ME 3701- Manufacturing Engineering

Instructor

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KENNESAW STATE UNIVERSITY
SOUTHERN POLYTECHNIC COLLEGE OF ENGINEERING AND ENGINEERING TECHNOLOGY
Department of Mechanical Engineering

Course Description

Catalog Description (Credit Hours: 3)

This course introduces the fundamentals and applications of major manufacturing processes and engineering along with their capabilities, analyses, selection and economics. It establishes the technical knowledge for processes such as casting, deformation, material removal and polymer processes. Modern rapid prototyping processes such as 3D printing is also covered. Laboratory demonstrations and exercises compliment the topics covered in lectures.

Prerequisites

ME 3101: Materials Science and Engineering, ENGR 3131: Strength of Materials Engineering Standing.

If you do not meet the prerequisite requirements, you are expected to withdraw from this course. If it is discovered that a student is lacking in prerequisites (at any time during the semester), the instructor reserves the right to remove the student from the class and assign a grade of W (or WF if past the drop date).

Course Details

Course name: Manufacturing Engineering, ME 3701
Meeting times: Online

Learning Outcomes

By the end of this course, students should be able to:

1. Identify the onset of plastic deformation (yielding) in a complex state of stress, which is typically encountered during manufacturing processes.
2. Determine if a part can be manufactured (without material failure) by bulk forming processes such as forging, extrusion and drawing, and sheet forming processes such as bending and deep drawing; and estimate the force required to manufacture parts by bulk forming and sheet forming processes.
3. Identify various features in a lathe.
4. Describe how a chip is formed by continuous shearing of material in lathe, milling, and other machining processes; what are the different types of chips; forces and energy required during machining; and estimate how often a tool needs to be changed/sharpened during machining

5. Discuss the operation and forces involved during other manufacturing processes such as grinding and powder metallurgy.
6. Identify various features in a mold used for sand casting, estimate solidification time for casting, understand various complexities encountered during mold filling which can lead to defective parts in casting.
7. Explain the mechanical behavior of plastics and composites, and various processes used to manufacture parts from plastics and composites.
8. Describe the operation of rapid prototyping (3D printing) processes.

Topics covered

1. Overview to manufacturing processes, design for manufacturing
2. Mechanical behavior of materials
3. Bulk deformation processes: forging, extrusion, drawing
4. Sheet metal forming processes: bending, deep drawing
5. Machining processes
6. Mechanics of chip formation during machining
7. Abrasive processes - grinding
8. Casting processes
9. Polymer processing
10. Rapid prototyping (3D printing)

Week	Subject	Chapters of the Groover's book	Assessments Due
1	Engineering Materials, Design for Manufacturing	Ch1	
2	Metals, Alloys	Ch 6	HW 1 (Week 1 Materials)
3	Mechanical Properties	Ch3	HW 2: Chapter 6
4	Mechanical Properties	Ch3	HW 3: Ch 3, TEST 1 (Chs 3 & 6)
5	Casting	Chs 10& 11	HW 4 (Ch 10)
6	Powder Metallurgy, Metal Forming	Chs 16 and 18	HW 6: Chapter 16
7	Rolling and Forging	Ch 19	Test 2 (Chs 10, 11 & 16)
8	Extrusion and Bar Drawing	Ch 19	HW 7: Chapter 18
9	Sheet Metal Working	Ch 20	HW 8: Chapter 19
10	Cutting Tools	Ch 23	Test 3 (Chs 18, 19 & 20)
11	Cutting Tools	Ch 23	Test 4 (Ch 23)
12	Polymers	Ch 8	HW 10 (Ch 8)
13	Polymer Processing	Ch 13	HW 11 (Ch 13)
14	Turning, Milling and Grinding	Chs 21, 22 & 25	HW 12 (Chs 21/22)
15	Additive Manufacturing	Ch 34	
16	Review		HW 13 (Ch 34), Test 5 (Chs 8, 13, 21, 22)
17			Final Exam

Textbook (OPTIONAL)

The lecture notes are provided ad they are based on:
Fundamentals of Modern Manufacturing; Materials, Processes and Systems, by M. P. Groover, John Wiley & Sons, Inc. Any edition.

You can also use tis textbook: Manufacturing Processes for Engineering Materials, 6th Edition by Serope Kalpakjian and Steven R. Schmid, 6th edition. 2017, Publisher: Pearson, ISBN-13: 978-0-13-429055-3.

Technical Requirements

Access to D2L is essential for the course material and instructions.

Grading Policy

Discussions (10%), Homework quizzes (30%), Tests (40%), Final exam (20%)

Details: Introduction Discussion=3%, Project Discussion 7%, Each Homework Quiz=2.5%, Each test=8%

Grade Conversion: [90 - 100% = A, 80 - 89% = B 70 - 79% = C 60 - 69% = D Below 60% = F]

Course Expectations

Attendance Policy

Students are expected to participate in online discussion and be active. Points will be taken off final grade in case the student is inactive in class.

Discussions

There are some discussions in this course. Please check the tentative schedule and announcements for details of the discussions.

Homework Quizzes

There are weekly quizzes from the chapters of the book which are partially selected. These are in the form of true/false questions and multiple choices. They have 20-25 questions. Engineering problems are included. To do well, you need to study each power-point file together with other solved problems files and watch the videos and then right before each quiz or test, review them one more time.

Tests

These are in the form of true/false questions and multiple choices, and are given after certain modules are covered. Tests cover the course materials which were taught in the previous session (or sessions). Each test has maximum 50 questions. Engineering problems are included. Many FE exam questions are like the questions that are prepared for you. Very similar. It seems that maybe more than one answer are correct! You cannot say they are tricky, but they are based on common sense and logic. This class is very heavy, but you need to understand things in order to do well in tests. Do not memorize! Understand and summarize. Watch more videos on youtube.
It is advised that you summarize the equations for each test and prepare the equations sheets. These will be wonderful to have later on for the FE exam and other exams.

Final Exam

It is in the form of true/false questions and multiple choices, and is cumulative. Engineering problems are included. Final exam has maximum 70 questions.

Course Communication

Course material will be disseminated in D2L including lecture notes, video clips, etc. All official

course announcements, will be posted in the D2L course news (announcements). Be sure to check D2L regularly. Review the Email/News Forwarding file in "Start Here" module. Review all other files which are placed there.

Assignments and tests' grades will be uploaded not later than 7 days. Students' emails will be replied within 24 hours. In case there is a delay in replying emails, please resend your email right away.

Student Responsibility:

Distance learning requires more individual discipline than traditional classes, and requires that you have at least some control over your time and schedule. It is not easier or less time than face-to-face courses. During each week, students are expected to:

- Check D2L course website regularly and read the ANNOUNCEMENTS;
- Follow the weekly schedule;
- Study the assigned material, such as; PPT lecture notes, textbook chapters, PPT slides, Videos, etc.;
- Complete and submit assigned quizzes or homework on time.

Tips for Effective Online Learning

For an online class, students can really enjoy the benefits of learning at your own pace and in whatever environment that you choose. Below are some tips for effective online learning:

- Check the D2L course website regularly. Always be aware of the current status of the course. It might be helpful to subscribe to the announcements within the News Tool, sign up for text message alerts, or subscribe to your posts within the Discussion Tool. By taking advantage of the tools within the environment and the posted learning material, you can maintain an enhanced learning experience.
- Work closely with your instructor. If you have any questions, please contact me immediately. The best way to contact me if via email or text, and you will be guaranteed to have a reply within 12 hours.
- Begin your work early. If you can start a task early, don't start late. Assuming you spend the same amount of time completing the task, starting later will be much more stressful than starting early. Never wait until the last minute to begin an assignment! You'll have no turnaround time if you need help or something happens.

Course Outline

Please refer to the "**Tentative schedule module**" on D2L which contains the detailed schedule, chapters taught and the summary of all assessments.

Help Resources

Contacts to get Help

Student Help Desk studenthelpdesk@kennesaw.edu or call
470.578.3555 KSU Service Desk

All Federal, BOR and KSU Student Policies

https://curriculum.kennesaw.edu/resources/federal_bor_ksu_student_policies.php

KSU Student Resources
https://curriculum.kennesaw.edu/resources/ksu_student_resources_for_course_syllabus.php

Conduct

ADA/504 Compliance

"A student at KSU who has a disabling condition and needs academic accommodations has a responsibility to voluntarily identify him/herself as having a disability by scheduling an appointment with the Disability Services Coordinator as soon as possible." Please check the following page carefully:

http://sss.kennesaw.edu/sds/
The coordinator can be contacted at 678-915-7244.

Student Conduct

Academic dishonesty and non-academic misconduct, in any form, is not tolerated in the classroom. This includes, but is not limited to, cheating, plagiarism, and disorderly conduct. Please refer to sections in the Undergraduate Catalog on "A Disruptive Behavior and Academic Dishonesty". Also, please see the file "Academic Honesty" in "start here" folder.

What is Plagiarism?

Plagiarism is defined as the practice of taking someone else's work or ideas and passing them off as one's own. If you are unaware or uncertain on how to properly cite a particular source, please do not neglect to add the citation—that is considered plagiarism. If you have questions on how to cite your work, please contact me immediately! For more information, please refer to the "Plagiarism Policy" under the *Policies* section of this syllabus.

Turnitin

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Terms and Conditions of Use posted on the Turnitin.com site.

Help Resources
Contacts to get Help

Student Help Desk studenthelpdesk@kennesaw.edu or call 470.578.3555

Additional Resources
Remote access to Library Resources: http://library.kennesaw.edu/
Student Support:
Peer-Tutoring and Academic Support: https://engineering.kennesaw.edu/peer-mentoring-center/index.php
Advising: https://engineering.kennesaw.edu/undergrad-advising.php
Bookstore: http://bookstore.kennesaw.edu/home.aspx

Privacy Policy Links
D2L: http://www.brightspace.com/legal/privacy/

University Policies
Academic Honesty

Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section II of the Student Code of Conduct addresses the University's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation/ falsification of University records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement.

Plagiarism Policy

No student shall receive, attempt to receive, knowingly give or attempt to give unauthorized assistance in the preparation of any work required to be submitted for credit as part of a course (including examinations, laboratory reports, essays, themes, term papers, etc.). When direct quotations are used, they should be indicated, and when the ideas, theories, data, figures, graphs, programs, electronic based information or illustrations of someone other than the student are incorporated into a paper or used in a project, they should be duly acknowledged.

Disability Statement

Kennesaw State University provides program accessibility and reasonable accommodations for persons defined as disabled under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Kennesaw State University does not deny admission or subject to discrimination in admission any qualified disabled student.

A number of services are available to help students with disabilities with their academic work. In order to make arrangements for special services, students must visit the Office for Student Disability Services and make an appointment to arrange an individual assistance plan. In most cases, certification of disability is required.

Special services are based on

- medical and/or psychological certification of disability,
- eligibility for services by outside agencies, and
- ability to complete tasks required in courses.

ADA Position Statement

Kennesaw State University, a member of the University System of Georgia, does not discriminate on the basis of race, color, religion, age, sex, national origin or disability in employment or provision of services. Kennesaw State University does not discriminate on the basis of disability in the admission or access to, or treatment or employment in, its programs or activities. The Americans with Disabilities Act (ADA), Public Law 101-336, gives civil rights protections to individuals with disabilities. This statute guarantees equal opportunity for this protected group in the areas of public accommodations, employment, transportation, state and local government services and telecommunications. The following individuals have been designated by the President of the University to provide assistance and ensure compliance with the ADA. Should you require assistance or have further questions about the ADA, please contact:

- ADA Compliance Officer for Students
  470-578-6443
- ADA Compliance Officer for Facilities
  470-578-6224
- ADA Compliance Officer for Employees
  470-578-6030

Syllabi Statements

Course Delivery

KSU may shift the method of course delivery at any time during the semester in compliance with University System of Georgia health and safety guidelines. In this case, alternate teaching modalities that may be adopted include hyflex, hybrid, synchronous online, or asynchronous online instruction.

Policy on the Usage of Artificial Intelligence

AI Use Prohibited:

You are expected to generate your own work in this class. When you submit any kind of work, you are asserting that you have created it completely on your own unless you indicate otherwise using quotation marks and proper citation for the source(s) you used to help you. Submitting content that has been generated by someone other than you, or that was created or assisted by an AI generative tool is cheating and constitutes a violation of the KSU Code of Academic Integrity.

Institutional Syllabus Policies, Procedures, and Resources

Federal, BOR, & KSU Required Syllabus Policies and Student Resources

KSU Academic Integrity Statement

Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section 5c of the Student Code of Conduct addresses the university's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to university materials, misrepresentation/falsification of university records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the Department of Student Conduct and Academic Integrity (SCAI), which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement.

Please see more here.

COVID-19 illness

If you are feeling ill, please stay home and contact your health professional. In addition, please email your instructor to say you are missing class due to illness. Signs of COVID-19 illness include, but are not limited to, the following: Cough, Fever of 100.4 or higher, Runny nose or new sinus congestion, Shortness of breath or difficulty breathing, Chills, Sore Throat, New loss of taste and/or smell

COVID-19 vaccines are a critical tool in "Protecting the Nest." If you have not already, you are strongly encouraged to get vaccinated immediately to advance the health and safety of our campus community. As an enrolled KSU student, you are eligible to receive the vaccine on campus. Please call (470) 578-6644 to schedule your vaccination appointment or you may walk into one of our student health clinics.

For more information regarding COVID-19 (including testing, vaccines, extended illness procedures and accommodations), see KSU's official Covid-19 website.

Face Coverings

Please wear a face covering while inside my office. Unvaccinated individuals are also strongly encouraged to continue to socially distance while inside campus facilities, when possible.

	Jan 2025						
Week	Mon	Tue	Wed	Thurs	Fr	Sat	Sun
Week 1	6 First day of class	7	8	9	10 Drop/Add	11	12
W 2	13	14 HW 1 (Week 1) Discussion 1 Due	15	16	17	18	19
W 3	20 *MLK Day* HW 2 (Ch 6)	21	22	23	24	25	26

	Jan-Feb 2025						
	Mon	Tue	Wed	Thurs	Fr	Sat	Sun
W 4	27	28	29	30 HW 3 (Ch 3)	31 Test 1 (Chs 3 & 6)	1 Test 1 (Chs 3 & 6)	2 Test 1 (Chs 3 & 6)
W 5	3	4	5	6	7	8	9 HW 4 (Ch 10)
W 6	10 *HW 5 omitted) Answers will be posted)*	11	12	13	14	15	16 HW 6 (Ch 16)
W 7	17	18	19	20	21 Test 2 (Chs 10, 11 & 16)	22 Test 2 (Chs 10, 11 & 16)	23 Test 2 (Chs 10, 11 & 16)

	Feb- March 2025						
	Mon	Tue	Wed	Thurs	Fr	Sat	Sun
W 8	24	25	26	27	28	1	2 HW 7 (Ch 18)
W 9	3	4 Last Day to Withdraw Without Academic Penalty, 11:45 p.m.	5	6	7	8	9 HW 8 (Ch 19)
W 10	10 (NO *HW 9. Answers will be posted)*	11 Break this week	12	13	14	15	16 Test 3 (Chs 18, 19 & 20)
W 11	17 Test 3 (Chs 18, 19 & 20)	18 Test 3 (Chs 18, 19 & 20)	19	20	21	22	23
W 12	24	25	26	27	28	29	30

				Test 4 (Ch 23)	Last day to withdraw Test 4 (Ch 23)	Test 4 (Ch 23)	Test 4 (Ch 23)

	April 2025						
	Mon	Tue	Wed	Thurs	Fr	Sat	Sun
W13		1	2	3	4 HW 10 (Ch 8)	5	6
W14	7	8 HW 11 (Ch 13)	9	10	11	12	13 HW 12 (Chs 21/22)
W15	14	15	16	17 HW 13 (Ch 34) Omitted	18	19	20 Test 5 (Chs 8, 13 & 22)
W16	21 Test 5 (Chs 8, 13 & 22)	22 Test 5 (Chs 8, 13 & 22)	23	24	25	26	27

	April- May 2025						
	Mon	Tue	Wed	Thurs	Fr	Sat	Sun
W17	28 **Final Exam**	29 **Final Exam**	30	1	2	3	4
	5	6	7	8 Grades Due			

HW quiz 1: From Week 1 Materials

HW 2: Chapter 6

HW 3: Chapter 3

Test 1: Chapters 3 & 6

HW 4: Chapter 10

HW 5: Chapter 11 (omitted, answers are posted))

HW 6: Chapter 16

Test 2: Chapters 10, 11, & 16

HW 7: Chapter 18

HW 8: Chapter 19

HW 9: Chapter 20 (Omitted, answers are posted)

Test 3: Chapters 18, 19 and 20

Test 4: Chapter 23

HW 10: Chapter 8

HW 11: Chapter 13

HW 12: Chapter 21/22

HW 13: Chapter 34 Omitted

Test 5: Chapters 8, 13 and 21/22

Final Exam: All the above chapters