

ME3B7 Manufacturing Technology [5 credits]

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Semester: 2

Module organisation:

Start week	End week	Lecturers per week	Lecturers total	Tutorials per week	Tutorials total
1	12	3	33	1	11

Module description:

The objective of this module is to provide students with an introduction to manufacturing in general, and cover traditional manufacturing processes such as casting, metal forming, sheet metal working and material removal processes. In particular, the focus is to provide a treatment of manufacturing that is quantitative rather than just descriptive. The module will enable students to solve quantitative manufacturing problems through the use of material science and mathematical theory.

Learning outcomes

On successful completion of this module, the student should be able to:

1. Analyse the heating, pouring, solidification and shrinkage of metals during sand casting process from an engineering perspective.
2. Design riser and chaplets for different sand casting products.
3. Identify and describe the different casting processes in terms of machinery, tooling, set-up, materials, defects, advantages and disadvantages.
4. Analyse both bulk metal deformation (Rolling, Forging, extrusion and drawing) and sheet metalworking (cutting, bending and deep drawing) processes to solve engineering problems.
5. Identify and describe the different bulk metal deformation and sheet metalworking processes in terms of machinery, tooling, set-up, materials, defects, advantages and disadvantages.
6. Use the theory of metal machining (orthogonal cutting model and Merchant's theory) to solve engineering problems in turning, drilling and milling operations.
7. Identify and describe a range of different machining processes in terms of machinery, tooling, set-up, materials, defects, advantages and disadvantages.
8. Understand the mechanisms of tool wear and its influence on the selection of cutting tool materials, geometry and cutting fluids.
9. Solve tool life problems by utilising the Taylor Tool Life Equation.

Module content

- Introduction and overview of manufacturing
- Fundamentals of metal casting
- Metal casting processes
- Fundamentals of metal forming
- Bulk deformational processes in metal working
- Sheet metalworking
- Theory of metal machining
- Machining operations and machine tools
- Cutting tool technology
- Economic and product design considerations in machining

Teaching strategies

This module is taught using a combination of lecturers, tutorial problem solving sessions, multiple choice review quizzes and a group based laboratory assignment. All lecture notes, tutorial questions and solutions, multiple choice quizzes, videos and laboratory handouts will be available through Blackboard.

Assessment

Assessment for this module will be in the form of a two hour written exam (70%), laboratory assignment (15%) and a number of multiple choice quizzes (15%).

Required textbook

- Groover's Principles of Modern Manufacturing, materials, processes, and systems. SI Version. Mikell P. Groover. ISBN: 978-1-119-24912-2.
- Manufacturing Engineering and Technology. Kalpakjian and Schmid

Laboratory

CNC machining