

Advanced Robotics Capstone

METS-260

Summer 2022 Section All 3 Credits 06/14/2022 to 08/08/2022 Modified 05/02/2022

Description

The purpose of this class is to build on the students' basic robotic knowledge, to include robot vision systems, robot safety zones and interlocks, and advanced programming. This will all culminate with a capstone project that will incorporate electrical, mechanical, fluid power, robotic, and PLC systems. (Su)

Requisites

Prerequisite Courses: Minimum 2.0 in (ELTE 260 and METM 108 and METS 125 and METS 160)

Placement Scores: Reading Level 3 and Writing Level 4 and Math Level 4

Contact Hours

| | | | | | | | |
|---------|----|-----|----|-------|---|-----------|----|
| Lecture | 24 | Lab | 48 | Other | 0 | Total Hrs | 72 |
|---------|----|-----|----|-------|---|-----------|----|

Course Topics

- A. Robotic Vision Systems
- B. Integration of PLC with Robotics
- C. Capstone Project

Student Learning Outcomes

Upon successful completion of this course, students should be able to:

- A. Robotic Vision Systems
 1. Setup/Calibrate industry standard robot vision system.
 2. Setup robot vision tool parameters.
 3. Utilize vision data in an industrialized robotic program.
 4. Setup robot safety zones.
- B. Integration of PLC with Robotics
 1. Configure Robot Ethernet I/O.
 2. Configure PLC parameters for robot communication (Ethernet IP).
 3. Review PLC diagnostics for robotic applications.
 4. Incorporate robot-safe I/O interlocks.
 5. Utilize an HMI interface.
- C. Capstone project will require the student to:
 1. Demonstrate all safety practices pertaining to this project.
 2. Draw schematics and prints of the project.
 3. Install and test automated equipment.
 4. Create a process flow chart to program an Allen Bradley PLC.
 5. Create a process chart to program a Fanuc robot.

6. Work in a team to construct, program, and troubleshoot the automated system.
7. Discuss problems and solutions related to completion of the project.

Materials

Tools, Equipment, or Apparel (required of the student)

1. Safety glasses (worn during labs).
2. Leather type shoes are required to protect students (no canvas type or open type shoes will be accepted).

Evaluation

Student Electronic Access to Grades

D2L is the College's Course Management System which includes a gradebook function allowing students access to their grades in order to receive timely and meaningful feedback on their progress in the course at any time. These grades will align with the Evaluation Criteria listed in this syllabus. D2L is accessed through the MyLCC page.

Whenever practicable, results for graded items should be posted electronically within 48 hours after the instructor has completed the grading process for the items, and final grades for the course should be entered no later than the specified grading day.

Criteria

| Type | Weight | Topic | Notes |
|-------------|--------|-------|------------------|
| Assignments | 5-15% | | |
| Projects | 75-90% | | Capstone Project |
| Quizzes | 5-15% | | |

Breakdown

| College Standard | |
|---------------------------|---|
| | |
| College Grading Standards | Recommended Guidelines for Student Grades |
| 4.0 --- Excellent | 4.0 --- 91 – 100% |
| 3.5 --- ----- | 3.5 --- 86 – 90% |
| 3.0 --- Good | 3.0 --- 81 – 85% |
| 2.5 --- ----- | 2.5 --- 76 – 80% |
| 2.0 --- Satisfactory | 2.0 --- 71 – 75% |
| 1.5 --- ----- | 1.5 --- 66 – 70% |
| 1.0 --- Poor | 1.0 --- 60 – 65% |

| | |
|---------|-----------------|
| 0.0 --- | 0.0 --- 0 - 59% |
|---------|-----------------|

* Course Policies

- Class Attendance/Participation
- Other
- Extra Credit

Extra credit may be available for this course. This information is provided by the section instructor.

🏛 Institutional Policies

Academic Success Coaches (ASC)

Student success is our first goal. Our Academic Success Coaches mentor students to help them meet their educational, personal and career goals. Faculty or staff may refer you to an ASC for help if you are not doing well in a class. Please watch your LCC email for a referral.

We also suggest you contact an ASC on your own if you need help or advice to reach your goals.

To contact an ASC, call (517) 483-1422, email lcc-successteam@star.lcc.edu (<mailto:lcc-successteam@star.lcc.edu>), or visit the [Academic Success Coaching Team website \(https://www.lcc.edu/admissions-financial-aid/get-started/success-coaches.html/\)](https://www.lcc.edu/admissions-financial-aid/get-started/success-coaches.html/) for more information.

Disability Statement

Students with disabilities who may need accommodations in this class should contact the Center for Student Access (CSA). They are located in the Gannon Building, Star Zone - Center for Student Support. You can also access the [Center for Student Access website \(https://lcc.edu/services/access/\)](https://lcc.edu/services/access/), or call (517) 483-5323. Contacting the Center early helps ensure that accommodations are put in place as soon as possible.

Enrollment Verification

Instructors will verify participation in a course by the 8th day after the start date of sections less than 8 weeks long, and by the 15th day after the start date of sections 8 weeks or longer. Students who have not participated will be dropped from the course and may be responsible for any non-refundable fees.

Student Code of Conduct and General Rules and Guidelines

The College recognizes the value and importance of a safe and orderly learning environment that supports honesty, integrity, and ethical conduct. The [Student Code of Conduct and General Rules and Guidelines \(https://lcc.edu/academics/documents/pdf-policies/catalog-student-rules-and-guidelines.pdf\)](https://lcc.edu/academics/documents/pdf-policies/catalog-student-rules-and-guidelines.pdf) ensure the protection of student rights and the health and safety of the College community. The College has established procedures for reporting and addressing alleged violations.

Students must follow the Student Code of Conduct and the General Rules and Guidelines. Also, the instructor may establish reasonable guidelines within the classroom. Violations of the Student Code of Conduct and General Rules and Guidelines may be reported to the [Office of Student Compliance \(mailto:lcc-osc@lcc.edu\)](mailto:lcc-osc@lcc.edu).

Transfer

For transfer information, please consult the LCC [Transfer webpage \(https://lcc.edu/academics/transfer/\)](https://lcc.edu/academics/transfer/). In addition, the [Michigan Transfer Network website \(https://www.mitransfer.org/\)](https://www.mitransfer.org/) allows students to search how courses transfer to colleges and universities statewide.

The Michigan Transfer Agreement (MTA) simplifies the transfer of students from one Michigan institution to another. For the most current information, see the LCC [General Education webpage \(https://www.lcc.edu/academics/catalog/general-\)](https://www.lcc.edu/academics/catalog/general-)

[education/index.html](#)).

Students interested in transfer should contact the Academic Advising Center in the Gannon Building - Star Zone, (517) 483-1904.

Nondiscrimination Statement

Lansing Community College is committed to providing equal employment opportunities and equal education for all persons regardless of race, color, sex, age, religion, national origin, creed, ancestry, height, weight, sexual orientation, gender identity, gender expression, disability, familial status, marital status, military status, veteran's status, or other status as protected by law, or genetic information that is unrelated to the person's ability to perform the duties of a particular job or position or that is unrelated to the person's ability to participate in educational programs, courses services or activities offered by the college.

The following individuals have been designated to handle inquiries regarding the nondiscrimination policies: Equal Opportunity Officer, Washington Court Place, 309 N. Washington Square Lansing, MI 48933, 517-483-1730; Employee Coordinator 504/ADA, Administration Building, 610 N. Capitol Ave. Lansing, MI 48933, 517-483-1875; Student Coordinator 504/ADA, Gannon Building, 411 N. Grand Ave. Lansing, MI 48933, 517-483-1885; Human Resource Manager/Employee Title IX Coordinator, Administration Building, 610 N. Capitol Ave. Lansing, MI 48933, 517-483-1879; Student Title IX Coordinator, Gannon Building, 411 N. Grand Ave. Lansing, MI 48933, 517-483-9632.

COVID-19 Safety Precautions

All students, employees and visitors have a part to play in keeping LCC safe. Anyone who enters campus must follow the safety measures outlined on the [Keeping LCC Safe webpage \(https://www.lcc.edu/coronavirus/index.html\)](https://www.lcc.edu/coronavirus/index.html). Reports of noncompliance with current work safety rules and public health orders will be sent to the Student Compliance Office for action. Students with questions or concerns should email student.concerns@star.lcc.edu.

Media Release Statement

Photographs, pictures, slides, movies, video, or other media coverage of students may be taken for College-related business, in connection with their enrollment or participation in LCC activities without compensation from LCC, its Trustees, officers, directors, employees, students and agents of each of them. Photographs, pictures, slides, movies, video, or other media coverage of students may be used for any legal purposes.

College Catalog

For rules and procedures on matters such as Academic Calendar, Withdrawals, Incompletes, Appeals, etc., please review the [College Catalog \(https://www.lcc.edu/academics/documents/college-catalog.pdf\)](https://www.lcc.edu/academics/documents/college-catalog.pdf), and contact your Academic Advisor or Academic Success Coach.

Additional Items
