INTERNATIONAL UNIVERSITY LIAISON INDONESIA

IULI

SYLLABUS

Date/ Revision 7 January 2016

Faculty Engineering

Approval

SUBJECT : THERMO FLUID SCIENCE 2

1. Identification of Subject:

Name of Subject	:Thermo Fluid Science 2
Code of Subject	: THFL-2120
SKS / ECTS	:2/
Semester	:4
Study Program	:B-AVE
Lecturer	:Neno Ruseno, S.T., M.Sc.

2. Competency

After having the course, students are expected to:

a) Understand concepts and definitions of irreversibility and availability.
b) Understand about power and refrigerator systems.
c) Describe about gas mixture.
d) Understand about thermodynamic relations.
e) Understand about chemical reactions.
f) Introduce to phase and chemical equilibrium.
g) Understand about compressibility flow.

3. Description of Subject:

This course provides an abbreviated version of standard thermodynamics, fluid mechanics, and heat transfer, covering topics that engineering students are most likely to need in their professional lives. Students in a combined thermal-fluids course can gain a basic understanding of energy and energy interactions, various mechanisms of heat transfer, and fundamentals of fluid flow.

4. Learning Approach

Approach	: Combination of Expository - inquiry and colaborative
Method	: Discussion, question answer, sample problem, group work
Student Task	: Home work, group report, group presentation
Media	: LCD projector, slide.

IULI – Eco Campus, The Breeze, BSD City
PO BOX 150, BSD CPA 15330
+62 21 50588000/+62 85212318000
admin@iuli.ac.id
www.iuli.ac.id

5. Evaluation

a) Absence maximum : 25%
b) Participation in discussion : 5 points
c) Homework, Classwork : 5 points
d) Presentation, Simulation : 10 points
e) Daily Quiz : 20 points
f) Final Examination : 60 pointa

Total : 100 points

6. Contents/ Topics of Lecturing:

Week	Content/ Topics of Lecturing	Text Book Chapter	Remark
1	**Introduction and Properties of Fluids:** The No-Slip Condition; Classification of Fluid Flows; Vapor Pressure and Cavitation; Viscosity; Surface Tension and Capillary Effect;	Ch10[1]	
2	**Fluid Statics:** Introduction to Fluid Statics; Hydrostatic Forces on Submerged Plane Surfaces; Hydrostatic Forces on Submerged Curved Surfaces; Buoyancy and Stability.	Ch11[1]	
3	**Bernoulli and Energy Equations:** The Bernoulli Equation; General Energy Equation; Energy Analysis of Steady Flows.	Ch12[1]	
4	**Momentum Analysis of Flow Systems:** Newton's Laws; Choosing a Control Volume; Forces Acting on a Control Volume; The Reynolds Transport Theorem; The Linear Momentum Equation.	Ch13[1]	
5	**Internal Flow:** Introduction; Laminar and Turbulent Flows; The Entrance Region; Laminar Flow in Pipes; Turbulent Flow in Pipes; Minor Losses; Piping Networks and Pump Selection.	Ch14[1]	
6	**External Flow: Drag and Lift:** Introduction; Drag and Lift; Friction and Pressure Drag; Drag Coefficients of Common Geometries; Parallel Flow Over Flat Plates; Flow Over Cylinders and Spheres; Lift.	Ch15[1]	
7	**Mechanisms of Heat Transfer:** Introduction; Conduction; Convection; Radiation; Simultaneous Heat Transfer Mechanisms.	Ch16[1]	
8	**Steady Heat Conduction:** Steady Heat Conduction in Plane Walls; Thermal Contact Resistance; Generalized Thermal Resistance Networks; Heat Conduction in Cylinders and Spheres; Critical Radius of Insulation; Heat Transfer From Finned Surfaces.	Ch17[1]	
9	**Transient Heat Conduction:** Lumped System Analysis; Transient Heat Conduction in Large	Ch18[1]	

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	Plane Walls, Long Cylinders, and Spheres with Spatial Effects; Transient Heat Conduction in Semi-Infinite Solids; Transient Heat Conduction in Multidimensional Systems.		
10	**Forced Convection:** Physical Mechanism of Convection; Thermal Boundary Layer; Parallel Flow Over Flat Plates; Flow Across Cylinders and Spheres; General Considerations for Pipe Flow; General Thermal Analysis; Laminar Flow in Tubes; Turbulent Flow in Tubes.	Ch19[1]	
11	**Natural Convection:** Physical Mechanism of Natural Convection; Equation of Motion and the Grashof Number; Natural Convection Over Surfaces; Natural Convection Inside Enclosures.	Ch20[1]	
12	**Radiation Heat Transfer:** Introduction; Thermal Radiation; Blackbody Radiation; Radiative Properties; The View Factor; Radiation Heat Transfer: Black Surfaces; Radiation Heat Transfer: Diffuse, Gray Surfaces.	Ch21[1]	
13	**Heat Exchangers:** Types of Heat Exchangers; The Overall Heat Transfer Coefficient; Analysis of Heat Exchangers; The Log Mean Temperature Difference Method; The Effectiveness–NTU Method.	Ch22[1]	
14	**Rehearsal and Tutorial:** Rehearsal of all subject and students can ask for more detail.		
15	**Final Examination**		

7. Book Reference:

a) Main Text Book: [1] "Fundamentals of Thermal Fluid Sciences (SI Units), 4th Edition, 2012", Authors: Yunus Cengel, Robert Turner, John Cimbala, Publisher: Mc-GrawHill.

b) Supplement Textbooks:

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