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MNET 318-102: Manufacturing Process Design

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**New Jersey Institute of Technology
Department of Engineering Technology
MNET 318 Manufacturing Process Design**

COURSE NUMBER	MNET 318
COURSE NAME	Manufacturing Process Design
COURSE STRUCTURE	2-2-3 (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	Dr. S. Lieber/Mr. G. Makris
COURSE DESCRIPTION	A development of the principles of production, methodology and economics in view of production requirements with respect to materials, tolerances and finish. Production processes are matched to the product requirements. Laboratory work supports the lecture. Computer problem solving is incorporated in the course.
PREREQUISITE(S)	MNET 303
COREQUISITE(S)	None
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Elective
REQUIRED MATERIALS	Peter Scallan. Process Planning : <u>The Design/Manufacture Interface</u> . Elsevier, 2003 ISBN-13: 978-0750651295 Available through NJIT Library Online.
COMPUTER USAGE	Software: <i>MasterCAM</i> . <ul style="list-style-type: none">• Provided in NJIT Lab• Home Version Available for Reinforcement:<ul style="list-style-type: none">○ https://www.mastercam.com/solutions/home-learning-edition/
COURSE LEARNING OUTCOMES(CLO)	By the end of the course students should be able to: <ol style="list-style-type: none">1. Describe processing strategies and how they apply to manufacturing systems.2. Describe and Apply process planning documentation.3. Describe critical processing factors from the dimensional information interpreted from a drawing and how they apply to process planning.4. Describe suitable processes for a part based on the identified critical processing factors.5. Describe the main factors in the selection of tooling and how they apply to process planning.

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6. Describe the main factors in the selection of process parameters and how they apply to process planning.
7. Describe the types of workholders used in component manufacture and how they apply to process planning.
8. Describe inspection and testing methods and how they apply to selection of a process.
9. Describe the main costs in manufacturing and how they are used in process planning.
10. Develop CAM models with CAM software.
11. Apply knowledge of Manufacturing and Inspection processes to CAM.
12. Conduct Engineering Analysis with CAM.
13. Prepare Engineering documents/reports.

CLASS TOPICS

Manufacturing Systems, Process Planning, Process Planning Documentation, Drawing Interpretation, Material Evaluation and Process Selection, Production Equipment and Tooling Selection, Process Parameters, Workholding Devices, Selection of Quality Assurance Methods, Economics of Process Planning, CAM operation, CAM 2D Milling, CAM 3D Milling, CAM Lathe Operations, CAM Wire Operation, CAM Multiaxis, CAM Previewing Toolpaths, CAM Posting, CAM Documentation

STUDENT OUTCOMES

The Course Learning Outcomes support the achievement of the following MET Student Outcomes and TAC of ABET Criterion 9 requirements:

Student Outcome a - an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities

Related CLO – 1-9

Student outcome b - an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;

Related CLO –3-12

Student outcome c - an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;

Related CLO – 12

Student Outcome d - an ability to design systems, components, or processes for broadly-defined engineering technology problems

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appropriate to program educational objectives.

Related CLO – 1-12

Student outcome f - an ability to identify, analyze, and solve broadly-defined engineering technology problems

Related CLO – 1-12

Student Outcome g - an ability to communicate effectively regarding broadly-defined engineering technology activities

Related CLO – 13

GRADING POLICY Homework 15 %

Project 1 & 2 30 %

Note: Grading Policy Two Quizzes 25 %
may be modified by

Instructor for each Final Exam 30 %
Section in the Course)

Note: There are two quizzes during the semester. There will be no makeup quizzes.

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.

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- 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

Mr. G. Makris

COURSE

Dr. S. Lieber

COORDINATED BY

CLASS HOURS

Wednesday 5:45 PM – 9:50 PM 2302 GITC
Building

OFFICE HOURS

By appointment e-mail georghios.makris@njit.edu

HOMEWORK & PROJECT - IMPORTANT

Homework

1. Homework sets are due one week after they are assigned unless specified. Late penalty is minus 25% each week. Assignments more than one week late will not be accepted.
2. Homework must be submitted in the format provided by the professor.
3. Projects are due on the dates indicated. No late projects will be accepted.
4. Projects should be submitted in the format provided by the professor.

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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

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COURSE OUTLINE

Week	Topics	Homework Assignment
1 January 22	<u>Lecture</u> <ul style="list-style-type: none"> • Introduction to Manufacturing (Chapter 1) <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Basics Tutorial Part 1 	Homework Set #1
2 January 29	<u>Lecture</u> <ul style="list-style-type: none"> • Process Planning (Chapter 2) <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Basics Tutorial Part 2 • Project 1 Assigned 	Homework Set #2
3 February 5	<u>Lecture</u> <ul style="list-style-type: none"> • Drawing Interpretation (Chapter 3) <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Solids Tutorial Part 1 	Homework Set #3
4 February 12	<u>Lecture</u> <ul style="list-style-type: none"> • Material Evaluation & Process Selection Part 1 (Chapter 4) <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Solids Tutorial Part 2 	Homework Set #4
5 February 19	<u>Lecture</u> <ul style="list-style-type: none"> • Material Evaluation & Process Selection Part 2 (Chapter 4) <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Basic 2D Milling 	Homework Set #5
6 February 26	<u>Lecture</u> <ul style="list-style-type: none"> • Production Equipment & Tooling Selection (Chapter 5) <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Basic 3D Milling 	Homework Set #6 (Due March 11)
7 March 4	<u>Lecture</u> <ul style="list-style-type: none"> • Quiz #1 <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Dynamic Milling Part 1 	Finalize Project 1
8 March 11	<u>Lecture</u> <ul style="list-style-type: none"> • Process Parameters (Chapter 6) • Project # 1 Due 	Homework Set #7

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Week	Topics	Homework Assignment
	<u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Dynamic Milling Part 2 	
Spring Break March 15-22		
9 March 25	<u>Lecture</u> <ul style="list-style-type: none"> • Workholding Devices Part 1 (Chapter 7) • Project 2 Assigned <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Lathe Part 1 	Homework Set #8 (Due April 8)
10 April 1	<u>Lecture</u> <ul style="list-style-type: none"> • Workholding Devices Part 2 (Chapter 7) <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Lathe Part 2 	
11 April 8	<u>Lecture</u> <ul style="list-style-type: none"> • Selection of Quality Assurance Method (Chapter 8) <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Wire 	Homework Set #9 (Due April 22)
12 April 15	<u>Lecture</u> <ul style="list-style-type: none"> • Quiz #2 <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Set-Up Sheets 	Finalize Project 2
13 April 22	<u>Lecture</u> <ul style="list-style-type: none"> • Economics of Process Planning (Chapter 9) <u>Lab:</u> <ul style="list-style-type: none"> • MasterCAM Multi-Axis & Machine Simulation 	Homework Set #10 Finalize Project 2
14 April 29	<u>Lecture</u> <ul style="list-style-type: none"> • From Design to Manufacture (Chapter 10) • Project 2 Due 	
15 TBD May 8-14	Final Exam	