

Additive Manufacturing Certificate

New Jersey Advanced Manufacturing Initiative (NJAMI)
School of Engineering
Rutgers University-New Brunswick

1. Rationale

The self-standing certificate in **Additive Manufacturing** has the **goal** of preparing students to have a comprehensive understanding of 3D printing for their roles in the advanced manufacturing industry and management. Additive Manufacturing (AM), also known as 3D printing, is a disruptive technology that has received significant attention in recent years in both the popular press and the manufacturing industry. While the current and potential future applications for this technology are impressive and imaginative, it is often very difficult for students and professionals to have cohesive and comprehensive training. Therefore, it is imperative that professionals who wish to be manufacturing experts understand the fundamental physics behind major AM technologies, their advantages and limitations, and emerging applications. This new certificate offered by the School of Engineering (SOE) through the NJAMI will offer a comprehensive overview of many different AM technologies from fundamental science to applications.

2. Certificate Curriculum

Core Courses (Three): The AM certificate requires three graduate core courses and one elective graduate course. By leveraging the state-of-the-art facilities at NJAMI in Weeks Hall, students will be prepared to be practicing professionals through specialized coursework and hands-on laboratories. All required courses will offer the option of either on-campus classes or an online section (with specific on-campus laboratories in some instances) for working professionals.

- Additive Manufacturing (16:650:531), [3 credits]
- Optimal Design (16:650:524), [3 credits]
- Mechanics of Advanced Manufacturing (16:650:569), [3 credits]

Elective Course (One from the list below, all 3 credits)

- Mechanics of Materials (16:650:550)
- Manufacturing Processes and Control (16:540:572)
- Advanced Manufacturing Processes (16:540:573)
- Advanced Powder Processing I (16:635:501)
- Advanced Powder Processing II (16:635:502)
- Supply Chain Engineering (16:540:520)
- Data Analytics (16:540:507)
- Computational Methods (16:540:540)
- Pharmaceutical Materials Engineering (16:155:541)
- Polymer Science and Engineering I (16:155:552)
- Polymer Science and Engineering II (16:125:506).

3. Admissions & Requirements:

The admission requirements for the certificate program include:

- BA/BS degree in Science, Technology, Engineering, or Mathematics (STEM).
- GPA of 3.0 or above (Those with slightly lower GPAs but with three or more years of relevant industry experience may also be considered).
- For international students, TOFEL, and GRE scores (comparable to M. Eng. Program) will be required.

Students who received certificates from this program will be qualified to continue for M.Eng. or M.Sc. degrees in related programs such as Mechanical & Aerospace Engineering or Industrial & Systems Engineering, provided that their certificate program GPA is above 3.0.

4. Learning Outcomes & Assessment:

Learning Goal 1: Attain mastery of the essential aspects of practice and research in the field of Additive Manufacturing.

Assessment of student achievement of Goal 1:

- Grades in course projects and for the overall course.
- Achievement of students as evidenced by patent applications, 3D printing application cases in practice, selection for conference presentations, or peer-reviewed publications.

Learning Goal 2: Prepare to be professionals in Additive Manufacturing or related fields.

Assessment of graduate student achievement of Goal 2:

- Participate in professional networking through department activities.
- Participation in internships and other work tailored to career goals.
- Collection of data on professional placement data or continuation of graduate studies.
- Review by the industrial advisory board.

The leadership of the School of Engineering and the NJAMI will regularly review the structure and content of the program and the feedback received from assessments and surveys. These reviews will be used to provide the best possible education to students to meet the needs for highly trained individuals in Additive Manufacturing engineering and related fields.