New Jersey Institute of Technology
Department of Engineering Technology
MNET 300 Concepts in Machining

COURSE NUMBER   MNET 300

COURSE NAME   Concepts in Machining

COURSE STRUCTURE   2-2-3 (lecture hr/wk - lab hr/wk – course credits)

COURSE COORDINATOR/   Dr. S. Lieber/ Blaine Edlefsen
INSTRUCTOR

COURSE DESCRIPTION   Applications in the machining of various materials. Topics include speeds and feeds calculations, tooling concepts, gaging techniques and prototype construction.

PREREQUISITE(S)   MET 103

COREQUISITE(S)   None

REQUIRED, ELECTIVE   Elective
OR SELECTED ELECTIVE

MATERIALS   **Required Materials:**

Precision Machining Technology 3rd Edition
by Peter J. Hoffman , Eric S. Hopewell
ISBN-13: 9781337795302

Reference Materials:
Print Reading for Engineering and Manufacturing Technology 3rd Edition by David A. Madsen.
ISBN-13: 9781133716570

Access Engineering:
Design for Manufacturability Handbook, 2nd Edition, James Bralla

Geometric Dimensioning and Tolerancing for Mechanical Design, 3rd Edition, Gene R. Cogorno

Handbook of Machining and Metalworking Calculations, 1st Edition, Ronald A. Walsh

Materials and Manufacturing: An Introduction to How They Work and Why It Matters, 1st Edition, Mark A. Atwater, Ph.D.

COMPUTER USAGE   Software: Microsoft Office, CAD Software.

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COURSE OUTCOMES(CO)

By the end of the course students should be able to:
1. Define diverse manufacturing and inspection processes.
2. Describe engineering drawings and how their interpretation relates to the selection of different manufacturing and inspection processes.
3. Analyze engineering drawings towards the selection of manufacturing and inspection processes.
4. Apply knowledge of manufacturing /inspection process for fabrication planning with different materials.
5. Apply knowledge of manufacturing /inspection process for fabrication calculation with different materials.
6. Apply knowledge of manufacturing and inspection processes towards fabrication.
7. Prepare engineering documents/reports.

CLASS TOPICS

Engineering Drawing Analysis, Geometric Dimensioning and Tolerancing (GD&T), Materials, Fabrication Planning, Fabrication Calculation, Fabrication, Hand Tools, Saws, Drilling/Reaming/Threading, Milling Operations, Turning Operations, Toolholding, Workholding, Inspection Methods, Assembly, Fabrication.

STUDENT OUTCOMES

The Course Learning Outcomes support the achievement of the following MET Student Outcomes and TAC of ABET Criterion 9 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 CO – 1-7

Student Outcome 2 - an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
Related CO – 3-6

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 CO – 7

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GRADING POLICY		
	Homework	10 %
	Lab Reports	25 %
Note: Grading Policy may be modified by Instructor for each Section in the Course)	Lab Assignments	15 %
	Three Quizzes	20 %
	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.

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

Blaine Edlefsen

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COURSE COORDINATED BY   Dr. S. Lieber

CLASS HOURS

Monday   8:30– 10:35 AM   GITC 1404

Wednesday   8:30– 10:35 AM   GITC 1404

OFFICE HOURS

By appointment: blaine.edlefsen@njit.edu

HOMEWORK, LAB ASSIGNMENTS - IMPORTANT

1. Homework, Lab Assignments will be posted on the Learning Management System (LMS).
2. Homework and Lab Assignments are due as described in LMS. Late penalty is minus 25% each week. Assignments more than one week late will not be accepted.
3. Homework and Lab Assignments must be submitted in the format provided by the professor.
4. You need to be present and participate when the lab is conducted in order to receive credit for the related Lab Assignment. A Lab Assignment passing grade is required to pass the course.

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

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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 300 - Course Outline

Week	Date	Topics	Homework Assignment
1	1/22 1/27	**Lecture**: • Course Introduction • Introduction to Interpreting Engineering Drawings **Lab**: • Makerspace Introduction & Safety Training. • Lab-Assignment: Read & Interpret Engineering Drawings	**Read:** Hoffman: • Section 3 Unit 1, pp.202-211 • Section 2 Unit 4, pp. 138-141. Madsen: • Ch.1, pp.1-14; • Ch.5, pp. 61-79. • Ch. 8, pp. 160-171; 201-203. Cogorno: • Ch. 2 **Assignment:** Section 3 Unit 1 Review Questions: 1, 2, 4, 5, 6, 9, 10, 11 Section 2 Unit 4 (pp.138-146) Review Questions: 19, 20
2	1/29 2/3	**Lecture**: • Introduction to GD&T Drawing Interpretation o Datums o Geometric Characteristic and Related Symbols o Form • Measurement **Lab**: • Lab-1: Measurement & Inspection Review	**Read:** Hoffman: • Section 3 Unit 1, pp.214-218; 223-227 Madsen: • Ch. 8, pp. 184-187 • Ch.11, pp.273-278; 297-302 Cogorno: • Ch. 1 • Ch. 3

Week	Date	Topics	Homework Assignment
			- Ch. 4.1-4.6 - Ch. 5 **Assignment:** - Hoffman, Section 3 Unit 1: 13, 14, 15, 16, 17 - Cogorno Ch-1: 1, 2 - Cogorno Ch-4: 1 - Cogorno Ch-5: 1, 3
3	2/5 2/10	**Lecture**: - Materials: Metals and Plastics. - Hacksaws (Section 3-Unit 3) - Files (Section 3-Unit 3) - Saws and Cutoff Machines - Layout **Lab**: - Lab-2 Saw Cutting Laboratory	Hoffman: - Section 3 Unit 2, pp.235-237. - Section 3 Unit 3, pp.260-265. - Section 3-Unit 4, pp. 270-285 Madsen: - Ch.7, pp.109-122 Bralla: - Ch. 2.4 (11.3) - Ch. 4.1 (28.3) - Ch. 4.2 **Assignment:** Hoffman: - Section 3 Unit 2: Problems 2, 4. - Section 3 Unit 3, Problems 10, 11, 12, 13, 14, 15, 16. - Section 3-Unit 4, Problems 2,3, 5, 9, 10, 12
4	2/12 2/17	**Lecture**: Vertical Milling Machine Operations Part-1	**Read:**

Week	Date	Topics	Homework Assignment
		• Vertical Milling Workholding & Tooling • GD&T Orientation **QUIZ No. 1**	Hoffman: • Section 6 Unit 1, pp.469-482. • Section 6 Unit 2, pp.483-503. • Section 6 Unit 3, pp.504-527. Bralla: • Ch. 4.6 Madsen: • Ch. 7, pp. 129-131 • Ch. 11, pp. 302-305 Cogorno: • Ch. 6 **Assignment**: • Section 6, Unit-1: Review Question: 10 • Section 6, Unit-2: Review Questions: 13, 16 • Section 6, Unit-3: Review Questions: 1, 3, 4 • Cogorno: Ch. 6.6 (Chapter Review): 1,2,3,6,14,16, 27(only for plane surfaces) • Cogorno: Ch. 6.7 (Problems): 1, 5
5	2/19 2/24	**Lecture:** • Hole Making • GD&T Location **Lab**: • Lab-3: Introduction to Milling o Mill Introduction o Mill to Size o Edge Detection	**Read:** Hoffman: • Section 3 Unit 1, pp. 226-230. • Section 4 Unit 2, pp.324-339. • Section 4 Unit 3, pp.340-356. Madsen:

Week	Date	Topics	Homework Assignment
			• Ch.7, pp.134-136 • Ch. 8, pp.176-181 • Ch. 11, pp.306-323 Bralla: • Ch. 4.5 Cogorno: • Ch.7-8 **Assignments**: • Section 4-Unit-2: Questions 1, 3, 6 • Section 4-Unit-3: Questions 2, 3, 6, 7, 8, 10, 11 • Cogorno 7.12 Chapter Review: 1,2,4,5,9,12 • Cogorno 7.13 Problems: 1,2,3,4
6	2/26 3/3	**Lecture:** • Vertical Milling Machine Operations Part-2 • GD&T Profile Tolerance **Lab**: • Lab-3: Introduction to Milling ○ Mill Introduction ○ Mill to Size ○ Edge Detection	**Read:** Hoffman: • Section 3 Unit 1, pp. 224-228. • Section 6 Unit 3, pp.527-528; pp.533-535, 538; pp.542-545. Madsen: • Ch. 8, pp. 173-174, 178 • Ch. 11, pp. 316-317; 323-334. Cogorno: • Ch.11 Bralla: • Ch. 4.6 **Assignments**:

Week	Date	Topics	Homework Assignment
			• Section 6-Unit-3: Questions 10, 11, 12, 13, 14 • Cogorno Ch. 11: Chapter Review: 8, 9, 10, 12 • Cogorno Ch. 11: Problem: 1
7	3/5 3/10	**Lab**: • Lab-4: Drilling on the Mill o Mill Laboratory o Edge Detection o Hole Pattern.	
		SPRING BREAK NO CLASS 3/17 & 3/19	
8	3/12 3/24	**Lecture:** • Pocket Milling Manufacturing Discussion & Assignment **Lab**: • Lab-5: Pocket Milling o Milling a Square Pocket • Lab-6: Drill Press Laboratory o Counterbore Clearance Holes • Lab-7: Plate Inspection	•
9	3/26 3/31	**QUIZ No. 2** **Lab**: • Lab-5: Pocket Milling • Lab-6: Drill Press Laboratory • Lab-7: Plate Inspection	•
10	4/2 4/7	**Lecture:** • Lathe Tools, Toolholding, and Workholding • Machining Operations on the Lathe Part-1 • GD&T Datum Axis	**Read:** Hoffman: • Section 3 Unit 1, pp. 230-231.

Week	Date	Topics	Homework Assignment
		Lab: • Router Assignment • Lab-6: Drill Press Laboratory • Lab-7: Plate Inspection	• Section 5 Unit 1, pp. 360-368 • Section 5 Unit 2, pp.369-401. Madsen: • Ch. 8, pp. 171-173 • Ch. 11, pp. 283-284 Mark A. Atwater. Ch. 13.2 **Assignment:** • Section 5-Unit-1: Review Question: 6, 7, 8 • Section 5-Unit-2: Review Questions 1-3, 6, 10, 15, 18
11	4/9 4/14	**Lecture**: • Machining Operations on the Lathe Part-2 • GD&T Axis Control, Cylindricity, Concentricity, Runout Part-2 • Taper Turning • GD&T Profile Tolerance Revisited • Fit Tolerances **Lab**: • Lab-8: Introduction to Turning	Hoffman: • Section 3 Unit 1, pp. 212-213; pp. 218-223 • pp. 230-231. • Section 5 Unit 3, pp. 402-431 • Section 5 Unit 5, pp. 452-465 • Madsen: • Ch. 11, 289-294, 300-301, pp. 333-336. Bralla: • Ch. 4.4 Cogorno: • Ch. 10 **Assignment:**

Week	Date	Topics	Homework Assignment
			• Section 5-Unit-3: Review Question: 1, 4, 9, 10, 17, 18, 21, 24 • Section 5-Unit-5: Review Questions: 1, 3
12	4/16 4/21	**Lab**: • Lab-8: Introduction to Turning • Lab-9: Boring & Taper-Turning • Lab-10: Grooving & Die Threading	
13	4/23 4/28	**QUIZ No. 3** **Lab:** • Lab-8: Introduction to Turning • Lab-9: Boring & Taper-Turning • Lab-10: Grooving & Die Threading	
14	4/30 5/5	**Lab:** • Lab-8: Introduction to Turning • Lab-9: Boring & Taper-Turning • Lab-10: Grooving & Die Threading • Assembly Work Instruction	**FINALIZE LAB WORK**
15	TBD	**Final Exam**	