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IE 455-001: Robotics & Prog Logic Control

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BSIE PROGRAM EDUCATIONAL OBJECTIVES

I. Program graduates use the fundamental principles and major areas of Industrial Engineering in their professional practice.

II. Program graduates are life-long learners, pursuing graduate education, and professional growth in Industrial Engineering and related fields.

III. Program graduates pursue diverse career paths and advance in a variety of industries.

BSIE STUDENT OUTCOMES

(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social and economic factors

(3) An ability to communicate effectively with a range of audiences

(4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and social contexts

(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

(6) An ability to conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions

(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

IE 455 OUTCOMES OF INSTRUCTION The students will:

1 Learn to jog the robot (1).

 2 Learn to create, modify, and execute a robot program (1).

3 Learn to develop and design PLCs (1).

4 Learn to program in ladder logic (1).

5 Apply Engineering Ethics to actual industrial robot operations and PLC programming (4)

COURSE DESCRIPTION

This course provides a comprehensive description of the concepts of manufacturing systems, manufacturing metrics and economics with a variety of examples on them. The objective of this course is to teach students the basics of robot systems and to give hands-on experience with robots that are used in current production environments as well as PLC programming. The lab experiments of the course focus on two fundamental objectives:

1) PLCs programming and troubleshooting, using simulator and HMI which train students to execute real world projects;

2) Programming and troubleshooting techniques necessary to run industrial robots. Moreover, during the class students will gain exposure to quantitative methodologies and algorithms to analyze automated manufacturing systems. This is a heavily focused lab class and these labs will be done on-campus.

CANVAS

The course will make extensive use of the Canvas system to optimize student-instructor communication. All course materials including lecture slides and homework etc. will be distributed through Canvas. All submission of homework and other assignments will also be through Canvas. To access the system please go to https://canvas.njit.edu, you will need a valid UCID to login.

COURSE MATERIAL

Textbook: Automation, Production Systems and Computer-Integrated Manufacturing, 5th Edition, by Mikell P. Groover, Pearson. ISBN-10: 0-13-460546-2 ISBN-13: 978-0-13-460546-3
Provided Material on Canvas: PowerPoint Slides, Videos, Reading Material

GRADING

Based on individual and team performance as follows:

• 33% Midterm Exam

• 33% Final Exam

• 34% Lab Assignments

LAB TEAMS & TEAM PROJECT

The course involves several experiments and PLC project that are to be completed by all students. All experiments and the project will be completed in teams of 3 students. Please select your teams to match your skills. During the lab class the corresponding experiment will be demonstrated by the instructor. There are three Robotics Lab Assignments and three PLC lab assignments. Details of each assignment will be provided in the corresponding week. There is one final PLC project which will include a

STATEMENT ON ACADEMIC INTEGRITY

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.