

**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/ INSTRUCTOR	Dr. S. Lieber/ Blaine Edlefsen
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 OR SELECTED ELECTIVE	Elective
MATERIALS	<p>Required Materials:</p> <p>Precision Machining Technology 3rd Edition by Peter J. Hoffman , Eric S. Hopewell ISBN-13: 9781337795302</p> <p>Reference Materials: Print Reading for Engineering and Manufacturing Technology 3rd Edition by David A. Madsen. ISBN-13: 9781133716570</p> <p>Access Engineering: Design for Manufacturability Handbook, 2nd Edition, James Bralla</p> <p>Geometric Dimensioning and Tolerancing for Mechanical Design, 3rd Edition, Gene R. Cogorno</p> <p>Handbook of Machining and Metalworking Calculations, 1st Edition, Ronald A. Walsh</p> <p>Materials and Manufacturing: An Introduction to How They Work and Why It Matters, 1st Edition, Mark A. Atwater, Ph.D.</p>
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 Note: Grading Policy may be modified by Instructor for each Section in the Course)	Homework	10 %
	Lab Reports	25 %
	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 Dr. S. Lieber
COORDINATED BY

CLASS HOURS

Monday 8:30– 10:35 AM GITC 2311
Wednesday 8:30– 10:35 AM GITC 2311

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	9/3 9/8	Lecture: <ul style="list-style-type: none"> • Course Introduction • Introduction to Interpreting Engineering Drawings Lab: <ul style="list-style-type: none"> • Makerspace Introduction & Safety Training. • Lab-Assignment: Read & Interpret Engineering Drawings 	<u>Read:</u> Hoffman: <ul style="list-style-type: none"> • Section 3 Unit 1, pp.202-211 • Section 2 Unit 4, pp. 138-141. Madsen: <ul style="list-style-type: none"> • Ch.1, pp.1-14; • Ch.5, pp. 61-79. • Ch. 8, pp. 160-171; 201-203. Cogorno: <ul style="list-style-type: none"> • Ch. 2 <u>Assignment:</u> 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	9/10 9/15	Lecture: <ul style="list-style-type: none"> • Introduction to GD&T Drawing Interpretation <ul style="list-style-type: none"> ○ Datums ○ Geometric Characteristic and Related Symbols ○ Form • Measurement Lab: <ul style="list-style-type: none"> • Lab-1: Measurement & Inspection Review 	<u>Read:</u> Hoffman: <ul style="list-style-type: none"> • Section 3 Unit 1, pp.214-218; 223-227 Madsen: <ul style="list-style-type: none"> • Ch. 8, pp. 184-187 • Ch.11, pp.273-278; 297-302 Cogorno: <ul style="list-style-type: none"> • Ch. 1 • Ch. 3

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Week	Date	Topics	Homework Assignment
			<ul style="list-style-type: none"> Ch. 4.1-4.6 Ch. 5 <p><u>Assignment:</u></p> <ul style="list-style-type: none"> 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	9/17 9/22	<p>Lecture:</p> <ul style="list-style-type: none"> Materials: Metals and Plastics. Hacksaws (Section 3-Unit 3) Files (Section 3-Unit 3) Saws and Cutoff Machines Layout <p>Lab:</p> <ul style="list-style-type: none"> Lab-2 Saw Cutting Laboratory 	<p>Hoffman:</p> <ul style="list-style-type: none"> Section 3 Unit 2, pp.235-237. Section 3 Unit 3, pp.260-265. Section 3-Unit 4, pp. 270-285 <p>Madsen:</p> <ul style="list-style-type: none"> Ch.7, pp.109-122 <p>Bralla:</p> <ul style="list-style-type: none"> Ch. 2.4 (11.3) Ch. 4.1 (28.3) Ch. 4.2 <p><u>Assignment:</u></p> <p>Hoffman:</p> <ul style="list-style-type: none"> 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	9/24 9/29	<p>Lecture:</p> <ul style="list-style-type: none"> Vertical Milling Machine Operations Part-1 	<p><u>Read:</u></p>

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Week	Date	Topics	Homework Assignment
		<ul style="list-style-type: none"> Vertical Milling Workholding & Tooling GD&T Orientation <p>QUIZ No. 1</p>	<p>Hoffman:</p> <ul style="list-style-type: none"> Section 6 Unit 1, pp.469-482. Section 6 Unit 2, pp.483-503. Section 6 Unit 3, pp.504-527. <p>Bralla:</p> <ul style="list-style-type: none"> Ch. 4.6 <p>Madsen:</p> <ul style="list-style-type: none"> Ch. 7, pp. 129-131 Ch. 11, pp. 302-305 <p>Cogorno:</p> <ul style="list-style-type: none"> Ch. 6 <p><u>Assignment:</u></p> <ul style="list-style-type: none"> 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	10/1 10/6	<p>Lecture:</p> <ul style="list-style-type: none"> Hole Making GD&T Location <p>Lab:</p> <ul style="list-style-type: none"> Lab-3: Introduction to Milling <ul style="list-style-type: none"> Mill Introduction Mill to Size Edge Detection 	<p><u>Read:</u></p> <p>Hoffman:</p> <ul style="list-style-type: none"> Section 3 Unit 1, pp. 226-230. Section 4 Unit 2, pp.324-339. Section 4 Unit 3, pp.340-356. <p>Madsen:</p>

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Week	Date	Topics	Homework Assignment
			<ul style="list-style-type: none"> • Ch.7, pp.134-136 • Ch. 8, pp.176-181 • Ch. 11, pp.306-323 <p>Bralla:</p> <ul style="list-style-type: none"> • Ch. 4.5 <p>Cogorno:</p> <ul style="list-style-type: none"> • Ch.7-8 <p><u>Assignments:</u></p> <ul style="list-style-type: none"> • 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	10/8 10/13	<p>Lecture:</p> <ul style="list-style-type: none"> • Vertical Milling Machine Operations Part-2 • GD&T Profile Tolerance <p>Lab:</p> <ul style="list-style-type: none"> • Lab-3: Introduction to Milling <ul style="list-style-type: none"> ○ Mill Introduction ○ Mill to Size ○ Edge Detection 	<p><u>Read:</u></p> <p>Hoffman:</p> <ul style="list-style-type: none"> • Section 3 Unit 1, pp. 224-228. • Section 6 Unit 3, pp.527-528; pp.533-535, 538; pp.542-545. <p>Madsen:</p> <ul style="list-style-type: none"> • Ch. 8, pp. 173-174, 178 • Ch. 11, pp. 316-317; 323-334. <p>Cogorno:</p> <ul style="list-style-type: none"> • Ch.11 <p>Bralla:</p> <ul style="list-style-type: none"> • Ch. 4.6 <p><u>Assignments:</u></p>

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Week	Date	Topics	Homework Assignment
			<ul style="list-style-type: none"> 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	10/15 10/20	Lab: <ul style="list-style-type: none"> Lab-4: Drilling on the Mill <ul style="list-style-type: none"> Mill Laboratory Edge Detection Hole Pattern. 	
8	10/22 10/27	Lecture: <ul style="list-style-type: none"> Pocket Milling Manufacturing Discussion & Assignment Lab: <ul style="list-style-type: none"> Lab-5: Pocket Milling <ul style="list-style-type: none"> Milling a Square Pocket Lab-6: Drill Press Laboratory <ul style="list-style-type: none"> Counterbore Clearance Holes Lab-7: Plate Inspection 	
9	10/29 11/3	QUIZ No. 2 Lab: <ul style="list-style-type: none"> Lab-5: Pocket Milling Lab-6: Drill Press Laboratory Lab-7: Plate Inspection 	
10	11/5 11/10	Lecture: <ul style="list-style-type: none"> Lathe Tools, Toolholding, and Workholding Machining Operations on the Lathe Part-1 GD&T Datum Axis 	<u>Read:</u> Hoffman: <ul style="list-style-type: none"> Section 3 Unit 1, pp. 230-231. Section 5 Unit 1, pp. 360-368

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Week	Date	Topics	Homework Assignment
		Lab: <ul style="list-style-type: none"> Router Assignment Lab-6: Drill Press Laboratory Lab-7: Plate Inspection 	<ul style="list-style-type: none"> Section 5 Unit 2, pp.369-401. Madsen: <ul style="list-style-type: none"> Ch. 8, pp. 171-173 Ch. 11, pp. 283-284 Mark A. Atwater. Ch. 13.2 <u>Assignment:</u> <ul style="list-style-type: none"> Section 5-Unit-1: Review Question: 6, 7, 8 Section 5-Unit-2: Review Questions 1-3, 6, 10, 15, 18
11	11/12 11/17	Lecture: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Lab-8: Introduction to Turning 	Hoffman: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Ch. 11, 289-294, 300-301, pp. 333-336. Bralla: <ul style="list-style-type: none"> Ch. 4.4 Cogorno: <ul style="list-style-type: none"> Ch. 10 <u>Assignment:</u> <ul style="list-style-type: none"> Section 5-Unit-3: Review Question: 1, 4, 9, 10, 17, 18, 21, 24

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Week	Date	Topics	Homework Assignment
			<ul style="list-style-type: none"> Section 5-Unit-5: Review Questions: 1, 3
12	11/19 11/24	Lab: <ul style="list-style-type: none"> Lab-8: Introduction to Turning Lab-9: Boring & Taper-Turning Lab-10: Grooving & Die Threading 	
13	12/1 12/3	QUIZ No. 3 Lab: <ul style="list-style-type: none"> Lab-8: Introduction to Turning Lab-9: Boring & Taper-Turning Lab-10: Grooving & Die Threading 	
14	12/8 12/10	Lab: <ul style="list-style-type: none"> 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	