UNIVERSITY OF MASSACHUSETTS
DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING

MIE 697AM: Additive Manufacturing (Fall 2019)

➢ **Class Hours**
TuTh 11:30 - 12:45, Elab 305

➢ **Instructor**
Wen Chen, Assistant Professor of Mechanical and Industrial Engineering
Office: 317 Elab, Email: wenchen@umass.edu

➢ **Course Description**
Additive Manufacturing (AM), also known as 3D printing, is a class of disruptive technology that has received significant attention in recent years in both the popular press and the manufacturing industry. This course will cover a comprehensive understanding of various AM technologies and their applications. The course includes technically rich lectures encompassing: processing fundamentals, practical considerations such as material properties and design, cost and value analysis, and industrial applications of different AM technologies including laser selective melting, laser engineered net shaping, direct ink writing, projection stereolithography, wire-feed additive manufacturing, and fused deposition modeling. Hands-on lab activities involving both research and industrial-grade 3D printers for polymers and metals will be included. Particular emphasis will be placed on AM technologies for advanced metals and composites, and related materials design principles. Recent implementations of AM, such as those in the aerospace and health care industries, will be presented throughout the class as study cases. Popular press articles and technical papers on AM will be reviewed and discussed.

➢ **Textbook/References**
Textbook not required, but below are textbooks that will be highly referenced.


➢ **Grading**
Topical presentation (30%); Paper report (40%); Attendance (30%)

➢ **Lecture Topics**
1. Introduction to Additive Manufacturing Technologies
2. Fused Deposition Modeling
3. Projection Stereolithography
4. Direct Ink Writing
5. Laser Selective Melting
6. Laser Engineered Net-Shaping
7. Phase Transformation and Solidification
8. Sintering of Materials
9. Wire-feed Additive Manufacturing
10. Materials Design for Additive Manufacturing
Inclusivity. The diversity of the participants of this course is a valuable source of ideas, problem solving strategies, and engineering creativity. If you feel that your contribution is not being valued or respected for any reason, please speak with me privately. If you wish to communicate anonymously, you may do so in writing, speak with Assistant Dean Dr. Paula Rees (rees@umass.edu, 413.545.6324, or in person in 128b Marcus Hall, within the Engineering Community, Equity and Inclusion Hub across from the coffee shop). You may also submit any concerns or comments through the College of Engineering Climate Concerns and Suggestions on-line form (https://tinyurl.com/UMassEngineerClimate) and/or the Positive and Negative Classroom Experience online form (https://tinyurl.com/UMassEngineerClassroom). We are all members of an academic community with a shared responsibility to cultivate a climate where all students/individuals are valued and where both they and their ideas are treated with respect.

Pronouns and Names. Everyone has the right to be addressed by the name and pronouns that they use for themselves. Students can indicate their preferred/chosen first name and pronouns on SPIRE, which appear on class rosters. Please let me know what name and pronouns I should use for you if they are not on the roster. A student’s chosen name and pronouns are to be respected at all times in the classroom. To learn more read the Intro Handout on Pronouns: https://www.umass.edu/stonewall/sites/default/files/pronouns_intro.pdf

Disability Accommodation and Inclusive Learning Statement. If you have a disability or other learning support need and require accommodations, please let me know as soon as possible. You will need to register with Disability Services (161 Whitmore Administration building; phone 413-545-0892). Information on services and materials for registering are also available on their website www.umass.edu/disability. Your success in this class is important to me. We all learn differently and bring different strengths and needs to the class. If there are aspects of the course that prevent you from learning or make you feel excluded, please let me know as soon as possible. Together we’ll develop strategies to meet both your needs and the requirements of the course.

Integrity. There is no place for a dishonest engineer! Please read and be aware of the academic honesty policy: http://www.umass.edu/dean_students/academic_policy. While this isn't something that should arise, it is something we should be aware of and discuss as a class, as integrity is a core value of the engineering profession.

Attendance. This is a fast-paced class where we will explore the topic through lectures, discussions and other learning experiences. That means it is important that you attend every class, are on time and ready to engage with the topic of the day. Should you need to miss a class, please let me know in advance via email. If you miss more than two class sessions, we need to meet to figure out how you can catch up and pass the course with a grade you are satisfied with. Attendance counts for xx credits of your grade.

Class Readiness. This means that you need to engage with and stay abreast of the readings, homework, and any other learning activities for the assigned class session. Only then can you contribute and learn productively during our classroom time.

Participation. Our goal is to create an inclusive learning environment within our classroom and support positive change throughout our engineering community. To achieve this goal, I encourage you to come to lectures, actively participate in activities and discussions, cooperate with each other, and follow norms, which we will collectively establish. Active participation in this course will help you feel more engaged AND our learning community will benefit from sharing of common points of understanding, confusion, inspiration, etc. Participation counts for 50% of your grade.

Etiquette. I always answer e-mails and will do my best to answer your message within 48 hours. Please include a salutation, your name, COURSE NUMBER, and the question/issue. Please address me as (e.g., Prof. X, Dr. X, etc.).

Office Hours. Office hours are an important part in supporting you throughout this course. Even if you don’t have specific questions, needs, or concerns, I would love to chat with you at least once during the semester. You can always email me to schedule an office hour.