

1. BASIC INFORMATION

Course	Statistics
Degree program	Degree in Aerospace and Aircraft Engineering
School	Escuela de Arquitectura, Ingeniería y Diseño
Year	Second course
ECTS	6
Credit type	Basic
Language(s)	English
Delivery mode	On-Campus
Semester	Second semester
Academic year	2019/2020
Coordinating Professor	Javier Martínez Martínez

2. PRESENTATION

Statistics for Engineering is a 6 ECTS second-year mathematics course. Its overall objective is to equip students with knowledge and skills related to the concepts and basic problems of statistics and probability. The course is an introduction to statistical methods, mainly one-variable analysis, applied to the environment and scientific research in many fields of engineering. This subject is part of the Mathematics module, which consists of the following courses:

- Algebra
- Calculus I
- Calculus II
- Statistics.

Students will be able to deal with statistical concepts including measures of central tendency and dispersion, probability distributions, confidence intervals and hypothesis testing, and to apply them to a wide range of situations. They will demonstrate basic mathematical understanding and computational skills, and they will be able to explain and critique mathematical reasoning through speaking and writing in a precise and articulate way.

3. COMPETENCIES AND LEARNING OUTCOMES

Core competencies / Basic skills:

- CB2: Students can apply their knowledge to their work or vocation in a professional manner and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study..
- CB5: Students have developed learning skills that are necessary to undertake further studies with a high degree of autonomy

Cross-curricular competencies / Cross disciplinary skills:

- CT12: Knowledge of basic subjects and technologies, enabling the student to learn new methods, theories and technologies, and endowed it with great versatility to adapt to new situations (autonomous learning).
- CT14: Problem Solving with initiative, decision making, creativity, and critical thinking, professionally, and the preparation and defense of arguments (Troubleshooting).
- CT16: To communicate and convey information, ideas and skills in the student's field of specialization, either in writing or orally, both to skilled and unskilled audiences (communication skills).
- CT19: Working in interdisciplinary teams, providing the most efficient on the basis of cooperation, assuming their role within the team, establishing good relationships and exchanging information (Teamwork).

Specific competencies / specific skills:

- CE1: Ability to solve mathematical problems arising in engineering. Ability to apply knowledge of linear algebra, geometry, differential geometry, differential and integral calculus, differential equations, numerical methods, numerical algorithms, statistics and optimization.

Learning outcomes

Upon successful completion of the course, the student will be able to:

- LO1: Solve problems in Applied Mathematics.
- LO2: Generate structured reports with rigour (based on laboratory practices)

The following table shows the relationship between the competencies developed during the course and the learning outcomes pursued:

Competencies	Learning outcomes
CB2,CB5,CT12,CT14,CE1	LO1. Solve problems in Applied Mathematics
CB2,CB5,CT12,CT16,CT19	LO2. Generate structured reports with rigour (based on laboratory practices)

4. CONTENTS

The course is divided in five learning units, as detailed in Annex:

- Unit 1. Descriptive Statistics.
- Unit 2. Probability.
- Unit 3. Random variables.
- Unit 4. Probability models.
- Unit 5. Statistical inference. Introduction to stochastic systems.

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Face to face sessions.
- Case studies.
- Cooperative Learning.
- Problem Based Learning (PBL)

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Type of educational activity	Number of hours
AF1: Face to face sessions	25 h

AF2: Group work (participation in debates and seminars, group activities and exercises)	55 h
AF9: Self-study and autonomous work	50 h
AF10: Tutoring sessions, follow-up and assessment	20 h
TOTAL	150 h

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Assessable activity	Assessment criteria	Weight (%)
<i>Activity 1: Face-to face sessions</i>	The student must meet the University's minimum attendance policy requirement. Attendance must be properly recorded by the GRP system.	Met / Not met
<i>Activity 2: Working sessions and homework assignments</i>	<p>Assignments will be graded from 0 to 10, according to the following points:</p> <ul style="list-style-type: none"> • If the assignment corresponds to a working session, attendance is required. • Neatness. • Delivered on due time. • Completion rate (all/some/none of the exercises were completed) • Accuracy (all/some/none of the exercises were correct) • Understanding and reasoning (the exercise solutions are correctly formulated and all/some/none of the steps are correctly explained) 	30 %
<i>Activity 3: Group Project</i>	<ul style="list-style-type: none"> • Members of the team took an active part in the solving process • They worked effectively in groups. • Solutions were correct and enriched with comments and final discussions. 	20%

<i>Activity 4: Midterm examination</i>	<ul style="list-style-type: none"> • The complete set of equations that are needed to solve the problem has been properly obtained and explained. • The results that are obtained are correct in view of the considered hypotheses. • The results are thoroughly analyzed and discussed. 	20%
<i>Activity 5: Final examination</i>	<ul style="list-style-type: none"> • The complete set of equations that are needed to solve the problem has been properly obtained and explained. • The results that are obtained are correct in view of the considered hypotheses. • The results are thoroughly analyzed and discussed. 	30%

There are two assessment examinations in this course:

- A **midterm exam**, that counts for 20% of the course's final average grade and covers all the topics explained at class prior to the exam date.
- A **final exam** to be held at the end of the semester, during the final examination week, covering all the topics learned in the subject. Its weight is 30% of the course's final average grade.

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the course in the first exam period you should....

- Attend at least 50% of the lectures, with the exception of some special cases included in the School regulations. Attendance must be properly recorded by the GRP system.
- Obtain a grade greater or equal than 5.0 out of 10 in the final exam.
- Obtain a grade greater or equal than 5.0 out of 10 in the group project.
- Obtain a course's final average grade greater than or equal to 5.0 out of 10.

If a student fails to satisfy one of these requirements, he/she will be graded with a final average grade that shall not exceed 4.0 points out of 10. The grade will be NP (No presentado) in those cases where the student did not complete any graded activity.

7.2. Second exam period

Students who do not pass the course during the normal assessment period will have a second chance to retake the course in the Supplementary Exam Period. The same requirements and assessment rules mentioned in section 4.1 also hold in this period. Students will have the opportunity to redo the modules failed during the normal assessment period by carrying out new activities of similar difficulty and length. These activities will be published in the Virtual Campus at the beginning of the Supplementary Exam Period. In particular, students should...

- Obtain a grade greater than or equal to 5.0 out of 10 in the final exam.
- Obtain a grade greater than or equal to 5.0 out of 10 in the group project.
- Obtain a course's final average grade greater than or equal to 5.0 out of 10.

If a student fails to satisfy one of these requirements, he/she will be graded with a final average grade that shall not exceed 4.0 points out of 10

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Activity	Learning Unit	Weeks	Weight
Activity 2 (Working sessions and individual assignments)	U1	Weeks 1-3	30%
	U2	Weeks 4-6	
	U3	Weeks 7-9	
	U4	Weeks 11-14	
	U5	Weeks 14-17	
Activity 3: Group project	U1,U3,U4	Weeks 2-16 Oral presentation and Project deadline : Week 15-16	20%
Activity 4: Midterm examination	Midterm exam: U1, U2, U3	Week 9	20%
Activity 5: Final examination	Final exam: U1,U2,U3,U4,U5	Week 18	30%

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

9. BIBLIOGRAPHY

Here is the recommended bibliography:

- J.L. DEVORE (1998), *Probabilidad y estadística para ingeniería y ciencias*. México, International Thompson Editores.
- F.J. MARTÍN PLIEGO (2006), *Fundamentos de Probabilidad*. Madrid: Thomson Paraninfo.
- D.C. MONTGOMERY, G.C. RUNGER (2003). *Applied Statistics and Probability for Engineers*. New York, John Wiley and Sons.

- S. ROSS.(1998) *A first course in probability*. Prentice Hall.
- R. E. WALPOLE, R.H. MYERS (2000) *Probabilidad y Estadística*. México, McGraw-Hill.

10. DIVERSITY MANAGEMENT UNIT

Students with specific learning support needs:

Curricular adaptations and adjustments for students with specific learning support needs, in order to guarantee equal opportunities, will be overseen by the Diversity Management Unit (UAD: Unidad de Atención a la Diversidad).

It is compulsory for this Unit to issue a curricular adaptation/adjustment report, and therefore students with specific learning support needs should contact the Unit at unidad.diversidad@universidadeuropea.es at the beginning of each semester.

INSTITUTIONAL ASSESSMENT OF LEARNING OUTCOMES PLAN Covid-19

Course/Module Statistics
Degree Program Degree in Aerospace and Aircraft Engineering
Year 2º
Group M2Z
Professor Javier Martínez
Subject Coordinator : Javier Martínez

Teaching Activity described in the syllabus	Adapated activity in distance learning
AF1: Face to face sessions	AF1: Online sessions
AF2: Group work (participation in debates and seminars, group activities and exercises)	AF2: Group online sessions: online problems and exercise workshops
AF9: Self-study and autonomous work	AF9: Self-study and autonomous work
AF10: Tutoring sessions, follow-up and assessment	AF10: Online tutoring sessions, assessment using online tools (Blackboard)

Evaluation Activity that was planned in the Syllabus for face to face instruction		NEW virtual evaluation activity (adapted)	
Description of original face to face evaluation activity	Activity 1: Face to face sessions	Description of new activity	Activity 1: Online sessions
Content to be assessed	U1,U2,U3,U4,U5		
Learning Outcomes to be assessed <i>(Please check Syllabus of the course/module)</i>	LO1. Solve problems in Applied Mathematics LO2. Generate structured and rigorous reports (based on laboratory practices)		
Duration	4h/week , March-June 2020	Approximate duration	4h/week , March-June 2020
Weight in evaluation	-	Weight in evaluation	-
Please note:	Contents and exercises are explained via Blackboard Collaborate following the same schedule (days and class hours) using digital blackboard (iPad), PDFs and slides and other resources		

Evaluation Activity that was planned in the Syllabus for face to face instruction		NEW virtual evaluation activity (adapted)	
Description of original face to face evaluation activity	Activity 2 (Working sessions and/or individual assignments)	Description of new activity	Activity 2: Online individual assignments via Blackboard
Content to be assessed	U1,U2,U3,U4, U5		
Learning Outcomes to be assessed <i>(Please check Syllabus of the course/module)</i>	LO1. Solve problems in Applied Mathematics LO2. Generate structured and rigorous reports (based on laboratory practices)		
Duration	2h each	Approximate duration	2h each
Weight in evaluation	30%	Weight in evaluation	30%
Please note:			

Evaluation Activity that was planned in the Syllabus for face to face instruction		NEW virtual evaluation activity (adapted)	
Description of original face to face evaluation activity	Activity 3 (Group Project)	Description of new activity	Activity 3 (Group Project)
Content to be assessed	U1,U5		
Learning Outcomes to be assessed <i>(Please check Syllabus of the course/module)</i>	LO1. Solve problems in Applied Mathematics LO2. Generate structured and rigorous reports (based on laboratory practices)		
Duration	March 2020-May 2020	Approximate duration	March 2020 – May 2020
Weight in evaluation	20%	Weight in evaluation	20%
Please note:	Group Project guidelines were established at the beginning of the course. Students have kept working on the Group Project after lockdown, using online tools to maintain contact and to develop it.		

Evaluation Activity that was planned in the Syllabus for face to face instruction		NEW virtual evaluation activity (adapted)	
Description of original face to face evaluation activity	Activity 4: Midterm examination	Description of new activity	Activity 4: Online test + assignment
Content to be assessed	U1,U2,U3		
Learning Outcomes to be assessed <i>(Please check Syllabus of the course/module)</i>	LO1. Solve problems in Applied Mathematics		
Duration	2h (week 10)	Approximate duration	1h30m (week 13-14)
Weight in evaluation	20%	Weight in evaluation	20%=10%+10%
Please note:	Online test + exercises assignment		

Evaluation Activity that was planned in the Syllabus for face to face instruction		NEW virtual evaluation activity (adapted)	
Description of original face to face evaluation activity	Activity 5: Final examination	Description of new activity	Activity 5: Online test
Content to be assessed	U1,U2,U3, U4,U5		
Learning Outcomes to be assessed <i>(Please check Syllabus of the course/module)</i>	LO1. Solve problems in Applied Mathematics		
Duration	2h (week 18)	Approximate duration	1h30m (week 17-18)
Weight in evaluation	30%	Weight in evaluation	30%
Please note:	Online test		