

University of Houston
Department of Mechanical and Aerospace Engineering

**MECE 5397/6397: ADDITIVE MANUFACTURING
FALL SEMESTER 2024
SYLLABUS**

Format:	Lecture, 3 units
Class time and place:	5:30 – 7:00 PM Tu Th Classroom and Business Building (CBB) Room 120
Course website:	https://www.uh.edu/canvas
Instructor:	Dr. Maksud Rahman
Contact:	maksud@uh.edu
Office hours:	Wednesday 11:00 AM – 1 PM
Office:	N213 2 nd Floor Engineering Building 1
Prerequisite:	Introduction to Engineering, Introduction to Materials Science
Course materials:	Handouts: Class notes and assigned readings from advanced/additive manufacturing literature and industry Textbook: Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, 2nd Ed. (2015), Ian Gibson, David W. Rosen, Brent Stucker
Course objectives	Student will learn additive manufacturing (AM) or three-dimensional (3D) printing processes with theory and applications and the role of AM in product development and innovation. The course is designed to provide a fundamental basis of a wide range of additive manufacturing approaches, materials, and applications. You will learn the optimization between various printing processes, related software tools and techniques. The broad range of applications, the latest trends, and business opportunities will be discussed.
Learning outcomes	After completing this course, student will be able to: <ul style="list-style-type: none">• Understand the fundamental principles of AM, various AM processes, devices, and capabilities• Understand the selection of materials and processes for a specific application• Understand broad range of applications of AM• Understand the various software tools, processes, and techniques• Understand the latest trends, business opportunities, and future directions in AM

Lecture topics

Following topics will be covered in this course:

1. Basic Principles of Additive Manufacturing (AM)
2. Generalized AM Process Chain
3. Overview of AM technology
4. AM technology: Extrusion-based systems
5. AM technology: Photopolymerization
6. AM technology: Direct Write Technologies
7. AM technology: Powder Bed Fusion
8. AM technology: Materials jetting/Binder jetting
9. Materials and Process selection for AM
10. Design for AM (Software and methods)
11. Applications of AM technology
12. Business Opportunities and Future Directions

Grading

Performance will be assessed using readings, presentations, project papers, and class participation with the following weighting:

Readings and Presentation 30%

Class participation 5%

Mid-Term Examination 15%

Final Examination 20%

Course Project 30%

Readings and presentation: Literatures will be assigned for reading, and students will present the literature in the class. The presentations will be given by a team of 5-6 students. Details on the format of these presentations will be provided later.

Class participation: Participation in class discussions will be evaluated.

Examinations: There are two exams- midterm and final. Missing an exam will result in a zero grade for that exam unless alternative arrangements are made with the instructor prior to the exam. Exceptions may be made for severe medical or family emergencies.

Project: The team (max. 3 students) will conduct a project based on the proposed research and write a project paper detailing the processing, structure, and property relationships. Details on the format of the project papers will be provided later.

For all assignments and projects, students must contact the instructor prior to the due date of the assignment if they are unable to complete the work by the due date.

Academic Honesty Policy

High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be

recognized and addressed. The [UH Academic Honesty Policy](#) is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

Students are highly encouraged to discuss literature and presentation to facilitate learning. The final project will be done with partners and each partner will submit a document describing their contribution to the project.

Excused Absence Policy

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) and [Graduate Excused Absence Policy](#) for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).

Recording of Class

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Justin Dart, Jr. Student Accessibility Center](#). If you have accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

Mental Health and Wellness Resources

The University of Houston has a number of resources to support students' mental health and overall wellness, including [CoogsCARE](#) and the [UH Go App](#). UH [Counseling and Psychological Services \(CAPS\)](#) offers 24/7 mental health support for all students, addressing various concerns like stress, college adjustment and sadness. CAPS provides individual and couples counseling, group therapy, workshops and connections to other support services on and off-campus. For assistance visit uh.edu/caps, call 713-743-5454, or visit a [Let's Talk](#) location in-person or virtually. [Let's Talk](#) are daily, informal confidential consultations with CAPS therapists where no appointment or paperwork is needed.

Need Support Now?

If you or someone you know is struggling or in crisis, help is available. Call CAPS crisis support 24/7 at 713-743-5454, or the National Suicide and Crisis Lifeline: call or text [988](#), or chat 988lifeline.org.

Title IX/Sexual Misconduct

Per the UHS Sexual Misconduct Policy, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are places on campus where you can make a report in confidence. You can find more information about resources on the Title IX website at <https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/>.

Reasonable Academic Adjustments/Auxiliary Aids

The University of Houston is committed to providing an academic environment and educational programs that are accessible for its students. Any student with a disability who is experiencing barriers to learning, assessment or participation is encouraged to contact the Justin Dart, Jr. Student Accessibility Center (Dart Center) to learn more about academic accommodations and support that may be available to them. Students seeking academic accommodations will need to register with the Dart Center as soon as possible to ensure timely implementation of approved accommodations. Please contact the Dart Center by visiting the website: <https://uh.edu/accessibility/> calling (713) 743-5400, or emailing jdcenter@Central.UH.EDU.

The [Student Health Center](#) offers a Psychiatry Clinic for enrolled UH students. Call 713-743-5149 during clinic hours, Monday through Friday 8 a.m. - 4:30 p.m. to schedule an appointment.

The [A.D. Bruce Religion Center](#) offers spiritual support and a variety of programs centered on well-being.

The [Center for Student Advocacy and Community \(CSAC\)](#) is where you can go if you need help but don't know where to start. CSAC is a "home away from home" and serves as a [resource hub](#) to help you get the resources needed to support academic and personal success. Through our [Cougar Cupboard](#), all students can get up to 30 lbs of FREE groceries a week. Additionally, we provide 1:1 appointment to get you connected to on- and off-campus resources related to essential needs, safety and advocacy, and more. The [Cougar Closet](#) is a registered student organization advised by our office and offers free clothes to students so that all Coogs can feel good in their fit. We also host a series of cultural and community-based events that fosters social connection and helps the cougar community come closer together. Visit the CSAC homepage or follow us on Instagram: @uh_CSAC and @uhcupbrd. YOU belong here.

Women and Gender Resource Center

The mission of the [WGRC](#) is to advance the University of Houston and promote the success of all students, faculty, and staff through educating, empowering, and supporting the UH community. The WGRC suite is open to you. Stop by the office for a study space, to take a break, grab a snack, or check out one of the WGRC programs or resources. Stop by Student Center South room B12 (Basement floor near Starbucks and down the hall from Creation Station) from 9 am to 5 pm Monday through Friday.

Syllabus change policy

This syllabus is only a guide for the course and is subject to change. Notice of such changes will be announced as quickly as possible through Canvas.