

PELLISSIPPI STATE COMMUNITY COLLEGE  
MASTER SYLLABUS

**ROBOTICS & AUTOMATION**  
**EET 2430**

Class Hours: 2  
Laboratory Hours: 3

Credit Hours: 3  
Date Revised: Fall 2016

**Catalog Course Description**

Basic robotics and automation principles, including sensor technology, motion principles, and microcontroller technology, are applied. Degrees of freedom, multi-axis motion, gripper technology and other robotic features are covered. Lab includes programming of robots, interfacing sensors, and troubleshooting basic hardware and software problems, as well as analog-to-digital converter and digital-to-analog converter applications.

**Prerequisites**

None

**Corequisites**

None

**Textbook(s) and Other Course Materials**

Fanuc Robotics Handling Tool Operations & Programming Student Manual –  
MATAGHAND0213CE REV. C

**Week/Unit/Topic Basis**

| Week | Topic  |
|------|--|
| 1    | Lecture: Course Overview, Safety/Lab: Introduction to Simulation Software                          |
| 2    | Lecture: Robot System and Teach Pendant/Lab: Work cells in Simulation Software                     |
| 3    | Lecture: Power UP, Jogging & Initial Setup/Lab: Power up and Jogging principles;                   |
| 4    | Lecture: Error and Fault Recovery/Lab: View Axis Limits; Version Identification                    |
| 5    | Lecture: Frames/Lab: TOOL Frame Set up; Create USER and JOG Frames                                 |
| 6    | Lecture: Motion Programs/Lab: Create a Program   |
| 7    | Lecture: Motion Instructions/Lab: Create Position Registers; Motion Instructions; Create a Program |
| 8    | Lecture: Copying and Editing Programs/Lab: Select/Modify and Execute a Program                     |
| 9    | Lecture: Branching/Lab: Branching Instructions; CALL; Register Instructions                        |
| 10   | Lecture: Instructions- Position Register and Miscellaneous/Lab: Position Register OFFSET           |
| 11   | Lecture: INPUT/OUTPUT/Lab: INPUT/ OUTPUT; Miscellaneous and Other TP 13 Instructions               |
| 12   | Lecture: MACROS/Lab: MACRO COMMANDS  |
| 13   | Lecture: Program Adjust/Lab: Program Adjust  |

- 14 Lecture: Program and File Manipulation/Lab: Program and File Manipulation
- 15 Final Exam Period

### **Engineering Technology General Outcomes (Educational objectives)**

- I. Apply basic engineering theories and concepts creatively to analyze and solve technical problems
- II. Utilize with a high degree of knowledge and skill equipment, instruments, software, and technical reference materials currently used in industry.
- III. Communicate effectively using developed writing, speaking, and graphics skills.
- IV. Assimilate and practice the concepts and principles of working in a team environment.
- V. Obtain employment within the discipline or matriculate to a four year program in engineering or industrial technology

### **Engineering Technology Concentration Competencies**

NOTE: At the program level all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

Students will

- A. Apply the knowledge, techniques, skills, and modern tools for the concentration of study to specifically defined engineering technology activities
- B. Demonstrate the knowledge of mathematics, science, engineering and technology to engineering technology problems using developed practical knowledge
- C. Conduct and report the results of standard tests and measurements, and conduct, analyze and interpret experiment or project results
- D. Function effectively as a member of a technical team
- E. Identify, analyze and solve specifically defined engineering technology-based problems
- F. Employ Written, oral and visual communication in a technical environment

### **Course Goals**

NOTE: Capital letters after course goals reference the competencies of the Engineering Technology concentrations listed above.

The course will

- 1. Enhance student understanding of how to power up and jogging the robot. (A, B, C, D)
- 2. Enhance student understanding of recover from common program and robot faults. (A, B, C, D)
- 3. Improve student knowledge of executing production operations. (A, B, C)
- 4. Increase student experience of creating, modifying and executing a material handling programs. (A, B, C, D)
- 5. Enhance student understanding of creating and executing MACROs. (A, B, C)
- 6. Increase student experience of monitoring, forcing, and simulating input and output signals. (A, B, C, D, E, F)
- 7. Improve student knowledge of backup and restoring individual programs and files. (A, B, C, D)

8. Enhance student understanding recommended safety procedures. (A, B, C, D, E, F)
9. Demonstrate, as an individual and as a team member, library/information skills, time management skills, problem-solving skills, material management skills, and communication skills. (A, B, C, D, E, F)

**Expected Student Learning Outcomes\***

NOTE: Numbers after Expected Student Learning Outcomes reference the course goals listed above.

The student will

- a. Power up and Jog the Robot in different modes. (1, 2)
- b. Recover from common program and robot faults. (1, 2, 4, 5)
- c. Execute production operations. (1, 2, 3, 4, 5)
- d. Create, modify and execute a material handling program. (1, 2, 4)
- e. Create and execute MACROs. (5)
- f. Monitor, Force, and Simulate Input and Output Signals. (6)
- g. Backup and restore individual programs and files. (7, 8)
- h. Recommend safety procedures to be integrated into all training exercises. (8, 9)

**Evaluation**

|                     |              |
|---------------------|--------------|
| Testing Procedures: | 80% of grade |
| Chapter Tests       | 40%          |
| Quizzes             | 20%          |
| Final Exam          | 20%          |

Laboratory Expectations: 20% of grade

The laboratories for all EET courses are an essential part of conveying the concepts to the student. The labs would closely follow the classes in content and in time of presentation so that the student is actually verifying these concepts to his or her self. The student will be able to apply the theory learned in class. The laboratory grade will be determined by a combination of performance within the lab and the quality and demonstrated comprehension of the lab report. There will be at least twelve labs during the semester to go along with the classroom material.

|                                    |     |
|------------------------------------|-----|
| Performance in labs (subjective)   | 50% |
| Lab Reports (neatness and content) | 30% |
| Laboratory Test                    | 20% |

Field Work:

Students shall participate in one class field trip. A report will be required that will be part of the laboratory grade.

Other Evaluation Methods: None

Grading Scale:

|    |          |
|----|----------|
| A  | 93 - 100 |
| B+ | 88 - 92  |
| B  | 83 - 87  |
| C+ | 78 - 82  |

|   |          |
|---|----------|
| C | 70 - 77  |
| D | 60 - 69  |
| F | Below 60 |

## **Policies**

### Attendance Policy

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of Academic Affairs.

### Academic Dishonesty

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

### Accommodations for Disabilities

Students that need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Disability Services (DS) in order to receive accommodations in this course.

[Disability Services](http://www.pstcc.edu/sswd/) (<http://www.pstcc.edu/sswd/>) may be contacted via [Disability Services email](#) or by visiting Alexander 130.