

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
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Design for Manufacturability

College: College of Engineering

Department: Mechanical

First: Course Definition

1- Course Code: ME 637

2- Units: 3 Credit Hours

3 – Semester : 2nd

4 -Prerequisite : ME 340 Machine Design, ME 330 Manufacturing Processes

5- Co-requisite

6- Location (if not on main Campus):

Second: Course Objectives

(i) Introduce an overview of modern manufacturing processes and general knowledge of state-of the-art process technologies.

(ii) Conduct basic analysis of manufacturing processes as a tool for understanding the physical process capabilities, tolerances and limitations.

(iii) Develop ideas and guidelines to evaluate Design and Manufacturing trade offs.

(iv) Hands on exposure to manufacturing processes, CAD/CAM, rapid prototype, metal sand casting, injection molding, design-for-assembly (DFA) and design-of-experiment (DOE) methodologies through lab sessions.

Third: Course Specifications

1- Topics to be covered		
Subject	No of Weeks	Units
<i>3-D applied engineering applications and design</i>	1	3
<i>Design rules for DFM</i>	1	3
<i>Design rules for DFA</i>	1	3
<i>Part design for machining,.</i>	1	3

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<i>Part design for sheet metal</i>	1	3
<i>injection mold parts</i>	1	3
<i>die casting mold parts</i>	1	3
<i>Methods for applied design for Pro/Engineer 3-D part</i>	1	3
<i>ProE, composite, sheet metal and assembly modules are used to</i>	1	3
<i>practice variety of engineering design applications e.g. shafts, gears, bolts, springs etc.</i>	1	3
<i>Special Topics in Design for Manufacturing</i>	1	3
<i>Project Group Discussions</i>	1	3
<i>Project Group Discussions</i>	1	3
Mini Project Presentations	1	3
Final Exam	1	3

2- Course components (Total hrs in the Semester)

Lecture	Exercise or lab	Other
45	----	---

3- Intended Learning Outcomes of the Course (ILO's)

a. Knowledge

i) Description of the knowledge to be acquired:

Understanding of Design for Manufacturing and its relation to the cost of product.
Understanding of Design for assembly and its effect on production time and cost.
Understanding of Design Rules for machining, forming, casting and molding

ii) Teaching strategies to be used to develop that knowledge

Lectures
Home Assignments
Discussions in the Class
Case study
Mini project (Design)

iii) Methods of assessment of knowledge acquired

Quizzes: to assess understanding of fundamentals of DFA.
Discussion Groups: to assess interactive and communication abilities.

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Midterm Exams: to assess understanding of design procedure, problem solving and analytical and design capabilities for DFM.

Final Exam: to assess **understanding** of different aspects of DFM applied to machining, forming, molding and castings.

Mini project: to assess **practical hands-on**, report writing, ability to deal with suppliers, and design of systems.

b- Cognitive (Intellectual) Skills

i) Cognitive skills to be developed

(a) Ability to analyze, design and assess a mechanical part from DFM point of view

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ii) Teaching strategies to be used to develop these cognitive skills

- Lectures
- Assignments, at home
- Case study
- Mini project (Design), Supervised

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iii) Methods of assessment of students cognitive skills

Quizzes: to assess understanding of fundamentals of DFA.

Discussion Groups: to assess interactive and communication abilities.

Midterm Exams: to assess understanding of design procedure, problem solving and analytical and design capabilities for DFM.

Final Exam: to assess **understanding** of different aspects of DFM applied to machining, forming, molding and castings.

Mini project: to assess **practical hands-on**, report writing, ability to deal with suppliers, and design of systems.

c. Interpersonal Skills and Responsibility

i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- Team work
- Ideas development and sharing with others

ii) Teaching strategies to be used to develop these skills

- Assignments, at home

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- Case study
- Mini project (Design), Supervised

- iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility**
- Case Study
 - Mini Project
 - Mini Project Presentations
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d. Communication, Information Technology and Numerical Skills

- i) Description of the skills to be developed in this domain**
- - Use of Commercial 3D Software, e.g. ProE or SolidWorks
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- ii) Teaching strategies to be used to develop these skills**
- Lectures
 - Assignments, at home
 - Case study
 - Mini project (Design), Supervised

iii) Methods of assessment of students numerical and communication skills

- **Quizzes:** to assess understanding of fundamentals of DFM.
- **Discussion Groups:** to assess interactive and communication abilities.

Mini project: to assess **practical hands-on**, report writing, ability to deal with suppliers, and design of systems for DFM and DFA-

e. Psychomotor (if applicable) & Other Non-cognitive Skills

- i) Description of the psychomotor or other skills to be developed and the level of performance required**
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- ii) Teaching strategies to be used to develop these skills-**

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iii) Methods of assessment of student's psychomotor skills

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4- Student Assessment Schedule

Assessment	Assessment task (test, group project, examination etc.)	Weight of
1	Quizzes	10 %
2	General Performance/ Attendance	2 %
3	Mid Term Exam1	15 %
5	Mid Term Exam2	15 %
6	Mini Project, Home Assignment	8 %
7	Final Exam	50 %

5- Student Support

Extra office hours available to the student to discuss course material and mini project with the instructor.

6- Learning Resources

i) Essential Books (References)

1. Corrado Poli, *Design for Manufacturability: A Structured Approach*, Butterworth-Heinemann, 2001
- [2] Otto K., Wood K., *Product Design, Techniques in Reverse Engineering and New Product Development*, Prentice-Hall, 2001.

ii) Course Notes

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iii) Recommended Books

- [3] Baralla J.G., *Design for Manufacturability Handbook*, McGraw Hill, 1998.
- [4] Anderson D., *Design for Manufacturability and Concurrent Engineering*, CIM press, 2004.

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iv) Electronic Books & Web Sites:

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v) Periodicals

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INTERNATIONAL JOURNAL OF DESIGN AND MANUFACTURING TECHNOLOGY (JDMT)-

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7- Course Evaluation and Improvement Processes

i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching

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- End of semester teaching evaluations through survey forms
- End of semester course evaluations through survey forms

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ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department

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iii) Processes for Improvement of Teaching

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iv) Processes for verifying standards of student achievement (e.g. check marking by an independent faculty member of a sample of student work, periodic exchange

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and remarking of a sample of assignments with a faculty member in another institution)

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v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

The course evaluations done by the instructor are reviewed every semester by a subject committee. The improvements are debated, summarized and put up to the Department Council Meeting. After further debate and discussion the suggestions for modification of the course are sent forth to the college council. After approval from the college council the suggestions can be incorporated in the course.