ADDITIVE MANUFACTURING FOR INNOVATIVE DESIGN AND PRODUCTION
Schedule

WEEK 1: INTRODUCTION TO ADDITIVE MANUFACTURING (4 hrs)			
The course officially kicks off! In the first week, you'll take a Pre-Assessment to get a baseline of your understanding of the course material. During this period, you'll become familiar with the platform and course design. Finally, you'll be introduced to the history of additive manufacturing, its fundamental principles of operation, the industry landscape, and why it has, and will continue to, grow to broad industrial relevance.			
		ENTRANCE SURVEY	**5 min**
		PRE-ASSESSMENT	**10 min**
		GET STARTED	**35 min**
		• Welcome	1 min
		• Course Schedule	3 min
		• Discussion Forum	5 min
		• Who's Taking the Course	2 min
		• Who's Teaching the Course	5 min
		• Grading and Completion Criteria	1 min
		• Certificate Information and CEUs	1 min
		• Learning Objectives and Pedagogy	2 min
		• Academic Integrity and Rules of Conduct	1 min
		• Disclaimer	1 min
		• FAQ	10 min
		INTRODUCTION TO ADDITIVE MANUFACTURING	**3 hrs**
		• Foundations of Additive Manufacturing	5 min
		• Defining Additive Manufacturing	10 min
		• The Importance of Additive Manufacturing	15 min
		• The Additive Manufacturing Industry	25 min
		• The Additive Manufacturing Workflow	10 min
		• The Additive Manufacturing Technology Spectrum	15 min
		• Emerging Trends in Additive Manufacturing	10 min
		• Graded Assignment	60 min
		Your submission due by Monday Peer Assessment due by Wednesday	
		• Key Takeaways and Course Trajectory	5 min

WEEK 2: ADDITIVE MANUFACTURING PROCESSES (5 hrs)

In week two, you will explore each of the commercial AM technologies and understand their principle method of operation, materials compatibility, and application potential.

ADDITIVE MANUFACTURING PROCESSES	**5 hrs**
• Welcome to Week 2: Navigating the AM Process Spectrum	10 min
• Extrusion	40 min
• Photopolymerization	40 min
• Powder Bed Fusion	60 min
• Material Jetting	40 min
• Binder Jetting	40 min
• Directed Energy Deposition	40 min
• Lamination	30 min

WEEK 3: APPLICATIONS OF ADDITIVE MANUFACTURING (5 hrs)

The third week of the course focuses on the applications of AM across the product lifecycle, and presents both a framework for understanding the value case for AM as well as an approach for determining business readiness in its utilization of AM.

APPLICATIONS OF ADDITIVE MANUFACTURING	**5 hrs***
• Welcome to Week 3	5 min
• Framing the Applications of AM	30 min
• Prototyping	40 min
• Tooling	40 min
• Performance Improvement	40 min
• Mid-Week Concept Questions	20 min
• Production	40 min
• Customization and Personalization	30 min
• Spare Parts, Maintenance and Repair	20 min
• Art, Design, and Architecture	30 min
• A Framework for Evaluating the Adoption of AM	30 min
• Graded Assignment	1 hr

Your submission due by Monday | Peer Assessment due by Wednesday

* Week 3 features more content than you are required to complete in order to complete the week. The italicized time listings are expected if a learner were to engage in all examples provided.

WEEK 4 BREAK (No new content, assignments still due. Check deadlines above)

WEEK 5: THE AM DESIGN SPACE (5 hrs)

In week five, you will be introduced to the principles of designing parts for AM for each major process, illustrated through a series of instructional examples and test artifacts produced at MIT.

	WEEKS 5, 6, 7: AN INTRODUCTION TO DESIGN FOR AM	**10 min**
	• An Introduction to Design for AM	10 min
	THE AM DESIGN SPACE	**5 hrs**
	• Envisioning the AM Design Space	15 min
	• Comparing Process and Material Performance	40 min
	• AM Design Principles and the 3DMIT Kit	15 min
	• The 3DMIT Kit: Deep Dive	1 hr 30min
	• Lattice Structures in AM	30 min

WEEK 6: COMPUTATION-DRIVEN DESIGN FOR AM (5 hrs)

In week six, you will be introduced to the software workflow for additive manufacturing, including generative design tools and build preparation software.

	COMPUTATION-DRIVEN DESIGN FOR AM	**5 hrs**
	• Introduction to AM Software and Computational Design	35 min
	• Principles of Computational Design for AM	30 min
	• Computational Design of a High-Performance Wheel	60 min
	• Mid-Week Concept Questions	5 min
	• Generative Design at Autodesk	10 min
	• Advanced Topology Optimization for AM	15 min
	• Graded Assignment	1 hr 30 min
	Your submission due by Monday Peer Assessment due by Wednesday	

WEEK 7a: DATA REPRESENTATION AND BUILD PREPARATION (2 hrs)			
In the first part of week seven, you will be presented with the software infrastructure for AM, including how data is represented in different file format schemes, and how this data is translated into machine instructions via build preparation software.			
		DATA REPRESENTATION AND BUILD PREPARATION	**1 hr 45 mins**
		• Introduction	10 min
		• AM File Formats	20 min
		• AM Toolpaths	15 min
		• Build Preparation Software	60 min
WEEK 7b: IMPLEMENTING DfAM (4 hrs)			
In the second part of week seven, you will be presented with a methodology for leveraging the design creativity of AM to design new parts and products.			
		IMPLEMENTING DFAM	**2 hrs 30 min**
		• An Integrative Approach to DfAM	40 min
		• Integrative Examples of DfAM in Practice	20 min
		• Graded Assignment	1 hr 30 min
		Your submission due by Monday Peer Assessment due by Wednesday	
		(SUPPLEMENTARY) AM PROCESS KNOWLEDGE BASE	
		• Introduction	
		• Extrusion	
		• Photopolymerization	
		• Selective Laser Sintering	
		• Selective Laser Melting	
		• Electron Beam Melting	
		• Material Jetting	
		• Binder Jetting	

WEEK 8: ASSESSING THE COST AND VALUE OF ADDITIVE MANUFACTURING (5 hrs)

In week eight, you will be presented with a model and method for assessing the cost of additive manufacturing, as well as a series of exemplary scenarios illustrating how AM can change fundamental economics of manufacturing and product lifecycle cost.	**ASSESSING THE COST AND VALUE OF AM**	**5 hrs**
	• Introduction	10 min
	• A Cost Model of Conventional Manufacturing	20 min
	• Modeling the Cost of AM	1 hr 30min
	• Assessing the Value of AM	40 min
	• Cost and Value Scenarios	60 min
	• Graded Assignment	1 hr 30min
	Your submission due by Saturday Peer Assessment due by Wednesday	

WEEK 9: CASE STUDY (5 hrs)

In the ninth week of the course, you complete one part of a summative case study, whereby you apply the capability you've acquired over the duration of the course to solve a real-world design or strategy problem. You complete one of three cases.	**CASE STUDY OVERVIEW AND INSTRUCTIONS**	**1 min**
	STRATEGY AND OPERATIONS CASE STUDY –PART 1	**5 hrs**
	• Graded Assignment	5 hrs
	Your submission due by Monday Peer Assessment due by Saturday	
	DESIGN CASE STUDY OPTION I, GENERATIVE DESIGN OF A BRACKET – PART 1	**5 hrs**
	• Graded Assignment	5 hrs
	Your submission due by Monday Peer Assessment due by Saturday	
	DESIGN CASE STUDY OPTION II, PART CONSOLIDATION OF A DUCT – PART 1	**5 hrs**
	• Graded Assignment	5 hrs
	Your submission due by Monday Peer Assessment due by Saturday	

WEEK 10 BREAK (No new content, assignments still due. Check deadlines above)

WEEK 11: CASE STUDY (5 hrs)			
In the eleventh week of the course, you complete the second part of a summative case study, whereby you apply the capability you've acquired over the duration of the course to solve a real-world design or strategy problem.			
		STRATEGY AND OPERATIONS CASE STUDY – PART 2	**5 hrs**
		• Graded Assignment	5 hrs
		Your submission due by Wednesday Peer Assessment due by Sunday	
		DESIGN CASE STUDY OPTION I, GENERATIVE DESIGN OF A BRACKET – PART 2	**5 hrs**
		• Graded Assignment	5 hrs
		Your submission due by Wednesday Peer Assessment due by Sunday	
		DESIGN CASE STUDY OPTION II, PART CONSOLIDATION OF A DUCT – PART 2	**5 hrs**
		• Graded Assignment	5 hrs
		Your submission due by Wednesday Peer Assessment due by Sunday	

WEEK 12: THE FUTURE OF PRODUCTION (3 hrs)			
The twelfth week of the course synthesizes the material you have learned, and paints a vision of the future of production where AM is one part of intelligent, automated factory systems.		**THE FUTURE OF PRODUCTION**	**3 hrs**
		• Introduction	15 min
		• The Growing AM Infrastructure	40 min
		• The Digitization of Production	45 min
		• Charting Your AM Journey	40 min
		• Staying in Touch	10 min
		• Graded Assignment: Reflection	20 min
AFTER THE COURSE ENDS…			
		Last Day of the Course Course ends at 23:30 UTC	
		Two Days After the Course Ends Download your course certificate from your student dashboard	
		30 Days After the Course Ends (or when the next course begins) Fusion 360 license lapses	
		Course content available in perpetuity	