STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Aeronautical Software	**1010532121010530044**

Field of study	Profile of study (general academic, practical)	Year /Semester
Automatic Control and Robotics	**general academic**	**1 / 2**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Smart Aerospace and Autonomous Systems	**English**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
Second-cycle studies	**full-time**

No. of hours				No. of credits
Lecture: **12**	Classes: **10**	Laboratory: **8**	Project/seminars: **-**	**3**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
major	**from field**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student starting this module should have basic knowledge regarding software.
2	**Skills**	He/she should have skills allowing solving basic problems related to software. Student should understand the need to extend his/her competences.
3	**Social competencies**	In addition, in respect to the social skills the student should show attitudes as honesty, responsibility, perseverance, curiosity, creativity, manners, and respect for other people.

Assumptions and objectives of the course:

1. Provide students knowledge regarding current and emerging aerospace software.
2. Develop students? skills in solving problems related to UML, Buses, protocols, safety, security.
3. Acquire such skills by solving practical tests during laboratory classes.
4. Develop students? skills to carry out experiments and to work with aerospace software.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. acquire knowledge on aerospace software - [K_W4]
2. have wide and in-depth knowledge on UML, Buses, standards, safety, security, reliability - [K_W5]
3. be informed about trends and advances in UML, Buses, standards, safety, security, reliability - [K_W6]
4. know methodology of carrying out experiments with UML, Buses, standards, safety, security, reliability - [K_W8]

Skills:

1. is able to acquire, integrate, interpret and evaluate information from literature, databases and WWW sources on UML, Buses, standards, safety, security, reliability. - [K_U1]
2. is able to plan and arrange self-education process in particular covering issues of UML, Buses, standards, safety, security, reliability - [K_U5]
3. is able to apply navigation and guidance methods to solve engineering as well as scientific problems. - [K_U9]
4. is able to integrate knowledge coming both from different sub-domains of UML, Buses, standards, safety, security, reliability to formulate and solve engineering tasks. - [K_U10]
5. can conduct experimental studies and analyse their results with UML, Buses, standards, safety, security, reliability - [K_U12]
6. is able to evaluate strong and weak points of algorithms and their implementation and asses their usefulness to IT tasks - [K_U13]

Social competencies:

1. understands that knowledge and skills related to UML and buses quickly becomes non relevant - [K_K1]
2. knows examples / case studies of UML, Buses, standards, safety, security, reliability and analysis and understands their limitations - [K_K4]
3. is able to correctly assign priorities to own tasks - [K_K6]

Assessment methods of study outcomes

Formative assessment:

a) lectures:

based on answers to question in the written exam,

b) laboratory classes:

evaluation of doing correctly assigned tasks (following provided lab. instructions),

Total assessment:

a) verification of assumed learning objectives related to lectures:

i. evaluation of acquired knowledge on the basis of the written exam.

ii. discussion of correct answers in the exam

b) verification of assumed learning objectives related to laboratory classes:

i. evaluation of student?s knowledge necessary to prepare, and carry out the lab tasks,

ii. monitoring students? activities during classes,

iii. evaluation of lab reports (partly started during classes, finished after them)

iv. two written tests during the classes,

Additional elements cover:

i. discussing more general and related aspects of the class topic,

ii. showing how to improve the instructions and teaching materials.

Course description

This course provides an overview of aerospace software and its safety as it relates to the safety standards used in the aircraft industry, traditional safety analysis techniques and current research and development efforts in the field. In particular, learners will gain an understanding of the various software safety standards used in the aircraft industry, traditional safety analysis techniques, and current research and development efforts in the field. Failure Mode Effects Analyses (FMEA) have proven to be an effective method for improve the reliability of hardware systems. An introduction to Software FMEA and relation to Hardware FMEA is provided along with a step-by-step approach to performing software FMEA

Course Outline : UML languge, Avionics bus and standard (ARINC, MIL), The difference between Safety, Security and Reliability, The difference between Software, Hardware and Data Safety, The role of various Safety Standards (DO-178B, DO-254, ARP 4761, ARP 4754, etc.) , Current safety analysis techniques, Laying groundwork for performing Software FMEA;

Practical work: Exercises will be set, which will involve analysis and design of selected real world examples.

When completing this course the students will be able to:

- Understand the fundamentals of aerospace software
- Understand the fundamentals of EACA standards and the type

The lab-classes will be focused on practical exercises with software implementations and their application to test or real situations. It should cover real world applications

Learning methods:

1. Lectures: multimedia presentation, presentation illustrated with examples presented on black board, solving tasks, multimedia showcase
2. Labs: solving tasks, practical exercises, discussion, teamwork, multimedia showcase, competitions or case studies

Basic bibliography:

1. Aeronautics and Space engineering board National Research Council Assessment of space shuttle flight software development, National Academies Press, 1993

2. F. De Florio Airworthiness, an introduction to aircraft certification: a guide to understanding JAA, EASA and FAA standards Elsevier, 2006

Additional bibliography:

Result of average student's workload

Activity	Time (working hours)
1. participating in laboratory classes / tutorials	18
2. preparing to laboratory classes:	4
3. finishing reports from laboratory classes (in addition to laboratory classes):	4
4. consulting issues related to the subject of the course; especially related to t laboratory classes and projects,	5
5. preparing to assessment tests	10
6. participating in lectures	12
7. studying literature / learning aids	10
8. preparing to and participating in exams	15

Student's workload

Source of workload	hours	ECTS
Total workload	78	3
Contact hours	35	1
Practical activities	26	1