SYLLABUS

Date/ Revision	25 January 2016/ 00
Faculty	Engineering
Approval	Dean of Faculty Engineering

SUBJECT : STATICS AND MECHANICS OF MATERIAL – MECH2100

1. Identification of Subject:

Name of Subject	:Statics and Mechanics of Material
Code of Subject	:MECH-1200
SKS / ECTS	:4/6
Semester	:2
Study Program	:AVE, ELE, MTE, MEE, INE
Lecturer	:Dipl.-Ing. Wahjoe Goeritno M.Si

2. Competency

After having the course, students are expected to:

a) Be able to solve the basic mechanics problem dealing with force operation
b) Solve the equilibrium problem in particle or in rigid body
c) Be able to analyze of structure
d) Have understanding of Stress, Strain, Torsion, Deformation
e) Be able to solve problem in axial load, torsion load, bending load
f) Be able to determine the deflection of beams
g) Be able to analyze the mechanical design

3. Description of Subject:

This course is intended for students in engineering faculty. The course will cover two major topics ie.: statics problem and mechanics of material.

The first phase, the course will discuss about forces in plane, forces in space, equilibrium of particles and equilibrium of rigid body and analysis of structure for truss problem.

The second phase, the course will cover the concept of stress, the axial load, torsion load, bending load and combine load. The deflection due to load will also be discussed in form of solving some respective problems.

Finally the mechanical design of a system will also be discussed in order to train the analyzing thinking for solving the real problem in mechanics.

4. Learning Approach

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

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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	Topics	Content	Remark
1	**Introduction to Mechanics**	What is Mechanics? Fundamental concept and principles – Mechanics of Rigid Body. Fundamental Concepts – Mechanics of Deformable Bodies. Method of Problem Solution.	CH1
2	**Statics of Particles**	Forces in a Plane: Resultant of Forces, Vectors, Resolution of Force, Force in Cartesian notation, Equilibrium of a Particles, Free Body Diagrams Forces in Space: Component of Force, Addition forces in space, Equilibrium of a Particles in Space, Free Body Diagrams.	Ch2
3	**Rigid Bodies, Equivalent System of Forces**	External and Internal Forces. Equivalent Forces, Moment of Force about a Point. Varignon's Theorem. Moment of a Force about a given Axis. Moment of a Couple. Addition of a Couple. Equivalent System of Forces.	Ch3
4	**Equilibrium in Rigid Body**	Equilibrium in Plane: Support reaction, Free Body Diagram, Two Force Member, Three Force Member, Graphical Solution, and Analytical Solution. Equilibrium in Space: Support reaction, Free Body Diagram, Two Force Member, Three Force Member, Analytical Solution.	Ch4 Quiz
5	**Distributed Forces**	Area and Lines: Centre of Gravity. Centroid of Area and Lines. Distributed Loads on Beams. Volumes: Centre of Gravity	Ch5
6	**Analysis of Structures**	Trusses: Definition of Truss. Simple truss. Analysis of Truss by Joint Method. Analysis of Truss by Section Method. Frame and Machine: Multiforce Members. Analysis of Frame. Machines.	CH6 Quiz
7	**Moments of Inertia of Area**	Moment of Inertia of an Area. Polar Moment of Inertia. Radius of Gyration. Parallel Axis Theorem. Moment of Inertia of Composite Areas.	Ch8

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8	**MIDTERM SEMESTER BREAK**		
9	**Concepts of Stress**	Normal Stress. Shearing Stress. Stress-Strain Diagram. Hooke's Law. Shearing Strain. Modulus of Elasticity. Modulus of Rigidity. Poisson's Ratio	CH9 Quiz
10	**Axial Load**	Saint Vernant's Principle Elastic Deformation of an Axially Loaded Member Principle of Super Position	Ch9
11	**Axial Load**	Statically Indeterminate Axial Load Force Method of Analysis for Axially Loaded Member Thermal Stress Stress Concentration	Ch9
12	**Torsion Load**	Deformation in a Circular Shaft. Stresses in regard of Torsion Load. The Torsion Formula Power Transmission	Ch11
13	**Torsion Load**	Angle of Twist Statically Indeterminate Torsion Load Solid Circular Shaft Stress Concentration	Ch11
14	**Bending Load**	Shear and Bending Moment Diagram Graphical Method for Constructing Shear and Bending Moment Diagram	Ch14 Quiz
15	**Bending Load**	Bending Deformation of a Straight Member The Flexure Formula Unsymmetric Bending Stress Concentration	Ch14 Quiz
16	**Final Examination**		

7. Book Reference:

a) Text Book:
"Statics and Mechanics of Materials", **Author:** Ferdinand P. Beer, E. Russell Johnston, Jr., John T. DeWolf, David F. Mazurek –, **Publisher:** Mc. Graw Hill Higher Education

b) "Statics and Mechanics of Materials", **Author:** Russel C. Hibbeler, **Publisher**: Pearson.

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