Module title: Advanced Engineering Thermodynamics

Module code: 24-14-705-01

Module credit: 3

Module objectives

This course is intended for graduate students in Mechanical Engineering. The overall goal of the course is to develop a sound understanding in the theory and application of advanced thermodynamics, especially as related to heat engines, process and environment heating/cooling.

Term: Second Term

Lecturer: Dr. Faramarz Sarhaddi

Associate Professor

fsarhaddi@eng.usb.ac.ir

Assessments:

30% mid-term exam

60% final exam

10% seminars and homework

References:

Thermodynamics, Kinetic Theory, and Statistical Thermodynamics (3rd Edition), F. W. Sears, G. L. Salinger, ISBN-13: 978-0201068948; ISBN-10: 020106894X

Advanced Engineering Thermodynamics (3rd Edition), Adrian Bejan, ISBN-13: 978-0471677635; ISBN-10: 0471677639

Entropy Generation through Heat and Fluid Flow (1st Edition), Adrian Bejan, ISBN-13: 978-0471094388; ISBN-10: 0471094382

Molecular Thermodynamics of Fluid-Phase Equilibria (3rd Edition), J. M. Prausnitz, R. N. Lichtenthaler, E. G. de Azevedo, ISBN-13: 978-0139777455; ISBN-10: 0139777458

Fundamental of Statistical Thermodynamics (1st Edition), R. E. Sonntag and G. J. Van Wylen, ISBN-13: 978-0898747850; ISBN-10: 0898747856

Module subjects:

1st week: Fundamental concepts

2nd week: Equilibrium

3rd week: Equations of state of real gases

4th week: The first second law of thermodynamics

5th week: Some consequence of the first law

6th week: Entropy concept and the second laws of thermodynamics

7th week: Combined first and second laws

Mid-term Exam

8th week: Thermodynamic potentials

9th and 10th weeks: Exergy analysis

11th week: Entropy generation minimization

12th week: Mixtures and solutions

13th week: Phase equilibrium and chemical equilibrium

14th and 15th weeks: Kinetic theory

15th and 16th weeks: Statistical thermodynamics

Final Term Exam