New Jersey Institute of Technology
Department of Engineering Technology
MNET 215 Materials and Processing for Technology

COURSE NUMBER	MNET 215
COURSE NAME	Materials and Processes for Technology
COURSE STRUCTURE	2-2-0
COURSE COORDINATOR/ INSTRUCTOR	Dr. S. Lieber/ Mr. D. Orlos
COURSE DESCRIPTION	The course introduces students to applications of materials, manufacturing processes, and metrology. Topics include engineering materials, heat treatment process, fabrication processes, finishing processes, and inspection processes.
PREREQUISITE(S)	MET 103, CHEM 301 or (CHEM 125 and CHEM 125A) or (CHEM121 and CHEM 125A)
COREQUISITE(S)	None
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
REQUIRED MATERIALS	Text: **Precision Machining Technology, 3rd Edition** by Peter J. Hoffman, Eric S. Hopewell, Brian Janes – Cengage Learning – ISBN: 978-1337795302. **Through NJIT Access Engineering:** **Design for Manufacturability Handbook, 2nd Edition** by James G. Bralla – McGraw-Hill – ISBN: 978-0070071391
COMPUTER USAGE	Software: Microsoft Office, CAD Software.
COURSE LEARNING OUTCOMES(CLO)	By the end of the course students should be able to: 1. Describe different engineering materials and their properties. 2. Describe manufacturing and inspection processes. 3. Describe finishing and heat treatment processes. 4. Apply knowledge towards selection of manufacturing process for a specified material. 5. Apply knowledge towards selection of inspection process for a specified material. 6. Apply knowledge towards selection of heat treatment/finishing process for a specified material. 7. Prepare engineering documents/reports.
CLASS TOPICS	Metal Composition & Classification, Heat Treatment, Hand Tools, Saws, Measurement Systems, Grinding, Drilling, Milling

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Operations, Turning Operations, Inspection Methods, Additive Manufacturing, Inspection Methods, Finishing Processes

STUDENT OUTCOMES

The Course Learning Outcomes support the achievement of the following MNET Student Outcomes and ETAC of ABET Criterion 3 requirements:

Student Outcome (1) - an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
Related CLO – 1-6

Student Outcome (2) - an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
Related CLO – 4-6

Student Outcome (3) - an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
Related CLO – 7

Student outcome (4) - an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;
Related CLO –4-6

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GRADING POLICY

Note: Grading Policy may be modified by Instructor for each Section in the Course)

Homework	10 %
Labs	20 %
Lab Assignment	10%
Three Quizzes	30 %
Final Exam	30 %

There are three quizzes during the semester. The lowest grade will be dropped. However, if you achieve an A for all three quizzes, you will not be excused from the final. There will be no makeup tests – if you miss one test, then that is the test you will drop.

Homework sets are due one week after they are assigned. Late penalty is minus one problem grade. Assignments more than one week late will not be accepted.

- Homework must be submitted in sets, arranged in order as in course outline.
- Homework must be written on quadrille 8½ x 11 engineering pad, one side only. Sets must be stapled together in the upper left hand corner.
- Homework problems should done using the "Given and Find" format and all equations should be defined symbolically prior to calculating any values. DO NOT HAND IN class notes or scratch work.

You need to be present and participate when the lab experiment is conducted in order to receive credit for the report. All labs reports are due in two weeks after they were conducted. After the due date reports will be accepted for 75% credit. After the reports have been returned to the class late reports will be accepted for only 50% credit. Assignments more than two weeks late will not be accepted. A lab and lab assignment passing grade is required to pass the course.

ACADEMIC INTEGRITY

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments

range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to http://www.njit.edu/academics/honorcode.php

STUDENT BEHAVIOR

- No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories.
- Cellular phones must be turned off during the class hours – if you are expecting an emergency call, leave it on vibrate.
- No headphones can be worn in class, unless allowed by the professor.
- Unless the professor allows the use during lecture, laptops should be closed during lecture.
- During laboratory, if you are finished earlier, you must show the professor your work before you leave class
- Class time should be participative. You should try to be part of a discussion

MODIFICATION TO COURSE

The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline.

PREPARED BY

Daniel Orlos

COURSE COORDINATED BY

Dr. S.Lieber

CLASS HOURS

Lecture	Thursday	6:00-7:55 PM	GITC 2311
Lab	Thursday	8:05-10:05 PM	GITC 2311

OFFICE HOURS

By appointment:

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GRADING LEGEND

GRADE	NUMERIC RANGE
A	90 to 100
B+	85 to 89
B	80 to 84
C+	75 to 79
C	70 to 74
D	60 to 69
F	0 to 59

GENERATIVE AI

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities. It is not permitted to be used in the assignments noted by the instructor, as doing so would undermine student learning and achievement of course learning outcomes. Additionally, if and when students use AI in this course, the AI must be cited as is shown within the NJIT Library AI citation page for AI. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

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MNET 215 - COURSE OUTLINE

Wk	Date	Topics	Assignment
1	1/23	**Lecture**: • Course Introduction • Safety (Section 2 Unit 1). • Engineering Drawings (Section 3 Unit 1). **Lab Introduction**: Makerspace Introduction & Training.	Section 2 Unit 1 (pp.37-57) Review Questions: **1, 2, 15, 20** Section 3 Unit 1 (pp.201-233) Review Questions. **3, 7, 16.**
2	1/30	**Lecture**: • Semi-Precision (Section 2 Unit 3) • Precision Measurements (Section 2 Unit 4) • Layout (Section 3 Unit 2) **Lab 1**: Semi & Precision Measurement Laboratory	Section 2 Unit 3 (pp.79-93) Review Questions: **1, 3, 8** Section 2 Unit 4 (pp. 94-147) Review Questions: **1-6** Section 3 Unit 2 (pp. 234-251) Review Questions. **1, 7, 12**.
3	2/6	**Lecture:** • Hand Tools (Section 3 Unit 3) • Saws (Section 3 Unit 4) • Metal Composition and Classification (Section 2 Unit 6) • Non Ferrous Metals (2.3 DFM-Handbook) **Lab 2**: Layout Laboratory	Section 2 Unit 6 (pp. 158-174) Review Questions: **3, 5, 11, 13.** Section 3 Unit 4 (pp. 269-285) Review Questions: **1, 5, 10**

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Wk	Date	Topics	Assignment
			Section 3 Unit 3 (pp. 252-268) Review Questions: **1-4, 9, 15** Design for Manufacturability Handbook, 2nd Edition Read Section 2.3
4	2/13	**Lecture**: • Drilling, Threading, Tapping, and Reaming (Section 3 Unit 6) • Drill Press (Section 4 Unit 1) **Lab 3**: Drilling lab Part 1.	Section 3 Unit 6 (pp. 296-315) Review Questions: **2-5** Section 4 Unit 1 (pp.317-323) Review Questions: **3,4,6**
5	2/20	**Lab 3**: Drilling lab Part 2. **QUIZ No.1**	
6	2/27	**Lecture**: • Metal forging, casting, forming, and rolling. • Laser Cutter, Water Jet, and Wire EDM **Lab 4**: Inspection.	Design for Manufacturability Handbook, 2nd Edition Instructor provided materials.
7	3/6	**Lecture**: • Heat Treatment of Metals (Section 2 Unit 7) **Lab 5**: Sheet Metal forming laboratory.	Section 2 Unit 7 (pp. 175-189) Review Questions: **6-10**

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Wk	Date	Topics	Assignment
8	3/13	**Lecture**: • Introduction to Turning Operations, Tool Geometry, and CNC Part 1 **Lab 6**: Heat Treatment Laboratory Part 1.	Section 5 Unit 1 Turning (pp. 359-368) Review Questions: **1-3**
SPRING BREAK NO CLASS 3/20			
9	3/27	**Lecture**: • Introduction to Turning Operations, Tool Geometry, and CNC Part 2 **Lab 6**: Heat Treatment Laboratory Part 2.	Section 5 Turning Units 2-3 (pp. 368-431) Review Questions: **pp. 401 – 5, 11, 16, 17 / pp. 431 – 5-7**
NO CLASS 4/3			
10	4/10	**Lecture**: • Introduction to Milling Operations, Tool Geometry, and CNC Part 1 **QUIZ No.2**	Section 6 Milling Unit 1 (pp. 467-482). Review Questions: **1-2, 6** Section 6 Milling Unit 2 (pp. 483-503). Review Questions: **1-2, 7-9**
11	4/17	**Lecture**: • Introduction to Milling Operations, Tool Geometry, and CNC Part 2 **Lab 7**: Turning Operations Part 1	Section 6 Milling Unit 3 (pp. 504-546). Review Questions: **5-8**
12	4/24	**Lecture**: • Finishing Operations • Precision Measurements (Section 2 Unit 4) ○ Surface Roughness Measurements	Instructor provided materials.

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Wk	Date	Topics	Assignment
		Lab 7: Turning Operations Part 2	Section 2 Unit 4 (pp.137-147) Review Questions: **18-23**
13	5/1	**QUIZ No. 3** **Lab 8**: Milling Operations Part 1	
14	5/6	**Lecture**: • Additive Manufacturing **Lab 8**: Milling Operations Part 2	Instructor provided materials.
TBD		**Final Exam**	