**University of Michigan-Dearborn**

**Winter 2021**

# **IMSE/CIS 381: Industrial Robots, 4 Credit hrs**

# Professor: Cheol W. Lee, 2241 Engineering Complex (2241 HPEC)

# Phone: (313) 583-6792 E-mail: [cheol@umich.edu](mailto:cheol@umich.edu)

# Office Hours: M: 2:30 – 4 PM, W: 2:30 – 4 PM via Zoom **Or by appointment**

Teaching Assistant: Gabriele Galli, E-mail: [ggalli@umich.edu](mailto:ggalli@umich.edu)

Dearborn Discovery Core Category or Categories: N/A

Course Meeting Times and Format(s): Please refer to Course Outline and Lab Schedule in this Syllabus

**Course Website:** [canvas.umd.umich.edu](http://canvas.umd.umich.edu)

**Course Description:**

The course introduces students in engineering and computer science to fundamentals of robotics technology, programming and their applications in industrial environment. The emphasis will be on robotics anatomy and configurations, robotics kinematics, end effectors, use of sensors in robotics, robotics programming, design of robot workcell, robotics applications to production problems, cost justifications and robotics safety, rather than on the extensive theory of robotics. Three-hour lecture and three-hour laboratory per week.

**Program Goals:**

Program goals are available from:

<http://umdearborn.edu/cecs/departments/industrial-and-manufacturing-systems-engineering/undergraduate-programs/bse-industrial-systems-engineering/educational-objectives>

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**Dearborn Discovery Core Goals:**

N/A

**Course Objectives:**

This course is designed to provide junior Industrial and Systems Engineering, Computer and Information Science, and other engineering students the basic knowledge and fundamentals on how to select**,** program, and implement robots in industrial environments and to design robot workcells.

**Required Materials and/or Technology:** None

**References:**

***Robotics: introduction, Programming, and Projects***, James L. Fuller, Second Edition, Prentice Hall, 1999.

***Robot Technology, Fundamentals***, James G. Keramas, Delmar Publishers, 1998.

**Assignment and Grading Distribution:**

Two Examinations 50% (25% each)

Project 25%

On-line training & labs 15%

Assignments 6%

Quizzes 4%

**Grading Scale:**

*>95 A+*

*90 to 94.9 A*

*85 to 89.9 A-*

*80 to 84.9 B+*

*75 to 79.9 B*

*70 to 74.9 B-*

*65 to 69.9 C+*

*60 to 64.9 C*

*50 to 59.9 D*

*Less than 50 E*

**Tentative Course Outline:**

# Week (Date) Topic Reading

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1. (1/19) Introduction; What is Robot and History of robots

2. (1/26) Robot Anatomy and Components of an Industrial Robot;

Part I

3 (2/2) Part II

4. (2/9) Robot Motion Analysis and Control

5 (2/16) End-of-Arm Tooling

6 (2/23) Sensors

**7 (3/2) Test #1 (On-Line 6:00-8:30PM)**

8 (3/9) Robot vision

9 (3/16) Robot Programming, Operating Systems for Robots

10 (3/23) Robot Application Programming

11 (3/30) Robot cell design

12 (4/6) Robot Applications

13 (4/13) Robot Maintenance, Justification

**14 (4/20) Test #2 (On-Line 6:00-8:30PM)**

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**Laboratory Schedule:**

## Week of Activity

1/14 Introduction

1/21 Lab #1

1/28 Lab #2

2/4 Lab #3

2/11 Lab #4

2/18 Lab #5

2/25 Well-being Break

**3/4 Project Announcement (On-Line 6:00-7:00PM)**

**3/11 – 4/15 Project: On-line meetings will be scheduled during lab hours (6-9PM)**

**4/22 Project Presentation and Final Report Due**

**University Attendance Policy:**

A student is expected to attend every class and laboratory for which he or she has registered. Each instructor may make known to the student his or her policy with respect to absences in the course. It is the student’s responsibility to be aware of this policy. The instructor makes the final decision to excuse or not to excuse an absence. An instructor is entitled to give a failing grade (E) for excessive absences or an Unofficial Drop (UE) for a student who stops attending class at some point during the semester.

**Academic Integrity Policy:**

The University of Michigan-Dearborn values academic honesty and integrity. Each student has a responsibility to understand, accept, and comply with the University’s standards of academic conduct as set forth by the Code of Academic Conduct (http://umdearborn.edu/697817/), as well as policies established by each college. Cheating, collusion, misconduct, fabrication, and plagiarism are considered serious offenses and violations can result in penalties up to and including expulsion from the University.

**Disability Statement:**

The University will make reasonable accommodations for persons with documented disabilities. Students need to register with Disability Resource Services (DRS) every semester they are enrolled. DRS is located in Counseling & Support Services, 2157 UC (http://www.umd.umich.edu/cs\_disability/). To be assured of having services when they are needed, students should register no later than the end of the add/drop deadline of each term. If you have a disability that necessitates an accommodation or adjustment to the academic requirements stated in this syllabus, you must register with DRS as described above and notify your professor.

**Safety:**

All students are strongly encouraged to register in the campus Emergency Alert System, for communications during an emergency. The following link includes information on registering as well as safety and emergency procedures information: <http://umemergencyalert.umd.umich.edu/> Finally, all students are also encouraged to program 911 and UM-Dearborn’s Public Safety phone number (313) 593-5333 into personal cell phones. In case of emergency, first dial 911 and then if the situation allows call UM-Dearborn Public Safety.