

CASPER COLLEGE COURSE SYLLABUS
ROBO 1650 Electromechanics

Semester/Year: Fall 2015

Lecture Hours: 2

Lab Hours: 2

Credit Hours: 3

Class Time: Lec 9:00-10:50 a.m **Days:** Monday

Room: GW 214

Lab: 9:00-10:50 p.m **Days:** Wednesday

Room: GW 214

Instructor's Name: Megan Graham

Instructor's Contact Information: Office: GW 116D

Office Phone: 268-2539

Email: mgraham@caspercollege.edu

Office Hours: M, T, W, TH 12:00-1:00 p.m. T, W 5:00– 6:00 p.m.

Course Description:

The course will examine mechanical devices used in motion control. The emphasis will be on gear, belt and chain drives as well as simple transmissions. Students will also learn about DC and AC motors and motor control circuits used with these mechanical systems.

Statement of Prerequisites: None

Institutional Outcomes:

- Demonstrate effective oral and written communication
- Use the scientific method
- Solve problems using critical thinking and creativity
- Demonstrate knowledge of diverse cultures and historical perspectives
- Appreciate aesthetic and creative activities
- Use appropriate technology and information to conduct research
- Describe the value of personal, civic, and social responsibilities
- Use quantitative analytical skills to evaluate and process numerical data

Program Goals:

1. To provide comprehensive training in the field of robotics technology, so that the associate degree and certificate graduates are technically qualified to obtain employment in the robotics industry or an allied field.
2. To provide the necessary training for graduates to continue on to advanced training in robotics technology in an advanced Robotics Technology program.

Course Goals:

To understand the principles of mechanics, electricity and magnetism as they apply to electromechanical machine elements.

Course Objectives:

Student will be able to:

1. Determine the mechanical advantage of various simple machines
2. Determine the major static and dynamic forces on mechanisms
3. Select the best possible mechanism for a particular motion
4. Describe the advantages and disadvantages of gear, belt, and chain drives
5. Size, install and adjust gear, belt and chain drive
6. Describe the advantages and disadvantages of selected rotational and linear transmission mechanisms
7. Select the best possible transmission mechanism for a particular motion
8. Describe the basic operation of DC and AC motors.
9. Select, install, and troubleshoot switches and relays in a motor control circuit.

Methodology:

Descriptions and basic concepts of various mechanisms will be presented in 2 lectures per week. Students will be able to test these concepts in the hands-on 2 hour lab per week. Homework will provide practice in calculations, sizing, describing and selecting for various applications of mechanisms. There are 2 projects where students may be required to work on outside of the normal class hours.

Evaluation Criteria:

| | |
|---------------------------|------------|
| Homework | 10% |
| Lab | 30% |
| <u>Tests and Projects</u> | <u>30%</u> |
| | 100% |

Required Text, Readings, and Materials:

- Scientific Calculator

Class Policies: Last Date to Change to Audit Status or to Withdraw with a W Grade:

November 12, 2015

Student Rights and Responsibilities: Please refer to the Casper College Student Conduct and Judicial Code for information concerning your rights and responsibilities as a Casper College Student.

Chain of Command: If you have any problems with this class, you should first contact the instructor to attempt to solve the problem. If you are not satisfied with the solution offered by the instructor, you should then take the matter through the appropriate chain of command starting with the Department Head/Program Director, the Dean, and lastly the Vice President for Academic Affairs.

Academic Dishonesty: (Cheating & Plagiarism) Casper College demands intellectual honesty. Proven plagiarism or any form of dishonesty associated with the academic process can result in the offender failing the course in which the offense was committed or expulsion from school. See the Casper College Student Code of Conduct for more information on this topic.

Official Means of Communication: Casper College faculty and staff will employ the student's assigned Casper College email account as a primary method of communication. Students are responsible to check their account regularly. This is also, where you will find course evaluation links during course evaluation periods.

ADA Accommodations Policy: If you need academic accommodations because of a disability, please inform me as soon as possible. See me privately after class, or during my office hours. To request academic accommodations, students must first consult with the college's Disability Services Counselor located in the Gateway Building, Room 344, (307) 268-2557, bheuer@caspercollege.edu. The Disability Services Counselor is responsible for reviewing documentation provided by students requesting accommodations, determining eligibility for accommodations, and helping students request and use appropriate accommodations.

Safety: Personal and equipment safety standards will be strictly enforced. It is the individual's responsibility to develop a safe work attitude.

Calendar or schedule indicating course content:

| Week | Mon | Wed |
|-------------|--|---|
| 1 | Intro and Safety EX 1 Safety | Kinematics EX 2 Force Vectors |
| 2 | Numbers and Conversions EX 3 Conversions | Force and Velocity Calculations EX 4 Force Calculations |
| 3 | <i>Labor Day Holiday</i> | Simple Machines – Levers EX 5 Levers |
| 4 | EX 5: Levers Cont'd EX 6 Velocity Calculations | Pulleys EX 7 Pulleys HW 1 |
| 5 | Wheel and Axle, Winch, Chain Hoist | Inclined Plane, Wedge and Screw Test 1 Review |
| 6 | <i>Test 1</i> | Linkages EX 8 Linkages <i>Project 1: Rube Goldberg Machine</i> |
| 7 | <i>Project 1: Rube Goldberg Machine</i> | <i>Project 1: Rube Goldberg Machine</i> |
| 8 | <i>Project 1: Rube Goldberg Machine Demonstration</i> | <i>Project 1: Rube Goldberg Machine Demonstration</i> |
| 9 | <i>Fall Break</i> | Gears EX 9 Gears |
| 10 | EX 10 Gear Selection | Belts and Chains EX 11 Belt Selection |
| 11 | Couplings, Joints and Fasteners EX 12 Measurement | Bearings EX 13 Bearing Selection Test 2 Review |
| 12 | <i>Test 2</i> | Solenoids Relays EX 14 Solenoids and Relays |
| 13 | <i>Project 2: Design</i> | Pneumatics EX 15 Pneumatics |
| 14 | <i>Project 2: Build</i> | <i>Thanksgiving Holiday</i> |
| 15 | DC Motors EX 16 DC Motor Selection HW 2 | <i>Project 2: Build</i> |
| 16 | Stepper and Servo Motors EX 17 Stepper and Servo Motors HW 3 | <i>Project 2: Demonstration</i> |

Final Exam as Scheduled