

# ADDITIVE MANUFACTURING AND DESIGN

## 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.

Code	Title	Credits
<b>Required Courses</b>		
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	Engineering and Scientific Principles 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. <sup>1</sup>		
Complete one credit of colloquium preferably in the first two semesters in the program. The following courses are offered to meet this requirement. <sup>3</sup>		
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		
<b>Culminating Experience</b>		
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) <sup>2</sup>	3
<b>Total Credits</b>		<b>30</b>

<sup>1</sup> Note that AMD 596 cannot be used to fulfill this requirement.

<sup>2</sup> M.Eng. students can complete a three (3) credit course in one (1) semester.

<sup>3</sup> 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 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.

Code	Title	Credits
<b>Required Courses</b>		
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	Engineering and Scientific Principles 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. <sup>1</sup>		
Complete one credit of colloquium preferably in the first two semesters in the program. The following courses are offered to meet this requirement. <sup>3</sup>		
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		
<b>Culminating Experience</b>		
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	Individual Studies (Scholarly Paper)	3-6
or AMD 600	Thesis Research	

**Total Credits** **30-33**

<sup>1</sup> Note that AMD 596 cannot be used to fulfill this requirement.

<sup>2</sup> M.S. paper option students are required to complete one (1) credit in each of three (3) semesters.

<sup>3</sup> The one-credit colloquium does not count toward the 30 graduate course credits required.

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.