Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: Applied Thermodynamics and Heat Transfer			
ACADEMIC YEAR: 2019/20			
TYPE OF EDUCATIONAL ACTIVITY: Basic			
TEACHER: Di Tommaso Rocco Mario			
e-mail: rocco.ditommaso@unibas.it		web:	
phone: +390971205145		mobile (optional):	
Language: Italian			
ECTS: 9	n. of hours: 90 54 h lessons 36 h practice	Campus: Potenza Dept./School: Program:	Semester: Annual

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course have the aim to provide the main concepts of classical thermodynamics by guiding students to understand the phenomena of energy interaction between systems and the surrounding environment. In particular, the study starting from the thermodynamic balance of fluid systems (gases and vapors) will evolve in the study of thermodynamic transformations for the realization of direct and inverse thermodynamic cycles. The exchange of energy will be dealt with both from the point of view of the mechanical exchange and from the point of view of thermal energy exchange.

At the end of the course the student will be able to understand the interaction between system and environment and their evolution between different states of thermodynamic equilibrium;

The student will be able to draw direct and inverse thermodynamic cycles by quantizing energy exchanges and efficiency gains;

The student will be able to propose autonomous variations in the processes involved in the exchange of both mechanical and thermal energy.

PRE-REQUIREMENTS

Students must have acquired elements of math and physics analysis. In practice, it is suggested that students have taken the tests of Analysis 1 and Physics 1 or have studied the contents in order to acquire, with greater ease and profit, the contents of the course of Applied Thermodynamic

SYLLABUS

Basic concepts of thermodynamics: introduction: thermodynamic systems, equilibrium states, processes. The First Law of thermodynamics: application to closed and open systems. The Second Law of thermodynamics: statements and irreversibility. Cycles and processes for power and refrigeration plants (Otto, Brayton, Rankine, vapor-compression cycle); heat transfer mechanisms, the Fourier's equation, the one-dimensional steady-state solution for plane and cylindrical geometry; electrical analogy and equivalent thermal network; transient conduction (the lumped capacitance method); forced convection in internal and external flows, dimensionless numbers; thermal radiation, black body, gray surfaces, radiation exchanges.

TEACHING METHODS

Theoretical lessons (54 hours) and Classroom tutorials (36 hours)

EVALUATION METHODS

Written and Oral examinations

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- V. Betta, G. Alfano; Fisica Tecnica, Liguori Editore.
- Cavallini, L. Mattarolo; Termodinamica applicata, Cleup.
- Principi di trasmissione del calore. F. Kreith. LIGUORI.

- Elementi di trasmissione del calore. G. Guglielmini, C. Pisoni. MASSON.
- Trasmissione del calore. C. Bonacina, A. Cavallini, L. Mattarolo. CLEUP
- Notes from lessons

INTERACTION WITH STUDENTS

Student Reception: Tuesdays 11:30-13:30 at own teacher office room.

In addition to the weekly reception time, the teacher is available for clarification at the end of each lesson

EXAMINATION SESSIONS (FORECAST)[1]
10/09/2019; 15/10/2019; 26/11/2019; 21/01/2020; 18/02/2020; 24/03/2020; 28/04/2020; 26/05/2020; 23/06/2020; 14/07/2020

SEMINARS BY EXTERNAL EXPERTS YES □ NO X

FURTHER INFORMATION

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