The Hong Kong University of Science and Technology

UG Course Syllabus

Design and Manufacturing 1

MECH 2520

3 credits

No prerequisite

Name of Course Instructor: Molong Duan

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Course Description

This course covers the following topics:
Engineering Design – Creative process; Design specification; Design evaluation; Product Lifecycle Management; Design Portfolio
Engineering Drawings - Communication tool; Drawing standards; Orthographic projection; 3D drawing
Dimensioning and Tolerancing – Basic concepts; Dimensional tolerances - Limits and fits, Cumulative tolerances; Geometric tolerances and measurement
Material Selection -Types of materials; Design for X (Strength, Deformation, etc.);
Material Specification and Evaluation
Design Evaluation: Quality function deployment
Design for Assembly
Design for Manufacturing
Design for Manufacturing:
Primary manufacturing processes - Mold and die related processes (casting, molding, forming, sheet metal forming, powder metallurgy, composite manufacturing)
Secondary manufacturing processes: Machining processes: (turning, drilling, shaping, milling, grinding and abrasive processes, non-traditional and thermal cutting processes)
Tertiary manufacturing processes – surface finishing processes (cleaning and surface treatments, coating and deposition processes)
Jigs and Fixture Design
Jigs and Fixtures components
Jigs and Fixtures design principles

Laboratory session:

- Laboratory sessions will be started on Feb 3 (Monday)
- SolidWorks drawing techniques and practice
- **No** attendance checking **but required** to submit lab assignments
- Module design discussion
- **Pass the SolidWorks Drawing test during the end of the semester (Compulsory)**

Assessments:

Assessment Task	Contribution to Overall Course grade (%)
Web-based Self-Learning Assignments (Mostly Manufacturing)	15%
SolidWorks Practice Assignments (8 assignments)	20%
SolidWorks Design Project	25%
Midterm (Mostly on Design)	15%
Final Examination	25%
SolidWorks Drawing Test during lab session (Compulsory)	**Must Pass**

Required Texts and Materials

- Shigley's Mechanical Engineering Design, Budynas, Nisbett, 2011, McGraw-Hill.
- Fundamentals of Modern Manufacturing: Materials, Processes and Systems, Groover, 2010, John Wiley & Sons, Inc.

Reference books

- Materials Selection in Mechanical Design (4th Edition), Ashby, 2011, Elsevier.
- Machinery's Handbook, Oberg et al., 2012, Industrial Press
- Dimensioning and Tolerancing Handbook, Drake, 1999, McGraw-Hill.