



ÇANKAYA UNIVERSITY

Faculty of Engineering

Syllabus

Department	Mechanical Engineering						
Course Code & Course Name	ME421 - Additive Manufacturing						
Number of Weekly Lecture Hours	3	Weekly Lab/Tutorial Hours	0	Number of Credit Hours	3	ECTS Credit	5
Academic Year	2023-2024						
Semester	Fall						
Instructor	Onat Halis TOTUK						
E-mail	onattotuk@cankaya.edu.tr						
Room &Phone	LA-24 2331315						
Lecture Hours							
Office Hour							
Course Web Site	me421.cankaya.edu.tr/						

Course Description	
<p>This course covers following topics; Basic principles and development of additive manufacturing, generalized process chain, Vat photopolymerization, powder bed fusion, extrusion-based processes, material jetting, sheet lamination and directed energy deposition processes, direct write technologies, low cost systems, process selection guidelines, post processing and software issues, direct digital manufacturing, design for additive manufacturing, rapid tooling, applications, business opportunities and future directions of the method.</p>	

Prerequisites (if any)	1 st	2 nd	3 rd	4 th
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/> Consent of the Instructor		<input type="checkbox"/> Give others, if any.	
Co-requisites (if any)	1 st	2 nd	3 rd	4 th
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Course Type	<input type="checkbox"/> Must course for dept. <input type="checkbox"/> Must course for other dept.(s) <input checked="" type="checkbox"/> Elective course for dept. <input type="checkbox"/> Elective course for other dept.(s)			

Course Objectives
1) To explain methods used in additive manufacturing. 2) To explain theories governing the additive manufacturing. 3) To give information on additive manufacturing materials 4) To explain relations between materials to be processed and methods of additive manufacturing 5) To introduce common machines used for the technology 6) To show applications and business opportunities with future directions

Course Outline	
Week	Topic(s)
1	Introduction and Basic Principles of Additive Manufacturing
2	Development of Additive Manufacturing Technology
3	Generalized Additive Manufacturing Process Chain
4	Vat Photopolymerization Processes / Powder Bed Fusion Processes / Extrusion-Based Systems
5	Material Jetting / Binder Jetting / Sheet Lamination Processes
6	Directed Energy Deposition Processes / Direct Write Technologies
7	The Impact of Low-Cost AM Systems / Guidelines for Process Selection
8	Post-processing / Software Issues
9	Direct Digital Manufacturing / Design for Additive Manufacturing
10	Rapid Tooling
11	Applications of Additive Manufacturing
12	Applications of Additive Manufacturing
13	Comparison of Additive Manufacturing Methods
14	Business Opportunities and Future Directions

Grading Policy								
Assesment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage
Homework			Case Study			Attendance		
Quiz			Lab Work			Field Study		
Midterm Exam	1	%30	Class Participation			Project	1	%30
Term Paper			Oral Presentation			Final Exam	1	%40

Textbook(s)				
Author(s)	Title	Publisher	Publication Year	ISBN
Ian Gibson, David Rosen, Brent Stucker	Additive Manufacturing Technologies	Springer	2015	978-1-4939-2112-6

Reference Books				
Author(s)	Title	Publisher	Publication Year	ISBN
Dongdong Gu	Laser Additive Manufacturing of High-Performance Materials	Springer	2014	978-3-662-46088-7
Andreas Gebhardt	Understanding Additive Manufacturing	Hanser Publishers	2011	978-3-446-42552-1

Teaching Policy
There are 3 hours of lectures each week. Parallel to the lectures, practice laboratories have to be carried out.

Laboratory, Studio and Court Hall Usage
There are laboratories for practicing 3D modeling, model conversion (post processing) and production using 3D printers

Computer Usage
Students should be able to apply solid modeling for part design. Other software and hardware needs will be thought during the course.

Learning Outcomes
<ol style="list-style-type: none"> 1. Have an understanding of additive manufacturing 2. Gain the ability to manufacture a 3D part by using some of the methods of additive manufacturing 3. Have an understanding of relations between materials and methods 4. Gain the latest manufacturing technology with future business possibilities