

Engineering Program

Specialization Production and Computer Aided Manufacturing Technology
Course Number ۰۲۰۲۰۲۱۴۱
Course Title **Machining Technology**
Credit Hours (۳)
Theoretical Hours (۳)
Practical Hours (۰)

Brief Course Description:

This course will resume the study of machining principles with an emphasis on the mechanics of chip formation and cutting forces. Cutting tool material and its geometry, Machinability and the factors that influence tool life, surface integrity and machining power.

Course Objectives:

At the end of this course student will be able to:

1. Determine suitable operating conditions for various cutting processes.
2. Operate and control the cutting machines properly.
3. Plan for products and determine the required manufacturing phases
4. Selection admissible cutting speeds
5. Selection of CNC machines

Detailed Course Description:

| Number | Title | Content | Time |
|--------|--|---|------|
| | Material removal processes | Theory of metal machining Machining technology Chip formation in metal machining: The orthogonal cutting model Actual chip formation Force relationships Merchant equation Power and energy relationships in machining Cutting temperature Computing cutting temperatures Measurement of cutting temperature | |
| | Machining operations and machine tools | Part geometry Turning and related operations: Cutting conditions in turning Engine lathe Turning machines and boring machines Drilling and related operations: Cutting conditions in drilling Drill presses Milling and related operations: Types of milling operations Cutting conditions in milling Milling machines Shaping and planning Broaching Sawing Machining operations for special geometries: screw threads, gears High-speed machining Machining centers and turning centers | |
| | Cutting-tool technology | Tool life Tool wear | |

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|--|---|---|--|
| | | <p>Tool materials:</p> <ul style="list-style-type: none"> • High-speed steel and its predecessors • Cast cobalt alloys • Cemented carbides • Cermets • Coated carbides • Ceramics • Synthetic diamonds • Cubic boron nitride <p>Tool geometry Effect of alloying elements on tools mechanical, chemical, and physical properties, operational behavior and tool life Cutting fluids Work piece fixing</p> | |
| | Machinability | <p>Materials machinability Effect of alloying elements in workpart material on machinability</p> | |
| | Grinding and related abrasive processes | <p>Grinding: The grinding wheel Grinding process Application considerations in grinding Grinding operations and grinding machines Other abrasive processes:</p> <ul style="list-style-type: none"> • Honing • Lapping • Super finishing • Polishing and buffing | |
| | Automation technologies for manufacturing systems | <p>Introduction to NC and CNC Automation fundamentals Components of automated system Types of automation Hardware components for automation: Sensors, actuators, interface devices, process controllers Numerical control Analysis of NC positioning systems NC part programming Applications of numerical control</p> | |

Evaluation Strategies:

| Evaluation | | Percentage | Date |
|--------------------------|------------|------------|------|
| Exams | Midterm | 40% | |
| | Final Exam | 50% | |
| Projects and Assignments | | 10% | |

Teaching Methodology:

- Lecturing
- Technical videos watching

Text Books & References:

Text Books:

- Groover, Fundamentals of Modern Manufacturing, 4th Ed

- قطع المعادن، شادي أبو سريس

References:

- تقنية التشغيل، الإدارة العامة لتصميم وتطوير المناهج، المؤسسة العامة للتعليم الفني والتدريب المهني، المملكة العربية السعودية
- Kalpakjian, Manufacturing Engineering and Technology, 6th Edition in Si Units