Grant Title: Accelerated Pathways in Advanced Manufacturing (APAM)

Community College of Rhode Island Author:

Link: http://www.ccri.edu/

Document: Number10 Strategy3 Activity1 Deliverable14j - 09-ETCN-2350-Automated Machining Tech-rev.03

DOL Disclaimer Statement:



"This workforce product was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The U.S. Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership."



Unless otherwise noted - this work is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of this license, visit http://creativecommons.org/licenses/by/4.0/.

COURSE PROPOSAL APPROVAL TRACKING FORM

Name of Proposal: Automated Machining Technology

SIGNATURES REQUIRED PRIOR TO SUBMISSION

	Academic Department	
Proposal Originator(s):		
	Signature	Date
-	Signature	Date
Department Vote for Approval (Depart	: # Yes <u>10</u> # No tment members voting "no" may submit a separate repo	# Not Voting
Department Chair:	Signature	Date
Academic Dean:	Signature	Date

Note: All sections of this form must be completed and submitted with all required attachments to the Chair of the Curriculum Committee according to published distribution schedule. Should you have any questions, call the Office of the Dean of Business, Science and Technology, 825-2147.

CURRICULUM REVIEW COMMITTEE MEETING FOLLOW UP			
Meeting Date: Curriculum Committee Chair:	Committee Vote: Si	# Yes # No	# Abstentions
Forward to VPAA a	and President	Return to Depart	tment
V.P. for Academic Affairs:	Si	gnature	Date
READY FOR IMPLEMENTATION			
President:	Si	gnature	Date

File: Office of Vice President for Academic Affairs

Community College of Rhode Island

Course Proposal:

x New Course Revised Course

Please attach a course syllabus with course topics, textbook titles and evaluation methods.			
Date Submitted:	//		
DEPARTMENT:	Engineering and Technology		
DEVELOPED BY:	Raymond Ankrom		
COURSE TITLE:	Automated Machining Technology		
COURSE NUMBER:	ETCN-2350		
	CONTACT HOURS PER WEEK Other: Lecture hours: 1 Lab hours: 3 (Clinical hrs., Practicum, etc.)		
CREDITS: <u>3</u>	ACTUAL COURSE MEETING TIME HOURS / MINUTES PER WEEK Lecture Lab Other: hours / minutes:hours / minutes:(Clinical hrs., Practicum, etc.)		
Pleas If this course v Automated M	se circle: this is a 1 st year course this is a 2 nd year course vill be required in a specific academic program(s), indicate below: anufacturing and Quality Technology (ETMQ) Certificate		
If this course v	vill replace another course in a specific academic program, indicate below:		
If this course r	an on an experimental basis, indicate the course number:		

Rationale:

During this sixty hour course, the student will be introduced to Wire EDM machining, 4 Axis milling, metal selection and Heat Treatment, Plasma-torch technology, robot integration, emphasizing set-up and safe operating in the 21st century Advanced Manufacturing workplace. The class will use the MasterCAM software to create programs for the Wire EDM machine and 4 Axis HAAS vertical milling machine. Students will also learn the Conversational programming package included with the machines. This course is the advanced level of the CNC introduction courses now offered in the certificate programs. Students will learn from lecture and have time in the lab to set up and operate these advanced level manufacturing machines. The DACUM committee in the Fall of 2015 concluded that the existing program is good but indicated that Wire EDM, 4 Axis machining, Plasma-torch operation and Robots in Manufacturing should be part of training in the program.

CATALOG DE	
OLD:	New Course
NEW:	
	Wire EDM machining, 4 Axis milling, metal selection and Heat Treatment, Plasma-torch technology, robot integration, emphasizing set-up and safety in the work environment, are key skills needed for the growing 21 st century Advanced
	Manufacturing workplace. This course will expand skills students have learned in CNC programming (ETCN 1300),
	machine processes skills and information from the Machinery's Handbook to properly set-up and operate these
	Advanced level machines with confidence.
PREREQUISI	List course number, title and reading level
	List course number, title and reading level
TRANSFERABI	LITY: Is this course intended for transfer to the following institutions:
How does the this proposed	e course align with existing transfer agreements? Please list the specific course(s) at sister institution I course will match.
N/A	

Student Learning Outcomes/Educated Person:

The learning outcomes of specific courses foster multiple perspectives which contribute to the acquisition of desired graduate outcomes as well as to inform and deliver discipline related content.

✓ On the next page entitled "Student Learning Outcomes"

- Please delineate the major learning outcomes for the proposed course. Each learning outcome should be written in a format that follows the statement "as a result of this course, a student will be able to:"
- Indicate what techniques/methods will be used to achieve these student learning outcomes?
- List how will the student learning outcomes be assessed?

Community College of Rhode Island

The learning outcomes of specific courses are to foster multiple perspectives that contribute to the acquisition of desired graduate outcomes as well as to inform and deliver discipline related content.

Please delineate below the major learning outcomes for the proposed course. Learning Outcomes should be written in a format that follows the statement: "as a result of this course, a student will be able to..."

ltem #	STUDENT LEARNING OUTCOMES	TECHNIQUES/METHODS USED TO ACHIEVE OUTCOMES	TYPE(S) OF ASSESSMENT USED TO DETERMINE THE DEGREE TO WHICH THE
1	As a result of this course the student will be able to create CNC programs for the Wire EDM machine.	Class lectures, team work, class demonstrations, lab exercises from textbook, tutorials and PowerPoint presentations and web support material.	Creation of CNC programs that result in machined parts that conform to class designs and drawings. Students' programs and parts applied to grading rubrics; class exams and quizzes.
2	As a result of this course the student will be able to create CNC programs for the 4 Axis CNC milling machine.	Class lectures, team work, class demonstrations, lab exercises from textbook, tutorials and PowerPoint presentations and web support material.	Creation of CNC programs that result in machined parts that conform to class designs and drawings. Students' programs and parts applied to grading rubrics; class exams and quizzes.
3	As a result of this course the student will be able to create CNC programs for the automated plasma cutting table.	Class lectures, team work, class demonstrations, lab exercises from textbook, tutorials and PowerPoint presentations and web support material.	Creation of CNC programs that result in machined parts that conform to class designs and drawings. Students' programs and parts applied to grading rubrics; class exams and quizzes.
4	As a result of this course the student will be able to integrate the industrial gripper robot with CNC milling machine.	Class lectures, team work, class demonstrations, lab exercises from textbook, tutorials and PowerPoint presentations and web support material.	Creation of CNC programs that result in machined parts that conform to class designs and drawings. Proper integration of robot to load and unload work holding vise. Students' programs and parts applied to grading rubrics; class exams and quizzes.

Learning

CCRI Definition of an Educated Person: Four Abilities

The Community College of Rhode Island recognizes four critical areas that define the learning outcomes of a CCRI graduate. These four abilities can be applied in many contexts and are critical skills that must be developed not only at CCRI, but over the course of a lifetime. These core abilities guide students, faculty and staff in establishing educational goals and assessing learning within and across the primary domains of knowledge: arts and humanities, science and mathematics, and the social sciences.

Since individual courses provide the opportunity to gain knowledge in these four critical areas, it is essential to understand which areas are to be covered in each course. In each of the four areas below, please indicate in the <u>Item(s) #</u> box next to each critical element, the <u>Item #(s)</u> from the previous page (Student Learning Outcomes) which supports the Educated Person Ability that is covered.

140m/0)#

1.	Effective Communication	
	a. Use standard English grammar and mechanics	
	b. Create work that addresses a given purpose and	x
	context and responds to the target audience	
	c. Present a central idea, supported by concrete,	x
	relevant details	
	d. Establish a clear and consistent sequence of ideas	
2.	Critical Thinking	
	a. Identify and analyze complex ideas	x
	b. Determine a research focus and the nature and scope	x
	of information needed	
	c. Locate, evaluate, and use information effectively	x
	d. Draw logical conclusions from information	x
	e. Express well-reasoned or innovative perspectives	
3.	Quantitative, Mathematical and Scientific Reasoning	
	a. Demonstrate an understanding of mathematical,	x
	quantitative or scientific principles.	
	b. Apply a scientific approach in asking guestions	x
	Apply mathematical, quantitative, or scientific	x
	principles in solving problems	
	d. Interpret numeric information in graphical forms	x
4.	Social Interaction	
	a. Evaluate ethical dimensions of decisions	
	b. Use teamwork to accomplish tasks in groups	X
	c. Demonstrate an understanding of global, cultural and	
	historical perspectives	

Note: With respect to the four abilities listed above, the level of attainment achieved should reflect the needs of the specific program. It is not necessary that individual courses address each outcome, yet, in total, all courses required by a program of study must together meet these goals.

ADMINISTRATIVE PLANNING

Indicate the campus(es) where the course will be offered: Knight X Flanagan Liston Newport
Indicate: Days X Evenings X TV Internet Satellites Specify:
Indicate semester(s) the course will be offered: Fall X Spring X Summer
Indicate the course scheduling format: 15 weeks 5 week module Other
Requested start date:08 / _30 / _2016_
Will this course necessitate purchasing new capital equipment? Yes X No
If yes, type and source of funding for purchase:
Specify amount and type of additional operating funds required to support this course, including any software:
N/A
Will students be required to use a lab as part of the course? Yes X No
If yes, specify lab characteristics and lab preference (e.g., public computer lab, electronic classrooms, specific science lab, etc.):
Advanced Manufacturing Lab on the ground floor on the Warwick campus room 0100.
Will course require a lab fee? Yes X No
Explain the reasons for requesting a lab fee. List specific items requiring replacement each semester/year.
perishable wire guides, Air hardening steels and heat treatment costs; Plasma torch tips, guides and perishable supplies; future updates to machine design software.

ADMINISTRATIVE PLANNING continued:

Do current full-time or adjunct faculty possess requisite education/experience? Specify additional/unique training that may be required.

Yes	
Will additional staff hiring be required to implement this course proposal?	Yes No x
If yes, specify requirements/skills:	
N/A	

What additional books, periodicals, data bases or other resources are needed in the Library to support the course?

Students will use the newest edition of the Machinery's Handbook (Industrial Press)

If another department(s) will be impacted by this course offering, indicate the department(s) involved, the potential impact, and the principals involved in these discussions.

N/A

COMMUNITY COLLEGE OF RHODE ISLAND ENGINEERING & TECHNOLOGY DEPARTMENT

ADVANCED MANUFACTURING TECHNOLOGY CLASS SYLLABUS

INSTRUCTOR: RAYMOND ANKROM

PHONE: 825-2350; rankrom@ccri.edu

Materials Required: flash drive, scientific calculator, student version of MasterCAM X8 included with required text.

Open Lab Time: TBA Office Hour TBA

<u>Class objective</u>: During this sixty hour course, the student will be introduced to Wire EDM machining, 4 Axis milling, metal selection and Heat Treatment, Plasma-torch technology, robot integration, emphasizing set-up and safe operating in the 21st century Advanced Manufacturing workplace. The class will use the MasterCAM software to create programs for the Wire EDM machine and 4 Axis HAAS vertical milling machine. Students will also learn the Conversational programming package included with the machines. The students will learn set-up and operation of this machinery located in 0100.

<u>Class Structure</u>: This course meets 15 times for 4 hours, the first 30-to50 minutes of the class will be a lecture, at this time, the class objectives and topics will be, explained and demonstrated. The remaining class / lab time will be used to practice, using classroom installed software, intuitive and conversational programming at the machine control panel, and HAAS machine simulators. Due to the nature of lab, there will be lots of interaction between all the students in the class, and the instructor. Instructor will post class information, assignments, and internet blinks to CCRI's Blackboard for students to access.

<u>Textbooks</u>: Course will use MasterCAM X8 software, installed on Engineering and Technology classroom computers,

MasterCAM X8 Wire Training Tutorial ISBN#: 978-1-77146-132-1

Text includes MasterCAM X8 Home Edition Software. <u>Machinery's Handbook</u>, Industrial Press, 29th edition ISBN# 978-0-8311-2900-2 (reference, other editions permissible)

Text Book is available at <u>www.emastercam.com</u>

Solidworks 2015 is software available on classroom computers.

<u>Assignment Completion Dates</u>: All projects and assignments will have due dates. The completed work will be expected on that day by the end of the section class time.

<u>Class Attendance:</u> The Department of Engineering and Technology has instituted an attendance policy for all classes. Two unexcused absences will result in a one letter grade drop deducted from the class average. Three unexcused absences will result in a second letter grade being deducted from your class average. Four unexcused absences will result in another letter grade deducted from the class average. After Five unexcused absences, a final grade of F will be entered as a final grade unless you dropped the class.

Grading procedure:

Attendance / Class Quizzes 10%

Class Exams 20%

Part Programs / Set-up and produce parts 50%.

Final Exam 20%

Course Learning Objectives:

- The student will be able to identify machining operations, summarize set-up, operation, and programming
- Students will use good blueprint interpretation practices to develop part programs to machine parts in tolerance.
- Students will use math skills to verify RPM and feed speeds, geometry and trigonometry calculations needed to develop programs from part prints.
- Students become familiar with software and will draw parts from prints, tutorials, and measured parts. Students will assign tools and toolpaths, and verify with MasterCAM simulation.
- Students well set-up and machine one or more parts, as assigned, using specific machine intuitive software, MasterCAM X8, SolidWorks 2015.
- Set-up may include work material selection, preparation and heat treatment of steel.
- This is a fast paced Advanced class; out of class homework is assigned, and student preparation before class is expected.

<u>Class Cell Phone and other Electronics Devices Policy:</u> If not being used for direct classroom work, All cell phones, headphones, text messaging equipment, CD players, MP3 players or other music file players; GPS equipment, Blackberries, Palm Pilots and/ or any other electronic device not listed here have very limited use in the classroom. Do not take still pictures or video of other students or instructor. You do NOT have permission to take still pictures or video of other students or instructor. You may get permission from instructor to take still pictures or video of machine control panel or your program in action. Failure to comply with this policy could result in dismissal from the class. This is a Safety concern. This is a privacy concern.

Prerequisites: ETME 1020, Machine Processes, ENGR 1030, SolidWorks, ETCN 1300 CNCI