

ENGR 3000/ Foundation of Manufacturing

Instructor Contact

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Office Hours: Through Email Appointment

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Communication Expectations: The primary tool to be used for enabling communication between instructor and students is the email. The timeframe for responding emails is 2 days. The feedback for the assignments will be posted after two weeks of submission. CLEAR has a webpage for students that provides [Online Communication Tips](https://clear.unt.edu/online-communication-tips) (<https://clear.unt.edu/online-communication-tips>).

Welcome to UNT!

As members of the UNT community, we have all made a commitment to be part of an institution that respects and values the identities of the students and employees with whom we interact. UNT does not tolerate identity-based discrimination, harassment, and retaliation. UNT's full Non-Discrimination Policy can be found in the UNT Policies section of the syllabus.

Course Description

This course introduces the end-to-end engineering pathway from product design to manufacturable realization, emphasizing modern (advanced) manufacturing processes and decision-making. Students learn how geometry, materials, tolerances, and surface requirements drive process selection, tooling/fixtures, inspection strategy, cost, and sustainability outcomes. Through a semester-long, team-based design-build-test project, students will develop a manufacturable component from requirements definition to process planning, fabrication (or prototype build), and verification. The course integrates design for manufacturing/assembly (DFM/DFA), additive and hybrid manufacturing, CNC planning basics, process-structure-property fundamentals, quality control, and digital manufacturing workflows (CAD/CAM/CAE, data capture, and traceability).

Course Structure

The course will be delivered in a face-to-face mode. The length of the semester is according to the UNT current policies.

Course Prerequisites or Other Restrictions

N/A

Course Objectives

At the conclusion of this course, the student will (be able to):

1. Translate customer/engineering requirements into manufacturable specifications (function, constraints, interfaces).
2. Apply DFM/DFA principles to reduce complexity, cost, and risk while meeting performance targets.

3. Select manufacturing processes (subtractive, additive, formative, joining, finishing) using material, geometry, tolerance, and production volume criteria.
4. Create a manufacturing plan including process routing, setup strategy, tooling/fixtures, and work instructions.
5. Generate basic CAM toolpaths (or AM build plans), estimate cycle time and cost drivers, and justify design/process trade-offs.

Appropriate Program Outcomes

According to the Engineering Technology Accreditation Commission (ETAC) of ABET, an Engineering Technology program must demonstrate that graduates have:

1. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines,
2. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology problems that require the application of principles and applied procedures or methodologies
3. An ability to apply creativity in the design of systems, components or processes for broadly defined engineering technology problems appropriate to program educational objectives,
4. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.
5. An ability to conduct standard test and measurements; to conduct, analyze, and interpret experiments; and apply experimental result to improve processes.

Materials

Recommended Textbooks and References

1. Additive Manufacturing Technologies-3D Printing, Rapid Prototyping and Direct Digital Manufacturing
2. Authors: Ian Gibson, David W. Rosen, Brent Stucker. Springer, 2015, ISBN: 978-1-4939-2112-6 (Print) 978-1-4939-2113-3 (Online), <http://link.springer.com/book/10.1007%2F978-1-4939-2113-3>

Teaching Philosophy

The learning experience of this course is based on hands-on use of advanced software tools and tool-shop scenarios. During the lecture sessions, the students can learn in an active way, doing exercises assisted by the professor and the instructional assistant. During the lab sessions, the students will learn in a face-to-face mode how to work with Computer Aided Manufacturing tools.

Course Technology & Skills

Minimum Technology Requirements

- Computer: Equipped with multimedia capabilities, Windows 10 or superior in the case of PC users or Safari 8 or superior system in the case of Mac users.
- [Canvas Technical Requirements](https://clear.unt.edu/supported-technologies/canvas/requirements) (<https://clear.unt.edu/supported-technologies/canvas/requirements>)

Technical Assistance

Part of working in the online environment involves dealing with the inconveniences and frustration that can arise when technology breaks down or does not perform as expected. Here at UNT we have a Student Help Desk that you can contact for help with Canvas or other technology issues.

UIT Help Desk: [UIT Student Help Desk site](http://www.unt.edu/helpdesk/index.htm) (<http://www.unt.edu/helpdesk/index.htm>)

Email: helpdesk@unt.edu

Phone: 940-565-2324

In Person: Sage Hall, Room 130

Walk-In Availability: 8am-9pm

Telephone Availability:

- Sunday: noon-midnight
- Monday-Thursday: 8am-midnight
- Friday: 8am-8pm
- Saturday: 9am-5pm

Laptop Checkout: 8am-7pm

For additional support, visit [Canvas Technical Help](https://community.canvaslms.com/docs/DOC-10554-4212710328) (<https://community.canvaslms.com/docs/DOC-10554-4212710328>)

Rules of Engagement

Rules of engagement refer to the way students are expected to interact with each other and with their instructors. Here are some general guidelines:

- While the freedom to express yourself is a fundamental human right, any communication that utilizes cruel and derogatory language on the basis of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law will not be tolerated.
- Treat your instructor and classmates with respect in any communication online or face-to-face, even when their opinion differs from your own.
- Ask for and use the correct name and pronouns for your instructor and classmates.
- Speak from personal experiences. Use “I” statements to share thoughts and feelings. Try not to speak on behalf of groups or other individual’s experiences.
- Use your critical thinking skills to challenge other people’s ideas, instead of attacking individuals.
- Avoid using all caps while communicating digitally. This may be interpreted as “YELLING!”
- Be cautious when using humor or sarcasm in emails or discussion posts as tone can be difficult to interpret digitally.
- Avoid using “text-talk” unless explicitly permitted by your instructor.
- Proofread and fact-check your sources.
- Keep in mind that online posts can be permanent, so think first before you type.

See these [Engagement Guidelines](https://clear.unt.edu/online-communication-tips) (<https://clear.unt.edu/online-communication-tips>) for more information.

Course Requirements/Outline

- Introduction to Additive Manufacturing Technologies
- Digital Workflow for Additive Manufacturing
- Material for AM and Material Properties
- Design for Additive Manufacturing
- Additive Manufacturing Processes, Process Characteristics and Capability, Process Models
- Evaluation, Economics and Benchmarking of AM processes
- Use of AM process for Rapid Tooling Applications

Team Assignments (Project):

1. Team-based learning is found to be very effective in engineering design, especially when it emphasizes on concept application with scaffolded processes through which students could learn both the concepts and the application in self-managed learning teams. In order to do so, students will be strategically organized into groups for the entire term of the course, and the course content will be organized into major units based on the design processes. This experience will also help students to improve team collaboration and communication skills, which are the mostly mentioned characteristics of top-notch professionals.
2. The team project is scaffolded with 6 small submissions throughout the semester, plus a final report and final presentation at the end.
3. The small submissions along the semester align with the design thinking processes we will learn together in this class.
4. All students will fill out a self- and peer- evaluation at the end. Your final grade on the team assignments/project will be adjusted based on the evaluation.
5. If you contribute significantly less (or more) than other team members with supported evidence, your grade from teamwork will be lowered (or increased).
6. To succeed in team projects, students are expected to be accountable for learning lecture on time, asking questions proactively, investing time and effort working in their team.

Grading Elements and Weights

Projects (6 small)	80%
Quiz (6 total)	20%
TOTAL	100%

- A: 90-100% (Outstanding, excellent work. The student performs well above the minimum criteria.)
- B: 80-89% (Good, impressive work. The student performs above the minimum criteria.)
- C: 70-79% (Solid, college-level work. The student meets the criteria of the assignment.)
- D: 60-69% (Below average work. The student fails to meet the minimum criteria.)
- F: 59 and below (Sub-par work. The student fails to complete the assignment.)

NOTICE OF SAFETY REGULATIONS:

1. All students are required to purchase their own eye protection, which is to be worn at all times while in the laboratory.
2. Suitable footwear, has non-slip soles and hard uppers (preferably with safety toe), which completely enclose the foot. Sandals and tennis shoes are strictly prohibited.
3. Long, loose hairstyles must be constrained to prevent engagement in moving machinery, tools work, etc.
4. Neckties, necklaces, etc. must be removed or tucked into the shirt to prevent engagement in moving machinery, tools work, etc.
5. Compressed air may be used to clean parts and small tools, but never during cleanup periods, or to clean machinery, clothing or any part of one's body.
6. Consult with the instructor prior to attempting to lift or move heavy objects.
7. One student only may manipulate a CNC controller at a given time.
8. Metal chips may be removed with a brush; never use fingers.
9. Non-essential, distracting conversation with students operating machinery is prohibited.
10. Only official assignments may be undertaken during laboratory periods.
11. Any liquid spills are to be wiped up immediately.
12. Running and any horseplay are expressly forbidden.
13. Only officially enrolled students may enter and work in the laboratory.
14. No food or beverages are permitted in the laboratory.
15. Gloves may not be worn.
16. Audio/visual devices, including cell phones, will not be used in the laboratory.
17. Students with hidden medical conditions or handicaps, which may impact on their safe functioning in the laboratory, are requested to consult with the instructor.
18. Any accident, regardless of severity, will be reported promptly to the instructor.

Course Evaluation

Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course.

Late Work

All work turned in after the deadline will receive a grade of zero unless the student has a university-excused absence and provides documentation with 48 hours of the missed deadline.

Examination Policy

Students will be evaluated by a Middle Term Examination, by a Final Examination and by Quizzes. There is no any restriction to use open books or to use Internet browsers. However, since each evaluation is time constraint, and the problems/exercises will be displayed in a random manner, it is required to be focused on the tests and to use reading and analytical skills for answering all the questions and solving all the exercise in a timely manner.

Assignment Policy

The University is committed to providing a reliable online course system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will extend the time windows and provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and contact the UNT Student Help Desk: helpdesk@unt.edu or 940.565.2324 and obtain a ticket number. The instructor and the UNT Student Help Desk will work with the student to resolve any issues at the earliest possible time.

Instructor Responsibilities and Feedback

Grade Disputes

The student is required to wait 24 hours before contacting me to dispute a grade. Within that time, the instructor will review the assignment details and reflect on the quality of the work the student turned in.

Communication

Most general questions should go through the Q & A forum in the Discussion Board area. If the student has a private question, he/she can contact the instructor, who should be able to respond within 24 hours on weekdays (usually sooner).

Instructor Feedback on Assignments

The instructor should return feedback on all assignments within 1 week of the due date. If the instructor is unable to return feedback he will post an Announcement to let everyone know when it can be expected.

Attendance Policy

Since this course will be delivered partially remote, the attendance will be recorded with the Assignments. Visit the [University of North Texas' Attendance Policy](http://policy.unt.edu/policy/15-2-) (<http://policy.unt.edu/policy/15-2->) to learn more.

Syllabus Change Policy

This syllabus is subject to change at any time during the semester with changes to be announced in class.

UNT Policies

Academic Integrity Policy

Academic Integrity Standards and Consequences. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. [Insert specific sanction or academic penalty for specific academic integrity violation.]

ADA Policy

UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the [ODA website \(https://disability.unt.edu/\)](https://disability.unt.edu/).

Prohibition of Discrimination, Harassment, and Retaliation (Policy 16.004)

The University of North Texas (UNT) prohibits discrimination and harassment because of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law in its application and admission processes; educational programs and activities; employment policies, procedures, and processes; and university facilities. The University takes active measures to prevent such conduct and investigates and takes remedial action when appropriate.

Emergency Notification & Procedures

UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

Retention of Student Records

Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Canvas online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about student's records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University's policy. See UNT Policy 10.10, Records Management and Retention for additional information.

Acceptable Student Behavior

Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT's [Code of Student Conduct](https://deanofstudents.unt.edu/conduct) (https://deanofstudents.unt.edu/conduct) to learn more.

Access to Information - Eagle Connect

Students' access point for business and academic services at UNT is located at: my.unt.edu. All official communication from the University will be delivered to a student's Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward e-mail [Eagle Connect](https://it.unt.edu/eagleconnect) (https://it.unt.edu/eagleconnect).

Student Evaluation Administration Dates

Student feedback is important and an essential part of participation in this course. The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 13, 14 and 15 [insert administration dates] of the long semesters to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the survey. Once students complete the survey they will receive a confirmation email that the survey has been submitted. For additional information, please visit the [SPOT website](http://spot.unt.edu/) (http://spot.unt.edu/) or email spot@unt.edu.

Sexual Assault Prevention

UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex, and therefore prohibit sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking, and/or sexual assault, there are campus resources available to provide support and assistance. UNT's Survivor Advocates can assist a student who has been impacted by violence by filing protective orders, completing crime victim's compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-565- 2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at oeo@unt.edu or at (940) 565 2759.

Important Notice for F-1 Students taking Distance Education Courses

Federal Regulation

To read detailed Immigration and Customs Enforcement regulations for F-1 students taking online courses, please go to the [Electronic Code of Federal Regulations website](http://www.ecfr.gov/) (http://www.ecfr.gov/). The

specific portion concerning distance education courses is located at Title 8 CFR 214.2 Paragraph (f)(6)(i)(G).

The paragraph reads:

(G) For F-1 students enrolled in classes for credit or classroom hours, no more than the equivalent of one class or three credits per session, term, semester, trimester, or quarter may be counted toward the full course of study requirement if the class is taken on-line or through distance education and does not require the student's physical attendance for classes, examination or other purposes integral to completion of the class. An on-line or distance education course is a course that is offered principally through the use of television, audio, or computer transmission including open broadcast, closed circuit, cable, microwave, or satellite, audio conferencing, or computer conferencing. If the F-1 student's course of study is in a language study program, no on-line or distance education classes may be considered to count toward a student's full course of study requirement.

University of North Texas Compliance

To comply with immigration regulations, an F-1 visa holder within the United States may need to engage in an on-campus experiential component for this course. This component (which must be approved in advance by the instructor) can include activities such as taking an on-campus exam, participating in an on-campus lecture or lab activity, or other on-campus experience integral to the completion of this course.

If such an on-campus activity is required, it is the student's responsibility to do the following:

- (1) Submit a written request to the instructor for an on-campus experiential component within one week of the start of the course.
- (2) Ensure that the activity on campus takes place and the instructor documents it in writing with a notice sent to the International Student and Scholar Services Office. ISSS has a form available that you may use for this purpose.

Because the decision may have serious immigration consequences, if an F-1 student is unsure about his or her need to participate in an on-campus experiential component for this course, s/he should contact the UNT International Student and Scholar Services Office (telephone 940-565-2195 or email internationaladvising@unt.edu) to get clarification before the one-week deadline.

Student Verification

UNT takes measures to protect the integrity of educational credentials awarded to students enrolled in distance education courses by verifying student identity, protecting student privacy, and notifying students of any special meeting times/locations or additional charges associated with student identity verification in distance education courses.

See [UNT Policy 07-002 Student Identity Verification, Privacy, and Notification and Distance Education Courses](https://policy.unt.edu/policy/07-002) (<https://policy.unt.edu/policy/07-002>).

Use of Student Work

A student owns the copyright for all work (e.g. software, photographs, reports, presentations, and email postings) he or she creates within a class and the University is not entitled to use any student work without the student's permission unless all of the following criteria are met:

- The work is used only once.
- The work is not used in its entirety.
- Use of the work does not affect any potential profits from the work.
- The student is not identified.
- The work is identified as student work.

If the use of the work does not meet all of the above criteria, then the University office or department using the work must obtain the student's written permission.

Download the UNT System Permission, Waiver and Release Form

Transmission and Recording of Student Images in Electronically-Delivered Courses

1. No permission is needed from a student for his or her image or voice to be transmitted live via videoconference or streaming media, but all students should be informed when courses are to be conducted using either method of delivery.
2. In the event an instructor records student presentations, he or she must obtain permission from the student using a signed release in order to use the recording for future classes in accordance with the Use of Student-Created Work guidelines above.
3. Instructors who video-record their class lectures with the intention of re-using some or all of recordings for future class offerings must notify students on the course syllabus if students' images may appear on video. Instructors are also advised to provide accommodation for students who do not wish to appear in class recordings.

Example: This course employs lecture capture technology to record class sessions. Students may occasionally appear on video. The lecture recordings will be available to you for study purposes and may also be reused in future course offerings.

No notification is needed if only audio and slide capture is used or if the video only records the instructor's image. However, the instructor is encouraged to let students know the recordings will be available to them for study purposes.

Academic Support & Student Services

Student Support Services

Mental Health

UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:

- [Student Health and Wellness Center](https://studentaffairs.unt.edu/student-health-and-wellness-center) (https://studentaffairs.unt.edu/student-health-and-wellness-center)
- [Counseling and Testing Services](https://studentaffairs.unt.edu/counseling-and-testing-services) (https://studentaffairs.unt.edu/counseling-and-testing-services)
- [UNT Care Team](https://studentaffairs.unt.edu/care) (https://studentaffairs.unt.edu/care)
- [UNT Psychiatric Services](https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry) (https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry)
- [Individual Counseling](https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling) (https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling)

Chosen Names

A chosen name is a name that a person goes by that may or may not match their legal name. If you have a chosen name that is different from your legal name and would like that to be used in class, please let the instructor know. Below is a list of resources for updating your chosen name at UNT.

- [UNT Records](#)
- [UNT ID Card](#)
- [UNT Email Address](#)
- [Legal Name](#)

**UNT eUIDs cannot be changed at this time. The collaborating offices are working on a process to make this option accessible to UNT community members.*

Additional Student Support Services

- [Registrar](https://registrar.unt.edu/registration) (https://registrar.unt.edu/registration)
- [Financial Aid](https://financialaid.unt.edu/) (https://financialaid.unt.edu/)
- [Student Legal Services](https://studentaffairs.unt.edu/student-legal-services) (https://studentaffairs.unt.edu/student-legal-services)
- [Career Center](https://studentaffairs.unt.edu/career-center) (https://studentaffairs.unt.edu/career-center)
- [Counseling and Testing Services](https://studentaffairs.unt.edu/counseling-and-testing-services) (https://studentaffairs.unt.edu/counseling-and-testing-services)
- [UNT Food Pantry](https://deanofstudents.unt.edu/resources/food-pantry) (https://deanofstudents.unt.edu/resources/food-pantry)

Academic Support Services

- [Academic Resource Center](https://clear.unt.edu/canvas/student-resources) (https://clear.unt.edu/canvas/student-resources)
- [Academic Success Center](https://success.unt.edu/asc) (https://success.unt.edu/asc)
- [UNT Libraries](https://library.unt.edu/) (https://library.unt.edu/)
- [Writing Lab](http://writingcenter.unt.edu/) (http://writingcenter.unt.edu/)