Modeling and manufacturing

ID 217 NJIT Spring 2025

FMH310, Faculty Memorial Hall | Room 310 Tuesdays 6:00 pm - 8:20 pm

"Quality means doing it right when no one is looking."

- Henry Ford

"Manufacturing is more than just putting parts together. It is coming up with ideas, testing principals and perfecting the engineering, as well as the final assembly."

- James Dyson

"No design is possible until the materials with which you design are completely understood."

- Ludwig Mies Van Der Rohe

Course description.

This course will build on the computer modeling techniques of the ID 216 course and combine it with the programs, tools and facilities used in common modern industrial manufacturing. The course will also explore Computer Aided Manufacturing as a means of facilitating mass customization: the process of creating small batches of products that are custom designed to suit each particular user.

Course Overview:

ID217 Modeling and Manufacturing is the second in a series of two classes for second year Industrial Design students. Both fall into the category of "skill classes". While inventiveness, design thinking, and creativity are expected from students, the objective of this class is mastery of the skills we cover.

The goal of this class is to further develop students' digital and physical modeling abilities. Additionally, we will focus on understanding common methods of production and the impact they have on designs. The class will consist of both digital and physical components and exercises.

Homework will be given most weeks, but most assignments will be due two weeks after they are given. In many instances we will review work in progress during the interim classes. This ensures that there is adequate time for students to access NJIT's facilities and obtain assistance as they need it.

Course Objectives:

- Further develop parametric modeling skills, using ID216 as a foundation
- Further develop our familiarity with tools in the model shop
- Learn to recognize various materials and manufacturing processes
- Build a baseline understanding of the requirements of common manufacturing processes
- Develop designs and design details that ensure compatibility with selected processes

Grading

Final grade will be based on the following criteria: Level of effort and commitment, quality of work, class participation, project progress, timely submissions and subject comprehension as demonstrated by assignments, punctuality and attendance.

Grade distribution:

- Readings, discussions, participation in class and regular attendance: 25%
- Assignments and projects: 75%

Your Responsibility

- **Participate in class** discussions. Contribute individual experiences and opinions when relevant to the topic so that others can benefit and learn. This is a big part of the class.
- Ask questions...there is no dumb/bad question.
- **Respect** others opinions, and their social, cultural, political, moral and religious point of view.
- **Cell phones should be turned off** at the beginning of class unless you are emergency personnel on-call. Activation or use of a cell phone will be penalized.
- Take individual responsibility for completing and submitting assignments on time.
- **Participate in all team-related** activities, homework assignments, presentations and exercises.
- **Check e-mail and Canvas** frequently. Everyone must have an active e-mail address. You can receive a free e-mail address and access to the Internet from NJIT.
- At the end of semester all work produced for this class **shall also be uploaded to Kepler.** Failure to do so shall result in a failing grade until this requirement has been satisfied.
- Regular attendance is expected. When possible, please give advance notice of your absence. NJIT requires attendance for ALL students. After 3 recorded absences, your grade will be lowered by one-half (½) grade point for each additional absence, if you are not carrying a medical, school or religious related excuse. No excuses will be accepted without a written note from the Dean or a doctor. Students with particular needs and foreseen absences should present them to their instructor within the first week of class. Attendance for student athletes: No student athlete may miss any regularly scheduled classes for any practice activities. This means students can neither miss nor leave class early (or arrive late) to attend a practice. While student athletes may miss class when participating in intercollegiate competition, it is the responsibility of the student athlete to proactively inform the instructor well in advance to make appropriate arrangements to complete or make up any assignments or exams in a timely fashion.
- Lateness is inconsiderate and disruptive and will not be tolerated. Four lates will be counted a one absence.

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.

If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

Artificial Intelligence

Generative artificial intelligence has the potential to improve decision-making and enhance creativity and productivity.

While it does not have to be used in every (or any) project, it is certainly a tool that could be used to benefit under appropriate circumstances. There may be times when an instructor prohibits the use of generative AI, and times when its use is required. Follow the instructions of your teacher. However, to uphold academic integrity with the use of AI, students must consider the limitations of AI and use it critically and ethically. Be aware of the possibility of bias, incomplete and/or inaccurate information, plagiarism, and issues of data privacy. Generative AI tools can produce invalid and inaccurate information (also known as "hallucinations"). Students are responsible for any and all information or work presented that is generated in any capacity with AI tools. For graphic endeavors, students must cite the use of AI and document intermediate design steps showing text and prompts along with any images generated by AI. Tool(s) used must be cited. Do not simply copy and paste Al-generated material and claim it as your own (text or graphics). Even re-writing Al-generated output into your own words requires proper attribution. Modifications made by the designer and the way Al-generated work is used must be made clear and documented. In other words, the design and presentation processes must be documented when Al-generated work is incorporated at any step. Finally, for your own protection and to respect the privacy rights of others, do not use your personal data (including NJIT UCID), or that of others, in any prompts for AI generated material. Ever. The use of AI generative tools in design schools is in the experimental stage.

The guidelines above are based, in part, on developmental work and standards generated by the University of New South Wales in Sydney, Australia and Lawrence Technological University in Detroit, Michigan.

Accommodations for Disabilities

NJIT and instructors will endeavor to make any accommodation required and necessary for the success of students with disabilities. However, in order to receive accommodation(s), disabilities MUST be documented with NJIT Office of Accessibility Resources and Services (@njit.edu) and notification of request for accommodation must be made to the instructor by the second week of class. More information may be found at: <u>https://www.njit.edu/accessibility/</u>.

No accommodations can be granted "after the fact" unless due to a situation (injury/illness/etc.) that occurs or is documented during the semester. In those instances, accommodations will commence upon notification or observation of the disability. If approved for accommodation(s), it is at the discretion of the approved students whether to avail themselves of these opportunities. Failure to utilize approved accommodations will not be considered when preparing final grades or assessments for the course. Please understand that some accommodations are publicly evident (like extended time on project presentations) and utilization of these accommodations will be seen by other students which removes any right(s) to privacy about those accommodations.

Required Supplies and equipment

Many of these are likely to overlap with studio requirements or previous classes. You will use all of these supplies throughout your time at NJIT and beyond. Coursework requirements will not be relaxed for unprepared students.

· 6-Inch Metal Machinist Ruler with Metric and Imperial Markings

- 3-inch engineers square
- X-acto handle and blades (#11 blades recommended)

- Cyanoacrylate glue (Superglue/crazy glue gel recommended)
- Dust Masks (3M 8110S recommended)
- Safety glasses

(if you need to wear prescription glasses be sure to purchase safety goggles that will fit over your glasses, regular glasses are not safety compliant protective wear)

Software – you will need to have the latest version of Solidworks installed on your computer. See the following link for instructions.

https://njit.instructure.com/courses/8519/pages/solidworks-students-faculty

Recommended additional supplies and equipment

- 6 or 9-Inch Calipers (digital recommended)
- Cutting Mat (18x24 recommended)
- Sandpaper (various grits 400-40)
- Snap Blade Knife & Blades (Olfa 5003 recommended)

Various other supplies, such as sheet metal, wood, fasteners, resin and casting materials will be required throughout the semester. Together with the cost of 3D printing, these materials will cost about \$200.

Notes -

Course syllabus and weekly schedule will very likely change throughout the course. While the primary assigned location for this course is **FMH310**, many classes will take place in the various workshops and maker spaces. Notice of locations and changes will be sent to the class via email and updated in the calendar.

It is the responsibility of the students to make note and keep up to date with these changes.

Weekly Course Schedule

The weekly course schedule along with reading assignments and project assignments will be available on Canvas. Schedule and assignments are subject to change so please be sure to check frequently for updates.

Contact Information

The culture at NJIT is a digital one. There is a lot of information online at NJIT and email is the official means of communication. This means that an administrator or teacher may inform you of critical information (like the time and place of an exam, a field trip, change in a due date for a project, etc.) via email and expect you to receive it. It is YOUR responsibility to monitor your "njit.edu" email address. You may forward the address to another email address, but MAKE SURE YOU MONITOR EMAIL COMING TO YOUR OFFICIAL NJIT EMAIL ADDRESS.

Instructor's contact Information

Email: ms3256@njit.edu