Mechanical Engineering Dept. Department

Syllabus
ME 427: Turbomachinery (3-0-3)

Course Catalog Description:

Thermo-fluid dynamics aspects of fluid flow. Kinematic relations and efficiencies of turbomachines. Two dimensional cascades; Turbine and Compressor cascade correlations and performance. Axial Turbines (two dimensional analysis), Axial Flow Compressors and Fans (two dimensional analysis), Centrifugal Compressors and Fans, Radial Flow Turbines, and preliminary design fundamentals of turbomachines and three dimensional considerations

Course Pre-requisites:

- ME 204: Thermodynamics II
- ME 311: Fluid Mechanics

Course Objectives:

1. The purpose of the course is to introduce the means by which the energy transfer is achieved in the main types of turbomachines and the different behaviors of individual types in operation
2. The course aims at introducing preliminary design fundamentals of turbomachines including axial and radial flow turbines and axial and centrifugal flow compressors.

Course Learning Outcomes:

CLO1. Understand the function and performance of the main components of turbomachinery systems

CLO2. Understand of main principles of energy transfer in turbines and compressors.

CLO3. Conduct a performance analysis of a centrifugal and axial compressors

CLO4. Carry out various design tasks for solving operational-type problems in different turbomachinery systems

Learning Resources:

- Gas Turbine Theory, 6th Edition, by H. I.H. Saravanamuttoo, G. F. C. Rogers and H. Cohen, 2009, Prentice Hall
- Fluid Machinery Performance, Analysis and Design, by Terry Wright, 1999, CRC Press
- 2) Fluid Mechanics Thermodynamics of Turbomachinery, 4th Edition, 1998, Pergamon Press

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Introduction	1	2.0%
Tests	10	4.0%
Definition and classification of turbomachines	2	4.0%
Basic thermodynamic and fluid mechanics equations	3	10.0%
Basics of turbomachinery and efficiency calculations	4	14.0%
Dimensional Analysis and performance laws	5	4.0%
Two dimensional cascades	6	7.0%
Centrifugal compressors and their preliminary design	7	17.0%
Axial flow compressors and their preliminary design	8	19.0%
Axial and radial flow turbines and their preliminary design	9	19.0%

Lecture Weekly Schedule:

Week#	Topics
1	3
2	3 (Continue)
3	3 (Continue)
4	3 (Continue)
5	3 (Continue)
6	3 (Continue)
7	3 (Continue)
8	3 (Continue)
9	3 (Continue)
10	3 (Continue)
11	3 (Continue)
12	3 (Continue)
13	3 (Continue)
14	3 (Continue)
15	3 (Continue)