# MECH2520 Design and Manufacturing I

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<tr>
<th>Course Code: MECH2520</th>
<th>Course Title: Design and Manufacturing I</th>
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<tbody>
<tr>
<td>Required Course Or Elective Course: Required</td>
<td>Terms Offered (Credits): Spring (3 credits)</td>
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<tr>
<td>Faculty In Charge: Robin Ma</td>
<td>Pre/Co-Requisites: NA</td>
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<td>Michael Wang</td>
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<tr>
<th>Course Structure: Two sections (L1 and L2)</th>
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<tr>
<td>Lecture: 1 day per week (2 hours)</td>
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<td>Laboratory: 1 day per week (2 hours)</td>
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## Textbook/Required Material:

- HKUST Library online full text e-book database

## References:

1. British Standard – BS308
2. http://www.manufacturing.net/ - global design news
### Course Description:
1. Introduction to the Engineering Design Process and Engineering Graphics
2. Design Specification and Evaluation
3. Geometric Construction, Sketching, Orthographic Projection, Auxiliary Views;
4. Dimensioning and Tolerancing
5. Manufacturing Methods
6. Design for Manufacturing
7. Design for Assembly

### Course Topics:
1. Engineering Design – Creative Process; Design Specification; Design Evaluation; Product Lifecycle Management; Design Portfolio
2. Engineering Drawings - Communication Tool; Drawing Standards; Orthographic Projection; 3D Drawing
3. Dimensioning and Tolerancing – Basic Concepts; Dimensional Tolerances - Limits and Fits, Cumulative Tolerances; Geometric Tolerances and Measurement
4. Material Selection -Types of Materials; Design for X (Strength, Deformation);
5. Material Specification and Evaluation
7. Design for Assembly
8. Design for Manufacturing
10. Secondary Manufacturing Processes: Machining Processes: (Turning, Drilling, Shaping, Milling, Grinding and Abrasive Processes, Non-Traditional and Thermal Cutting Processes)
11. Tertiary Manufacturing Processes – Surface Finishing Processes (Cleaning and Surface Treatments, Coating and Deposition Processes)
12. Physical Vapor Deposition (PVD) and Chemical Vapor Desposition (CVD)
13. Jigs and Fixture Design

### Course Objectives:
1. To provide the students with a basic understanding of the design process and procedure.
2. To provide the students with an understanding on dimension and tolerance specification and its importance in product design.
3. To introduce the concept of material selection and design for assembly and manufacturing.
4. To introduce the basic manufacturing processes and the relevant design considerations.
5. To articulate effective design communication.

### Course Outcomes:
A. Develop an engineering design specification for a product based on initial concepts.
B. Develop design alternatives and conduct design evaluation based on a design specification.
C. Communicate effectively via engineering drawings and design presentation.
D. Conduct detailed component design to meet the engineering specification of parts or assemblies.
E. Select appropriate manufacturing processes for engineering parts based on design requirements.
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<th>Assessment Tools:</th>
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<tr>
<td>SolidWorks Drawing Test (Compulsory)</td>
<td>Pass</td>
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<tr>
<td>Peer evaluation</td>
<td>10%</td>
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<td>Two In-class Quiz</td>
<td>10% x 2</td>
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<tr>
<td>Project presentation</td>
<td>20%</td>
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<td>Design Project</td>
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<td>Phase 1 – Engineering specification development – individual</td>
<td>20%</td>
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<tr>
<td>Phase 2 – Detailed Design – Group</td>
<td>30%</td>
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