

IENG 302 – Manufacturing Processes

Semester: Spring 2019

Time/location: MRB-E 113, 8:00 – 09:15 A.M., Tuesday and Thursday

Number of credit hours: 2

Course Description: Introduction to different manufacturing processes. Study of integrated manufacturing systems impacted by design, materials selection, and process selection. Evaluation of various engineering, economic, and design considerations in selecting materials and manufacturing processes.

Prerequisites: MAE 343 or IENG 301

Co-requisites by topics: None

Textbook/Lecture: The students will be provided an advanced version of the new book by Dr. Ramy Harik, University of South Carolina, and Dr. Thorsten Wuest, West Virginia University, free of charge through eCampus as a password protected PDF. The students are asked to provide weekly / chapter feedback (see link below) in return.

Additional Resources: Manufacturing Videos and Review Questions are available on the website introtomanufacturing.com

Feedback Link: <https://sites.google.com/view/introtomanufacturing/feedback?authuser=0>

Instructor (Lecture): Name: Dr. Juergen Lenz
Position: Post-Doctoral Fellow, IMSE Department
Room: ESB 305A
Email: Juergen.Lenz@mail.wvu.edu
Office hours: Thursday 10:00 - 11:00

Teaching Assistant: TBA

Topics Covered in Lecture:

Class Schedule for Spring 2019*:					
Month	Date	Day	Topic	Chapter	Notes
January	01/08/19	Tuesday	Introduction & Syllabus / Overview of Manufacturing	1	First Day of Class
January	01/10/19	Thursday	Overview of Manufacturing	1	
January	01/15/19	Tuesday	Overview of Mfg. / Deformative Manufacturing - Intro & Forging	1 & 2	
January	01/17/19	Thursday	Deformative Manufacturing - Rolling & Casting	2	
January	01/22/19	Tuesday	Deformative Manufacturing - Casting	2	
January	01/24/19	Thursday	Deformative Manufacturing - Sheetmetal & Review	2	
January	01/29/19	Tuesday	EXAM I / 8:00am - 9:00am	1 & 2	
January	01/31/19	Thursday	Subtractive Manufacturing - Shape Classification & Process Planning	3	
February	02/05/19	Tuesday	Subtractive Manufacturing - Process Planning & Milling	3	
February	02/07/19	Thursday	Subtractive Manufacturing - Milling & Drilling	3	
February	02/12/19	Tuesday	Subtractive Manufacturing - Drilling & Turning	3	
February	02/14/19	Thursday	Additive Manufacturing - Materials Classification & FFF	4	
February	02/19/19	Tuesday	Additive Manufacturing - FFF & SLS	4	
February	02/21/19	Thursday	Additive Manufacturing - SLS & SLA	4	
February	02/26/19	Tuesday	NO CLASS		2 cr.
February	02/28/19	Thursday	NO CLASS		2 cr.
March	03/05/19	Tuesday	Review Session 3 & 4	3 & 4	
March	03/07/19	Thursday	EXAM II / 8:00am - 9:00am	3 & 4	
March	03/12/19	Tuesday	NO CLASS		Spring Recess
March	03/14/19	Thursday	NO CLASS		Spring Recess
March	03/19/19	Tuesday	Assembly Processes - Permanent Processes	5	
March	03/21/19	Thursday	Assembly Processes - Non-Permanent Processes	5	
March	03/26/19	Tuesday	CAD/CAM - Numerical Chain & Geometrical Modeling	6	
March	03/28/19	Thursday	CAD/CAM - Geometrical Modeling & Manufacturing References	6	
April	04/02/19	Tuesday	CAD/CAM - Manufacturing References & G-Code	6	
April	04/04/19	Thursday	Review Session 5 & 6	5 & 6	
April	04/09/19	Tuesday	EXAM III / 8:00am - 9:00am	5 & 6	
April	04/11/19	Thursday	Polymers Manufacturing - Polymers & Polymerization	7	
April	04/16/19	Tuesday	Polymers Manufacturing - Injection Molding & Extrusion Molding	7	Guest Speaker - Dr. Todd Hamrick (WVU) <i>(to be confirmed)</i>
April	04/18/19	Thursday	Polymers Manufacturing - Extrusion Molding & Blow Molding	7	
April	04/23/19	Tuesday	Composite Manufacturing	8	Guest Speaker - Dr. Ramy Harik (USC) <i>(to be confirmed)</i>
April	04/25/19	Thursday	Review Session for Final Exam	1 - 8	Last Day of Classes
April	04/30/19	Tuesday	FINAL EXAM / 8am - 10am	1 - 8	Final Exam (comprehensive)

*SUBJECT TO CHANGE AT DISCUSSION OF INSTRUCTOR AT ANY TIME

Contribution of course to meeting the professional component:

Engineering topics: 100%.

Student Learning Objectives:

1. Describe a variety of major manufacturing processes, such as casting, bulk metal working, plastics processing, machining, and welding.
2. Apply concepts from prerequisite courses to understand the origin of, and to estimate the value of, the relevant process parameters for major manufacturing processes.
3. Identify causes of common manufacturing defects and recommend process changes to reduce defects.
4. Select a manufacturing process based on material, part geometry, and number of parts to produce.

Course Relationship to ABET Program Educational Outcomes:

Outcome 1 - Students will have acquired the ability to use modern and classical Industrial Engineering methodologies such as operations research, manufacturing processes and systems, computer programming and simulation, production and service systems, human factors and ergonomics, facilities planning and materials handling, project management, data analysis, engineering statistics and quality control, and engineering economics.

Key Abilities Students Will Acquire: **(1) Ability to understand manufacturing processes capabilities and applications, (2) Demonstrate a moderate proficiency in the use of actual manufacturing processes, and (3) Ability to select appropriate manufacturing processes based on material properties, cost, and other factors.**

Grading:

Test #1 January 29 th	30%
Test #2 March 7 th	30%
Test #3 April 9 th	30%
<i>(Lowest test score will be dropped resulting in 60% contribution to overall grade from tests)</i>	
Total Contribution from Tests	60%
Final Exam April 30th, 8am – 10am (Comprehensive)	40%
Total:	100%

Grading Scale:

- A = 90 – 100%
- B = 80 – 89%
- C = 70 – 79%
- D = 60 – 69%
- F = 59% or less

Tests (60%): Three tests will be given during the semester. Tests will determine 60% (30% each) of your final average. The tests will begin promptly at 8:00 am and end at 9:00 am. If you arrive late you will not be given extra time to complete the test. Failure to attend a test results in the assignment of a zero for that test grade. Typically tests are composed of two portions: 15 multiple choice questions (60 points) and 2 exercises (40 points). Grade forgiveness for the lowest test grade is available. The grade forgiveness can be used for out of town travel (job interview, sports participation, health care visit, etc.) or any emergency situation. Students will have their lowest test grade automatically dropped.

Final Exam (40%): The final exam is comprehensive of the course material covered during the semester. The exam will determine 40% of your final average. Typically final exams are composed of two portions: 20 multiple choice questions (60 points) and 4 exercises (40 points). There will be no makeup of the final exam. Failure to attend the final exam results in the assignment of a zero for the final grade.

In-Class Quizzes / Homework / Extra-Work: In-Class Quizzes / Homework / Extra-Work will not be graded. Their purpose is to prepare you for the exams and give you an indication of your understanding of the class material throughout the semester.

General Exam Information:

- Tests and the Comprehensive Final will be closed book although you be provided an official class formula sheet that will also be posted in advance on eCampus. You may not bring any other notes, cell phones, or other electronic device such as a smart watch. No headsets or hearing aids will be allowed. Sunglasses, baseball caps, hoods or any other head gear is not allowed (exception might be granted based on medical reasons or religious beliefs).
- Students are required to check all pages of a test. Missing a test question is the sole responsibility of the student.
- Students that fail to write their name on the exam will be assigned a zero on the exam.

Statement on Attendance: Attendance will not be taken regularly, however, students are responsible for ALL material covered in class. Instructor may choose to take attendance sporadically. It is not the instructor's job to provide notes, etc. for students who have not attended lectures. Failure to attend on test days will result in a grade of zero on that test. Any absence during exams is covered by test forgiveness policy, with no exceptions. Late arrival at exams will not be tolerated. It is up to the discretion of the Instructor to allow the late student to take the test. However, no extra time will be provided to the late student. A late student will in no case be allowed to take the exam in case that at least one other student has already handed in their exam and left the room prior to the arrival of the late student.

Statement on Student Behavior in the Classroom:

Since you are all professionals in training, you are expected to conduct yourself in a professional manner while in this class. For instance, while the class is in progress, everyone is expected to remove hats and sunglasses, put away the newspaper, **refrain from eating and drinking**, and **turn off cell phones**. Students are expected NOT to talk to other students or laugh or create any

such unwanted noise or other disruptions during the class period. Disruptive students will be warned during the class period that such behavior will not be tolerated and will possibly be re-seated. If disruption continues, the student will be required to leave the class and be referred to the Department Chair and/or other administrators for disciplinary action.

Academic Integrity

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me BEFORE the assignment is due to discuss the matter.

WVU Inclusivity Statement

The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see <http://diversity.wvu.edu>.