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) Corequisite(s)	MNET 303 None	
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Elective	
REQUIRED MATERIALS	Peter Scallan. Process Planning : <u>The Design/Manufacture</u> <u>Interface</u> . Elsevier, 2003 ISBN-13: 978-0750651295	
	Available through NJIT Library Online.	
COMPUTER USAGE	Software: <i>MasterCAM</i> . <ul> <li>Provided in NJIT Lab</li> <li>Home Version Available for Reinforcement: <ul> <li><u>https://www.mastercam.com/solutions/home-learning-edition/</u></li> </ul> </li> </ul>	
Course Learning Outcomes(CLO)	<ul> <li>By the end of the course students should be able to:</li> <li>1. Describe processing strategies and how they apply to manufacturing systems.</li> <li>2. Describe and Apply process planning documentation.</li> <li>3. Describe critical processing factors from the dimensional information interpreted from a drawing and how they apply to process planning.</li> <li>4. Describe suitable processes for a part based on the identified critical processing factors.</li> <li>5. Describe the main factors in the selection of tooling and how they apply to process planning.</li> </ul>	

	<ol> <li>Describe the main factors in the selection of process parameters and how they apply to process planning.</li> <li>Describe the types of workholders used in component manufacture and how they apply to process planning.</li> <li>Describe inspection and testing methods and how they apply to selection of a process.</li> <li>Describe the main costs in manufacturing and how they are used in process planning.</li> <li>Develop CAM models with CAM software.</li> <li>Apply knowledge of Manufacturing and Inspection processes to CAM.</li> <li>Conduct Engineering Analysis with CAM.</li> <li>Prepare Engineering documents/reports.</li> </ol>
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	<ul> <li>The Course Learning Outcomes support the achievement of the following MET Student Outcomes and TAC of ABET Criterion 9 requirements:</li> <li>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;</li> <li>Related CO – 1-12</li> </ul>
	<b>Student Outcome (2)</b> - an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline; Related CO – 1-12
	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 $CO - 13$

Student outcome (4) - an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; Related CO - 12

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

# • 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	Mr. G. Makris	
COURSE COORDINATED BY	Dr. S. Lieber	

<b>CLASS HOURS</b>		
Wednesday	6:00 PM - 10:05 PM	GITC 2311

#### **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.

#### **GRADING LEGEND**

GRADE	NUMERIC RANGE
А	90 to 100
B+	85 to 89
В	80 to 84
C+	75 to 79
С	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 <u>NJIT</u> 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.

## **COURSE OUTLINE**

Week	Date	Topics	Homework Assignment
1	1/22	Lecture	
		• Introduction to Manufacturing (Chapter 1)	Homework Set #1
		T 1	(Due January 29)
		Lab: MasterCAM Pasies Tutorial Part 1	
2	1/29	MasterCAW basics rutorial Fait 1	
-	1/2/	Process Planning (Chapter 2)	
			Homework Set #2
		Lab:	(Due February 5)
		MasterCAM Basics Tutorial Part 2	
	2/5	Project 1 Assigned	
3	2/5	Lecture Drowing Interpretation (Chapter 2)	
		• Drawing interpretation (Chapter 3)	Homework Set #3
		Lab:	(Due February 12)
		MasterCAM Solids Tutorial Part 1	
4	2/12	Lecture	
		Material Evaluation & Process Selection	
		Part 1 (Chapter 4)	Homework Set #4
		Lab	(Due February 19)
		MasterCAM Solids Tutorial Part 2	
5	2/19	Lecture	
		Material Evaluation & Process Selection	
		Part 2 (Chapter 4)	Homework Set #5
			(Due February 26)
		Lab: MasterCAM Dagia 2D Milling	
6	2/26	MasterCAM Basic 2D Minning	
U	2/20	Production Equipment & Tooling Selection	
		(Chapter 5)	Homework Set #6
			(Due March 5)
		Lab:	
	2/5	MasterCAM Basic 3D Milling	
	3/5	Lecture	
			Finalize Project 1
		Lab:	I munize I roject I
		MasterCAM Dynamic Milling Part 1	
8	3/12	Lecture	Homework Set #7

Week	Date	Topics	<b>Homework Assignment</b>
		• Process Parameters (Chapter 6)	(Due March 26)
		Project # 1 Due	
		Lab:	
		MasterCAM Dynamic Milling Part 2	
		SPRING BREAK NO CLASS 3/19	
9	3/26	Lecture	
		• Workholding Devices Part 1 (Chapter 7)	
		Project 2 Assigned	
		Lab:	Homework Set #8
10	1/2	MasterCAM Lathe Part 1	(Due April 9)
10	4/2	Lecture	
		• Workholding Devices Part 2 (Chapter 7)	
		Lab	
		• MasterCAM Lathe Part 2	
11	4/9	I ecture	
	<b>-</b> //	Selection of Quality Assurance Method	
		(Chapter 8)	Homework Set #9
		(chapter o)	(Due April 16)
		Lab:	r · · ·
		MasterCAM Wire	
12	4/16	Lecture	
		• Quiz #2	Eingling Project 2
			Finalize Project 2
		Lab:	
		MasterCAM Set-Up Sheets	
13	4/23	Lecture	
		• Economics of Process Planning (Chapter 9)	Homework Set #10
		T 1	(Due April 30)
		LaD:	Finalize Project 2
		MasterCAM Multi-Axis & Machine     Simulation	
14	4/30	Lecture	
		• From Design to Manufacture (Chapter 10)	
		• Project 2 Due	
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