Design and Manufacturing I

ME58120320 – Summer 2013

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Lectures July 10th – July 21st, 8:50 AM -11:15 AM

Textbook Steven Liang and Albert Shih, *Analysis of Machining and Machine Tools*, Springer, 2016. ISBN 978-1-4899-7645-1

Goals The goals of this course are to provide the knowledge of:

- traditional and non-traditional machining processes and machine tools.
- modeling and analysis methods of machining processes
- advanced machining technology

Content

Traditional machining processes

- Single point, multiple point and abrasive machining processes and surface generation
- Machine tools – components, accuracy and metrology
- Cutting mechanics – chip formation, forces, and energy
- Cutting temperatures – thermal modeling and measurements
- Cutting tools – materials, coatings, and tool geometry, tool wear and tool life
- Machining dynamics

Non-traditional machining processes

- Electrical discharge machining
- Chemical-based machining
- Energy-based machining
- Biomedical machining

Machining systems

- Systems configurations
- Data for design, fabrication and inspection

Exams A 2-hour final exam on July 24th, 9:00 – 11:00 AM. Closed book. An A4 size hand-written cheat sheet (both sides) and a calculator are allowed.

Homework Three homework will be assigned on July 10th, 12th, and 17th.
Homework due at the start of the lecture on July 12th, 17th, and 20th).
Please submit your solution and bring a photocopy to class as the instructor will go through homework problem solutions during lecture.

Quiz To make the class interactive and to take attendance, we will conduct quizzes during lecture.

Honor Code Homework assignments must be completed on your own. You must independently formulate your solution, though discussing the subject matter with your classmates is encouraged. You may not compare your solution with your classmates. You must submit the solution individually.

In-class quiz should be taken by yourself. No one may answer the quiz question for you by using your name. Discussion about quiz questions is not allowed.

Grading Grade will be based on final exam, homework, quiz, and participation. The grading scheme is as follows

Final Exam	60%
Homework	30%
Quiz and Participation	10%

Tentative Course Schedule

Date	Time	Lectures and events	Homework
July 10 (Mon)	8:50 – 11:15 AM	Chapter 1 Introduction Chapter 2 Single Point Cutting	HW1 on Chapters 1-3 assigned
July 11 (Tue)	8:50 – 11:15 AM	Chapter 3 Multiple Point Cutting	
July 12 (Wed)	8:50 – 11:15 AM	Chapter 4 Grinding HW1 Solutions	**HW1 Due before lecture** HW2 on Chapters 4-7 assigned
July 13 (Thu)	8:50 – 11:15 AM	Chapter 5 Machines Chapter 6 Machine Tool Metrology	
July 14 (Fri)	8:50 – 11:15 AM	Chapter 7 Mechanics of Machining	
July 17 (Mon)	8:50 – 11:15 AM	Chapter 9 Temperature HW2 Solutions	**HW2 Due before lecture** HW3 on Chapters 9-13 assigned
July 18 (Tue)	8:50 – 11:15 AM	Chapter 10 Dynamics Chapter 11 EDM	
July 19 (Wed)	8:50 – 11:15 AM	Chapter 12 ECM Chapter 13 Laser and E-beam Machining	
July 20 (Thu)	8:50 – 11:15 AM	Chapter 14 Biomedical Machining HW3 Solutions	**HW3 Due before lecture**
July 21 (Fri)	8:50 – 11:15 AM	Practice Problem Session Exam Review and Q&A	
July 24 (Mon)	**9:00-11:00 AM**	**Final Exam**	