Spring 1-1-2020

MNET 318-102: Manufacturing Process Design

Georghios Makris

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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  

Available through NJIT Library Online.  

Computer Usage: Software: MasterCAM.  
- Provided in NJIT Lab  
- Home Version Available for Reinforcement:  

Course Learning Outcomes (CLO): By the end of the course students should be able to:  
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.
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.

**CLASS TOPICS**


**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

<table>
<thead>
<tr>
<th>Grading Policy</th>
<th>Homework 15 %</th>
<th>Project 1 &amp; 2 30 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: Grading Policy</td>
<td>Two Quizzes 25 %</td>
<td>Final Exam 30 %</td>
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<tr>
<td>may be modified by Instructor for each Section in the Course)</td>
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<tr>
<td>Note: There are two quizzes during the semester. There will be no makeup quizzes.</td>
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**Grading Policy**  
Homework 15 %  
Project 1 & 2 30 %  
Two Quizzes 25 %  
Final Exam 30 %

**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](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**
Mr. G. Makris

**Course Coordinated by**
Dr. S. Lieber

**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.
**Grading Legend**

<table>
<thead>
<tr>
<th>GRADE</th>
<th>NUMERIC RANGE</th>
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<tbody>
<tr>
<td>A</td>
<td>90 to 100</td>
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<td>B+</td>
<td>85 to 89</td>
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<td>B</td>
<td>80 to 84</td>
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<td>C+</td>
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<td>C</td>
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<td>D</td>
<td>60 to 69</td>
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<td>F</td>
<td>0 to 59</td>
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COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Homework Assignment</th>
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</table>
| 1 January 22 | Lecture  
- Introduction to Manufacturing (Chapter 1)  
Lab:  
- MasterCAM Basics Tutorial Part 1 | Homework Set #1 |
| 2 January 29 | Lecture  
- Process Planning (Chapter 2)  
Lab:  
- MasterCAM Basics Tutorial Part 2  
**Project 1 Assigned** | Homework Set #2 |
| 3 February 5 | Lecture  
- Drawing Interpretation (Chapter 3)  
Lab:  
- MasterCAM Solids Tutorial Part 1 | Homework Set #3 |
| 4 February 12 | Lecture  
- Material Evaluation & Process Selection Part 1 (Chapter 4)  
Lab:  
- MasterCAM Solids Tutorial Part 2 | Homework Set #4 |
| 5 February 19 | Lecture  
- Material Evaluation & Process Selection Part 2 (Chapter 4)  
Lab:  
- MasterCAM Basic 2D Milling | Homework Set #5 |
| 6 February 26 | Lecture  
- Production Equipment & Tooling Selection (Chapter 5)  
Lab:  
- MasterCAM Basic 3D Milling | Homework Set #6 (Due March 11) |
| 7 March 4 | Lecture  
- Quiz #1  
Lab:  
- MasterCAM Dynamic Milling Part 1 | **Finalize Project 1** |
| 8 March 11 | Lecture  
- Process Parameters (Chapter 6)  
**Project #1 Due** | Homework Set #7 |
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<tr>
<th>Week</th>
<th>Topics</th>
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<tbody>
<tr>
<td></td>
<td>Lab:</td>
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<tr>
<td></td>
<td>• MasterCAM Dynamic Milling Part 2</td>
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<td><strong>Spring Break March 15-22</strong></td>
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<td>9</td>
<td>Lecture</td>
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<td>• Workholding Devices Part 1 (Chapter 7)</td>
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<td>• <strong>Project 2 Assigned</strong></td>
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<td>Lab:</td>
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<td>• MasterCAM Lathe Part 1</td>
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<td>• Workholding Devices Part 2 (Chapter 7)</td>
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<td>• MasterCAM Lathe Part 2</td>
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<td>• Selection of Quality Assurance Method (Chapter 8)</td>
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<td>• MasterCAM Wire</td>
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<td>• MasterCAM Set-Up Sheets</td>
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<td>• Economics of Process Planning (Chapter 9)</td>
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<td>Lab:</td>
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<tr>
<td></td>
<td>• MasterCAM Multi-Axis &amp; Machine Simulation</td>
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<td>Lecture</td>
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<td>• From Design to Manufacture (Chapter 10)</td>
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<td>• <strong>Project 2 Due</strong></td>
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<td>15</td>
<td><strong>Final Exam</strong></td>
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<td>May 8-14</td>
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