IE-352
Section 1, CRN: 48700/1/2
Section 2, CRN: 48706/7/8
Second Semester 1435-36 H (Spring-2015) – 4(4,1,2)
"MANUFACTURING PROCESSES – 2"

Course Description

Course-in-brief

Cutting mechanisms; Material removal operations; Tool materials and geometry; Cutting tools assembly techniques; Effects of cutting variables on machining operations; Effects of machining parameters on machine tool elements; Non-traditional machining; Process design selection.

Level: 6

Estimated Category Content:
Engineering science: 3 credit hours
Engineering design: 1 credit hour

Prerequisite:
IE-251 – "Manufacturing Materials"

Co-requisite:
IE-252 – "Manufacturing Processes – 1"

Time and Place

Section 1	Section 2	
Lecture (48700): **Sun, Tues, Thurs: 11:00 – 11:50 AM ; Wed : 10-10:50 AM** (A1-46/2); Dr. El-Sherbeeny	Lecture (48706): **Sun : 09 :00 - 10:50** (A1-46/1)**, Tue: 10:00 – 10:50 AM** (A1-46/3)**; Thu : 10:00 -10:50** (A1-46/1); Dr. El-Sherbeeny	
Exercises (48702): **Wed: 11:00 – 11:50 AM**; (A1-54/1); Dr. El-Sherbeeny	Exercises (48708): **Tue: 09:00 – 09:50 AM**; (A1-52); Dr. El-Sherbeeny	
Lab (48701): **Mon: 10:00 – 11:50 AM** (A1-54); Engr. Abdul-Naser Dawud	Lab (48707): **Tue : 01:00 – 02:50 PM**; (A1-46/3); Engr. Abdul-Naser Dawud	

Course Resources

Resources for the course include the instructor; references; class notes and handouts; your teammates; the library; and the World Wide Web.

Instructor
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Teaching Assistants

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Office Hours

I adopt an open-office policy. You are encouraged to come to my office and ask questions, consult, provide feedback, or give suggestions at anytime during the day. Best times to find me in the office this semester are: **Sundays-Tuesday: any time after dhodr (1:00 PM), or by appointment.**

Textbook: ***Manufacturing Engineering and Technology***. Serope Kalpakjian, Steven R. Schmid. Sixth Edition (SI). Prentice Hall: Singapore, 2010. ISBN-13: 978-981-06-8144-9

Reference: ***Principles of Modern Manufacturing***. Mikell P. Groover. Fourth Edition. Wiley: Asia, 2011. ISBN: 978-0-470-50592-2.

Websites (sample)

http://www.stefanelli.eng.br/en/index.html
http://www.engineersedge.com/tolerance__calc_menu.shtml

Computer Usage

Exercises are assigned regarding the usage of the statistical package of *Dynoware* software for performing cutting force analysis.

Project Work

The project entails production of a given component, with requirements including necessary tooling and measurements, machining variables, and machining time. Alternatively, you may be asked to perform a literature review related to advances on one of the machining processes discussed in this course.

Course Objectives

The course familiarizes students with metal removal machines and processes; trains students to operate and carryout experiments on metal removal machines; and introduces students to the basic techniques required to choose optimal machines, decide on optimal sequences of operations, and to determine optimal cutting parameters and demonstrate them clearly in an operation sheet.

Intended Learning Outcomes

At the end of this course, students are expected to acquire knowledge regarding the following:

1. Work piece design analysis for manufacturing (tolerancing, dimensioning, material requirement) [**a, b, e**].
2. Machining process operations (traditional and non-traditional) [**a, e**].
3. Metal cutting analysis (force, power, machining time calculations in different machining processes. [**a, b, e**].
4. Process design and planning (cutting and material conditions selection) [**c, e**].
5. Economics of metal cutting operations [**a, c, e**].

Course Policies

Homework Policy

Problems will be assigned and collected often. I will try my best to grade and promptly return the results to you in order to stay up-to-date with your progress in the course. Your solution must be organized and neat, otherwise it will be returned to you ungraded. The solution must include a problem statement, all pertinent solution steps, equations used and assumptions made, and **boxed** answers with proper units. Use only one side of a sheet and start the solution of a new problem on a new page.

Attendance

Attendance is a must! Attendance will be taken **at the beginning of each class period**. In case you are not present when attendance is taken, you will be counted as absent; no exceptions. Students who absent themselves during a semester **for more than 25%** of the required number of lectures may not be allowed to continue the course, denied from sitting for the final examination, and assigned a course grade of DN which is reported in their transcript.

Class Discussion

Communication is very important in achieving collective goals and objectives. Feel free to voice your opinions and ask questions anytime during a class period. Practice your right and freedom to learn.

Help Sessions

Help sessions will be organized at convenient times as needed upon request from students.

Make-up Tests and Late homework Policy

No makeup test will be given and late homework will not be accepted unless the reason is beyond the student's control. A valid excuse must be presented.

Expected Behavior

Practicing engineers are expected to conduct themselves in an ethical and professional manner. This includes attending all class activities; meeting deadlines; observing common courtesies to fellow students, teachers, and staff; being honest; making a diligent effort to learn; and not engaging in any disruptive, irresponsible manner. Legitimate collaboration is encouraged but academic dishonesty will not be tolerated.

Assessment and Evaluation

Many aspects of the course will receive on-going, real-time assessments and feedback to help improve students' performance. This will be done by discussing performance in class and by arranging individual meetings.

Assessment in the following areas will be converted to points, to compute your final grade in the course:

Assessment Item	Comment	Marks*
Class Participation	Coming on time; Answering questions in class, etc.	5%
Homework	Assigned once every 3-4 weeks	5%
Project	One semester project and presentation	10%
Laboratory	Lab reports (every lab)	10%
Quizzes	Assigned once every 2-3 weeks	10%
Midterms	Two midterms	20%
Final Exam	Exams period	40%

* Subject to change

Course Curriculum:

Course topics*:

1. Dimensional and geometric tolerances and linear measurements (9 classes)
2. Machine tool elements and motions (3 classes)
3. Machining operations: turning; boring; shaping; drilling; and milling (9 classes)
4. Metal cutting analysis; single point tool; tool materials; force and power calculations; tool wear; machinability (12 classes)
5. Finishing operations: grinding; honing; lapping (3 classes)
6. Non-traditional machining processes (3 classes)
7. Process design and manual process planning (3 classes)

* Subject to change

Laboratory topics*:

1. Metal cutting related measurements
2. Machine tools and machine tools operations
3. Cutting tool geometry
4. Experimental study in metal cutting: chip formation; tool wear and cutting force measurements
5. Non-traditional machining processes
6. Developing routing sheets

* Subject to change

Course Outline*

Week	Date: G (H)	Topic*	Activity*
1	Jan 25 – 29,'15 (9-4 ربيع الآخر، 1436)	**Student registration** **Syllabus, course content**	
2	Feb 01 – 05, '15 (16-12 ربيع الآخر، 1436)	**Introduction**	Lab 1
3	Feb 08 – 12, '15 (23-19 ربيع الآخر، 1436)	**1. Dimensional and geometric tolerances and linear measurements**	Lab 2 Quiz 1
4	Feb 15 – 19, '15 (30-26 ربيع الآخر، 1436)	**2. Machine tool elements and motions**	Lab 3 HW 1
5	Feb 22 – 26, '15 (7-3 جمادى الأولى، 1436)	**3. Machining operations: turning; boring; shaping; drilling; and milling**	Lab 4 Quiz 2
6	Mar 01 – 05, '15 (14-10 جمادى الأولى، 1436)	**Cont. Machining operations: turning; boring; shaping; drilling; and milling** **Revision**	Lab 5
7	Mar 08 – 12, '15 (21-17 جمادى الأولى، 1436)	**Review** **FIRST MIDTERM: Thurs. Mar 12, '15**	Lab 6
8	Mar 15 – 19, '15 (28-24 جمادى الأولى، 1436)	**Cont. Machining operations: turning; boring; shaping; drilling; and milling**	Project Lab 7 Quiz 3
9	Mar 22 – 26, '15 (6-2 جمادى الآخرة، 1436)	**SPRING BREAK (أجازة الربيع)**	
10	Mar 29 – Apr 02, '15 (13-9 جمادى الآخرة، 1436)	**4. Metal cutting analysis; single point tool; tool materials; force and power calculations; tool wear; machinability**	HW 2 Lab 8

11	Apr 05 – 09, '15 (16-20 جمادى الآخرة ، 1436)	**Cont. Metal cutting analysis; single point tool; tool materials; force and power calculations; tool wear; machinability**	Quiz 4 Lab 9
12	Apr 12 – 16, '15 (23-27 جمادى الآخرة ، 1436)	**Cont. Metal cutting analysis; single point tool; tool materials; force and power calculations; tool wear; machinability**	Exercises HW 3* Lab 10
13	Apr 19 – 23, '15 (30 جمادى الآخرة – 4 شعبان، 1436)	**5. Finishing operations: grinding; honing; lapping** **SECOND MIDTERM: Thurs. Apr 23, 2015**	
14	Apr 26 – 30, '15 (7-11 شعبان، 1436)	**6. Non-traditional machining processes** **PROJECT PRESENTATIONS: Thurs. Apr. 30, 2015**	
15	May 03 – 07, '15 (14-18 شعبان، 1436)	**7. Process design and manual process planning**	
16	May 10 – 14, '15 (21-25 شعبان، 1436)	**Review**	Quiz 5*

*** Tentative**