ME557: Additive Manufacturing

Instructor Name: Anna Thornton
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Office Hours: Th 12-2

Course Dates: Fall 2019
Course Time & Location: T Th 9 - 10:15
Labs Friday afternoons
Course Credits: 4

Course Description.
This course will teach the fundamentals of Additive Manufacturing (AM) theory and how AM is being used in industry to accelerate product development and replace more traditional low-volume and high volume manufacturing processes. Topics will cover the technologies, methods, and applications or a range of additive methods including FDM (Fused Deposition Modeling), SLA (Sterolithography) and MLS(Metal Laster Sintering), methods for designing for additive will be covered, and implications of additive manufacturing in the complete product life-cycle. We will use the equipment in EPIC to demonstrate and practice the design and production of additive parts.

Books and Other Course Materials

- Gibson, I., Rosen, David, & Stucker, Brent. (2015). Additive Manufacturing Technologies 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing (2nd ed. 2015.. ed.). New York, NY: Springer New York : Imprint: Springer. (*available online at BU libraries)*
- HBS course pack
- Misc. articles posted on BB

Courseware
Blackboard will be used to distribute all of the course material

Assignments and Grading

- Assignments 50%
- Participation 30%
  - Peer reviews – 10%
  - Class participation – 10%
  - Space maintenance – 10%
- Literature Review 20%

Resources/Support/How to Succeed in This Course:

1. Prof. Thornton will hold office hours and can meet by appointment as needed.
2. Accommodations for Students with Documented Disabilities: If you are a student with a disability or believe you might have a disability that requires accommodations, please contact the Office for Disability Services (ODS) at (617) 353-3658 or access@bu.edu to coordinate any reasonable accommodation requests. ODS is located at 19 Deerfield Street on the second floor (19 Buick Street as of September 1, 2018).

Community of Learning: Class and University Policies

1. All students should participate in design reviews, class discussions and presentations.

2. **Attendance & Absences.** Please notify Prof. Thornton if you need to be absent. Absences for university approved reasons will be allowed and we will work to plan how to make up the work Policy on Religious Observance.

3. **Assignment Completion & Late Work**. All assignments should be turned in through Blackboard. Grades will be reduced for late work.

4. **Academic Conduct Statement,** Students should abide by BU's academic code. *https://www.bu.edu/academics/policies/academic-conduct-code/*

Outline of Class Meetings: Date, Topic, Readings Due, Assignments Due

All assignments and readings can be found on blackboard. Below is a summary of the lectures over the semester. There will be a number of guest lecturers from industry to talk about technology and applications.

DATE	Lecture	Topic	LAB	Literature review
9/3	**1**	Introduction to Additive	Quick start	
9/5	**2**	CAD modeling, STL and slicing algorithms		
9/10	**3**	Support	A1 review time	L1
9/12	**4**	FDM		
9/17	**5**	FDM	A1 final – review Lattice software	
9/19	**6**	Lattice design		
9/24	**7**	Topological optimization	Teach lattice and TO – A2 reivew	L2
9/26	**8**	Metal printing (PBF, PBM, FDM-based) /		
10/1	**9**	Metal printing (PBF, PBM, FDM-based) **SLA Lecture from Formlabs**	A2	
10/3	**10**	SLA –		
10/8	**11**	Binder jet, poly jet, and other methods **DESK TOP METAL**	A3 - review	L3
10/10	**12**	Simulation and modeling / metal printing –	A3 final	
10/17	**13**	DFA **Markforged lecture**		
10/22	**14**	Equipment elements for designing and building printers	A4 - work	
10/24	**15**	Post processing		L4
10/29	**16**	Reverse engineering, scanning, modeling etc.	A4 - work	
10/31	**17**	Where does additive fit in the value chain		
11/5	**18**	Medical applications	A4 final	
11/7	**19**	Industrial tooling		L5
11/12	**20**	Other applications	A5 / A6 – work	
11/14	**21**	Process selection and comparison. How do design which one is best –		
11/19	**22**	Additive in production / supply chain impacts and logistics of traceability -	A5 / A6 - work	
11/21	**23**	Additive eco-system and startups Will Boley		
11/26	**24**	Future direction of AM		
12/3	**25**	Course summary	A5 / A6 - due	
12/5	**26**	Final presentation	A7 due	
12/10				

Assignments

1	Design and build something for the additive work space
2	Lattice
3	Topological optimization
4	Experimental design
5	Print in metal
6	Do something cool
7	Report on new technology

Literature review

- There will be 5 literature reviews of peer-reviewed articles. You will be graded on at least two of these.