COURSE: Computational Thermo-Fluid Dynamics for Machinery

ACADEMIC YEAR: 2019/2020

TYPE OF EDUCATIONAL ACTIVITY: Characteristic

INSTRUCTOR: Annarita Viggiano
e-mail: annarita.viggiano@unibas.it
phone: +39.0971.205204
Language: Italian

ECTS: 9 n. of hours: 81 (lessons 48, tutorials/practice 33)

Campus: Potenza
Dept./School: School of Engineering
Program: Mechanical Engineering Master’s Degree

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES
The purpose of this course is to provide advanced knowledge of applied thermo-fluid dynamics and of Computational Fluid Dynamics (CFD) and to introduce students to the use of CFD for design, analysis and optimization of energy and propulsion systems. At the end of the course, the students will be able to use advanced computational tools, both open source and licensed, to choose the proper mathematical models for the design of a specific component and the numerical methods for the solution of the equations.

PRE-REQUIREMENTS
Fundamentals of fluid machinery are needed.

SYLLABUS
Mathematical models for the study of turbulent reacting flows (41 hours)

Numerical schemes for computational fluid dynamics (18 hours)

Applications to design and analysis of propulsion and energy systems (22 hours)
Applications of CFD to design and analysis by using open source software. Computer simulations.

TEACHING METHODS
Theoretical lessons and classroom tutorials (63 hours)
Laboratory tutorials (18 hours)

EVALUATION METHODS
The examination consists of the elaboration of a project and an oral examination. During the development of the project, students have to apply the theoretical knowledge and software skills acquired during the lessons in order to design, analyze and optimize a component of a fluid system. The project is usually developed by a group of students and should be delivered a week before the oral examination. Each student will discuss the project during the oral
examination, when the knowledge and skills acquired by the student, as well as his ability to solve problems, will be verified. The overall grade will take into account all stages of the examination.

### TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Instructor’s notes available at [http://docenti.unibas.it/site/home/docente.html?m=004204](http://docenti.unibas.it/site/home/docente.html?m=004204)


Other textbooks


### INTERACTION WITH STUDENTS

All the necessary information about the course and the evaluation methods, as well as the contact details of the instructor, are provided to students during the first lesson and made available on the instructor web site.

As regards the office hours, please, refer to the following link:

[http://docenti.unibas.it/site/home/docente.html?m=004204](http://docenti.unibas.it/site/home/docente.html?m=004204)

### TENTATIVE EXAMINATION SCHEDULE

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### SEMINARS BY EXTERNAL EXPERTS

YES ☑ NO □

### FURTHER INFORMATION

The seminar will be confirmed during the spring semester.

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1 Subject to possible changes: check the web site of the Instructor or the Department/School for updates.