New Jersey Institute of Technology
Department of Engineering Technology
MNET 303 Advanced Techniques in CAD/CAM

COURSE NUMBER	MNET 303
COURSE NAME	Advanced Techniques in CAD/CAM
COURSE STRUCTURE	2-2-3 (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	Dr. S. Lieber/ Mr. S. Dyer
COURSE DESCRIPTION	Applications including hands-on experience with CAD/CAM systems. Emphasis is on understanding how displayed objects are represented and manipulated on the computer. Laboratory experiences contribute to an understanding of the advantages and limitations of CAD/CAM systems.
PREREQUISITE(S)	MET 105
COREQUISITE(S)	None
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Elective
REQUIRED MATERIALS	Kuang-Hua Chang Machining Simulation Using SOLIDWORKS CAM 2023. SDC Publications 2023, ISBN: 978-1-63057-570-0
COMPUTER USAGE	Software: ***Solidworks***.
COURSE OUTCOMES(CO)	By the end of the course students should be able to: 1. Develop CAD models with Parametric CAD software. 2. Develop CAM models with CAM software. 3. Apply knowledge of Manufacturing and Inspection processes to CAD/CAM. 4. Conduct Engineering Analysis with CAD/CAM. 5. Prepare Engineering documents/reports.
CLASS TOPICS	Castings and Forging process, CAD sketch and extrude, Cutting Operations (Mill, Wire EDM, Drill), CAD Mirror & Revolve, Helical Sweep, Pattern, CAM Milling/Drilling, CAM Turning, Inspection Methods, CAD Assembly, Geometric Dimensioning & Tolerancing, CAD 3D Annotation, Part and Assembly Drawing Formats/Templates, Working with STEP Files, Sheet Metal Modeling, Additive Manufacturing, CAD Blend and Shell:

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CAD/CAM Project:

Project 1: Each student will describe the manufacturing processes needed to fabricate an existing modeled part. A Project Report will be submitted.

Project 2: Each student will model the parts for an assembly. Students will prepare engineering drawings for parts and the assembly. Students will conduct engineering evaluation and manufacturing. A Project Report will be submitted.

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 – 1-4

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 – 1-4

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 – 5

Student outcome (4) - an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;
Related CO – 3-4

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GRADING POLICY

Note: Grading Policy may be modified by Instructor for each Section in the Course)

Homework	20 %
Project 1 & 2	20 %
Two Quizzes	30 %
Final Exam	30 %

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.
- 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.

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PREPARED BY Mr. S. Dyer

COURSE COORDINATED BY Dr. S.Lieber

CLASS HOURS

Monday 6:00 PM – 10:05 PM MALL PC 36

OFFICE HOURS

By appointment e-mail snb0319@njit.edu

HOMEWORK & PROJECT - IMPORTANT

Homework

1. Homework sets are due one week after they are assigned. . 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

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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COURSE OUTLINE

Week	Date	Topics	Homework Assignment
1	1/27	Description of Castings & Forgings Introduction to Solid Modeling (Solidworks) • Solidworks Overview • Parametric Modeling Fundamentals	1. Parametric Modeling Fundamentals Tutorial 2. Parametric Modeling Fundamentals: Exercises 3, 4
2	2/3	Description of Cutting Operations (Mill, Wire EDM, Drill) Solid Modeling: • Constructive Solid Geometry Concepts • Solidworks CAM Introduction (Lesson 1) & Milling (Lesson 4) **Project 1 Assigned**	1. Constructive Solid Geometry Tutorial 2. Extrude Lesson Tutorial 3. *Connecting Rod* 4. CAM Exercise
3	2/10	Description of Turning Operations (Screw Threads) Solid Modeling: • Revolve Lesson • Helical Sweep, Pattern • Thumb Screw Solidworks CAM: Turning a Stepper Bar (Lesson 10)	1. Thumb Screw Tutorial 2. Connecting Rod Bottom 3. Cap Screw with Thread and Relief 4. CAM Exercise
4	2/17	Advanced 2D Sketching Solidworks CAM: Turning a Stub Shaft (Lesson 11)	1. Advanced 2D Sketching Tutorial 2. Bushings 3. CAM Exercise
5	2/24	**Quiz #1** Description of Inspection Methods Solid Modeling: • Assembly	1. **Finalize Project 1** 2. Connecting Rod Sub-Assembly
6	3/3	**Project 1 Submitted** Dimensioning/Tolerancing & GD&T Part 1 Solid Modeling: • Drawing Template Solidworks CAM: Tolerance Based Machining (Lesson 9)	1. Drawing Template 2. Crankshaft 3. CAM Exercise

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Week	Date	Topics	Homework Assignment
7	3/10	Dimensioning/Tolerancing & GD&T Part 2 Solid Modeling: • 3D-Sketch Lesson **Project 2 Assigned**	1. 3D-Sketch Lesson 2. GD&T Homework 3. Exercise 10
SPRING BREAK NO CLASS 3/17			
8	3/24	Dimensioning/Tolerancing & GD&T Part 3 Solid Modeling: • Assembly Drawings • Sweep Loft Lesson (Cup & Spring)	1. Connecting Rod Sub-Assembly Drawing 2. Sweep Loft Lesson Tutorial (Cup & Spring) 3. Sweep & Loft Lesson Bottle
9	3/31	Solid Modeling: • Sheet Metal Part 1	1. Sheet Metal Tutorial 2. Sheet Metal Exercise
10	4/7	**Quiz #2** Solid Modeling: • Sheet Metal Part 2	1. Sheet Metal Exrcise a. Create Part Drawing with Overall Dimensions
11	4/14	Solidworks CAM: • Machining 2.5 Axis (Lesson 5) Solid Modeling: • Creating Multibody Parts	1. CAM Exercise 2. Multi Body Parts Tutorial 3. Exercise 3.1
12	4/21	Solidworks CAM: • Machining a Free Form Surface & Limitations (Lesson 6)	1. CAM Exercise
13	4/28	Solidworks CAM: • Multipart Machining (Lesson 7)	1. CAM Exercise 2. **Finalize Project 2**
14	5/5	**Submit Project 2** Additive Manufacturing	Review For Final
15	**TBD**	**Final Exam**	

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