

1. BASIC INFORMATION

Course	Navigation Systems I
Degree program	Aerospace Engineering in Aircraft
School	School of Architecture, Engineering and Design
Year	Second Year
ECTS	6 ECTS
Credit type	Mandatory
Language(s)	English
Delivery mode	Face to face
Semester	First Semester
Academic year	2024/2025
Coordinating professor	Víctor Manuel Padrón Nápoles

2. PRESENTATION

This course belongs to the “Aerospace systems and infrastructures” module:

1. Aerospace Technology 6 ECTS (first academic year)
2. Navigation Systems I 6 ECTS (second academic year)
3. Navigation Systems II 6 ECTS (second academic year)
4. Air Transport 6 ECTS (second academic year)

The course includes the next topics: Electrical engineering, electronic engineering, basics of telecommunications and air navigation systems.

3. KNOWLEDGE, SKILLS, AND COMPETENCES

Knowledge

- **CON19** - Identify the 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).

Specific knowledge of the subject:

- Identify the fundamentals of circuit theory, analog electronics, and power electronics.
- Describe the fundamentals of electric machines.
- Describe electrical engineering in aircraft, airports, and navigation systems.
- Identify the fundamentals of communication theory and wave propagation.

Skills

- **HAB04** Use computer tools to search for bibliographic or information resources (Information Search). Specific skills of the subject:

- Based on a set of requirements and previous information, conceptualize an engineering problem, outline the approach to solving it, and find the optimal solution. All of this is relative to the competencies of this module.

Competencies

- **CP01 CO11.** Appropriate knowledge applied to engineering of: fundamental components of different types of aircraft; functional elements of air navigation system and electrical installation and associated electronics; fundamentals of airport design and construction and its diverse elements.
- **CP03 CO13.** Applied knowledge of: the science and technology of materials, mechanics and thermodynamics, fluid mechanics, aerodynamics and flight mechanics, navigation and air traffic, aerospace technology, theory of structures, air transport, economy and production projects; impact on environment.
- **CP12.** Generate new ideas and concepts from known ideas and concepts, reaching conclusions or solving problems, challenges, and situations in an original way in the academic and professional environment.
- **CP13.** Convey messages (ideas, concepts, feelings, arguments), both orally and in writing, strategically aligning the interests of the various parties involved in communication in the academic and professional environment in the field of aerospace engineering.
- **CP14.** Employ information and communication technologies for data search and analysis, research, communication, and learning in the field of aerospace engineering.
- **CP15.** Influence others to guide and lead them towards specific objectives and goals, taking into consideration their viewpoints, especially in professional situations arising from the volatile, uncertain, complex, and ambiguous (VUCA) environments of the current world.
- **CP16.** Collaborate with others in achieving a shared academic or professional objective, actively participating, demonstrating empathy, and practicing active listening and respect for all team members.
- **CP17.** Integrate analysis with critical thinking in an evaluation process of different ideas or professional possibilities and their potential for error, relying on evidence and objective data that lead to effective and valid decision-making.
- **CP18.** Adapt to adverse, unexpected situations that cause stress, whether personal or professional, overcoming them and even turning them into opportunities for positive change.
- **CP19.** Demonstrate ethical behavior and social commitment in the performance of professional activities, as well as sensitivity to inequality and diversity.

4. CONTENT

The course covers the content stated in the official description of the Degree:

- Fundamentals of circuit theory and analog and power electronics
- Foundations of electrical machines
- Electrical engineering in aircraft, airports and navigation systems
- Fundamentals of communication theory and wave propagation

To do that, the course material is organized in eight learning units as shown below:

- Unit 1. Introduction to Circuit Analysis
- Unit 2. AC Waveforms, Phasors and Impedances
- Unit 3. Introduction to AC Power and AC Power Circuits

- Unit 4. Electrical Systems of Aircraft
- Unit 5. Introduction to Electronics. Diodes
- Unit 6. Introduction to Transistors
- Unit 7. Introduction to Power Electronics
- Unit 8. Fundamentals of communication and wave propagation

Unit 8 can be taught in the next semester course “Navigation Systems II”, jointly with radars and radio navigation systems.

5. TEACHING-LEARNING METHODOLOGIES

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

- Lecture-based class
- Laboratory Exercises. Simulation
- Integration of teamwork. Research by groups or problem solving by groups
- Self-study
- Mentoring, academic monitoring and assessment

6. LEARNING ACTIVITIES

The following table shows, for each learning activity: i) the total time the student will spend, ii) the time distribution between in-class and off-class time, and iii) the course policy about the use of artificial intelligence (AI) in that activity.

Learning activity	Number of hours	In-class time	Use of AI
Lecture-based class	25	25 (100%)	Not allowed
Laboratory and/or problem-solving session	12	12 (100%)	Not allowed
Integrative teamwork	43	23 (53%)	Suggested
Self-Study	70	60	Suggested
TOTAL	150		

Further details about the AI-use policy will be published through the virtual campus platform once the course has started.

7. ASSESSMENT

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

Assessment system	Weight
SE01 – Exams and objective tests	35%
SE02 – Articles, essays and reports	25%

SE03 – Peer-evaluation, auto-evaluation, portfolio production and other alternative assessment procedures	20%
SE04 – Off-class events, conferences and seminars (*)	10%
SE05 – Core/cross-curricular competences (performance)	10%

(*) If these activities could not be carried out, the corresponding weight would split evenly between systems SE02 and SE03.

When you access the course on *Virtual Campus*, you'll find a description of the assessment activities you must 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 must obtain a final course grade of at least 5 out of 10 (weighted average).

In addition to that, it will be necessary for you to obtain a grade greater than or equal to 5.0 in all assessments: the final exam, the final work, the integrating project activities and, the average grade of the lab exercises and the rest of evaluation activities. And comply with the minimum attendance regulations established by the STEAM School, whenever applicable.

If any of the above requirements were not met, the final grade may not exceed 4.0 in a scale up to 10, failure.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In addition to that, it will be necessary for you to obtain a grade greater than or equal to 5.0 in all assessments: the final exam, the final work, the integrating project activities and, the average grade of the lab exercises and the rest of evaluation activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

If any of the above requirements were not met, the final grade may not exceed 4.0 in a scale up to 10, failure.

8. SCHEDULE

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

Assessable activities	Deadline
AE1. Lab Exercise 1	Weeks 2-3
AE2. Lab Exercise 2	Weeks 6-8
AE3. Lab Exercise 3	Weeks 11-13

AE4. Lab Exercise 4	Weeks 13-15
AE5. Integrating project activities	Weeks 3-14
AE6. Midterm Exam	Weeks 12-15
AE7. Final work presentation	Weeks 17-18
AE8. Final Exam	Weeks 17-18

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

The recommended Bibliography is:

1. R. L. Boylestad and B. A. Olivari. "Introductory Circuit Analysis, Global Edition", 14th edition. Pearson, 2023.
2. H. Robbins and W. C. Miller. "Circuit Analysis: Theory and Practice", 5 th Edition. Cengage, 2013.
3. D. R. Cunningham and J. A. Stuller. "Circuit Analysis", 2nd Edition. John Wiley and Sons, 1995.
4. M. Nahvi and J. A. Edminister. "Schaums's outline of theory and problems of electric circuits", 6th Edition. Mc-Graw-Hill Education, 2013.
5. J. O'Malley. "Schaums's outline of theory and problems of basic circuit analysis", 2nd Edition. McGraw-Hill, 1992.
6. Malvino and D. Bates. "Electronic Principles", 8th Edition. Mc-Graw-Hill Education, 2015.
7. S. Sedra and K. C. Smith. "Microelectronic Circuits", 7Th Edition. Oxford University Press, 2014.
8. N. Mohan, T. M. Undeland and W. P. Robbins. "Power Electronics: Converters, Applications and Design", 3rd Edition. Wiley, 2002.
9. Manuals and documentation of Aircraft, simulation tools and aviation professional organizations.

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

From the Educational Guidance and Diversity Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by means of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunities for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at: orientacioneducativa@universidadeuropea.es

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.