New Course: CEE 498: Mechanics of Additive Manufacturing

Spring 2019: MW 10-11:20, Rm 2312 NCEL

Instructor: Professor Arif Masud

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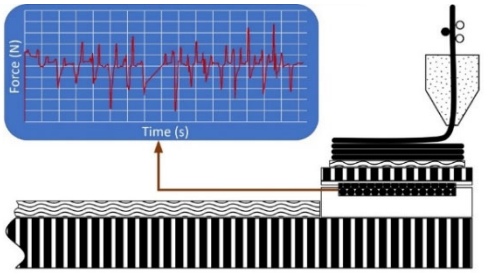

Pre-Requisites

- CEE-471 (or TAM equivalent for MechSE / AE students).
- Familiarity with Matlab programming.
- A first-year graduate course on FEA (Pre / Co-requisite).

Course Description

Additive Manufacturing (AM) involves processes where a component can be fabricated directly from the Computer Aided Design (CAD). This course is designed to make students familiar with Direct Digital Manufacturing (DDM) process both in theory and in practice. It will focus on the Mechanics of AM technologies that involve (3D) layer-based manufacturing with Polymer and Cementitious materials. Expected outcome of the course is a trained student who possesses basic scientific understanding of this emerging technology and is aware of the important research challenges associated with its use.

Week	Topic(s)
1	Introduction to AM: History, Benefits, Terminology, Basic Principles
2	Process Physics for Additive Manufacturing
3	AM Applications; AM Technical Challenges
4	AM Process Chain; Intro. to Software Tools
5	Direct Design and Digital AM
6	AM Processes for Structural Engineering
7, 8	Materials Science for AM: (i) Cement Based Materials, (ii) Polymer Based Materials
9, 10	Mathematical Models for AM
11	Transport phenomena and Flow Modeling
12	Curing, Phase change, Property evolution
13,14	Residual stresses, Fatigue, Delamination
15	Process Monitoring, Robotics and AI