DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
INDUSTRIAL ENGINEERING PROGRAM, BSC.

Course Syllabus

1. **Course number and name**
   IE 557 Additive Manufacturing

2. **Credits and contact hours**
   (3+0) 3 credit hours, 3 contact hours

3. **Course type**
   In Person Learning Course (3+0)

4. **Instructor's or course coordinator's name**
   Click here to enter text.

5. **Textbook information**
   ISO/ ASTM DIS 52900:2018 (E), (2018), Additive manufacturing – General principles –Terminology, ISO/ ASTM International 2018.

   Redwood B., Schöffer F., Garret B., (2017), The 3D Printing Handbook: Technologies, design and applications, Editura 3D Hubs, ISBN 978-90-827485-0-5.

   a. **Other supplemental materials**
      Instructor's notes

6. **Specific course information**
   a. **Catalog description**
      Fundamental knowledge of Additive Manufacturing and Reverse Engineering (RE) and their applications in manufacturing, medical and other sectors. Design for additive manufacturing. Additive manufacturing feedstock materials. Post Processing and post treatment requirements. Material Properties of parts produced using additive manufacturing

   b. **Prerequisites or co-requisites**
      Prerequisite: IE311 Manufacturing Processes 2 , IE551 Computer Aided Design and Manufacturing

   c. **The course is:**
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7. Specific goals for the course

a. Course outcomes:

After completion of the course, students are expected to be able to:

1. Apply knowledge on additive manufacturing, and reverse engineering in a variety of domains
2. Investigate process parameters for effective additive manufacturing
3. Differentiate principles behind additive manufacturing and reverse engineering technologies available in the market and select an appropriate AM technology based on preset optimization criteria (eg. cost, quality, time/ available resources)
4. Apply design for additive manufacturing (DfAM) in practice for the development of new products

b. The following student outcomes are addressed by the course:

SO-(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

SO- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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8. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Apply knowledge on additive manufacturing, and reverse engineering in a variety of domains	-	Lab	Lab assignment
CO-(2): Investigate process parameters for effective additive manufacturing	-	Lectures (Example and Problems)	Assignment
CO-(3): Differentiate principles behind additive manufacturing and reverse engineering technologies available in the market	-	Video and Project	Project

and elect an appropriate AM technology based on preset optimization criteria (eg. cost, quality, time/ available resources)			
CO-(4) Apply design for additive manufacturing (DfAM) in practice for the development of new products	-	Video and Project	Project
Student Outcomes			
SO-(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		Term Project	Term Project
SO- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice		Term Project	Term Project

9. Weekly Teaching Plan

Week	Lecture	Topic	Method of Delivery
1	Lec_1	Course Overview and Syllabus	Lecture
1	Lec_2	Additive Manufacturing Technologies – Principles and Applications (Additive Manufacturing Basic Concepts and processes)	Lecture
1	Lec_3	Additive Manufacturing Technologies – Principles and Applications (Additive Manufacturing Basic Concepts and processes)	Lecture
2	Lec_4	Additive Manufacturing Technologies – Principles and Applications (Solid- Based Additive Manufacturing Technologies)	Lecture
2	Lec_5	Additive Manufacturing Technologies – Principles and Applications (Solid- Based Additive Manufacturing Technologies)	Lecture
2	Lec_6	Additive Manufacturing Technologies – Principles and Applications (Solid- Based Additive Manufacturing Technologies)	Lecture

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3	Lec_7	Additive Manufacturing Technologies – Principles and Applications (Powder-Based Additive Manufacturing Technologies)	Lecture
3	Lec_8	Additive Manufacturing Technologies – Principles and Applications (Powder-Based Additive Manufacturing Technologies)	Lecture
3	Lec_9	Additive Manufacturing Technologies – Principles and Applications (Powder-Based Additive Manufacturing Technologies)	Lecture
4	Lec_10	Additive Manufacturing Technologies – Principles and Applications (Liquid-Based Additive Manufacturing Technologies)	Lecture
4	Lec_11	Additive Manufacturing Technologies – Principles and Applications (Liquid-Based Additive Manufacturing Technologies)	Lecture
4	Lec_12	Additive Manufacturing Technologies – Principles and Applications (Liquid-Based Additive Manufacturing Technologies)	Lecture
5	Lec_13	Lab	Lab
5	Lec_14	Lab	Lab
5	Lec_15	Lab	Lab
6	Lec_16	Data Interfacing for Additive Manufacturing (STereoLithography (STL) Models)	Lecture
6	Lec_17	Data Interfacing for Additive Manufacturing (STereoLithography (STL) Models)	Lecture
6	Lec_18	Data Interfacing for Additive Manufacturing (STereoLithography (STL) Models)	Lecture
7	Lec_19	Data Interfacing for Additive Manufacturing (Slicing Techniques)	Lecture
7	Lec_20	Data Interfacing for Additive Manufacturing (Slicing Techniques)	Lecture
7	Lec_21	Data Interfacing for Additive Manufacturing (Slicing Techniques)	Lecture
7	Lec_22	Data Interfacing for Additive Manufacturing (Reverse Engineering for Additive Manufacturing Applications)	Lecture
7	Lec_23	Data Interfacing for Additive Manufacturing (Reverse Engineering for Additive Manufacturing Applications)	Lecture
7	Lec_24	Data Interfacing for Additive Manufacturing (Reverse Engineering for Additive Manufacturing Applications)	Lecture

9	Lec_25	Design for Additive Manufacturing (Optimization of 3D printing process parameters)	Lecture
9	Lec_26	Design for Additive Manufacturing (Optimization of 3D printing process parameters)	Lecture
9	Lec_27	Design for Additive Manufacturing (Optimization of 3D printing process parameters)	Lecture
10	Lec_28	Lab	Lab
10	Lec_29	Lab	Lab
10	Lec_30	Lab	Lab
11	Lec_31	Design for Additive Manufacturing (Influences, complementarity and Synergy in AM and conventional technologies)	Lecture
11	Lec_32	Design for Additive Manufacturing (Influences, complementarity and Synergy in AM and conventional technologies)	Lecture
11	Lec_33	Design for Additive Manufacturing (Influences, complementarity and Synergy in AM and conventional technologies)	Lecture
12	Lec_34	Design for Additive Manufacturing (Macro environment of AM)	Lecture
12	Lec_35	Design for Additive Manufacturing (Macro environment of AM)	Lecture
12	Lec_36	Design for Additive Manufacturing (Macro environment of AM)	Lecture
13	Lec_37	Design for Additive Manufacturing (AM Business models and reshaping production)	Lecture
13	Lec_38	Design for Additive Manufacturing (AM Business models and reshaping production)	Lecture
13	Lec_39	Design for Additive Manufacturing (AM Business models and reshaping production)	Lecture
14	Lec_40	AM challenges and future trends	Lecture
14	Lec_41	AM challenges and future trends	Lecture
14	Lec_42	AM challenges and future trends	Lecture
15	Lec_43	Lab	Lab
15	Lec_44	Lab	Lab
15	Lec_45	Lab	Lab

1. **Grade Distribution:**

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Assessment	Grade	Week No.
First Exam	20%	5th Week
Second Exam	20%	10th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works ….)	10%	1-16th Week
- Final Examination	50%	16th Week

Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.