-degree program will be based on: academic records, GRE scores, applicable work experience, their personal statement of interests in additive manufacturing design, and three letters of recommendation from a previous professor or supervisor who can attest to the applicant’s academic potential. Applicants will be expected to have a Bachelor of Science or four-year Associates degree in engineering, manufacturing, materials science, or related field from a U.S. regionally accredited institution or from an officially recognized degree-granting international institution. An undergraduate cumulative grade point average of 3.0 or better on a 4.0 scale in the final two years of undergraduate studies is required.

### Admission Requirements
Applicants apply for admission to the program via the Graduate School application for admission (http://gradschool.psu.edu/prospective-students/how-to-apply). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (http://gradschool.psu.edu/graduate-education-policies).

The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants. See GCAC-305 Admission Requirements for International Students (http://gradschool.psu.edu/graduate-education-policies) for more information.

To maintain a high quality program, it is important that our students are of a caliber to succeed. As such, the admission requirements for the students enrolling in the M.S. and M.Eng. degree program will be based on: academic records, GRE scores, applicable work experience, their personal statement of interests in additive manufacturing design, and three letters of recommendation from a previous professor or supervisor who can attest to the applicant’s academic potential. Applicants will be expected to have a Bachelor of Science or four-year Associates degree in engineering, manufacturing, materials science, or related field from a U.S. regionally accredited institution or from an officially recognized degree-granting international institution. An undergraduate cumulative grade point average of 3.0 or better on a 4.0 scale in the final two years of undergraduate studies is required.

### Degree Requirements
**Master of Engineering (M.Eng.)**

Requirements listed here are in addition to Graduate Council policies listed under GCAC-700 Professional Degree Policies (http://gradschool.psu.edu/graduate-education-policies).

A minimum of 30 credits at the 400, 500, or 800 level is required. At least 18 credits must be at the 500 or 800 level, with a minimum of 6 credits at the 500 level.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSGN 562</td>
<td>Design for Additive Manufacturing</td>
<td>19</td>
</tr>
<tr>
<td>ESC 545</td>
<td>Scientific and Engineering Foundations of Additive Manufacturing</td>
<td></td>
</tr>
<tr>
<td>IE 527</td>
<td>Additive Manufacturing Processes</td>
<td></td>
</tr>
<tr>
<td>MATSE 567</td>
<td>Additive Manufacturing of Metallic Materials</td>
<td></td>
</tr>
<tr>
<td>ME 566</td>
<td>Metal Additive Manufacturing Laboratory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete a minimum of 8 credits of electives in 400 and/or 500 level courses. A listing of approved courses is maintained by the program.</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Complete one credit of colloquium preferably in the first two semesters in the program. The following courses are offered to meet this requirement:</td>
<td></td>
</tr>
<tr>
<td>EDSGN 590</td>
<td>Colloquium</td>
<td></td>
</tr>
<tr>
<td>ESC 514</td>
<td>Engineering Science and Mechanics Seminar</td>
<td></td>
</tr>
<tr>
<td>IE 590</td>
<td>I E Colloquium</td>
<td></td>
</tr>
<tr>
<td>EDSGN 590</td>
<td>Individual Studies (Scholarly Paper)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total Credits</td>
<td>30</td>
</tr>
</tbody>
</table>

1 Note that AMD 596 cannot be used to fulfill this requirement.
2 M.Eng. students can complete a three (3) credit course in one (1) semester.
3 The one-credit colloquium does not count toward the 30 graduate course credits required.

### Culminating Experience
A scholarly paper must be completed to meet the specific requirement of the culminating experience. This paper will demonstrate depth of knowledge to his/her adviser, a second reader, and the Director of the AMD Graduate Program. AMD 596 Individual Studies (Scholarly Paper) must be completed to meet this requirement.

Candidates must write a culminating project paper on a topic mutually agreed upon with the adviser. Students will be encouraged to utilize their current employer to identify a relevant or practical problem of importance that additive manufacturing and appropriate design methods could address. The quality of the required paper is such that it must be suitable for publication in a professional journal or proceedings at a national or international conference, which generally requires a peer-review process.
Master of Science (M.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (http://gradschool.psu.edu/graduate-education-policies)

A minimum of 30 credits at the 400, 500, 600, or 800 level is required. At least 18 credits must be in 500-level courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMD 596</td>
<td>Individual Studies (Scholarly Paper)</td>
<td>3-6</td>
</tr>
<tr>
<td>AMD 600</td>
<td>Thesis Research</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30-33</td>
</tr>
</tbody>
</table>

Required Courses

Complete the following 5 required courses that total 19 credits with a grade point average of 3.00 or higher.

- EDSGN 562  Design for Additive Manufacturing
- ESC 545  Scientific and Engineering Foundations of Additive Manufacturing
- IE 527  Additive Manufacturing Processes
- MATSE 567  Additive Manufacturing of Metallic Materials
- ME 566  Metal Additive Manufacturing Laboratory

Complete a minimum of 8 credits of electives in 400 and/or 500 level courses. A listing of approved courses is maintained by the program.

Complete one credit of colloquium preferably in the first two semesters in the program. The following courses are offered to meet this requirement:

- EDSGN 590  Colloquium
- ESC 514  Engineering Science and Mechanics Seminar
- IE 590  I E Colloquium
- MATSE 590  Colloquium
- ME 590  Colloquium

Complete SARI (Scholarship and Research Integrity) training

Culminating Experience

A scholarly paper or thesis must be completed to meet the specific requirement of the culminating experience. The paper or thesis will demonstrate depth of knowledge to his/her adviser, a second reader, and the Director of the AMD Graduate Program.

AMD 596  or AMD 600  Individual Studies (Scholarly Paper) 3-6

The M.S. degree scholarly paper option is designed to be completed in 3 semesters, or one calendar year (fall, spring, and summer). A research adviser will be assigned to students in their first semester. Students who need more time to complete the final paper will be allowed to complete the paper, and have it reviewed and approved after the third semester has ended. Students are not required to remain in residence while they complete the final paper. However, extensions granted to students in this program must comply with the Graduate Council policy on deferred grades (http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-400/grading-system). Students who choose the thesis option for their culminating experience are expected to take two years to complete the degree.

Culminating Experience

Candidates may choose a scholarly paper or thesis option to fulfill their culminating experience. Students who choose the scholarly paper option must write a culminating project paper on a topic mutually agreed upon with the adviser and register for 3 credits of AMD 596 to complete the paper. Students will be encouraged to utilize an industry internship or current employer to identify a relevant or practical problem of importance that additive manufacturing and appropriate design methods could address. The quality of the required paper is such that it must be suitable for publication in a professional journal or proceedings at a national or international conference, which generally requires a peer-review process.

Candidates who choose the thesis option must write and defend, at an oral examination, a thesis based upon original research in the field. The thesis will demonstrate depth of knowledge to his/her adviser, a second reader, and the Director of the AMD Graduate Program. Candidates must submit a thesis following the procedures specified by the Graduate School and register for 6 credits of AMD 600. The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School, and the student must pass the thesis defense.

Student Aid

Graduate assistantships available to students in this program and other forms of student aid are described in the Tuition & Funding (http://gradschool.psu.edu/graduate-funding) section of The Graduate School's website. Students on graduate assistantships must adhere to the course load limits (http://gradschool.psu.edu/graduate-education-policies/gsad/gsad-900/gsad-901-graduate-assistants) set by The Graduate School.

World Campus students in graduate degree programs may be eligible for financial aid. Refer to the Tuition and Financial Aid section (http://www.worldcampus.psu.edu/tuition-and-financial-aid) of the World Campus website for more information.

Courses

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Additive Manufacturing and Design (AMD) Course List (https://bulletins.psu.edu/university-course-descriptions/graduate/amd)

Contact

Campus  University Park
Graduate Program Head  Timothy William Simpson
Director of Graduate Studies (DGS)  Timothy William Simpson
or Professor-in-Charge (PIC)
Program Contact  Jaclyn Stimely
                Room 104, The 230 Building
                Penn State University
                University Park PA 16802
                juc52@psu.edu
                (814) 863-8069

Program Website  View (http://AMDprogram.psu.edu)
<table>
<thead>
<tr>
<th>Campus</th>
<th>World Campus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate Program Head</td>
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| Program Contact     | Jaclyn Stimely  
                      | Room 104, The 230 Building  
                      | Penn State University  
                      | University Park PA 16802  
                      | juc52@psu.edu  
                      | (814) 863-8069 |
| Program Website     | View (http://www.worldcampus.psu.edu/degrees-and-certificates/penn-state-online-additive-manufacturing-and-design-masters-degree/overview) |