT, Aviation trainings, licenses, ratings (pilots, cabin crew, maintenance, air traffic control, ground officer), training organizational

navigation service provider, maintenance, training organizations, etc.)	requirements, flight simulation training devices
4th week:	5th week:
Practice: PHARMAFLIGHT VISIT, International organizations, (ICAO, IATA, EASA, FAA), their functions, duties, regulatory and supervisory powers, tasks of the national aviation authority (NAA), basic communication principles with NAA	**Practice:** AIRCRAFT DEMONSTRATION: History of Aviation, technical development stages, principle of flights, basics of areodinamics, forces, types and of characteristics of aircrafts, dimensions, controls
6th week:	7th week:
Practice: AIRPORT VISIT, Airports, design and constructions, categories, subsystems, airport services, ground handling, basic operational processes	**Practice:** AIRPORT VISIT, Airport organization, The organizational structure of the airports, the operation of the airport and the relationship between the other service providers, the structure of the aerodrome manual
8th week: 1st drawing week	
9th week:	10th week:
Practice: AIRPORT VISIT, Air traffic management, ATM basics, types of airspaces, air traffic rules	**Practice:** AIRPORT VISIT, Air traffic services, aeronautical information, role and structure of AIP, NOTAM publications, flight plan, ATC permissions, ATFM, slot management
11th week:	12th week:
Practice: AIRLINES DEMONSTRATION, categories, organizational units (OPS, CAMO, etc.), structure of flight, basic operational processes, operating models: traditional and low-cost airlines, network carrier and point-to-point carrier, hub and spoke system, global airline associations	**Practice:** AIRLINES DEMONSTRATION, Organizational structure of the airlines, internal and external relations of organizational units, airline manuals
13th week:	14th week:
Practice: AIRCRAFT DEMONSTRATION, Aircraft maintenance, type certificate, continuous airworthiness, airworthiness review certificate, basic documentation of maintenance, work orders, levels and types of maintenance (line, hangar, A-B-C-D	**Practice:** AIRPORT VISIT, Emergency planning, Flight accidents, categories, reporting system, investigation principles and process, competencies, goals

check); organizational requirements, quality management; methods (Lean, 5S)	

15th week: 2nd drawing week

Requirements

A, for a signature:

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Basics of Aviation II

Code: MK3PPL2R03HX17-EN

ECTS Credit Points: 3

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): 0+3

Topics:

The course teaches the basic knowledge of Aviation in order to assist the students to understand 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.

By conducting Part II of the course the students will be familiarizied with airport and airline environment, training regulations, dispatch procedures, pre-flight planning, training aircraft, and post flight requirements including logbook maintenance and emergency procedures. In the first flight training hours the student will become familiar with the training aircraft, its operating characteristics, flight controls, basic instruments and system, general good operating techniques and safety procedures. At the completion the student shall be able to, with assistance, conduct a pre-flight, 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 and become 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 conducting both Part of the course the student will have the basic theoretical and practical knowledge to carry on with the first summer flying where they have the opportunity to make an intense flight programme.

Literature:

Recommended:

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

Schedule

1st week Registration week	
2nd week: Practice: AIRPORT OPERATION, Airport visit, Airside and landside operations, facilities, airport technical services Airport management and operational systems: resource management, aircraft stands, check-in counters, boarding gates allocation, Airport security and safety, aircraft geometry and aircraft manoeuvring areas, lights, signs and markings, Aircraft rescue and fire-fighting, emergency planning	3rd week: Practice: AIRLINE OPERATIONS, Airline Management systems, structure of the documents, Airline Operation Control Center, primary functions and roles, operational systems: Navigational Database, Crew Planning, Flight Scheduling, Maintenance Planning, Demonstration of the main documents: Operations Manual PART A, PART B, PART C, PART D, Organisation Management Manual (OMM), Continous Airworthiness Management Exposition (CAME), Maintenance program, flight planning, approach and landing procedures, climb and descent
4th week: Practice: SATEFY MANAGEMENT SYSTEM IN AVIATION, regulatory background, ICAO Annex 19 - Safety Management, ICAO Doc 9859 - Safety Management Manual, SMS fundamentals, safety culture, Designing and operating an SMS, Principles and Objectives of the Safety Management System, Safety	5th week: Practice: AIRCRAFT GENERAL KNOWLEDGE, Aircraft demonstration, Instruments And Displays, Pressure, Fuel, Temperature, Flow Rate, Rpm, Altitude, Speed Measure, Transmitters, Aerodynamic Parameter Measure, Vario, Magnetism: Magnetic Compass,

Policy and aims, responsibilities, documentation, risk assessment, Flight Safety Strategies, SHELL Model, Safety Management Sysem Manual (SMSM), Safety Risk Management, promotion, training, communication	Gyroscope Instruments, bank and turn Indicator, Altitude Indicator, Stall Indicators, Radio Altimeter, Display Units, Communication Systems, VHF, HF and Satcom
6th week: **Practice:** FLIGHT PERFORMANCE AND FLIGHT PLANNING, Aircraft demonstration, Weight and center of gravity, Weight limitations, CG position limitations, Loading: terminology, Weight limits, Weight calculations, Aircraft weight and CG parameters, CG calculation documents, CG position determination, performance, Flight Planning and check, VFR navigation planing, Fuel planing, Before flight fuel calculations	**7th week:** **Practice:** BASICS OF METEOROLOGY, the atmosphere, temperature, Wind, Turbulence, air masses and fronts, pressure systems, QFE, QNH, Water Shapes in Air, clouds and fog, flight hazards (icing, windshear, thunderstorm), meteorological information, weather charts
8th week: 1st drawing week	
9th week: **Practice:** NAVIGATION, General navigation, The solar system, Time and exchange time, Headings, Distance, Magnetism and compass, Basic principles, Meridians, parallels, ortodroma, loxodroma, Valid aeronautical charts, VFR Communication, Basic procedures, Meteorological phrases (VFR), Procedures in case of radio failure, Emergency and urgency procedures, Ground speed calculation, Heading correction, Flight log book	**10th week:** **Practice:** AIRCRAFT FAMILIARIZATION AND PREPARATION FOR FLIGHT, Pre-flight weather procedure and planning requirements (Weight & balance, Take off and landing performance computations), Emergency drills (Action in the event of fire on the ground and in the air, Engine cabin and electrical system fire, Post flight requirements (Return and securing of aircraft), Familiarization with the aeroplane (Characteristics of the aeroplane, Cockpit layout, systems, Check lists, drills, controls), Systems failure, Escape drills, location and use of emergency equipment and exits), Aircraft maintenance discrepancy procedures, Logbook maintenance and debriefing
11th week: **Practice:** PREPARATION FOR AND ACTION AFTER FLIGHT, Flight authorization and aeroplane acceptance including technical log and certificate of maintenance, Equipment required, such as maps, etc., Completion of authorization sheet and serviceability	**12th week:** **Practice:** AIR EXPERIENCE BRIEFING, Review current and forecast weather/Notams, Review performance planning/weight and balance, Review lesson objectives and establish targets, Performing pre-flight line inspection to

documents, External checks, Internal checks, Harness, seat and rudder pedal adjustments, Starting and warm up checks, Power checks, Running down system checks and switching off the engine, Leaving the aeroplane parking, security and picketing (e.g. tie down)	include required aircraft documents, Correct use of the checklist, FLIGHT LESSON, Engine start and engine controls, Radio communications on the ground and in flight, Taxi -speed and directional control including use of brakes, Pre-takeoff checks (run-up), Normal take-off, Traffic pattern departure, Local area familiarization, Straight and level flight (VR), Trim technique, Medium banked turns (VR) and how to clear for traffic before turning, Climbs (VR), Glides (VR), Demonstrate traffic pattern entry approach and normal landing, Parking, shutdown, and securing airplane
13th week: **Practice:** EFFECTS OF CONTROLS – ATTITUDES AND MOVEMENTS BRIEFING, Primary effects when laterally level and when banked using the aileron and the rudder, Effects of Airspeed and Power using the elevator during climb descend, Trimming controls, Flaps, Effects of Nose Attitude, Airspeed and Power, Operation of Mixture control, Carburetor heat, Cabin heating/ventilation, FLIGHT LESSON Engine start and engine e controls, Local area familiarization which may include short point to point flight, Straight and level flight, Trim technique, Medium banked turns and how to clear for traffic before turning, Climbs, Glides	**14th week:** **Practice:** TAXIING AND GROUND EMERGENCIES BRIEFING, undercarriage structure, brake technic, taxiway signs, fire extinguishing, FLIGHT LESSON, Pre-taxi checks, Starting, control of speed and stopping, Engine handling, Control of direction and turning, Turning in confined spaces, Parking area procedure and precautions, Effects of wind and use of flying controls, Effects of ground surface, Freedom of rudder movement, Marshalling signals, Instrument checks, Air traffic control procedures, Emergencies, Brake and steering failure
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Theoretical Knowledge of Airline Transport Pilot Licence I (ATPL)

Code: MK3TKA1R03HX17-EN

ECTS Credit Points: 3

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 (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 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:** SUBSONIC AERODYNAMICS, Basics, laws and definitions, Laws and definitions, Basics about airflow, Aerodynamic forces and moments on aerofoils, Shape of an aerofoil section, Wing shape **Practice:**Airflow examples, calculations	**3rd week:** **Lecture:** SUBSONIC AERODYNAMICS, Two-dimensional airflow around an aerofoil, Streamline pattern, Stagnation point, Pressure distribution, Centre of pressure and aerodynamic centre, Lift and downwash **Practice:** Calculation examples
4th week: **Lecture:** SUBSONIC AERODYNAMICS, Drag and wake, Influence of angle of attack, Flow separation at high angles of attack, The lift **Practice:** Calculation examples	**5th week:** **Lecture:** SUBSONIC AERODYNAMICS, Coefficients, The lift coefficient Cl, The drag coefficient Cd, Three-dimensional airflow about an aeroplane, Streamline pattern, Induced drag, Total drag, Parasite drag and speed, Induced drag and speed, **Practice:** Lift and drag examples, calculations,Total drag and speed, The total drag–speed graph
6th week: **Lecture:** SUBSONIC AERODYNAMICS, Ground effect, Effect on CDi, Effect on stall, Effect on CL, Effect on take-off and landing characteristics of an aeroplane **Practice:** Ground effect examples, calculations	**7th week:** **Lecture:** SUBSONIC AERODYNAMICS, The relationship between lift coefficient and speed in steady, straight and level flight, Represented by an equation, Represented by a graph **Practice:** Ground effect examples, calculations
8th week: 1st drawing week	
9th week: **Lecture:** SUBSONIC AERODYNAMICS, The stall, Flow separation at increasing angles of attack, The stall speed **Practice:** Stall examples, calculations	**10th week:** **Lecture:** SUBSONIC AERODYNAMICS, The initial stall in span-wise direction, Stall warning, Special phenomena of stall **Practice:** Stall examples, calculations
11th week: **Lecture:** SUBSONIC AERODYNAMICS, CLMAX ugmentation, Trailing-edge flaps and the reasons for use in take-off and landing,	**12th week:** **Lecture:** SUBSONIC AERODYNAMICS, Spoilers and the reasons for use in the different phases of flight, Speed brakes, The boundary layer,

Leading-edge devices, Vortex generators, Means to reduce the CL–CD ratio **Practice:** Flaps in operation, demonstration	Different types, Aerodynamic degradation, Ice and other contaminants **Practice:** Spoilers in operation, demonstration
13th week: **Lecture:** HIGH-SPEED AERODYNAMICS, Speeds, Speed of sound, Mach number, Compressibility, Subdivision of aerodynamic flow, Shock waves, Normal shock waves, Oblique shock waves **Practice:** High-speed case studies	**14th week:** **Lecture:** Mach cone, Effects of exceeding Mcrit, Mcrit, Effect on lift, on drag, on pitching moment, on control effectiveness, Buffet onset, Means to influence Mcrit **Practice:** High-speed case studies
15th week: 2nd drawing week	

Requirements

A, for a signature:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Theoretical Knowledge of Airline Transport Pilot Licence (ATPL) II

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: Lecture: STABILITY, Static and dynamic stability, Basics and definitions, Precondition for static stability, Sum of forces, Sum of moments	3rd week: Lecture: STABILITY, Static and dynamic longitudinal stability, Methods for achieving balance, Static longitudinal stability, Neutral point, Location of centre of gravity, The Cm–α graph
4th week: Lecture: STABILITY, The elevator position versus speed graph (IAS), The stick force versus speed graph (IAS),	5th week: Lecture: STABILITY, The manoeuvring stability/stick force per G, Stick force per G and the limit-load factor, Dynamic longitudinal stability
6th week: Lecture: STABILITY, Static directional stability, Sideslip angle β, Yaw-moment coefficient Cn, Cn–β graph	7th week: Lecture: STABILITY, Static lateral stability, Bank angle Ø, The roll-moment coefficient Cl
8th week: 1st drawing week	

9th week:	10th week:
Lecture: STABILITY, Contribution of sideslip angle β, The Cl–β graph	Lecture: STABILITY, Dynamic lateral/directional stability, Effects of asymmetric propeller slipstream, Tendency to spiral dive, Dutch roll
11th week:	12th week:
Lecture: CONTROL, General, *Basics, the three planes and three axes, Camber change, Angle-of-attack change,* Pitch (longitudinal) control*, Elevator/all-flying tails, Downwash effects, Ice on tail, Location of centre of gravity, Moments due to engine thrust*	Lecture: CONTROL, Yaw (directional) control*, Rudder limiting*, Roll (lateral) control*, Ailerons, Spoilers, Adverse yaw, Means to avoid adverse yaw*
13th week:	14th week:
Lecture: CONTROL, Roll/yaw interaction, Means to reduce control forces*, Aerodynamic balance, Artificial means*	Lecture: CONTROL, Mass balance, Trimming, *Reasons to trim, Trim tabs, Stabiliser trim*
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory.

B, for grade:

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

Theoretical Knowledge of Airline Transport Pilot Licence (ATPL) III

Code: MK3TKA3R02HX17-EN

ECTS Credit Points: 2

Evaluation: official exam

Year, Semester: 2nd year, 2nd 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 Flightto 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:

Limitations, Manoeuvring envelope, Gust envelope, propellers, conversion of engine torque to thrust, Secondary effects of propellers, flight mechanics, Forces acting on an aeroplane, 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: LIMITATIONS, Operating limitations, *Flutter, Aileron reversal, Landing gear/flap operating* Practice: limitation examples	3rd week: Lecture: LIMITATIONS, *VMO, VNO, VNE, MMO* Practice: VMO, VNO, VNE, MMO examples
4th week: Lecture: LIMITATIONS, Manoeuvring envelope, *Manoeuvring-load diagram, Factors affecting the manoeuvring-load diagram* Practice: Examples on Manoeuvring-load diagram	5th week: Lecture: LIMITATIONS Gust envelope, *Gust-load diagram, Factors affecting the gust-load diagram.* Practice: Examples on Gust-load
6th week: Lecture: PROPELLERS, Conversion of engine torque to thrust, *Relevant propeller parameters, Blade twist,*	7th week: Lecture: PROPELLERS, *Fixed pitch and variable pitch/constant speed, Propeller*

Practice: Propellers in operation, demonstration	*efficiency versus speed, Effects of ice on propeller* **Practice:** Propellers in operation, demonstration
8th week: 1st drawing week	
9th week: **Lecture:** PROPELLERS, Engine failure*, Windmilling drag, Feathering,* Design features for power absorption*, Aspect ratio of blade, Diameter of propeller, Number of blades, Propeller noise* **Practice:** Engine failure case studies	**10th week:** **Lecture:** PROPELLERS, Secondary effects of propellers*, Torque reaction, Gyroscopic precession, Asymmetric slipstream and blade effect* **Practice:** Examples on torque reaction, Asymmetric slipstream and blade effect
11th week: **Lecture:** FLIGHT MECHANICS, Forces acting on an aeroplane*, Straight horizontal steady flight, Straight steady climb,* **Practice:** Forces examples, climb case studies	**12th week:** **Lecture:** FLIGHT MECHANICS, *Straight steady descent, Straight steady glide, Steady coordinated turn* **Practice:** Forces examples, descent, glide, turn case studies
13th week: **Lecture:** FLIGHT MECHANICS, Asymmetric thrust*, Moments about the normal axis, Forces parallel to the lateral axis, Influence of aeroplane mass* **Practice:** Asymmetric trust example	**14th week:** **Lecture:** FLIGHT MECHANICS, *Secondary propeller effects, VMCA, VMCL, VMCG, Influence of density,* Particular points on a polar curve **Practice:** Secondary propeller effects example
15th week: 2nd drawing week	

Requirements

A, for a signature:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

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

Code: MK3AGK1R04HX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

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

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

Schedule

1st week Registration week	
2nd week: **Lecture:** SYSTEM DESIGN, LOADS, STRESSES, MAINTENANCE, System design, Design concepts, Level of certification, Loads and stresses **Practice:** Lab demonstration, Loads and stresses	3rd week: **Lecture:** SYSTEM DESIGN, LOADS, STRESSES, MAINTENANCE, Fatigue, Corrosion, Maintenance, Maintenance methods: hard time and on condition **Practice:** Examples on Fatigue, Corrosion
4th week: **Lecture:** AIRFRAME, Construction and attachment methods, Materials, Aeroplane: wings, tail surfaces and control surfaces, Design and construction, Structural components, Loads, stresses and aeroelastic vibrations ('flutter') **Practice:** Site visit, aircraft demonstration	5th week: **Lecture:** AIRFRAME, Fuselage, landing gear, doors, floor, windscreen and windows, Structural limitations **Practice:** Site visit, aircraft demonstration
6th week: **Lecture:** HYDRAULICS, Hydromechanics: basic principles **Practice:** Site visit, aircraft demonstration	7th week: **Lecture:** HYDRAULICS, Hydraulic systems, Hydraulic fluids: types, characteristics, limitations, System components: design, operation, degraded modes of operation, indications and warnings **Practice:** Lab demonstration, hydraulic fluids
8th week: 1st drawing week	
9th week: **Lecture:** LANDING GEAR, WHEELS, TYRES, BRAKES, Landing gear, Types, System components, design, operation, indications and warnings, on-ground/in-flight protections, emergency extension systems, Nose-wheel steering: design, operation **Practice:** Lab demonstration, simplified landing gears	10th week: **Lecture:** LANDING GEAR, WHEELS, TYRES, BRAKES, Brakes, Types and materials, System components, design, operation, indications and warnings, Anti-skid, Autobrake, Wheels, rims and tyres, Types, structural components and materials, operational limitations, thermal plugs **Practice:** Lab demonstration, simplified brakes
11th week:	12th week:

Lecture: FLIGHT CONTROLS, Aeroplane: primary flight controls, Manual controls, Fully powered (irreversible), Partially powered controls (reversible), System components, design, operation, indications and warnings, degraded modes of operation, jamming **Practice:** Site visit, aircraft demonstration	**Lecture:** FLIGHT CONTROLS, Aeroplane: secondary flight controls, System components, design, operation, degraded modes of operation, indications and warnings, Aeroplane: Fly-by-Wire (FBW) control systems **Practice:** Site visit, simulator demonstration
13th week: **Lecture:** PNEUMATICS — PRESSURISATION AND AIRCONDITIONING SYSTEMS, Pneumatic/bleed air supply, Piston-engine air supply, Gas turbine engine: bleed air supply **Practice:** Site visit, aircraft demonstration	**14th week:** **Lecture:** PNEUMATICS, Aeroplane: pressurisation and air-conditioning system, System components, design, operation, degraded modes of operation, indications and warnings **Practice:** Site visit, aircraft demonstration
15th week: 2nd drawing week	

Requirements

A, for a signature:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

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

Code: MK3AGK2R04HX17-EN

ECTS Credit Points: 4

Evaluation: official exam

Year, Semester: 2nd 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): 2+1

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

, anti and de-icing systems, fuel system, protection and detection systems, oxygen systems,DC and AC electrics, switches, generators and alternators, aircraft electric power system, piston engines, lubrication, cooling, ignition, fuel, mixture, carburettors, 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 szám: 978 1 90620 265 1
- CAE OXFORD AVIATION ACADEMY (UK), Electrics and electronics, 2015, ISBN szám: 978 1 90620 266 8
- CAE OXFORD AVIATION ACADEMY (UK),Powerplant,2015, ISBN szám:978 1 90620 267 5

Schedule

1st week Registration week	
2nd week: **Lecture:** ANTI-ICING AND DE-ICING SYSTEMS, design, operation, indications and warnings, operational limitations, Ice-	3rd week: **Lecture:** FUEL SYSTEM, Piston engine, Fuel: types, characteristics, limitations, operation, system components, indications **Practice:** Site visit, aircraft demonstration

warning systems: types, operation, and indications **Practice:** Site visit, aircraft demonstration	
4th week: **Lecture:** FUEL SYSTEM, Turbine engine, Fuel: types, characteristics, limitations, operation, system components, indications **Practice:** Examples on fuel characteristics	**5th week:** **Lecture:** ELECTRICS, General, definitions, basic applications: circuit breakers, logic circuits, Static electricity, Direct current and Alternating, Resistors, capacitors, inductance coil, Permanent magnets, Electromagnetism, Circuit breakers, Semiconductors and logic circuits, Batteries **Practice:** Lab demonstration
6th week: **Lecture:** ELECTRICS, Generation, DC, AC generation, Constant Speed and Intergrated Drive (CSD/IDG) systems, Transformers, Distribution, General, distribution, load management and monitoring systems: automatic generators and bus switching during normal and failure operation, indications and warnings, Electrical motors, General, Operating principle, Components **Practice:** Lab demonstration	**7th week:** **Lecture:** PISTON ENGINES, General, Types of internal-combustion engines: basic principles, definitions, Engine: design, operation, components and materials, Fuel, Types, grades, characteristics, limitations, Engine fuel pumps **Practice:** Site visit, aircraft demonstration
8th week: 1st drawing week	
9th week: **Lecture:** PISTON ENGINES, Carburettor/injection system, Lubrication systems, Ignition circuits, Mixture, Definition, characteristic mixtures, control instruments, associated control levers, indications **Practice:** Lab demonstration	**10th week:** **Lecture:** PISTON ENGINES, Aeroplane: propellers, Definitions, Constant-speed propeller: design, operation, system components, Reduction gearing, Propeller handling: associated control levers, degraded modes of operation, indications and warnings, Performance and engine handling, **Practice:** Performance examples
11th week: **Lecture:** TURBINE ENGINES, Basic principles, Basic generation of thrust and the thrust formula, types of turbine engines, components, Coupled turbine	**12th week:** **Lecture:** TURBINE ENGINES, Main-engine components, Aeroplane: air intake, Compressor and diffuser, Combustion chamber, Turbine, Aeroplane: exhaust, Additional components and systems, Engine fuel system, control system,

engine, Free turbine engine: design, operation, components and materials **Practice:** Operations presentation	lubrication, auxiliary gearbox, ignition, starter, Reverse thrust **Practice:** Operations presentation
13th week: **Lecture:** TURBINE ENGINES, Engine operation and monitoring, General, Starting malfunctions, Re-light envelope, Performance aspects, Thrust, performance aspects, and limitations, Auxiliary Power Unit (APU), operation, functions, operational limitations **Practice:** Operations presentation	**14th week:** **Lecture:** PROTECTION AND DETECTION SYSTEMS, Smoke detection, Types, design, operation, indications and warnings, Fire-protection systems, Fire extinguishing (engine and cargo compartments), Fire detection, Rain-protection system, OXYGEN 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. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Aircraft General Knowledge – Instrumentation (ATPL)

Code: MK3AGKIR04HX17-EN

ECTS Credit Points: 4

Evaluation: official exam

Year, Semester: 3rd year, 2nd 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): 4+3

Topics:

The course teaches the basic knowledge of Aircraft General Knowledge — Instrumentation 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:

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 thecomplex knowledge of instrumentation used in general and professinonal 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 szám: 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	5th week: **Lecture:** GYROSCOPIC INSTRUMENTS, Gyroscope: basic principles, Rate-of-turn

magnetic field, Aircraft magnetic field, Direct-reading magnetic compass, Flux valve **Practice:** Magnetism examples	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 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	**12th week:** **Lecture:** ALERTING SYSTEMS, PROXIMITY SYSTEMS, General, Flight Warning Systems (FWS), Stall Warning Systems (SWS), Stall 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	**14th week:** **Lecture:** MAINTENANCE, MONITORING AND RECORDING SYSTEMS, Cockpit Voice Recorder (CVR), Flight Data Recorders (FDR), Maintenance and monitoring systems, Integrated Health & Usage

Attitude Director Indicator (EADI), Navigation Display (ND), Electronic Flight Bag (EFB) **Practice:** Site visit, simulator demonstration	Monitoring System (IHUMS), Aeroplane Condition Monitoring System (ACMS) **Practice:** Case studies
15th week: 2nd drawing week	

Requirements

A, for a signature:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

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)

Code: MK3AIRLR04HX17-EN

ECTS Credit Points: 4

Evaluation: official exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: No

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

Topics:

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

The course coversthe 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 bacnground 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 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), Air Law, 2015, ISBN szám: 978 1 90620 264 4

Schedule

1st week Registration week	
2nd week:	3rd week:
Lecture: INTERNATIONAL LAW: CONVENTIONS, AGREEMENTS AND ORGANISATIONS, The Convention on International Civil Aviation (Chicago) — ICAO DOC 7300, Air navigation, The International Civil Aviation Organization (ICAO) Other conventions and agreements, World organisations, The International Air Transport Association (IATA) European organisations, European Aviation Safety Agency (EASA), EUROCONTROL, European Civil Aviation Conference (ECAC) Practice: Search practice in legislations	Lecture: AIRWORTHINESS OF AIRCRAFT, AIRCRAFT NATIONALITY AND REGISTRATION MARKS, ICAO Annex 8 and the related Certification Specifications Certificate of Airworthiness (CofA) Definitions of ICAO Annex 7, Aircraft nationality, common and registration marks to be used Practice: Case study in registration
4th week:	5th week:
Lecture: PERSONNEL LICENSING Regulation (EC) No 216/2008 (the Basic Regulation), Definitions, Applicability Part-FCL, Definitions, Content and structure, Commercial Pilot Licence (CPL), Airline Transport Pilot Licence (ATPL) and Multi-crew Pilot Licence (MPL), Ratings, Part-MED	Lecture: RULES OF THE AIR, Definitions of ICAO Annex 2, Applicability of the Rules of the Air, General rules, Visual Flight Rules (VFRs), Instrument Flight Rules (IFRs), Interception of civil aircraft Practice: Case study in rules of the air

ICAO Annex 1, Differences between ICAO Annex 1 and the Aircrew Regulation **Practice:** Methods in licensing, applications examples	
6th week:	**7th week:**
Lecture: PROCEDURES FOR AIR NAVIGATION SERVICES — AIRCRAFT OPERATIONS (PANS-OPS), Departure procedures,General criteria (assuming all engines operating), Standard instrument departures (SIDs),Omnidirectional departures, Approach procedures, Design, Arrival and approach segments, Missed approach, Visual manoeuvring (circling) in the vicinity of the aerodrome, Area Navigation (RNAV) approach procedures based on VOR/DME, Use of FMS/RNAV equipment to follow conventional non-precision approach procedures **Practice:** Examples in procedures	**Lecture:** PROCEDURES FOR AIR NAVIGATION SERVICES — AIRCRAFT OPERATIONS (PANS-OPS), Holding procedures, Entry and holding, Obstacle clearance (except table), Altimeter-setting procedures, Basic requirements and procedures, Procedures for operators and pilots, Secondary surveillance radar (transponder) operating procedures **Practice:** Examples in procedures
8th week: 1st drawing week	
9th week:	**10th week:**
Lecture: AIR TRAFFIC SERVICES AND AIR TRAFFIC MANAGEMENT, ICAO Annex 11 — Air Traffic Services, Definitions, Airspace, Air Traffic Control services, Flight Information Service (FIS), Alerting service, Principles governing RNP and ATS route designators, ICAO Document 4444-Air Traffic Management, Definitions, ATS system capacity and Air Traffic Flow Management (ATFM), ATC clearances, Horizontal speed control instructions, Change from IFR to VFR flight, Wake turbulence, Altimeter-setting procedures, Position reporting, Reporting of operational and meteorological information, Separation methods and minima **Practice:** Airport Tower visit, ATS system capacity calculations, requirements for different ATS systems	**Lecture:** AERONAUTICAL INFORMATION SERVICE, Introduction, Definitions of ICAO Annex 15, General, Integrated Aeronautical Information Package, Aeronautical Information Publication (AIP), NOTAMs, Aeronautical Information Regulation and Control (AIRAC), Aeronautical Information Circulars (AICs), Pre-flight and post-flight information/ data **Practice:** AIP, NOTAM examples
11th week:	**12th week:**

Lecture: AERODROMES (ICAO Annex 14, Volume I — Aerodrome Design and Operations), Aerodrome data, Aerodrome reference point, Pavement strengths, Declared distances, Physical characteristics, Runways, Runway strips, Runway-end safety area,Clearway,Stopway, Taxiways, Visual aids for navigation, Markings, Lights,Signs,Markers Aerodromes operational services, equipment and installations, Rescue and Firefighting (RFF), Apron management service, Ground-servicing of aircraft

Practice: Airport visit, planning examples, layout plan, master plan. Case study.

Lecture: FACILITATION (ICAO Annex 9)

General, Foreword, Definitions (ICAO Annex 9)

Entry and departure of aircraft, General Declaration, Entry and departure of crew, Entry and departure of passengers and baggage, Entry and departure of cargo

Practice: Facilitation examples

13th week:

Lecture: SEARCH AND RESCUE, Essential Search and Rescue (SAR) definitions in, ICAO Annex 12, Organisation, Operating procedures for non-SAR crews, Search and rescue signals

Practice: Case study.

14th week:

Lecture: SECURITY, Essential definitions of ICAO Annex 17, General principles, Organisation, Preventive security measures, Operators' security programme, Security procedures in other documents, i.e. ICAO Annex 2, ICAO Annex 6, ICAO Annex 14, ICAO Doc 4444

Practice: Airport visit, security procedures example, case study.

15th week: 2nd drawing week

Requirements

A, for a signature:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Human Performance (ATPL)

Code: MK3HUMPR03HX17-EN

ECTS Credit Points: 3

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): 3+2

Topics:

The course teaches the basic knowledge of Human 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:

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 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), Human Performance and limitations, 2015, ISBN szám: 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 PHYSIOLOGY, 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 and model of human error, Error generation **Practice:** Case studies	**10th week:** **Lecture:** DECISION-MAKING, Decision-making concepts, nature of bias and its influence on the decision-making process, 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:	**12th week:**

Lecture: AVOIDING AND MANAGING ERRORS, cockpit management, Safety awareness, Coordination (multi-crew concepts), Cooperation, Communication **Practice:** Site visit, coordination examples	**Lecture:** HUMAN BEHAVIOUR, Personality, attitude and behaviour, Individual differences in personality and motivation, Identification of hazardous attitudes (error proneness) **Practice:** Team work, presentation
13th week:	**14th week:**
Lecture: HUMAN OVERLOAD AND UNDERLOAD, Arousal, Stress, Fatigue and stress management **Practice:** Measurement techniques of fatigue	**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:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Flight Training I

Code: MK3FLT1R02HX17-EN

ECTS Credit Points: 2

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): 0+6

Topics and Scedule

The flying instruction is divided into five phases:

(1) 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: (i) pre-flight operations, mass and balance determination, aeroplane inspection and servicing; (ii) aerodrome and traffic pattern operations, collision avoidance and precautions; (iii) control of the aeroplane by external visual references; (iv) normal take-offs and landings; (v) flight at critically low air speeds, recognition of recovery from incipient and full stalls, spin avoidance; (vi) unusual attitudes and simulated engine failure.

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

(3) 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 comprise: (i) repetition of exercises of phases 1 and 2; (ii) VFR flight at relatively critical high air speeds, recognition of and recovery from spiral dives; (iii) VFR navigation progress test conducted by an FI not connected with the applicant's training; (iv) night flight time including take-offs and landings as PIC.

(4) phase 4: Exercises up to the instrument rating skill test comprise: (i) 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 is conducted by an FI or an authorised SFI; (ii) 20 hours instrument time flown as SPIC; (iii) 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; (iv) 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. (v) in-flight manoeuvres and specific flight characteristics; (vi) 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 is at a safe altitude unless carried out in an FSTD).

(5) phase 5: (i) instruction and testing in MCC comprisetherelevant training requirements; (ii) type rating training on Boeing 737 or Airbus 320.

Requirements

A, for a signature:

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Flight Training II

Code: MK3FLT2R02HX17-EN

ECTS Credit Points: 2

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): 0+5

Topics and Scedule

The flying instruction is divided into five phases:

(1) 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: (i) pre-flight operations, mass and balance determination, aeroplane inspection and servicing; (ii) aerodrome and traffic pattern operations, collision avoidance and precautions; (iii) control of the aeroplane by external visual references; (iv) normal take-offs and landings; (v) flight at critically low air speeds, recognition of recovery from incipient and full stalls, spin avoidance; (vi) unusual attitudes and simulated engine failure.

(2) 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: (i) maximum performance (short field and obstacle clearance) takeoffs and short-field landings; (ii) flight by reference solely to instruments, including the completion of a 180 ° turn; (iii) dual cross-country flying using external visual references, DR and radio navigation aids, diversion procedures; (iv) aerodrome and traffic pattern operations at different aerodromes; (v) crosswind take-offs and landings; (vi) abnormal and emergency procedures and manoeuvres, including simulated aeroplane equipment malfunctions; (vii) operations to, from and transiting controlled aerodromes, compliance with ATS

procedures, R/T procedures and phraseology; (viii) knowledge of meteorological briefing arrangements, evaluation of weather conditions for flight and use of AIS.

(3) 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 comprise: (i) repetition of exercises of phases 1 and 2; (ii) VFR flight at relatively critical high air speeds, recognition of and recovery from spiral dives; (iii) VFR navigation progress test conducted by an FI not connected with the applicant's training; (iv) night flight time including take-offs and landings as PIC.

(4) phase 4: Exercises up to the instrument rating skill test comprise: (i) 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 is conducted by an FI or an authorised SFI; (ii) 20 hours instrument time flown as SPIC; (iii) 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; (iv) 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. (v) in-flight manoeuvres and specific flight characteristics; (vi) 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 is at a safe altitude unless carried out in an FSTD).

(5) phase 5: (i) instruction and testing in MCC comprise the relevant training requirements; (ii) type rating training on Boeing 737 or Airbus 320.

Requirements

A, for a signature:

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Flight Training III

Code: MK3FLT3R02HX17-EN

ECTS Credit Points: 2

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+8

Topics and Scedule

The flying instruction is divided into five phases:

(1) 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: (i) pre-flight operations, mass and balance determination, aeroplane inspection and servicing; (ii) aerodrome and traffic pattern operations, collision avoidance and precautions; (iii) control of the aeroplane by external visual references; (iv) normal take-offs and landings; (v) flight at critically low air speeds, recognition of recovery from incipient and full stalls, spin avoidance; (vi) unusual attitudes and simulated engine failure.

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

(3) 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 comprise: (i) repetition of exercises of phases 1 and 2; (ii) VFR flight at relatively critical high air speeds, recognition of and recovery from spiral dives; (iii) VFR navigation progress test conducted by an FI not connected with the applicant's training; (iv) night flight time including take-offs and landings as PIC.

(4) phase 4: Exercises up to the instrument rating skill test comprise: (i) 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 is conducted by an FI or an authorised SFI; (ii) 20 hours instrument time flown as SPIC; (iii) 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; (iv) 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. (v) in-flight manoeuvres and specific flight characteristics; (vi) 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 is at a safe altitude unless carried out in an FSTD).

(5) phase 5: (i) instruction and testing in MCC comprise the relevant training requirements; (ii) type rating training on Boeing 737 or Airbus 320.

Requirements

A, for a signature:

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Flight Training IV

Code: MK3FLT4R02HX17-EN

ECTS Credit Points: 2

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): 0+8

Topics and Scedule

The flying instruction is divided into five phases:

(1) 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: (i) pre-flight operations, mass and balance determination, aeroplane inspection and servicing; (ii) aerodrome and traffic pattern operations, collision avoidance and precautions; (iii) control of the aeroplane by external

visual references; (iv) normal take-offs and landings; (v) flight at critically low air speeds, recognition of recovery from incipient and full stalls, spin avoidance; (vi) unusual attitudes and simulated engine failure.

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

(3) 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 comprise: (i) repetition of exercises of phases 1 and 2; (ii) VFR flight at relatively critical high air speeds, recognition of and recovery from spiral dives; (iii) VFR navigation progress test conducted by an FI not connected with the applicant's training; (iv) night flight time including take-offs and landings as PIC.

(4) phase 4: Exercises up to the instrument rating skill test comprise: (i) 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 is conducted by an FI or an authorised SFI; (ii) 20 hours instrument time flown as SPIC; (iii) 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; (iv) 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. (v) in-flight manoeuvres and specific flight characteristics; (vi) 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 is at a safe altitude unless carried out in an FSTD).

(5) phase 5: (i) instruction and testing in MCC comprise the relevant training requirements; (ii) type rating training on Boeing 737 or Airbus 320.

Requirements

A, for a signature:

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Flight Training V

Code: MK3FLT4R02HX17-EN

ECTS Credit Points: 2

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): 0+12

Topics and Scedule

The flying instruction is divided into five phases:

(1) 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: (i) pre-flight operations, mass and balance determination, aeroplane inspection and servicing; (ii) aerodrome and traffic pattern operations, collision avoidance and precautions; (iii) control of the aeroplane by external visual references; (iv) normal take-offs and landings; (v) flight at critically low air speeds, recognition of recovery from incipient and full stalls, spin avoidance; (vi) unusual attitudes and simulated engine failure.

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

(3) 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 comprise: (i) repetition of exercises of phases 1 and 2; (ii) VFR flight at relatively critical high air speeds, recognition of and recovery from spiral dives; (iii) VFR navigation progress test conducted by an FI not connected with the applicant's training; (iv) night flight time including take-offs and landings as PIC.

(4) phase 4: Exercises up to the instrument rating skill test comprise: (i) 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 is conducted by an FI or an authorised SFI; (ii) 20 hours instrument time flown as SPIC; (iii) 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; (iv) 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. (v) in-flight manoeuvres and specific flight characteristics; (vi) 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 is at a safe altitude unless carried out in an FSTD).

(5) phase 5: (i) instruction and testing in MCC comprise the relevant training requirements; (ii) type rating training on Boeing 737 or Airbus 320.

Requirements

A, for a signature:

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Subject group "Field-Specific Professional Subjects"

Meteorology I (ATPL)

Code: MK3MET1R02HX17-EN

ECTS Credit Points: 2

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): 1+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 szám: 978 1 90620 272 9
- Sándor Valéria-Wantuch Ferenc, Repülésmeteorológia, 2005, ISBN szám: 963 7702 91 1

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:	5th 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	**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:** THERMODYNAMICS, 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	**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,

Practice: Case studies on air masses and fronts	polar and secondary depressions; troughs, Tropical revolving storms, **Practice:** Case studies on storms
15th week: 2nd drawing week	

Requirements

A, for a signature:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Meteorology II (ATPL)

Code: MK3MET1R02HX17-EN

ECTS Credit Points: 2

Evaluation: official exam

Year, Semester: 3rd 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 szám: 978 1 90620 272 9
- SándorValéria-WantuchFerenc, Repülésmeteorológia, 2005, ISBN szám: 963 7702 91 1

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-air drop), Local winds and associated weather **Practice:** Foehn, Mistral, Bora, Scirocco, Ghibli and Khamsin, Harmattan	5th week: **Lecture:** FLIGHT HAZARDS, Icing, Conditions for ice accretion, Types of ice accretion, Hazards of ice accretion, avoidance, Turbulence, Effects on flight, avoidance, 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	7th week: **Lecture:** FLIGHT HAZARDS, Thunderstorms, Conditions for and process of development,

conditions for wind shear, Effects on flight, avoidance **Practice:** Case study, avoidance techniques	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 **Practice:** Aviation weather messages examples	**14th week:** **Lecture:** METEOROLOGICAL INFORMATION, Meteorological services, World area forecast system and meteorological offices, International organisations **Practice:** Meteorological offices in operation
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory.

Participation at practice classes is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Type Rating

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 teaches the basic knowledge of Multi-crew cooperation according to FCL.735.A; AMC1 FCL.930.MCCI

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

Displays, practical examples for softwares, hardware, environment, malfunctions in crew cooperation, leadership; tasks and privileges, cultural elements, pf and pm tasks, professional quality, responsible crew cooperation, personal characteristics, attitude and devotion: attention, conflict solving skill, intervention, effective and clear communication in flight, crew cooperation procedures, use of checklists

By conducting the course the student will have the knowledge recommended by the EU legislation FCL.735.A and AMC1 FCL.930.MCCI will understand the complex requirements of multi crew cooperation with it's compulsory set of operational and human skills.

Literature:

Compulsory:

- O'Connor, P., Hormann, H., Flin, R., Lodge, M. & Goeters, K. (2002). Developing a method for evaluating crew resource management: a European perspective. The International Journal of Aviation Psychology, 12, 263-285.
- Mearns, K., Flin, R. & O'Connor, P. (2001). Sharing worlds of risk; improving communication with crew resource management. Journal of Risk Research, 4, 377-392.
- Crew Resource Management: A Literature Review Robert W. Kaps Ran Keren-Zvi Jose R. Ruiz. Volume 8 Number 3 JAAER Spring 1999. Journal of Aviation/Aerospace Education & Research.

Schedule

1st week Registration week	
2nd week: 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: 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: Practice: Pre-flight preparation, FMS initialization, radio and navigation equipment preparation, flight documentation, computation of take-off performance data	5th week: 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
6th week: 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	7th week: Practice: Cruse, normal cruise cooperation and callouts, flying in turbulence, holding, icing emergency descent, early recognition of and reaction on approaching stall in differing aircraft configurations
8th week: 1st drawing week	
9th week: Practice: approach, cooperation and callouts, briefing before landing, descent cooperation and callouts, descent	10th week: Practice: approach, precision approach using raw data, precision approach using

techniques, descent and approach, instrument flight procedures, holding	flight director, precision approach using autopilot, one-engine inoperative approach
11th week:	12th week:
Practice: approach, non-precision and circling approaches, computation of approach and landing data, approach in low visibility conditions	Practice: go around, all engines go around, go-around with one engine inoperative, go-around cooperation and callouts, wind shear during approach
13th week:	14th week:
Practice: landing, cooperation and callouts, landings, normal, crosswind and with one engine simulated inoperative, transition from instrument to visual flight on reaching decision altitude or height or minimum descent altitude or height	Practice: emergency situations, type of pilot incapacitation, partial and full, recognition of the signs of incapacitation, actions to be taken by incapacitation, emergency and abnormal procedures, emergency descent, after landing and post flight procedures
15th week: 2nd drawing week	

Requirements

A, for a signature:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Radiotelephony

Code: MK3RADTR02HX17-EN

ECTS Credit Points: 2

Evaluation: mid-semester grade

Year, Semester: 4th year, 1st semester

Its prerequisite(s): Radionavigation

Further courses are built on it: Yes/No

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

Topics:

Radiotelephony subject contains supplementary information in addition to VFR and IFR communication ATPL subjects that fills the gap between theoretical knowledge and practical use of radiotelephony during actual flight operation.

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

Differences between certain countries, continents (content of atis, atc clearance, communication with ground staff and atc), types of operation (business jet, passenger flight, cargo flight, etops).

The course is not an obligation by the Part-FCL regulation nevertheless it is prepared to give a more comprehensive view for the pilot of the future to understand more deeply the correlations in aviation.

It 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), Communications, 2015, ISBN szám: 978 1 90620 277 4

Schedule

1st week Registration week	
2nd week: **Practice:** General Procedures, Use of VHF RTF Channels, Transmitting Technique, Transmission of Letters, of Time, Standard Words and Phrases, Callsigns, Continuation of Communications, Corrections and Repetitions, Clearance Issue and Read-back Requirements, Communication Failure, Record of Communications, Categories of Message	**3rd week:** **Practice:** General Phraseology, Level Reporting, Speed Control, Initial Call – IFR/VFR flights, Position Reporting, Flight Plans, Low Visibility Procedures, Delays
4th week: **Practice:** Aerodrome Phraseology, Aerodrome Control Service Phraseology, Type of Service, Departure Information and Engine Starting Procedures, Pushback and Powerback, Taxi Instructions, Pre-Departure Manoeuvring, Take-Off Clearance, Final Approach and Landing, Missed Approach, Runway Vacating and	**5th week:** **Practice:** Aerodrome Phraseology, Aerodrome Flight Information Service Phraseology, AFIS Phraseology for Ground Movement, Take-Off, Landing and Transit, RNAV (GNSS) Instrument Approach Procedures, Initial Call, Position Reporting, Traffic Information, Final Approach Fix, Inbound / Outbound Aircraft Interaction, Reporting GNSS Problems

Communicating after Landing Essential Aerodrome Information	
6th week: **Practice:** Aerodrome Phraseology, Aerodrome Phraseology for Vehicles (ATC and AFIS only), Movement Instructions, To Cross a Runway, Low Visibility Procedures, Messages Regarding Safety of an Aircraft and Regarding Wildlife, Broken-down Vehicle, Radio Failure	**7th week:** **Practice:** Aerodrome Phraseology, Aerodrome Air/Ground Communication Service Phraseology, Type of Service, Air/Ground Station Identification, Offshore Communication Service
8th week: 1st drawing week	
9th week: **Practice:** Radar Phraseology, Radar Identification of Aircraft, Secondary Surveillance Radar Phraseology, ATS Surveillance Service, Radar Vectoring, Traffic Information and Avoiding Action Phraseology, ACAS/TCAS Phraseology, Communications and Loss of Communications, Danger Area Crossing Service/Danger Area Activity	**10th week:** **Practice:** Approach Phraseology, Approach Control Service Phraseology, IFR Departures, VFR Departures, IFR Arrivals, VFR Arrivals, Special VFR Flights, Vectoring to Final Approach, Direction Finding (DF), VDF Procedure, NDB(L) and VOR Procedures, Area Navigation Global Navigation Satellite System RNAV(GNSS) Phraseology, Procedure Clearance
11th week: **Practice:** Approach Phraseology, Position Reporting, Final Approach Fix, Reporting GNSS Problems, Surveillance Radar Approach (SRA), Clearance to enter Control Zones (CTR), Reduced Traffic Information, Traffic Service – Operations below ATC Terrain Safety Levels, Deconfliction Service – Departing and Arriving Aircraft	**12th week:** **Practice:** Area Phraseology, Area Control Service Phraseology, Position Reporting, Flights Joining Airways, Flights Transitioning Between Different Classifications of Controlled Airspace, Flights Leaving Airways, Flights Crossing Airways, Flights Holding En-Route, Reduced Vertical Separation Minimum (RVSM) Phraseology
13th week: **Practice:** Emergency Phraseology, Distress and Urgency Communication Procedures, States of Emergency, UHF and VHF Emergency Service General Procedures, Emergency Message, PAN PAN MEDICAL, Ejection from Aircraft, Speechless Code, Radio Procedures – Practice Emergencies, Relayed Emergency Message, Emergency Descent, Fuel Shortage, Termination of Distress Communications and Imposition of Silence	**14th week:** **Practice:** Miscellaneous Phraseology, Wake Turbulence, 8.33 kHz Phraseology, Aerodrome Emergency Services, Radio Mandatory Zones

15th week: 2nd drawing week

Requirements

A, for a signature:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Mass and Balance (ATPL)

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 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:

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-engined 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 bacnground 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 szám: 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 Practice: Mass calculation examples	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: Basic calculations of CG
6th 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 Practice: Airport visit, demonstration of compartments, fuel system	7th week: 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
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:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Performance (ATPL)

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 szám: 978 1 90620 269 9

Schedule

1st week Registration week	
2nd week: **Lecture:** GENERAL, 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:	**5th 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	**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 ONLY, 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 performance, Cruise altitudes, Cost Index (CI),Use of aeroplane flight data **Practice:** Cruise techniques examples	**12th week:** **Lecture:** PERFORMANCE CLASS A, En route one engine inoperative, Drift down, Influence of variables on the en route one engine inoperative performance **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:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

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)

Code: MK3FLPMR03HX17-EN

ECTS Credit Points: 3

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+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 szám: 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, 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	10th week: Lecture: PRE-FLIGHT PREPARATION, Meteorological briefing, Extraction and analysis of relevant data from meteorological documents, Extraction and

alternate 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:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

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)

Code: MK3GENAR04HX17-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+4

Topics:

The course teaches the basic knowledge of General Navigation 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:

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 bacnground and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

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

Schedule

1st week Registration week	
2nd week:	**3rd 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	**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: Great circle, small circle, Use of latitude and longitude coordinates to locate any specific position	**Practice:** Time conversion examples
4th week:	**5th 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	**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:	**7th 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	**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:	**10th 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	**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:	**12th 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,	**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

Determination of temperature, Determination of appropriate speed, Determination of Mach number **Practice:** Calculation examples	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:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Radio Navigation (ATPL)

Code: MK3RANAR04HX17-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+4

Topics:

The course teaches the basic knowledge of Radio Navigation 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:

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 bacnground and basis of aviation, learn the structure and sources of the rules.

Literature:

Compulsory:

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

Schedule

1st week Registration week	
2nd week: **Lecture:** BASIC RADIO PROPAGATION 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 PROPAGATION 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: **Lecture:** RADAR, Pulse techniques and associated terms, Ground radar, Principles	7th week: **Lecture:** RADAR, Airborne weather radar, Principles, Secondary surveillance radar

Practice: Presentation and interpretation	and transponder, Principles, Modes and codes, , Errors and accuracy **Practice:** Presentation and interpretation
8th week: 1st drawing week	
9th week: **Lecture:** AREA NAVIGATION SYSTEMS, RNAV/FMS, 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:

Attendance at lectures is recommended, but not compulsory.

Participation at practice classes is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

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)

Code: MK3OPPRR02HX17-EN

ECTS Credit Points: 2

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+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 szám: 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, ,	10th week: Lecture: SPECIAL OPERATIONAL PROCEDURES AND HAZARDS, Fire and smoke, Carburettor fire, Engine fire, Fire in

Influence of the flight procedure (departure, cruise, approach), Influence by the pilot (power setting, low drag) **Practice:** Noise-abatement procedures	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:	**12th 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	**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:	**14th 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	**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:

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

Participation at **practice classes** is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up any practice 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 certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor.

B, for grade:

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

Communication VFR, IFR (ATPL)

Code: MK3COMMR02HX17-EN

ECTS Credit Points: 2

Evaluation: official exam

Year, Semester: 3rd year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: No

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

Topics:

The course teaches the basic knowledge of Communication VFR/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 (VFR), action required to be taken in case of communication failure, distress and urgency procedures, relevant weather, information terms (IFR), 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: Lecture: DEFINITIONS, Meanings and significance of associated terms,	3rd week:

Practice: Air Traffic Control abbreviation examples	**Lecture:** DEFINITIONS, Q-code groups commonly used in RTF air– ground communications **Practice:** Categories of messages
4th week:	**5th week:**
Lecture: GENERAL OPERATING PROCEDURES, Transmissions **Practice:** Transmission of letters, Transmission of numbers (including level information), Transmission of time, Transmission technique	**Lecture:** GENERAL OPERATING PROCEDURES, Standard words and phrases (relevant RTF phraseology included) **Practice:** Standard words and phrases examples
6th week:	**7th week:**
Lecture: GENERAL OPERATING PROCEDURES, Radio-telephony call signs for aeronautical stations including use of abbreviated call signs, **Practice:** Radio-telephony call signs for aircraft including use of abbreviated call signs	**Lecture:** GENERAL OPERATING PROCEDURES, Transfer of communication, **Practice:** Test procedures including readability scale; establishment of RTF communication, Read-back and acknowledgement requirements
8th week: 1st drawing week	
9th week:	**10th week:**
Lecture: GENERAL OPERATING PROCEDURES, Radar procedural phraseology, **Practice:** Level changes and reports	**Lecture:** ACTION REQUIRED TO BE TAKEN IN CASE OF COMMUNICATION FAILURE, action to be taken in case of communication failure on an IFR flight when flying in VMC **Practice:** communication failure action examples
11th week:	**12th week:**
Lecture: DISTRESS AND URGENCY PROCEDURES, PAN MEDICAL, Distress (definition, frequencies, watch of distress frequencies), Urgency (definition, frequencies) **Practice:** distress signal, distress message, urgency signal, urgency message	**Lecture:** RELEVANT WEATHER INFORMATION TERM, Aerodrome weather, **Practice:** Weather broadcast
13th week:	**14th week:**
Lecture: GENERAL PRINCIPLES OF VHF PROPAGATION AND ALLOCATION OF	**Lecture:** MORSE CODE, radio-navigation aids (VOR, DME, NDB, ILS) from their Morse-code identifiers,

FREQUENCIES, radio-frequency spectrum with particular reference to VHF, **Practice:** propagation characteristics of radio transmissions in the VHF band, the factors which reduce the effective range and quality of radio transmissions	**Practice:** SELCAL, TCAS, ACARS phraseology and procedures
15th week: 2nd drawing week	

Requirements

A, for a signature:

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B, for grade:

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