ME 122 Introduction to Turbomachinery

Louis Angelo M. Danao, Ph.D.
louisdanao@coe.upd.edu.ph
+63(2)9818500 *ext.* 3130

Reference:

Ingram, Grant. 2009. *Basic Concepts in Turbomachinery*. Ventus Publishing ApS. ISBN: 978-87-7681-435-9. Pages 144.

Coverage

1. Introduction
1.1. What is a Turbomachine?
1.2. The Cascade View
1.3. The Meridional View

2. Relative and Absolute Motion
2.1. 1D Motion
2.2. 2D Motion
2.3. Velocity Triangles in Turbomachinery
2.4. Velocity Components

3. Simple Analysis of Wind Turbines
3.1. Aerofoil Operation and Testing
3.2. Wind Turbine Design
3.3. Turbine Power Control

4. Different Turbomachines and Their Operation
4.1. Axial Flow Machines
4.2. Radial and Centrifugal Flow Machines
4.3. Radial Impellers
4.4. Centrifugal Impellers
4.5. Hydraulic Turbines
4.6. Common Design Choices
4.7. The Turbomachine and System

5. Application of The Equations of Fluid Motion
5.1. Conservation of Mass
5.2. Conservation of Momentum
5.3. Conservation of Energy and Rothalpy

Mid Term Exam
Distribution of Problem Specification for Project

6. Efficiency and Reaction
6.1. Efficiency
6.2. Reaction
6.3. Reaction on the h - s Diagram

7. Dimensionless Parameters for Turbomachinery
7.1. Coefficients for Axial Machines
7.2. Coefficients for Wind Turbines
7.3. Coefficients for Hydraulic Machines

8. Axial Flow Machines
8.1. Reaction for Repeating Stage
8.2. Loading and Efficiency Variation with Reaction
8.3. Stage Efficiency
8.4. Choice of Reaction for Turbines
8.5. Compressor Design
8.6. Multistage Steam Turbine

9. Hydraulic Turbines
9.1. Pelton Wheel
9.2. Analysis Approach
9.3. Francis Turbine
9.4. Kaplan Turbine

10. Analysis of Pumps
10.1. Pump Diffuser Analysis
10.2. Pump Losses
10.3. Centrifugal Pump Example
10.4. Net Positive Suction Head (NPSH)
10.5. Application to Real Pumps

Final Exam
Submission of Project
Plant Visit

Course Requirements:

Mid Term Exam	30%
Final Exam	30%
Project	30%
Plant Visit	10%

Grading Scale:

G	Final Grade	G	Final Grade
92 and higher	1.0	68 to below 72	2.5
88 to below 92	1.25	64 to below 68	2.75
84 to below 88	1.5	60 to below 64	3
80 to below 84	1.75	Lower than 60	5
76 to below 80	2.0		
72 to below 76	2.25		

Reminders:

- Attendance in class in not required, but highly recommended.
- Anyone caught cheating will be given a grade of 5, and the case may be brought to the Student Disciplinary Tribunal.
- As courtesy to the class, cell phones must be turned off or in silent mode during class hours and, stowed away and never used during exams.
- There is zero tolerance for not following instructions. Ignorance to the given instructions is not an acceptable excuse.