



COURSE OUTLINE: AMF103 - ADDITIVE MANUFACT. I

Prepared: Donovan Kennedy

Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	AMF103: ADDITIVE MANUFACTURING I
Program Number: Name	4069: AUTOMATED MANUFACT.
Department:	ROBOTICS GRADUATE CERTIFICATE
Semesters/Terms:	20F, 21W
Course Description:	In this course, students will be introduced to the physical properties and manufacturing characteristics of composites, polymers, various metallic alloys, binders and substrates used in Additive Manufacturing (AM). This course provides a fundamental overview of AM history and equipment, 3D printing, rapid prototyping, computer model simulation and programming, secondary processing and the impact of AM in society.
Total Credits:	2
Hours/Week:	2
Total Hours:	30
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
This course is a pre-requisite for:	AMF203, AMF205
Vocational Learning Outcomes (VLO's) addressed in this course:	4069 - AUTOMATED MANUFACT.
Please refer to program web page for a complete listing of program outcomes where applicable.	VLO 1 Solve automated manufacturing problems found in a typical industrial environment by applying engineering principles and decision-making strategies.
	VLO 2 Analyze and synthesize technical data to develop graphics and related technical documents conforming to engineering standards.
	VLO 3 Select and manage appropriate hardware and software for the creation of engineering designs.
	VLO 4 Identify and utilize manufacturing processes, rapid prototyping methods, and automation technologies to optimize product development.
	VLO 7 Exercise professionalism, leadership, and effective communication in an industrial work setting to increase overall productivity and support a positive work environment.
Essential Employability Skills (EES) addressed in this course:	EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
	EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.
	EES 6 Locate, select, organize, and document information using appropriate technology and information systems.
	EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.
	EES 9 Interact with others in groups or teams that contribute to effective working

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	relationships and the achievement of goals. EES 10 Manage the use of time and other resources to complete projects. EES 11 Take responsibility for ones own actions, decisions, and consequences.												
Course Evaluation:	Passing Grade: 50%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.												
Other Course Evaluation & Assessment Requirements:	Grade Definition Grade Point Equivalent A+ 90 - 100% 4.00 A 80 - 89% B 70 - 79% 3.00 C 60 - 69% 2.00 D 50 - 59% 1.00 F (Fail)49% and below 0.00 CR (Credit) Credit for diploma requirements has been awarded. S Satisfactory achievement in field /clinical placement or non-graded subject area. U Unsatisfactory achievement in field/clinical placement or non-graded subject area. X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course. NR Grade not reported to Registrar's office. W Student has withdrawn from the course without academic penalty. Smart watches, smart phones and similar devices are not allowed during tests or quizzes and must be removed. Smart phones are not acceptable for use as a calculator during a test or quiz.												
Books and Required Resources:	Manufacturing Engineering Handbook, Second Edition by Hwaiyu Geng Publisher: McGraw-Hill Education Edition: Second ISBN: 978-0-07-183977-8												
Course Outcomes and Learning Objectives:	<table border="1"> <thead> <tr> <th>Course Outcome 1</th><th>Learning Objectives for Course Outcome 1</th></tr> </thead> <tbody> <tr> <td>1. Understand what additive manufacturing is.</td><td>1.1 Explain the definition of additive manufacturing. 1.2 Describe the history of additive manufacturing. 1.3 Understand the process chain of additive manufacturing.</td></tr> <tr> <th>Course Outcome 2</th><th>Learning Objectives for Course Outcome 2</th></tr> <tr> <td>2. Understand additive manufacturing processes.</td><td>2.1 Describe the feedstock methods and shaping methods, and their differences. 2.2 Understand and explain layer manufacturing processes. 2.3 Understand the materials available and describe their advantages and disadvantages. 2.4 Understand how to select the appropriate material for the application.</td></tr> <tr> <th>Course Outcome 3</th><th>Learning Objectives for Course Outcome 3</th></tr> <tr> <td>3. Investigate different methods of additive</td><td>3.1 Identify and explain the various methods of additive manufacturing such as binder jetting, directed energy</td></tr> </tbody> </table>	Course Outcome 1	Learning Objectives for Course Outcome 1	1. Understand what additive manufacturing is.	1.1 Explain the definition of additive manufacturing. 1.2 Describe the history of additive manufacturing. 1.3 Understand the process chain of additive manufacturing.	Course Outcome 2	Learning Objectives for Course Outcome 2	2. Understand additive manufacturing processes.	2.1 Describe the feedstock methods and shaping methods, and their differences. 2.2 Understand and explain layer manufacturing processes. 2.3 Understand the materials available and describe their advantages and disadvantages. 2.4 Understand how to select the appropriate material for the application.	Course Outcome 3	Learning Objectives for Course Outcome 3	3. Investigate different methods of additive	3.1 Identify and explain the various methods of additive manufacturing such as binder jetting, directed energy
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	manufacturing.	deposition, material extrusion, and other. 3.2 Describe the advantages and disadvantages of each method and compare to traditional manufacturing methods.
	Course Outcome 4	Learning Objectives for Course Outcome 4
	4. Investigate designing for additive manufacturing.	4.1 Describe the machines used for each method of additive manufacturing. 4.2 Identify and explain how to design for each additive manufacturing method. 4.3 Understand and explain the time to manufacture and the costs associated with each method of additive manufacturing.
	Course Outcome 5	Learning Objectives for Course Outcome 5
	5. Understand the various other processes in additive manufacturing.	5.1 Understand and describe the polymer laminate technology. 5.2 Understand and describe accumulative roll bonding technology. 5.3 Understand and describe ultrasonic lamination technology. 5.4 Understand and describe vat photopolymerization process.

Evaluation Process and Grading System:	<table><tr><th>Evaluation Type</th><th>Evaluation Weight</th></tr><tr><td>Assignments</td><td>20%</td></tr><tr><td>Attendance & Participation</td><td>10%</td></tr><tr><td>Case Study / Project</td><td>20%</td></tr><tr><td>Test 1</td><td>25%</td></tr><tr><td>Test 2</td><td>25%</td></tr></table>	Evaluation Type	Evaluation Weight	Assignments	20%	Attendance & Participation	10%	Case Study / Project	20%	Test 1	25%	Test 2	25%
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Date:	December 1, 2020
Addendum:	Please refer to the course outline addendum on the Learning Management System for further information.

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