Universidad Europea
LAUREATE INTERNATIONAL UNIVERSITIES

Course Syllabus

Fluid Mechanics II

Year: 2018/2019
Code: 9966001303
Coordinating professor: José Omar Martinez Lucci
Degree program: Degree in Aerospace Engineering of aircrafts
School: Arquitectura, Ingeniería y Diseño
Languages: English

The mission of Universidad Europea de Madrid is to offer its students a holistic education, helping them become leaders and professionals capable of responding effectively to the needs of today's global world, adding value within their career fields, and contributing to social advancement through their entrepreneurial spirit and ethical integrity. We also strive to create and transfer knowledge through applied research, thus making our own contribution to progress and putting ourselves at the forefront of intellectual, scientific, and technological development.

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1. Basic information on the course/module

ECTS	6
Credit type	Degree requirements
Language	English
Delivery mode	Face to face
Trimester/Semester	First semester

2. Presentation of the course/module

This course belongs to the "Motopropulsion II" module:

- Mechanical and Graphic Design 6 ECTS (second year)
- Fluid Mechanics II 6 ECTS (third year)

In the Fluid Mechanics II subject the following topics are covered: External and internal flow, pressure distributions and forces on the aircraft, numerical simulation and computational fluid dynamics.

3. Competencies and learning outcomes

Core competencies:

- CB2: That 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.
- CB3: That students have the ability to gather and interpret relevant data (usually within their field of study) to make judgments that include reflection on relevant social, scientific or ethical
- CB5: That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy

Cross-curricular competencies:

- CT13: Ability to use tools to search for library resources or information (information retrieval).
- CT20: Take decisions, in advance, on what is need to be done, who should do it, and how it should be done.

Specific competencies:

- CE22: Adequate and applied knowledge to engineering field: Fluid mechanics fundamentals that describe the flow in all regimes to determine the pressure and force distributions on aircraft.

  Notes: UNIQUE LEVEL: Competence developed at one level. Level 1 (N1): awareness about the importance of competences and basic application of it to several situations. Level 2(N2): interiorization and skillful handling of competences. Level 3 (N3): Full interiorization and handling of competences at any needed situation.

Learning outcomes:

- LO24: To propose and design a set of models, as input data to fluid dynamics simulators.
- LO20. To conduct studies by integrating the technologies and engineering procedures which are developed in the competencies of this modules
- LO21. From a series of requirements, and prior information, to conceptualize an engineering problem, proposes an approach to solve it, and obtain the better solution. All this related to the competencies of this module

- LO22. To transfer some parts of an engineering problem to the laboratory, and utilize this resource as support to resolve it.

The table below shows the relation between the competencies developed during the course and the envisaged learning outcomes:

Competencies	Learning outcomes
CB5, CE22	LO24
CB3, CT13, CE22	LO20
CB2, CB5, CE22	LO21
CT20, CE22	LO22

The following table shows how the different types of activities are distributed and how many hours are assigned to each type:

Type of educational activity	Number of hours
Lecture-based class	20 h
Integration of team work	60 h
Self-study	50 h
Mentoring, academic monitoring and assessment	20 h
TOTAL	**150 h**

To develop the competencies and achieve the learning outcomes, you will have to complete the activities indicated in the table below:

Learning outcomes	Learning activity	Type of activity	Content
LO24. To propose and design a set of models, as input data to fluid dynamics simulators.	Activity 1	Self-study	UA 6. Application for the distribution of pressures and forces on the aircraft UA 7. Computational fluid mechanics. Practice advanced on fluid dynamics simulators
LO20.To conduct studies by integrating the technologies and engineering procedures which are developed in the competencies of this modules	Activity 2	Self study	UA1. Fluid-dynamic Lubrication. UA2. Introduction to the fluids in porous media UA 6. Application for the distribution of pressures and forces on the aircraft
	Activity 4	Integration of team work	
LO21. From a series of requirements, and prior information, to conceptualize an engineering problem, proposes an approach to solve it, and obtain the better solution. All this related to the competencies of this module	Activity 2	Self study	UA 3. Gas dynamics UA 5 Laminar and turbulent boundary layer UA 6. Application for the distribution of pressures and forces on the aircraft
	Activity 2	Mentoring, academic monitoring and assessment	
	Activity 5	Mentoring, academic monitoring and assessment	
LO22. To transfer some parts of an engineering problem to the laboratory, and utilize this resource as support to resolve it	Activity 3	Self-study	UA 4 Liquids in conduits UA 6. Application for the distribution of pressures and forces on the aircraft
	Activity 4.1	Integration of team work	
	Activity 4	Integration of team work	
	Activity 4.2	Integration of team work	
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When you access the course on the *Virtual Campus,* you'll find a description of the activities you have to complete, as well as the deadline and assessment procedure for each one.

4. Monitoring and assessment

The following table shows the assessable activities, their respective assessment criteria, and the weight each activity carries towards the final course grade.

Assessable activity	Assessment criteria	Weight (%)
Activity 1	• Correct results are obtained for several load cases. • The results are analyzed, and compared with analytical results. • Conclusion of the obtained results.	5%
Activity 2	• Appropriate hypothesis has been considered. • Correct results are obtained for several load cases, which are coherent with the hypothesis considered. • The results are analyzed and conclusions extracted to improve the structure. • Studies of state of the art are included	20%
Activity 3	• Student attends the class • Student attitude is proactive • Technical conclusions are included, by using theoretical concepts.	5%
Activity 4.1	• Explanation is clear and concise • Presentation contents are correct • Presentation time is adjusting to required duration • Student can answer the questions of audience • Presents all information clearly and concisely and in an organized manner • Does much more than merely restate the question and offer a brief response •	15%
Activity 5	• The answer contains one or two basic facts that are correct, but may also have incorrect statements as well. No connections or comparisons provided • The answer contains most (75%) of the points that needed to be included. The writing is clear, if uninspired. Correct attempts to integrate the points. • The answer not only contains the main points but goes beyond them to provide a critique of their veracity. The writing is clear and measured.	35%
Activity 4.2	• The format of the report is correct • All contents are included in the report • Technical conclusions are included, by using theoretical concepts • Avoids distracting grammar/spelling/etc. problems	20%

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

4.1. First exam period

- Exams, tests and other test and alternative techniques of assessment 35%
- Writing of articles, reports and project and Transversal skills 35% of the final grade
- Homework 30% of the final grade

Minimums needed to pass:

- To obtain 5 points over 10 points of the final exam.
- To obtain 5 points over 10 points of the final project.
- To obtain 5 points over 10 points of the homework.
- In order to be evaluated you must have a minimum of 50% attendance (ATTENDANCE IS VALID ONLY REGISTERED IN THE GRP SYSTEM)

The failed assignments, homework or lab reports during academic year can be submitted on extraordinary session. To pass the course, each assignment shall have, at least, five points out of ten and it is mandatory to pass all assignments, activities and exams. If the student fails or does not submit some activities these activities will not be considered for the average of the final grade.

4.2. Second exam period

Assessment activities:

- Realization of different tasks, problems and practical exercises, individually 20%
- Realization of laboratory practices and report 10%
- Realization of a project 20%
- Oral presentations presentation of the project 15%.
- Final exam 35%

5. Bibliography

1. Fluid Mechanics Fundamentals and Applications. Yunus A. Çengel and John M. Cimbala, First edition, editorial Mc Graw Hill, 2006
2. Viscous Fluid Flow, Frank m. White. Third edition, editorial Mc Graw Hill, 2006
3. Computational Fluid Dynamics, the basics with applications, John Anderson, Jr., First edition, editorial Mc Graw Hill, 1995.
4. Fundamentals of turbulence Modellig, Ching Chen, Shenq-Yuh Jaw. First edition, editorial Taylor and Francis Ltd. 1998.
5. Dynamics of Fluids in Porous Media, Jacob Bear. First edition, editorial Dover publications, 1988.

6. How to communicate with your professor

Whenever you have a question about the content or activities, don't forget to post it to your course forum so that your classmates can read it.

You might not be the only one with the same question!

If you have a question that you only want to ask your professor, you can send him/her a private message from the *Campus Virtual*. And if you need to discuss something in more detail, you can arrange an advisory session with your professor.

It's a good idea to check the course forum on a regular basis and read the messages posted by your classmates and professors, as this can be another way to learn.

7. Study recommendations

When you study at university, you need to plan and be consistent from the first week. It's very useful to exchange experiences and opinions with professors and other students, as this will help you develop core competencies such as flexibility, negotiating skills, teamwork, and, of course, critical thinking.

To help you, we recommend using a general method of study based on the following points:

- Study systematically and at a steady pace.
- Attend class and regularly check the course forum on the *Campus Virtual* so that you keep up to date with what's happening.
- Participate actively in the course by sharing your opinions, doubts and experiences relating to the topics covered and/or suggesting new topics of interest for discussion.
- Read the messages posted by your classmates and/or professors.

Active participation in physical and virtual classroom activities is of special interest and academic value. You can participate in many different ways: asking questions, giving your opinion, doing all the activities your professor suggests, taking part in collaborative activities, helping your classmates, etc. This way of working requires effort, but it will help you get better results as you develop your competencies.