

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 245 Robotic Vision Systems

**Course Description:** This course introduces the basic tasks and procedures for integrating a vision system with robot operations. Students will learn to setup, teach, test and modify vision applications on an industrial robot controller.

**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

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**Additional Information/Comments:**

**Developed as part of University, Community College and Industry Partnership: Revamping Robotics Education to Meet 21<sup>st</sup> 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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**V. 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 may 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.

**VI. COURSE OBJECTIVES:**

**Catalog Description:** This course introduces the basic tasks and procedures for integrating a vision system with robot operations. Student will learn to setup, teach, test and modify vision applications on an industrial robot controller.

**VII. STUDENT LEARNING OUTCOMES:**

| <b>Course Objectives</b>                        | <b>Course Outcomes</b>  | <b>Assessment Method</b>   |
|---|---|----------------------------|
| Setup and calibrate a robotic vision process    | Discuss the hardware and software requirements for a robotic vision system  | <b>Homework, Lab, Exam</b> |
| Set up and calibrate a robotic vision process   | Install and calibrate the hardware and software for a robotic vision system | <b>Homework, Lab, Exam</b> |
| Set up and calibrate a robotic vision process   | Setup communication between a robot and a PC for vision applications        | <b>Homework, Lab, Exam</b> |
| Program a robot to make use of a vision process | Create the tool frame required for camera operation.                        | <b>Homework, Lab, Exam</b> |
| Program a robot to make use of a vision process | Create the required user frame for vision system use.                       | <b>Homework, Lab, Exam</b> |
| Program a robot to make use of a vision process | Create a program to accomplish a task using a vision process                | <b>Homework, Lab, Exam</b> |

## VIII. INSTRUCTORS STATEMENT ON ACADEMIC INTEGRITY

As stated in the Bay College Integrity Policy: 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.

## IX. 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.

## X. STUDENT EVALUATION/GRADING: % of Grade

**Unit Exams:** 30%

**Quizzes/Chapter Review Questions:** 20%

**Labs** 30%

**Final exam :** 20%

**Total:** 100%

### Grade Scale

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

## **XI. 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.

## **XII. COURSE WITHDRAWAL**

It is your responsibility to withdraw/drop from the class if you choose to do so. You may drop this class within the first two weeks (**January 20**) with reimbursement for the tuition. You may withdraw within the third through tenth week (**March 24**) 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 you are required to request an Administrative Appeal. All students who do not follow the drop/withdrawal procedure will receive an “F” for the class.

## **XIII. 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 your instructor via phone or email as soon as possible to let him/her 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 Bay College. Bay College has subscribed to e2Campus to send time-sensitive emergency communication to students, faculty and staff who opt-in to BayAlert Campus Emergency Text and Voice Messaging.

Visit <http://baycollege.edu/Around-Campus/Campus-Safety/Bay-Alert.aspx> for more information and to sign up for BayAlert.

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.

**XIV. 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)**

| <b>DAY</b>   | <b>DATE</b> | <b>SUBJECT/TOPIC</b>                         |
|--------------|-------------|--|
| <b>Tues</b>  | 1/10/17     | Class Introduction                           |
| <b>Thurs</b> | 1/12/17     | Pre- Test, Introduction and Safety           |
| <b>Tues</b>  | 1/17/17     | Vision Overview, Hardware and Software       |
| <b>Thurs</b> | 1/19/17     | Vision Overview, Hardware and Software       |
| <b>Tues</b>  | 1/24/17     | Hardware and Software Installation           |
| <b>Thurs</b> | 1/26/17     | <b>Exam One</b>                              |
| <b>Tues</b>  | 1/31/17     | General Vision Concepts                      |
| <b>Thurs</b> | 2/02/17     | General Vision Concepts                      |
| <b>Tues</b>  | 2/07/17     | Camera Setup and Error Proofing              |
| <b>Thurs</b> | 2/09/17     | Camera Setup and Error Proofing              |
| <b>Tues</b>  | 2/14/17     | Camera Setup and Error Proofing              |
| <b>Thurs</b> | 2/16/17     | Camera Setup and Error Proofing              |
| <b>Tues</b>  | 2/21/17     | Lighting                                     |
| <b>Thurs</b> | 2/23/17     | Lighting                                     |
| <b>Tues</b>  | 2/28/17     | Lighting                                     |
| <b>Thurs</b> | 3/02/17     | <b>Exam Two</b>                              |
| <b>Tues</b>  | 3/07/17     | <b>Spring Break No Classes</b>               |
| <b>Thurs</b> | 3/09/17     | <b>Spring Break No Classes</b>               |
| <b>Tues</b>  | 3/14/17     | Tool & User Frame, Calibration Grid Frame    |
| <b>Thurs</b> | 3/16/17     | Tool & User Frame, Calibration Grid Frame    |
| <b>Tues</b>  | 3/21/17     | Tool & User Frame, Calibration Grid Frame    |
| <b>Thurs</b> | 3/23/17     | Tool & User Frame, Calibration Grid Frame    |
| <b>Tues</b>  | 3/28/17     | Overall Calibration, Testing and Adjustments |
| <b>Thurs</b> | 3/30/17     | Overall Calibration, Testing and Adjustments |
| <b>Tues</b>  | 4/04/17     | Overall Calibration, Testing and Adjustments |
| <b>Thurs</b> | 4/06/17     | Overall Calibration, Testing and Adjustments |
| <b>Tues</b>  | 4/11/17     | <b>Exam Three</b>                            |
| <b>Thurs</b> | 4/13/17     | 2D Single & 2D Multiple View Process         |
| <b>Tues</b>  | 4/18/17     | 2D Single & 2D Multiple View Process         |
| <b>Thurs</b> | 4/20/17     | 2D Single & 2D Multiple View Process         |
| <b>Tues</b>  | 4/25/17     | 2D Single & 2D Multiple View Process         |
| <b>Thurs</b> | 4/27/17     | 2D Single & 2D Multiple View Process         |
|              | 5/02/17     | <b>Finals Week - Final Exam</b>              |
|              |             |  |



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: ELEC245 Robotic Vision 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:

An exceptional and cutting edge topic. Very excited to see a course covering this locally. Material covered is a perfect introduction that will be fresh to many local manufacturers.

Reviewers Signature \_\_\_\_\_

Date: 3/28/17

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## 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:   |                    |                     |                    |
| <b>2. Material and Resources</b>   | <b>Exceptional</b> | <b>Satisfactory</b> | <b>Ineffective</b> |
| 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.                   |                    |                     |                    |
| <b>3. Learning Activities</b>  | <b>Exceptional</b> | <b>Satisfactory</b> | <b>Ineffective</b> |
| 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:   |             |              |             |

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