

Advanced Manufacturing Certificate in the MAE Graduate Program

The certificate in Advanced Manufacturing is to prepare students enrolled in the MAE Masters program to apply their mechanical engineering education to roles in advanced manufacturing research, management, and policy. Mechanical engineering provides the fundamental basis necessary for many areas of conventional and next-generation advanced manufacturing. The program offers a rigorous and in depth exposure to the broad set of core disciplines required in these fields through targeted courses and strategically paired electives from our department and others. By leverage existing resources, including existing courses (see below) and resources such as the MAE faculty's expertise and state-of-the-art research and teaching laboratories in the MAE Department, students will be prepared to be practicing professionals through specialized coursework and research (M.Sc.) or a capstone engineering project (M.Eng) This certificate will be coupled with a new graduate offering (Mechanics of Advanced Manufacturing) to be taken in the second semester.

1st Semester (10cr)

Required	642:527 Math	3cr
Required	650:530 Fluid Mechanics 1	3cr
Required	650:570 Conduction Heat Transfer	3cr
Required	Seminar	1cr

2nd Semester (10cr)

Required	Mech. of Advanced Manufacturing	3cr
Required	Seminar	1cr
Manufacturing Elective	(Choose one from the list below)	3cr
Technical Elective	See below	3cr

3rd Semester³ (10cr)

Required	650:550/4 Mechanics of Materials/Continua	3cr
Required	Seminar	1cr
Manufacturing Elective	(Choose one from the list below)	3cr
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Required Courses: Math (527), Fluids 1 (530), Conduction (570), Seminar in Mechanical Engineering (608,609), Mechanics of Advanced Manufacturing (New graduate course – see attached proposal) and Mechanics of Materials (550) or Mechanics of Continua (554).

Manufacturing Elective Courses: Math (528), Multiphysical Simulations (439), Robotics and Mechatronics (512), Optimal Design in Mechanical Engineering (524), Fluid Mechanics II (531), Computational Fluid Mechanics (534), Thermal Transport in Materials Processing (682). In other departments: Advanced Manufacturing Processes (540:573), Applications of Robotics in Mfg. Systems (540:570), Manufacturing Processes and Control (540:572) Automation and Computer Integrated Manufacturing I (540:568), Laser Based Micro-Manufacturing (540:673), Advanced Materials Characterization (635:524), Modern Electrochem (635:528), Microelectronic Processing (332:467).

Technical Elective Courses: Any graduate course offered by Engineering, Math, or Physics. As per Graduate School guidelines, a maximum of two 400-level undergraduate courses can be taken with the permission of the graduate director toward the credit requirements for M.Sc. or M.Eng. degree.