MANUFACTURING ENGINEERING, CERTIFICATE

OVERVIEW

Are you a student interested in manufacturing? Do you like drawing on a variety of skills and knowledge to solve complex problems? If so, you may wish to consider this certificate.

Because manufacturing itself is complex and broad, manufacturing engineers apply many engineering principles and work in a multidisciplinary world. This certificate allows students to emphasize either manufacturing systems or manufacturing processes—or, they can choose to spread courses evenly across both. Through this certificate, students will gain an understanding of these two areas of manufacturing. Undergraduates in industrial and systems engineering or mechanical engineering can pursue this certificate without adding time to the degree.

For more information about the program, please see https://www.engr.wisc.edu/academics/undergraduate-academics/certificate-manufacturing-engineering/.

HOW TO GET IN

ENROLLMENT

This undergraduate certificate is open to all undergraduate students at the University of Wisconsin–Madison. Mechanical engineering and Industrial and Systems Engineering students can complete this certificate without adding time to degree.

ADMISSION

Admission into the undergraduate Certificate in Manufacturing Engineering requires:

- Undergraduate standing at UW–Madison
- Cumulative GPA (at UW–Madison) greater than or equal to 3.0
- Green Shop Pass with CNC 1 upgrade (College of Engineering TEAM Lab, formerly known as the Student Shop)
- Completion of the admissions form (found on the program website (https://www.engr.wisc.edu/academics/undergraduate-academics/certificate-manufacturing-engineering/) under the “Curriculum, Admission and Completion” section under the “Admission” expanding header)
- Meeting with a faculty advisor

Students must complete an admissions form (https://www.engr.wisc.edu/academics/undergraduate-academics/certificate-manufacturing-engineering/), obtain the required signatures, and bring the form to one of the student services coordinators for the Department of Mechanical Engineering. The form will be used to ensure that students have completed the Green Shop Pass and CNC 1 upgrade in the College of Engineering TEAM Lab, meet the GPA requirement for admission, meet the course grade requirement for courses already completed, and list courses that are planned in order to satisfy the certificate program. The form will contain fields for the following information:

- Study plan (courses that have been taken, are being taken, and plan to take)
- Core courses
- Elective courses
- Grades for any courses that have already been taken
- When future courses will be taken
- Cumulative GPA at time of admission
- Expected graduation date
- Major
- Signature from a key program faculty member indicating that the student meets the admission requirements and has discussed the study plan with the faculty member

COMPLETION

In order to successfully complete the undergraduate certificate in manufacturing engineering, students must:

- Have been admitted to the certificate
- Maintain a cumulative GPA of 3.0 or greater for the courses taken for the certificate. If a course is repeated, the average of the grades received in the course will be used in calculating the cumulative GPA.
- Have received a grade of BC or higher in all courses taken for the certificate. If a course is repeated, the highest grade received in the course is used for this criteria.

REQUIREMENTS

The core courses were chosen to include three manufacturing process-focused courses as well as two manufacturing systems-focused courses. A manufacturing engineer must be multidisciplinary because of the complex and broad nature of manufacturing as an application of many engineering principles. The objective of the core course requirements is to provide students with basic understanding of manufacturing systems and basic understanding of manufacturing processes.

The certificate requires a total of 18 credits.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>M S &amp; E 332</td>
<td>Macroprocessing of Materials</td>
<td>9</td>
</tr>
<tr>
<td>M E 310</td>
<td>Manufacturing: Polymer Processing and Engineering</td>
<td></td>
</tr>
<tr>
<td>M E 311</td>
<td>Manufacturing: Metals and Automation 1,2</td>
<td></td>
</tr>
<tr>
<td>I SY E 315</td>
<td>Production Planning and Control</td>
<td></td>
</tr>
<tr>
<td>I SY E 415</td>
<td>Introduction to Manufacturing Systems, Design and Analysis 1</td>
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An additional three courses must be from any of the following Elective Courses with a grade of BC or better, with at least one course from each of the two categories:

1. Mechanical and Materials Engineering Electives

<table>
<thead>
<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>M E 311</td>
<td>Manufacturing: Metals and Automation 2</td>
</tr>
<tr>
<td>or M E 314</td>
<td>Manufacturing Fundamentals</td>
</tr>
<tr>
<td>M E 417</td>
<td>Transport Phenomena in Polymer Processing</td>
</tr>
<tr>
<td>M E 418</td>
<td>Engineering Design with Polymers</td>
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2. Industrial & Systems Engineering Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>I SY E 412</td>
<td>Fundamentals of Industrial Data Analytics</td>
</tr>
<tr>
<td>I SY E 415</td>
<td>Introduction to Manufacturing Systems, Design and Analysis ¹</td>
</tr>
<tr>
<td>I SY E/M E 510</td>
<td>Facilities Planning</td>
</tr>
<tr>
<td>I SY E/M E 512</td>
<td>Inspection, Quality Control and Reliability</td>
</tr>
<tr>
<td>I SY E/B M E 564</td>
<td>Occupational Ergonomics and Biomechanics</td>
</tr>
<tr>
<td>I SY E 575 or M E/STAT 424</td>
<td>Introduction to Quality Engineering</td>
</tr>
<tr>
<td>I SY E 605</td>
<td>Computer Integrated Manufacturing</td>
</tr>
<tr>
<td>I SY E 615</td>
<td>Production Systems Control</td>
</tr>
<tr>
<td>I SY E/M E 641</td>
<td>Design and Analysis of Manufacturing Systems</td>
</tr>
<tr>
<td>I SY E/M E 643</td>
<td>Performance Analysis of Manufacturing Systems</td>
</tr>
</tbody>
</table>

Total Credits: 18

¹ M E 313 Manufacturing Processes and M E 314 Manufacturing Fundamentals were replaced by M E 310 Manufacturing: Polymer Processing and Engineering and M E 311 Manufacturing: Metals and Automation.

² If M E 311 Manufacturing: Metals and Automation/M E 314 Manufacturing Fundamentals and/or I SY E 415 Introduction to Manufacturing Systems, Design and Analysis are taken as part of the Core Course Requirement, they then cannot also count as an elective.

No exceptions or substitutions to the core courses are allowed.

Elective courses not listed must be specifically approved by the curriculum committee of the department teaching the course. The request must include the course number, course name, name and contact information for the professor currently teaching or planning to teach the course; syllabus; and which category it should be listed under. Courses that are approved by the curriculum committee of the department teaching the course must be sent to the certificate program director. Only formal courses will be considered.

Only courses taken for a letter grade count toward this certificate. Only courses in which a grade of BC or better is received count toward this certificate. Courses taken at other institutions may be counted toward this certificate if they have been identified as equivalent through the existing process. At least 50% of the courses (i.e., three courses) for this certificate must be earned in residence on the UW–Madison campus.

Students must maintain a cumulative GPA of 3.0 or better for the courses taken for this certificate. If a course is repeated, the average of the grades received in the course will be used in calculating the cumulative GPA.

**CERTIFICATE COMPLETION REQUIREMENT**

This undergraduate certificate must be completed concurrently with the student’s undergraduate degree. Students cannot delay degree completion to complete the certificate.

**LEARNING OUTCOMES**

1. Demonstrate knowledge of the fundamental concepts of manufacturing discrete parts.
2. Utilize skills related to manufacturing engineering.
3. Communicate effectively in the methods related to manufacturing engineering.
4. Generate solutions to problems that may arise in manufacturing engineering.

**PEOPLE**

**KEY PROGRAM FACULTY (MAY SERVE AS ADVISORS FOR STUDENTS PURSUING THIS CERTIFICATE)**

**Department of Mechanical Engineering (ME)**
- Lianyi Chen, Assistant Professor
- Michael DeCicco, Assistant Faculty Associate
- Sangkee Min, Associate Professor
- Tim Osswald, Professor
- Frank E. Pfefferkorn, Professor
- Lih-Sheng (Tom) Turng, Professor

**Department of Industrial & Systems Engineering (ISyE)**
- Jingshan Li, Professor
- Kaibo Liu, Associate Professor
- Leyuan Shi, Professor
- Raj Veeramani, Professor
- Xin Wang, Assistant Professor
- Charlene Yauch, Associate Faculty Associate
- Shiyu Zhou, Professor

**Department of Materials Science & Engineering (MS&E)**
- Sindo Kou, Professor
- Kumar Sridharan, Professor