



Mechanical and Manufacturing Engineering

Course Outline

Term 2 2019

MMAN4200

ADDITIVE MANUFACTURING

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1. Staff contact details

Contact details and consultation times for course convenor

Name: Dr Xiaopeng Li (Course convenor)

Office location: 311B, Ainsworth Building

Tel: (02) 9385 6784

Email: xiaopeng.li@unsw.edu.au

Contact hours

| | Day | Time | Location |
|-----------------|------------|------------------|--------------------------------|
| Lectures | Tuesday | 9:00am – 10:00am | Colombo Theatre C (K-B16-LG05) |

Student learning outcomes

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

After successfully completing this course, you should be able to:

| Learning Outcome | EA Stage 1 Competencies |
|---|------------------------------------|
| 1. Understand the fundamental basis and nature of additive manufacturing techniques 2. Explain the principles and develop a system | PE1.1, PE 1.3, PE1.5, PE2.2, PE3.6 |

| Date | Topic | Lecture content | Demonstration/lab content | Suggested readings |
|-------------|---|---|--|---------------------------|
| Week 3 | Polymer additive manufacturing | Current additive manufacturing techniques for printing polymers, printing mechanisms, advantages and limitations | Review of previous lecture and exercises | Moodle lecture notes |
| Week 4 | Ceramic additive manufacturing | Current additive manufacturing techniques for printing ceramics, printing mechanisms, advantages and limitations | Review of previous lecture and exercises | Moodle lecture notes |
| Week 5,6,7 | Lab project | | | |
| Week 8 | A project study and design | A case study based on polymer, metal or ceramics additive manufacturing using printers in the school lab | Project presentations | Moodle lecture notes |
| Week 9 | Additive manufacturing process optimisation and design for additive manufacturing | Principles and strategies for additive manufacturing process optimisation; and software and design of advanced structures | Review of previous lecture and exercises | Moodle lecture notes |

6. Assessment

Assessment overview

| Assessment | Group Project? (# Students per group) | Length | Weight | Learning outcomes assessed | Assessment criteria | Due date and submission requirements | Deadline for absolute fail | Marks returned |
|----------------|---------------------------------------|---|--------|----------------------------|--------------------------------------|--------------------------------------|----------------------------|-------------------------------|
| Online quizzes | No | 1 to 5 questions every week (week 2,3,4,9,10) | 10% | 1, 2 | Weekly lecture | Fortnightly, via Moodle | N/A | After the quiz closes |
| Assignment 1 | No | Max 3000 words plus 10 references | 25% | 1, 2, 4 | Lectures 1 to 4 | Week 8 | N/A | Week 11 |
| Lab project | Yes (5 max) | 1 or 2 days | 25% | 1, 2, 3, 4 | Refer to assignment details | Week 8 | N/A | Week 11 |
| Final exam | No | 2 hours | 40% | 1, 2, 4 | All course content from week 1 to 10 | Exam period, date TBC | N/A | Upon release of final results |

All assignments and assessment criteria will be made available on Moodle prior to the assessments.

Assignments

Assignment 1 requires each student or a group of students (depending on the number of the enrolled students) to write an essay based on given topics about additive manufacturing. The topics will be provided to the students in week 4.

For the Lab project, students will be divided into several groups and a small, flexible project will be given to each group. Each project will be focused on polymer or metal additive manufacturing where y

- c. Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or
- d. Pass/Fail assessment tasks.

Marking

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

Examinations

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods: February for Summer Term, May for T1, August for T2, and November/December for T3.

Please visit myUNSW for Provisional Examination timetable publish dates.

For further information on exams, please see the [Exams](#) page.

10. Administrative matters and links

All students are expected to read and be familiar with School guidelines and policies, available on the intranet. In particular, students should be familiar with the following:

- x [Attendance](#)
- x [UNSW Email Address](#)
- x [Computing Facilities](#)
- x [Special Consideration](#)
- x [Exams](#)
- x [Approved Calculators](#)
- x [Academic Honesty and Plagiarism](#)
- x [Student Equity and Disabilities Unit](#)
- x [Health and Safety](#)
- x [Lab Access](#)

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

| | Program Intended Learning Outcomes |
|--|---|
| PE1: Knowledge and Skill Base | PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals |
| | PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing |
| | PE1.3 In-depth understanding of specialist bodies of knowledge |
| | PE1.4 Discernment of knowledge development and research directions |
| | PE1.5 Knowledge of engineering design practice |
| | PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice |
| PE2: Engineering Application Ability | PE2.1 Application of established engineering methods to complex problem solving |
| | PE2.2 Fluent application of engineering techniques, tools and resources |
| | PE2.3 Application of systematic engineering synthesis and design processes |
| | PE2.4 Application of systematic approaches to the conduct and management of engineering projects |
| PE3: Professional and Personal Attributes | PE3.1 Ethical conduct and professional accountability |
| | PE3.2 Effective oral and written communication (professional and lay domains) |
| | PE3.3 Creative, innovative and pro-active demeanour |
| | PE3.4 Professional use and management of information |
| | PE3.5 Orderly management of self, and professional conduct |
| | PE3.6 Effective team membership and team leadership |