ADDITIVE MANUFACTURING AND DESIGN

Graduate Program Head: Timothy Simpson
Program Code: AMD
Campus(es): University Park (M.S.)
                      World Campus (M.Eng.)
Degrees Conferred: Master of Science (M.S.)
                      Master of Engineering (M.Eng.)
The Graduate Faculty: View (https://secure.gradsch.psu.edu/gpms/index.cfm?
searchType=fac&prog=AMD)

The overall goal of the Master of Science in Additive Manufacturing and Design and Master of Engineering in Additive Manufacturing and Design is to educate students and working engineers to become technically outstanding experts in additive manufacturing. Specifically, the objectives include:

1. Apply foundational knowledge, critical thinking, problem solving, and creativity in the uses of additive manufacturing and associated design tools and methods.
2. Grow as leaders in manufacturing while maintaining the highest ethical standards in applying additive manufacturing to industry-relevant problems and design challenges.
3. Strive for the advancement of the state-of-art in additive manufacturing and design.
4. Develop innovative solutions through new design paradigms in their respective industries.

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 (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/gcac/gcac-305/gcac-305-admission-requirements-international-students) 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 Requirements (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.

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<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<td></td>
<td>Complete the following 5 required courses that total 19 credits with a grade point average of 3.00 or higher:</td>
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<td>EDSGN 562</td>
<td>Design for Additive Manufacturing</td>
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<tr>
<td>ESC 545</td>
<td>Scientific and Engineering Foundations of Additive Manufacturing</td>
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<td>IE 527</td>
<td>Additive Manufacturing Processes</td>
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<td>MATSE 567</td>
<td>Additive Manufacturing of Metallic Materials</td>
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<td>ME 566</td>
<td>Metal Additive Manufacturing Laboratory</td>
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<td>Complete a minimum of 8 credits in 400 and/or 500 level courses offered with the following designations: EDSGN, ESC, IE, MATSE or ME</td>
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<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>
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<td>EDSGN 590</td>
<td>Colloquium</td>
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<td>Complete SARI (Scholarship and Research Integrity) training</td>
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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 Associate Department Head of Graduate Studies in one of the five aforementioned Departments.

Complete 3 credits in one of the following offerings to complete the culminating project: | 3 |
| EDSGN 596 | Individual Studies                                        |         |
| ESC 596   | Individual Studies                                        |         |
| IE 596    | Individual Studies                                        |         |
| MATSE 596 | Individual Studies                                       |         |
| ME 596    | Individual Studies                                        |         |

Total Credits: 30

1. Note that EDSGN 596, ESC 596, IE 596, MATSE 596, and ME 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
Candidates must write a culminating project paper on a topic mutually agreed upon with the adviser. Students will be encouraged to utilize an industry internship (resident students) or current employer (online students) 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 Requirements. (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 in 500-level courses.

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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 in 400 and/or 500 level courses offered with the following designations: EDSGN, ESC, IE, MATSE or ME.

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 - IE Colloquium
- MATSE 590 - Colloquium
- ME 590 - Colloquium

Complete SARI (Scholarship and Research Integrity) training

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 Associate Department Head of Graduate Studies in one of the five aforementioned Departments.

Complete 3 credits in one of the following offerings to complete the culminating project:

- EDSGN 596 - Individual Studies
- ESC 596 - Individual Studies
- IE 596 - Individual Studies
- MATSE 596 - Individual Studies
- ME 596 - Individual Studies

Total Credits 30

Note that EDSGN 596, ESC 596, IE 596, MATSE 596, and ME 596 cannot be used to fulfill this requirement.

2 M.S. students are required to complete one (1) credit in each of three (3) semesters.
3 The one-credit colloquium does not count toward the 30 graduate course credits required.

The M.S. degree 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).

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-500/gsad-501-credit-loads-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)
or Professor-in-Charge (PIC)
Timothy William Simpson

Program Contact
Jaclyn Stimely
314A Leonhard Building
Penn State University
University Park PA 16802
juc52@psu.edu
(814) 863-8069

Program Website
View (http://AMDprogram.psu.edu)

Campus
World Campus

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Program Website
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degrees-and-certificates/
penn-state-online-additive-
manufacturing-and-design-masters-
degree/overview)