



UNDERGRADUATE STUDY: **AIR TRANSPORT**

SEMESTER (III)

Syllabus

Academic year 2025/2026

Course: Aviation 4.0+						
Head of course: Asst. Prof. Matija Bračić , Ph. D.						
Co-lecturers: Dajana Bartulović , Ph. D. Asst. Prof. Matija Bračić , Ph. D.						
Semester: W	Course code: 283295	Lectures: 30	Auditory exercises: 0	Laboratory exercises: 15	Seminars: 0	ECTS credits: 4
Group for lectures: 15 students			Group for auditory and laboratory exercises: 15 students			

Objective of the course:

- Introducing students with the application of software tools and automated services in aviation, including cyber-physical systems, human performance and aviation data monitoring systems, trend analysis and reporting systems, connecting devices via the internet, artificial intelligence, blockchain technology, robotics, simulations and predictive tools.

Course enrolment requirements:

- No enrolment requirements.

Learning outcomes:

1. Determine software tools and automated services applicable in aviation.
2. Criticise and make decisions based on data using software tools and automated services.
3. Select the option of the optimal software tool applicable in data analysis of a specific aviation segment.
4. Compare the advantages and disadvantages of software tools and automated services in aviation.
5. Predict behaviour patterns of a given aviation dataset by using simulation and/or predictive software tools.

**LECTURES and EXERCISES**

Week	Syllabus	Form of classes	Performed by	Lessons	Remark
1.	▪ Introduction to Aviation 4.0+	L	Matija Bračić	1	Defining the dates of the first and second colloquia.
		L	Dajana Bartulović	1	
	▪ Completing a program task using the system for monitoring and analysing aviation data (in the available software package)	LE	Dajana Bartulović	1	
2.	▪ The fourth industrial revolution – Industry 4.0	L	Dajana Bartulović	2	
	▪ Completing a program task using the system for monitoring and analysing aviation data (in the available software package)	LE	Dajana Bartulović	1	
3.	▪ Use of software tools and automated services in aviation	L	Dajana Bartulović	2	
	▪ Completing an event reporting program task using the safety reporting system (in the available software package)	LE	Dajana Bartulović	1	
4.	▪ Data driven decision-making (D3M)	L	Dajana Bartulović	2	
	▪ Completing an event reporting program task using the safety reporting system (in the available software package)	LE	Dajana Bartulović	1	



5.	Aviation 4.0	L	Dajana Bartulović	2	
	Completing a program task of analysis of safety performance trends using software(s) for safety and security management (in the available software package(s))	LE	Dajana Bartulović	1	
6.	Historical development from Aviation 1.0 to Aviation 4.0	L	Dajana Bartulović	2	
	Completing a program task of analysis of safety performance trends using software(s) for safety and security management (in the available software package(s))	LE	Dajana Bartulović	1	
7.	Cyber-Physical Systems (CPS) in aviation – connecting the cyber and physical aspects of aviation	L	Dajana Bartulović	2	
	Completing a risk assessment program task using artificial intelligence (in the available software package)	LE	Dajana Bartulović	1	
8.	Real-time human performance and/or aircraft data monitoring systems	L	Dajana Bartulović	2	1 st colloquium
	Completing a risk assessment program task using artificial intelligence (in the available software package)	LE	Dajana Bartulović	1	
9.	Integrated Safety Trend Analysis and Reporting System (iSTARS)	L	Dajana Bartulović	2	



	Completing a program task of statistical data analysis using statistical software tools (in the available software package)	LE	Dajana Bartulović	1	
10.	Connecting devices in aviation via the internet (IoT)	L	Dajana Bartulović	2	
	Completing a program task of statistical data analysis using statistical software tools (in the available software package)	LE	Dajana Bartulović	1	
11.	Artificial Intelligence (AI) – purpose and application in aviation	L	Dajana Bartulović	2	
	Completing a simulation program task using simulation tools in aviation (in a specific simulation software package)	LE	Dajana Bartulović	1	
12.	Blockchain technology – purpose and application in aviation	L	Dajana Bartulović	2	
	Completing a simulation program task using simulation tools in aviation (in a specific simulation software package)	LE	Dajana Bartulović	1	
13.	Robotics – purpose and application in aviation	L	Dajana Bartulović	2	
	Completing a forecasting program task using predictive tools in aviation (in a specific software package for predictive analytics)	LE	Dajana Bartulović	1	



14.	▪ Application of simulation tools in aviation	L	Dajana Bartulović	2	
	▪ Completing a forecasting program task using predictive tools in aviation (in a specific software package for predictive analytics)	LE	Dajana Bartulović	1	
15.	▪ Application of predictive tools in aviation	L	Dajana Bartulović	2	2 nd colloquium
	▪ Completing a forecasting program task using predictive tools in aviation (in a specific software package for predictive analytics)	LE	Dajana Bartulović	1	

L = Lectures; AE = Auditory Exercises; LE = Laboratory Exercises; S = Seminars



STUDENT OBLIGATIONS AND EXAMS

Conditions for obtaining signatures:

Attendance is mandatory and students are required to attend at least 80% of the lectures and exercises.

Written examination:

There are two ways of passing the exam:

- a) **two colloquia** – The first is held in the middle of the semester, the second at the end of the semester. Each colloquium consists of 25 theoretical questions. For a positive assessment of both written colloquia, it is necessary to achieve 60% points (maximum 100% points). Only students who have passed the first colloquium can attend second colloquium. Students who meet the requirements of the written colloquia approach the oral exam on which a final grade is formed accounting the results of the two written colloquia.
- b) **written test** – consists of a combination of questions from two colloquia to comprehensively cover the course content. The written test consists of 50 theoretical questions. A positive score of the written test is required to achieve 60% points (maximum 100% points). Students who meet the criteria are invited to the oral exam.

Oral examination:

To be invited to the oral exam, student must successfully pass two colloquia (get 60% or more points at both colloquia) or successfully pass a written test (get 60% or more points).

LITERATURE

a) Obligatory literature:

1. Bartulović D. Lecture and exercise material for the course Aviation 4.0+.

b) Recommended literature:

1. Kushan MC. Aircraft Technology. London: IntechOpen; 2018.
2. Accialini N. Industry 4.0 User Guide. Padua: University of Padua; 2021.
3. Gilchrist A. Industry 4.0: The Industrial Internet of Things. New York: Apress. 1st Edition; 2016.
4. Kahraman C, Aydın S. Intelligent and Fuzzy Techniques in Aviation 4.0: Theory and Applications. New York: Springer; 2021.



METHODOLOGY OF THE IMPLEMENTATION OF THE COURSE PLAN

1. LECTURES

The lectures follow the subject defined by the course syllabus and the course programme. All topics covered in the lectures are fully contained within the obligatory and recommended literature. Lectures are performed using Power Point presentations and boards. The lecture encourages discussion of the topic at hand. Students are provided by complete authorized lecture material in digital form (via Merlin system).

2. LABORATORY EXERCISES

Laboratory exercises complement lectures with practical work, through completing a program tasks using various software used in aviation for monitoring and analysing aviation data, safety reporting, analysing the performance trends, risk assessments, statistics, simulation and prediction.

Note: Individual and/or group viewing negative written test

Individual (or a group upon request) can view his/her negative written test, at the time of consultation or a designated time after each colloquium and/or written test.



3. DOCUMENTATION

The attendance of students in lectures and exercises is recorded prior to each class, and student work/progress is monitored statistically through the ISVU system (continuous monitoring). The written examinations of all colloquia/tests are archived.

4. SCORING SYSTEM

Table 1 The scoring system for the monitoring of students and explained credit values in ECTS credits

no	Segment:	Required credits to be achieved:		Remark:	ECTS credits
		Min.	Max.		
1.	Presence at the lectures	12	15	Presence $\geq$ 80%	0,75
2.	Presence at the exercises (laboratory)	12	15	Presence $\geq$ 80%	0,75
3.	First colloquium	15	25	First part of the lecture material <i>Replacement item 5.</i>	1
4.	Second colloquium	15	25	Second part of the lecture material <i>Replacement item 5.</i>	1
5.	Written test (terms)	30	50	Examination of the entire lecture material <i>Replacement items 3. and 4.</i>	2
6.	Oral exam	12	20	Oral examination of the lecture material	0,5
Σ	<i>Overall points:</i>	$\Sigma 66$	$\Sigma 100$	<i>Overall ECTS points:</i>	$\Sigma 4$



Table 2 Explanation of the credit values in evaluations

CREDITS:	Estimate based on attendance, two colloquies (or written test) - [3,5 ECTS]*:	The final score [4 ECTS]*:
60 – 70 %	Sufficient (2)	Exemption from the written part of the exam, the final score after oral exam
71 – 80 %	Good (3)	
81 – 90 %	Very good (4)	
91 – 100 %	Excellent (5)	Exemption from verbal parts of exam

Information for students (scoring system, implementation plan, learning outcomes, syllabus, literature, consulting teachers, announcement of results of examinations or colloquium, and all other information):

- <https://moodle.srce.hr/2025-2026/>
- <http://www.fpz.unizg.hr/>

Student assistants: Help regarding disseminating information about the course, and work with the students that need additional help in mastering the course material.