

Bay College
Course Cover Sheet



M-CAM Training Area:

CNC/Machining **Multi-Skilled/Mechatronics** Production Operation Welding/Fabrications

Program(s): Mechatronics and Robotics Systems, AAS

Course: ELEC 240 Real Time Robotics Systems

Course Description: This course introduces the theories involved in operating a robotic system. This includes safety, types of robots, mechanical and electrical components, and hardware and software controls. The student will learn proficient robotic operation using simulation software as well as gain hands-on experience with a FANUC robot in step-by-step and production modes.

Date Created: Nov 2015

Faculty Developer(s)/Instructional Designers(s): Mark Highum

Employer/Industry Partner: Engineered Machine Products (EMP), Stewart Manufacturing, Cal Grinding

College Contact: Mark Highum

Phone: 906.217.4083

Email: highumm@baycollege.edu

Additional Information/Comments:

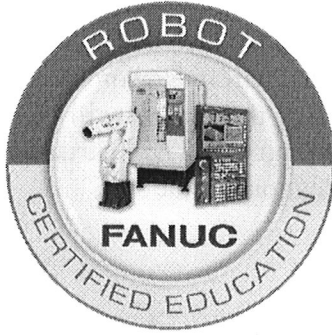
Developed as part of University, Community College and Industry Partnership: Revamping Robotics Education to Meet 21st Century Workforce Needs in conjunction with Michigan Technological University (MTU)

This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The 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.

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COURSE SYLLABUS **Fall 2016**
ELEC 240
Real Time Robotics Systems

MECHATRONICS
DIVISION OF TECHNOLOGY
BAY DE NOC COMMUNITY COLLEGE

LEAD INSTRUCTOR: MARK HIGHUM

I. COURSE INFORMATION:

Title:..... *Fluid Power*

Number:.....ELEC 240 01 10

Credit/contact hours:.....4/4

Prerequisites:.....None

Classroom number:.....402E/972

Class Hours:.....Tues/Thurs 4 PM- 5:50 PM

II. INSTRUCTOR INFORMATION:

Name:.....Mark Highum

Office location:.....402D

Office Hours:..... Tuesdays/Thursdays 11 AM – 12 PM, 2 – 4 PM

E-Mail:..... highumm@baycollege.edu

Office Phone:.....906-217-4083

III. TEXTS, READINGS, MATERIALS:

Texts: No textbook required

Materials Required for the course:

- A. Text (provided by Instructor)
- B. Notebook
- C. USB storage device (optional)

IV. ONLINE COURSE COMPONENT

There is no required online component to this class. The instructor will make some course materials available through the MyBay portal. Additionally, the student will be required to submit some classwork and lab reports via the MyBay portal. The instructor will use the Bay College email system for any needed communication to students.

V. CATALOG DESCRIPTION:

This course introduces the theories involved in operating a robotic system. This includes safety, types of robots, mechanical and electrical components, and hardware and software controls. The student will learn proficient robotic operation using simulation software as well as hands on experience with a FANUC robot in step-by-step and production modes.

VI. STUDENT ASSESSMENT:

All Bay College students will be expected to participate in assessment activities during their course of study at the college. These activities will include participating in assessment of General Education Outcomes, classroom assessment for specific course lessons, or assessment of skills needed for a specific program. These assessments will help instructors and the college make decisions to improve instruction and student learning.

VII. STUDENT LEARNING OUTCOMES:

Course Outcomes	Assessment Method
Discuss the CERT Cart Safety	Lab /Homework/ Exam
Explain different frames that are used by robotic arms	Lab /Homework/ Exam
Describe different inputs and outputs and how to configure them	Lab /Homework/ Exam
Understand and apply various program instructions and macro commands	Lab /Homework/ Exam
Explain how to set up a robot for production using teaching pendant	Lab /Homework/ Exam
Describe how to manipulate files: copy and delete programs, backup all or specific types of files to a specific device. Learn how to load programs from the backup device and how to make an image backup and restore	Lab /Homework/ Exam
Demonstrate proficiency manipulating a robotic arm and successfully complete assigned tasks	Lab /Homework/ Exam

VIII. STUDENT EVALUATION/GRADING:

% of Grade

Unit Exams:

25%

Quizzes/Homework:

15%

Labs

35%

Final exam :

25%

Total:

100%

Grade Scale

>90%	=	A
80-90%	=	B
70-80%	=	C
60-70%	=	D
<60%	=	F

IX. COLLEGE POLICIES

SEXUAL HARASSMENT AND DISCRIMINATION STATEMENT

Bay College takes its responsibilities under Title IX of the Education Amendments of 1972 seriously. Bay College is committed to providing an educational environment free from discrimination or harassment based on race, color, national origin, religion, sex, gender identity, age, disability, or other protected status. Bay College Board Policy 1060 prohibits discrimination or harassment based on the above-named categories. Prohibited acts include but are not limited to sexual assault, sexual harassment, domestic violence, dating violence, and stalking.

Students who experience or observe an incident of sex- or gender-based discrimination are encouraged to report it to a College employee or a member of the College's Title IX team. Faculty and staff are considered "responsible employees" and are required to report any such incident they observe or of which they are made aware. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a College-approved research project. Students also have options to discuss issues confidentially.

Questions concerning discrimination or harassment on the basis of gender may be directed as well to either the Title IX Coordinator or a Deputy Title IX Coordinator:

Kevin Carlson
Title IX Coordinator
Office: CB 201J (Escanaba Campus)
Office: WC 215 (Iron Mountain Campus)
kevin.carlson@baycollege.edu
906-217-4023

Dave Laur
Deputy Title IX Coordinator
Office: SC 512 (Escanaba Campus)
dave.laur@baycollege.edu
906-217-4031

Bridget DeGroot
Deputy Title IX Coordinator
Office: SC 523B (Escanaba Campus)
bridget.degroot@baycollege.edu
906-217-4049

SEXUAL HARASSMENT AND DISCRIMINATION STATEMENT (Cont.)

A complaint may also be filed by going to the College website www.baycollege.edu, selecting the “Campus Safety” link, and selecting the “Incident Report” link <https://publicdocs.maxient.com/incidentreport.php?BayCollege>. This report allows individuals to identify themselves or to submit an anonymous report.

Student Academic Assistance

Academic Testing Services provides proctored testing for both online and traditional courses. If you have a class on campus or online that requires you to take exams in testing services and have questions, please stop by room 876 in the HUB at the Escanaba Campus or call (906) 217-4035.

The **Bay College West Student Success Center** provides **tutoring** to students in all courses, as well as **Supplemental Instruction (SI)** in select courses. The Student Success Center is located in room 221 on the upper level next to the Student Services Desk, (906) 302-3035.

The Bay College **Library** provides services that are designed to meet classroom-related and general information needs of students, faculty, staff and the community. The Library’s primary goal is to provide resources that will enhance and expand an individual’s learning experience. Call (906) 217-4055 or stop by JHUC 952.

The **Office of Accessibility** assists students with a variety of services for classroom success and is located in room 811 of the Student Success Center in the HUB at the Escanaba Campus, (906) 217-4017. Services include (*but are not limited to*) specialized testing, classroom note taker, reader and/or scribe, alternative textbooks, use of a recorder for academic needs, interpreter for the deaf, and temporary use of a motorized scooter. These services are also provided to students at Bay College West Campus in room 211, (906) 302-3004.

Online Learning Support is available to students. For assistance stop by Online Learning Support in the HUB at the Escanaba campus Monday-Friday 8:30 am-5 pm or call (906) 217-4276 or email onlinehelp@baycollege.edu.

Placement test preparation is available to students seeking to place well initially or re-test to improve their placement in English, reading, or math. Students can schedule an appointment to receive preparation resources and strategies on how to prepare to take the placement test. Please call (906) 217-4301 or stop by the reception desk for the Student Success Center in the HUB at the Escanaba campus. Placement test preparation is available at West Campus during the fall and winter semesters. Call (906) 302-3035 or stop by room 221.

Supplemental Instruction (SI) is an internationally recognized academic support program that targets traditionally difficult courses. Students come together in regularly-scheduled study sessions to compare notes, discuss course materials, develop study tools, practice problem solving, and prepare for exams. These sessions are facilitated by trained SI leaders that attend the course with students and prepare study materials for use during SI sessions. SI staff can be found in the Student Success Center (rooms 827-833 at the Escanaba Campus or room 221 at West Campus) or can be reached via phone at (906) 217-4175.

The **TRiO Student Support Services** program provides many services to students, including academic planning, career exploration, transfer assistance, personal financial training and support, FAFSA assistance, cultural & college trips, leadership opportunities, grant aid, and tutoring in math, writing and General Education courses. The TRiO reception offices are located in room 815 of the Student Success Center in the HUB at the Escanaba Campus, (906) 217-4133 and in the Student Success Center at West Campus, (906)-302-3035.

Tutoring has become very popular at Bay College and is offered for all courses. Tutoring requests can be made through the front reception desk of the Student Success Center in the HUB at the Escanaba Campus. Feel free to stop in or call (906) 217-4230.

Please refer to the college catalog for specific details about services available to students.

Bay College ADA Statement

Disability-related accommodations and services for all Bay College students are provided through the Office of Accessibility (OOA) located on the Escanaba campus, room 811 of the Student Success Center in the HUB, or call (906) 217-4017, or email OOA@baycollege.edu. If you are a student with a disability and think you may require disability-related accommodations or services, please contact the Office of Accessibility. Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation in accordance with federal, state, and Bay de Noc Community College guidelines. Our online accessibility policy can be viewed at <http://www.baycollege.edu/Academics/Online-Learning/Accessibility-Policy.aspx>.

Technical Support for Online Learning

Students can receive live support for technical issues they encounter related to online learning.

Hours: 8:30 a.m. to 4:30 p.m. EST, Mon-Fri

Phone: 1.906.217.4276

Email: onlinehelp@baycollege.edu

Class Cancellation/College Closing/Notification of Emergency Situations

Weather concerns: As stated in Bay College's Student Handbook, A reasonable effort to be present is expected. Therefore, students may exercise their own judgment as to whether or not travel to campus is warranted during adverse weather. If you decide not to travel to campus, or determine that you need to leave campus because of threatening weather, you will be expected to contact me via phone as soon as possible to let me know why you will be absent and to discuss options for completing the missed work. Students are reminded of the opportunity to receive weather related and other emergency messages from the College through a cell phone text messaging option, called e2campus.

Enrollment into the emergency notification process can be completed by visiting Bay's website, navigating to the Campus Safety tab and following the instructions for emergency text messaging.

Should the instructor need to cancel a class session, every effort will be made to provide at least a one week notice of this cancellation. In the event of illness or other unforeseen conditions, the instructor will contact the students via the college email system as early as possible.

Academic Integrity

It shall be the policy of Bay de Noc Community College Board of Trustees that the college provides opportunities for students to gain the knowledge, skills, judgment and wisdom they need to function in society as responsible citizens. Plagiarism, falsifying data, and other forms of academic dishonesty are inconsistent with the college's goals and mission; Students are expected to pursue their education at Bay College with honor and integrity. In line with this college policy, any student found cheating, copying, or otherwise misrepresenting his/her performance, or any way gaining an unfair advantage over other students will be subject to disciplinary actions according to the Bay College Academic Integrity Procedures.

Course Withdrawal

It is the student's responsibility to withdraw/drop from the class if he or she chooses to do so. You may drop this class within the first two weeks (**Sept 9**) with reimbursement for the tuition. You may withdraw within the third through tenth week (**Nov 4**) and receive a WP (if passing at the time of the withdrawal request) or WF (if failing at the time of the withdrawal request). After the tenth week students are required to request an Administrative Appeal. All students who do not follow the drop/withdrawal procedure will receive an "F" for the class. Please refer to the college catalog for more specific details on this issue.

X. Guidelines for Success

Attendance: Students are expected to attend all class sessions. Should a student not be able to attend a class session, he/she is expected to talk to the instructor about material that was missed. Absences that are expected by the student should be discussed with the instructor prior to missing the class.

Missed Assignments: Assignments (and exams) are not normally accepted late. If the instructor allows a missed assignment (or exam) to be made up, it will be due within one week of the original due date. Any late assignment after one week will be counted as half credit.

Participation: Students are expected to participate in class discussions. Taking notes is not required, but is encouraged. Students are expected to read the assigned text prior to the class session. The instructor retains the right to use the book, handed out material and lecture notes for the exams.

Acceptable Use Policies: apply to all workstations and servers in CNSS classrooms and labs. Any student found to be violating acceptable use policies will be referred to the Dean of Business and Technology for discipline.

Incomplete: An incomplete grade is given only in extenuating circumstances, and only with prior arrangement with the instructor.

XI. TENTATIVE COURSE SCHEDULE: (This schedule is provided as a guide and is not to be construed as a contract)(Assignment/grade section is for student record keeping)

DAY	DATE	SUBJECT/TOPIC	Assignment/Grade
Tues	8/30/16	Course Introduction	
Thurs	9/01/16	Introduction to Robotics and Safety	
Tues	9/06/16	Understanding Frames: World Frame	
Thurs	9/08/16	Understanding Frames: Tool Frame	
Tues	9/13/16	Understanding Frames: Tool Frame	
Thurs	9/15/16	Understanding Frames: User Frame	
Tues	9/20/16	Understanding Frames: Jog Frame	
Thurs	9/22/16	EXAM ONE	
Tues	9/27/16	Program Instructions: Introduction	
Thurs	9/29/16	Program Instructions: Structure	
Tues	10/04/16	Program Instructions: Program Edit	
Thurs	10/06/16	EXAM TWO	
Tues	10/11/16	Working with Inputs/Outputs	
Thurs	10/13/16	Working with Inputs/ Outputs	
Tues	10/18/16	Programming with Inputs and Outputs	
Thurs	10/20/16	Programming with Inputs and Outputs	
Tues	10/25/16	Program Modification	
Thurs	10/27/16	Program Modification	
Tues	11/01/16	Program Modification	
Thurs	11/03/16	EXAM THREE	
Tues	11/08/16	Writing MACRO Commands	
Thurs	11/10/16	Using MACRO Commands	
Tues	11/15/16	Robot setup for Production	
Thurs	11/17/16	Robot setup for Production	
Tues	11/22/16	File Management	
Thurs	11/24/16	No Classes - Thanksgiving	
Tues	11/29/16	File Management	
Thurs	12/01/16	Final Programming Project	
Tues	12/06/16	Final Programming Project	
Thurs	12/08/16	Final Programming Project	
Tues	12/13/16	Final Review	
Thurs	12/15/16	FINAL CUMULATIVE EXAM	



Subject Matter Expert (SME) Course Review Summary

College: Bay College

M-CAM Training Area: CNC/Machining Multi-Skilled/Mechatronics Production Operation Welding/Fabrication

Degree Program Name: Mechatronics

Title of Course: ELEC240 Real Time Robotics Systems

Subject Matter Expert (SME) Reviewer Information

Name: Casey Calouette

Title: Engineer

Phone: 9062413582

Email: ccalouette@calvalves.com

Organization/Affiliation: Cal Grinding, Inc.

Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content):

AAS : Electrical Engineering Technology – Bay College, 2003

BS : Electrical Engineering Technology – Michigan Technological University, 2005

Ross's Manufacturing – Design Engineer, Frozen Custard Machine Electrical&Controls Design 2006

Cal Grinding, Inc. – Electrical & Manufacturing Engineer, Automation and Manufacturing Environment, 2006-Present

Synopsis of Findings:

Course meets the requirements for an introductory to robotics course. Of particular note is the immediate safety briefing prior to instruction. Also is the high percentage of the class grade that is based on laboratory time.

Reviewers Signature _____

Date: 3/28/17

Michigan Coalition for Advanced Manufacturing Subject Matter Expert Course Review

1. Course Overview and Objectives	Exceptional	Satisfactory	Ineffective
The goals and purpose of the course is clearly stated.		X	
Prerequisites and/or any required competencies are clearly stated.		X	
Learning objectives are specific and well-defined.		X	
Learning objectives describe outcomes that are measurable.	X		
Outcomes align to occupational focus (industry skills and standards).	X		
Comments or recommendations:			
2. Material and Resources	Exceptional	Satisfactory	Ineffective
The instructional materials contribute to the achievement of the course learning objectives.		X	
The materials and resources meet/reflect current industry practices and standards.		X	
The instructional materials provide options for a variety of learning styles.		X	
Resources and materials are cited appropriately. If applicable, license information is provided.		X	
Comments or recommendations: No instructional textbooks noted on the syllabus.			
3. Learning Activities	Exceptional	Satisfactory	Ineffective
Provide opportunities for interaction and active learning.	X		
Help understand fundamental concepts, and build skills useful outside of the learning object.	X		
Activities are linked to current industry practices and standards.	X		
Comments or recommendations: Many opportunities for hands on labs to better grasp the concepts.			

**Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review**

4. Assessment Tools/Criteria for Evaluation	Exceptional	Satisfactory	Ineffective
The course evaluation criteria/course grading policy is stated clearly on syllabus.	x		
Measure stated learning objectives and link to industry standards.	X		
Align with course activities and resources.		x	
Include specific criteria for evaluation of student work and participation.		x	
Comments and recommendations:			
5. Equipment/Technology	Exceptional	Satisfactory	Ineffective
Meets industry standards and needs.	x		
Supports the course learning objectives.	X		
Provides students with easy access to the technologies required in the course/module.	x		
Comments and recommendations:			

This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The 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.

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