

SYLLABUS

Date / Revision : 04 September 2017/ 03
Faculty : Engineering
Study Program : MEE

SUBJECT: Material and Metal Forming

1 Basic Information

1.01	Subject Name	Material and Metal Forming
1.02	Semester	4
1.03	Level	3
1.04	SKS	3
1.05	Mandatory / Curriculum	Mandatory / D-07
1.06	Subject Code	MAMF
1.07	Subject Code	ENG-D-MAMF-4107
1.08	Year	2017 (7)
1.09	Quality Control	Final Test, see evaluation
1.10	Limitations	Min 12, Max 32 students in a class
1.11	Combined with	--
1.12	Perquisite	Non
1.13	Responsible	Dr. Ir. Prianggada Indra Tanaya, MME
1.14	Revision	04 September 2017/ WaG

2 Description of Subject

The material and metal forming course is concerned with forming theory, technology, and their industrial application of material (plastics, polymers, rubber, glass) and metal forming. Mechanical and physical overview of material and metal properties are reviewed to give understanding of formability of material and metal as raw material for industrial product. Fundamental of metal casting and processes, glass-working, shaping processes for plastics, polymers, composite and rubber are studied. Metal forming and sheet metal working are discussed consisting typical forming technologies such as rolling, forging, extrusion, wire-drawing, bending, tubing, etc. The theory will be further explored using Scilab a Free/Open Source Software (F/OSS) to facilitate analytical processes.

3 Objectives

- Introduce how the metal and sheet metal are processed
- Introduce the process in plastic
- Introduce the processing in glass working
- Understand the machine for processing material.

4 Competency

After finished the course, students are expected to:

- Understand the theory, application, and technology of material and metal forming
- Understand the fundamental of metal casting and processes, metal forming and sheet metal working
- Capable to perform analysis of trivial problems regarding material and metal forming
- Understand the processes of metals and ceramics, polymer matrix composite and rubbers
- Knowing the function differences and cost related between molds and dies
- Understand the design consideration of each product produced using forming technology

5 Learning Approach / Methodology

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

6 Evaluation

5.1	Absence maximum	25%
5.2	Participation in Discussion	05 Points
5.3	Homework / Classwork	05 Points
5.4	Presentation /Simulation	10 Points
5.5	Daily Quiz	20 Points
5.6	Final Examination	60 Points
	Total	100 Points

7 Text Book and Reference

1	Main Text Book: <ul style="list-style-type: none"> Mikell P. Groover, Principle of Modern Manufacturing, 5th Ed., SI Version, Wiley & Sons, 2013, 978-1-118-47420-4
2	Supplementary Text books: <ul style="list-style-type: none"> Claude Gomez, et. Al, Engineering and Scientific Computing with Scilab, Birkhauser, 1999 Soft-ware: Scilab 5.5.2 download : http://www.scilab.org/download

8 Content / Topics of Lecture

Week	Content/ Topics of Lecturing	Text Book	Remark
1	Introduction to Material and Metal Forming Course and software tools. <ul style="list-style-type: none"> Discussing the syllabus and rule of the course given (30 minutes) Introduction to Scilab for analytical work 		Lecturer's presentation sheet Scilab software and manual
2	Overview of Material <ul style="list-style-type: none"> Properties and Product Attributes Discussing the nature of materials, mechanical, physical properties of materials and engineering materials 	Chapter 2, 3, 4, 5, 6	
3,4	Fundamental of metal casting <ul style="list-style-type: none"> Overview of casting technology, heating and pouring, solidification and cooling Metal Casting Processes <ul style="list-style-type: none"> Sand casting, expendable mold casting processes, permanent-mold casting processes, foundry practice, casting quality, metals for casting and product design consideration 	Chapter 7,8	Quiz 1
5	Fundamentals of Metal Forming <ul style="list-style-type: none"> Overview of metal forming, material behavior in metal forming, temperature, strain-rate sensitivity and influence of friction – lubrication in metal forming 	Chapter 14	Quiz 2
6	Bulk Deformation Processes in <ul style="list-style-type: none"> Metalworking Rolling, other deformation processes related to rolling, forging, other deformation processes related with forging, extrusion, wire and bar drawing 	Chapter 15	
7	Sheet Metal Working <ul style="list-style-type: none"> Cutting operation: Single tool, Compound tool, Progressive tool, Transfer tool, Strip lay out, Cutting force, Cutting clearance, Stripping force, Tool material, Die set. 	Chapter 16	Quiz 3
8	MIDTERM SEMESTER BREAK		

9	Sheet Metal Working <ul style="list-style-type: none"> Bending and Forming operation: U Bending, L Bending, V Bending, Z Bending, Edge bending, bending radius, Development of material, Bending Force, Striping Force. Deep drawing, Development of material, Drawing radius, Drawing force, Striping force. 	Chapter 16	
10,11	Shaping Processes for Plastic <ul style="list-style-type: none"> Properties of polymer melts, extrusion, product of sheet and film, fiber and filament production (spinning), coating processes, injection molding, compression and transfer molding, blow molding and rotational molding, thermo-forming, casting, polymer foam processing and forming, product design consideration 	Chapter 10	Quiz 4
12	Glass Working <ul style="list-style-type: none"> Raw materials preparation and melting, shaping processes, heat treatment and finishing, product design consideration 	Chapter 9	
13	Processing of Polymer Matrix Composites and Rubber <ul style="list-style-type: none"> Overview of PMC (Polymer Matrix Composite), open mold processes, close mold processes, PMS shaping processes, rubber processing and shaping, manufacture of tires and other rubber products 	Chapter 11	Quiz 5
14	Powder Metallurgy <ul style="list-style-type: none"> Characterization of engineering powders, production of metallic powders, conventional pressing and sintering, alternative pressing and sintering techniques, materials and products for powder metallurgy, design consideration of powder metallurgy. 	Chapter 12	
15	Processing of Ceramics and Cermet <ul style="list-style-type: none"> Processing of traditional ceramics and new ceramics, processing of cermet, product design considerations. Overview of lectures	Chapter 13	Quiz 6
16	Final Examination		