Bay College

Course Cover Sheet

M-CAM Training Area:

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

Program(s): Mechatronics, Certificate

Mechatronics and Robotics Systems, AAS

Course: ELEC 180 Electrical Machinery and Controls

Course Description: A study of the characteristics and operating principles of Direct and Alternating Current Machinery and Equipment. Also covered are control circuits, maintenance, and trouble analysis. Prerequisite: ELEC-130.

Date Modified: December 2014

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

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

College Contact: Mark Highum

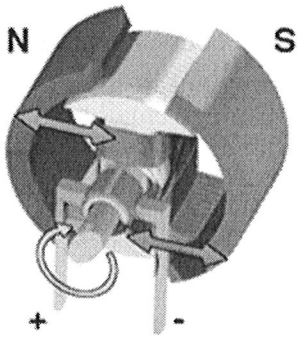
Phone: 906.217.4083

Email: highumm@baycollege.edu

Additional Information/Comments:

Textbook used is: Electric Motor Control by Stephen Herman ISBN 978-1-133-70281-8
Labs provided by Depco to be used with their Industrial Motor Control Trainer

This workforce solution was funded by a grant awarded by the U.S. Department ofl.abor·s Employment and Training Administration. The solution was created by the grantee and docs not necessarily reflect the official position of the l' .S. Department or l.abor. The Department of Labor makes no guarantees. warrantecs. 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.



COURSE SYLLABUS **Winter 2017**

ELEC 180 Electrical Machinery and Controls

Mechatronics
Bay College

LEAD INSTRUCTOR: MARK HIGHUM

I. **For important college policies and other information you need to know, visit** https://www.baycollege.edu/collegepolicies

II. **COURSE INFORMATION**:

Title:..... *Electrical Machinery and Controls*
Number:.....ELEC 180 01 10
Credit/contact hours:.....4/4
Prerequisites:.....ELEC 130
Classroom number:.....402E/972
Class Hours:.....TR 9 – 10:50 AM

III. **INSTRUCTOR INFORMATION:**

Name:.....Mark Highum
Office location:.....RM 402D
Office Hours:.....Wed –9AM - Noon
Tues & Thurs– 11AM-Noon
E-Mail:..... highumm@baycollege.edu
Office Phone:.....906-217-4083

IV. **COURSE MATERIALS:**

Required Text: **Electric MotorControl** 10th Edition
Stephen L. Herman

Additional Materials Required for the course:

A. Notebook
B. USB storage device (optional)
C. Scientific Calculator

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: A study of the characteristics and operating principles of Direct and Alternating Current Machinery and Equipment. Also covered are control circuits, maintenance, and trouble analysis.

VII. STUDENT LEARNING OUTCOMES:

Course Objectives	Course Outcomes	Assessment Method
Demonstrate an understanding of three phase power systems.	Describe the principles of three phase AC power.	**Homework, Lab, Exam**
Demonstrate an understanding of three phase power systems.	Analyze the operation of Delta and Wye connected three phase transformers, motors, and generators.	**Homework, Lab, Exam**
Demonstrate an understanding of automatic motor control systems.	Describe the use of various relays and automatic devices in motor control.	**Homework, Lab, Exam**
Demonstrate an understanding of electrical and mechanical principles and their relationships in motors.	Describe the relationships between speed, torque, and power in a motor.	**Homework, Lab, Exam**
Demonstrate working knowledge of complete motor control systems.	Analyze, connect, and troubleshoot AC/DC motor control circuits.	**Homework, Lab, Exam**
Demonstrate working knowledge of complete motor control systems.	Analyze, connect, and troubleshoot electrical motor drive circuits.	**Homework, Lab, Exam**

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. **<u>TENTATIVE COURSE SCHEDULE</u>: (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	Preparation
Tues	1/10/17	Class Introduction	
Thurs	1/12/17	Basic AC Theory	Read Chap1-OER text
Tues	1/17/17	Basic AC Theory	Read Chap1-OER text
Thurs	1/19/17	Reactance and Impedance	Read Chap3-OER text
Tues	1/24/17	Reactance and Impedance	Read Chap4-OER text
Thurs	1/26/17	Resonance	Read Chap6-OER text
Tues	1/31/17	Resonance	Read Chap6-OER text
Thurs	2/02/17	**EXAM ONE**	
Tues	2/07/17	Transformers	Read Chap9-OER text
Thurs	2/09/17	Transformers	Read Chap9-OER text
Tues	2/14/17	Three Phase Circuits	Read Chap10-OER
Thurs	2/16/17	Three Phase Circuits	Read Chap10-OER
Tues	2/21/17	AC Motors	Read Chap13-OER
Thurs	2/23/17	AC Motors	Read Chap13-OER
Tues	2/28/17	AC Motors	Read Chap13-OER
Thurs	3/02/17	**EXAM TWO**	
Tues	3/07/17	**Spring Break No Classes**	
Thurs	3/09/17	**Spring Break No Classes**	
Tues	3/14/17	Introduction to Motor Control	Read Section 1
Thurs	3/16/17	Circuit Connections and Symbols	Read Section 2
Tues	3/21/17	Control Pilot Devices	Read Section 3
Thurs	3/23/17	Basic Control Circuits	Read Section 4
Tues	3/28/17	Reduced Voltage AC Starters	Read Section 5
Thurs	3/30/17	Three Phase Controllers	Read Section 6
Tues	4/04/17	Wound Rotor Motor Controllers	Read Section 7
Thurs	4/06/17	**EXAM THREE**	
Tues	4/11/17	Synchronous Motor Controls	Read Section 8
Thurs	4/13/17	DC Motors	Read Section 9
Tues	4/18/17	DC Motor Controls	Read Section 9
Thurs	4/20/17	Deceleration Methods	Read Section 10
Tues	4/25/17	Motor Drives	Read Section 11
Thurs	4/27/17	**EXAM FOUR**	
	5/02/17	**Finals Week - Final Exam**	

Subject Matter Expert (SME) Course Review Summary
College: Bay College
M-CAM Training Area: ☐CNC/Machining **X Multi-Skilled/Mechatronics** ☐Production Operation ☐Welding/Fabrication
Degree Program Name: Mechatronics
Title of Course: ELEC180 Electrical Machinery and Controls
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 does a good job covering what would be considered essential for any manufacturing or process control facility. Unless the graduate goes into a purely electronic work place it is likely they will encounter, and use, the concepts taught in this class daily.**

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:			

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, warrantees, 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.