IE-352
Section 1, CRN: 48700/1/2
Section 2, CRN: 48703/4/5
Section 3, CRN: 48706/7/8
Section 4, CRN: 58626/7/8
Second Semester 1437-38 H (Spring-2017) – 4(4,1,2)
"MANUFACTURING PROCESSES – 2"

Course Description

Course-in-brief

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

Level: 6

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

Prerequisite:
IE-251 – "Manufacturing Materials"
GE-104 – "Basics of Engineering Drawing"

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

Time and Place

Section 1	**Section 3**
Lecture (48700): **Mon: 10:00 – 11:50 AM** (Civil Dept.: 1A-10) **Wed: 10:00 – 11:50 AM** (Civil Dept.: 1A-10) Dr. El-Sherbeeny	Lecture (48706): **Sun: 09:00 -09:50 AM** (1A-54) **Mon: 11:00 – 11:50 AM** (1A-47 / CADCAM) **Tue: 09:00 -09:50 AM** (1A-54) **Wed: 10:00 -10:50 AM** (1A-46/3) Dr. El-Sherbeeny
Exercises (48702): **Wed: 01:00 – 01:50 PM** (1A-46/1) Engr. Wadee' Ameen	Exercises (48708): **Mon: 10:00 – 10:50 AM** (Civil Dept.: 1A-15) Engr. Wadee' Ameen
Lab (48701): **Mon: 01:00 – 02:50 PM**; (1A-52) Engr. Ali Al-Marfadi	Lab (48707): **Tue: 01:00 – 02:50 PM**; (1A-52) Engr. Ali Al-Marfadi

Course Resources

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

Instructor
Ahmed M. El-Sherbeeny, PhD
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Teaching Assistants

Engr. Wadee' Ameen	Engr. Ali Al-Marfadi
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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 any time during the day. Best times to find me in the office this semester are: **Sun, Mon, Tue: 10:00 - 11:00 AM; Sun, Tue, Wed: 11:00 AM – 12:00 noon; or by appointment.**

Textbook: ***Manufacturing Engineering and Technology***. Serope Kalpakjian, Steven R. Schmid. Seventh Edition (SI). Pearson, 2013. ISBN-10: 9810694067; ISBN-13: 978-9810694067

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

Project Work
You will be asked to perform a literature review related to advances on one of the non-traditional machining processes.

Course Objectives

The course familiarizes students with metal removal machines and processes; gives them an insight of the mechanics of machining processes and making them capable of performing force, power and tool wear analysis for various machining operations. The course also trains students to operate and carryout experiments on metal removal machines. In addition, the student also get in depth understanding of the advanced manufacturing processes such as laser machining, electric discharge machining, etc. The course also introduces students to the basic techniques required to choose optimal machines, decide on optimal sequences of operations, and to determine optimal cutting parameters.

Intended Learning Outcomes

At the end of this course, students are expected to acquire knowledge regarding the following:
1. Understand the workpiece design for manufacturing (dimensional and geometric tolerances), and the theory of conventional metal cutting and non-conventional machining operations. [**a**, **b, e**].
2. Determine or improve the machining parameters and develop a process plan for a given workpiece.

Machining process operations (traditional and non-traditional) [**a, e**].

3. Perform metal cutting analysis that is force, power, machining time and tool wear calculations in different machining processes. [**a, b, e**].
4. Various machine tools and conducting experiments. [**a, b**].
5. Process design and planning (cutting and material conditions selection) [**c, e**].

Course Policies

Homework Policy

Problems will be assigned and collected often. We will try our 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 will 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 Attendance	Used only to assess denial status (beginning of class!)	0%
Homework	Assigned once every 3-4 weeks	5%
Quizzes	Assigned once every 2-3 weeks	5%
Project	One semester project and presentation	10%
Laboratory	Lab reports (every lab); 2 lab exams	20%
Midterms	Two midterms (see schedule below)	20%
Final Exam	Exams period	40%

* Subject to change

Course Curriculum:

Course topics*:

1. Dimensional and geometric tolerances (2 weeks)
2. Fundamentals of metal cutting (3 weeks)
3. Mechanics of metal cutting (2 weeks)
4. Tool wear and tool life (1 week)
5. Conventional machining processes (3 weeks)
6. Finishing operations: grinding; honing; lapping (1 week)
7. Non-traditional machining processes (1 week)
8. Manual process planning (1 week)

* 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 (1A)		**Student registration** **Syllabus, course content**	
2 (2A)		**Introduction**	Lab 1
3 (3A)		**1. Dimensional and geometric tolerances**	Lab 2 Quiz 1
4 (4A)		**Cont. Dimensional and geometric tolerances**	Lab 3 HW 1
5 (5A)		**2. Fundamental of metal cutting**	Lab 4 Quiz 2
6 (6A)		**Cont. Fundamental of metal cutting**	Lab 5
7 (7A)		**3. Mechanics of metal cutting** **Review** **FIRST MIDTERM: Sat. Mar 25, '17**	Lab 6
8 (8A)		**Cont. Mechanics of metal cutting**	Project Lab 7 Quiz 3
9		**SPRING BREAK (أجازة الربيع)**	
10 (9A)		**4. Tool Wear and Tool Life**	HW 2 Lab 8
11 (10A)		**5. Conventional machining processes**	Quiz 4 Lab 9
12 (11A)		**Cont. Conventional machining processes**	Exercises HW 3* Lab 10

13 (12A)	**Cont. Conventional machining processes**
	SECOND MIDTERM: Sat. May 06, 2017
14 (13A)	**6. Finishing operations: grinding; honing; lapping** **PROJECT PRESENTATIONS: Thurs. May. 11, 2017**
15 (14A)	**7. Non-traditional machining processes**
16 (15A)	**8. Manual process planning** Quiz 5*

*** Tentative**