

**OHLONE COLLEGE**  
**Ohlone Community College District**  
**OFFICIAL COURSE OUTLINE**

**I. Description of Course:**

1. **Department/Course:** CNET - 115
2. **Title:** Introduction To Robotics and Automated Systems
3. **Cross Reference:**
4. **Units:** 4  
**Lec Hrs:** 3  
**Lab Hrs:** 3
5. **Repeatability:** Yes Times:3
6. **Grade Options:** Letter Grade, May Petition Credit/No Credit (GC)

7. **Degree/Applicability:**  
Credit, Degree Applicable, Transferable - CSU (T)
8. **General Education:**
9. **Field Trips:** Not Required
10. **Requisites:**  
**Advisory**  
Advisory: Eligible for ENGL-151B, ENGL-163, MATH-151

**12. Catalog Description:**

Students who take this class will understand how scientific innovation can affect their lives either directly or indirectly. The class will teach students the principles of scientific methodology as it is applied to solving problems. The application of this scientific method will be used to navigate an abundance of technical information - to obtain the information, understand it and determine how to apply it. This course describes the functional hardware and software components of Automated Systems. The student will experience how scientific principles are applied by building robotic. The emphasis is for students to learn science by actually doing science.

**13. Class Schedule Description:**

Students learn about automated systems by building and programming robots.

**14. Counselor Information:**

Students interested in pursuing careers as technicians in technology fields would benefit from this course.

**II. Student Learning Outcomes**

The student will:

1. Describe and explain how computers and robots are similar, the components of an automated system, and the difference between analog and digital systems.
2. Integrate and apply knowledge of basic electricity and magnetism theory into physical systems.
3. Program microcomputers using a high level programming language.
4. Gain knowledge of robotics and automated manufacturing used in industry.
5. Design, create and program robots to perform specific tasks.
6. Solve problems in a group/team format - plan a project and divide it into manageable tasks.
7. Research latest technologies used in industry.

**III. Course Outline:**

- A. Physical Systems and Computer Systems
  - 1. Natural and Man Made Systems
  - 2. Physical Phenomena Characterize Physical Systems Outputs
  - 3. Conversion of System Outputs into Digital Input for Computer
  - 4. Computer Processing of Inputs - from Analog to Digital
  - 5. Decision Making by Computer Systems
  - 6. Closed Loop and Open Loop System Control
  - 7. Fundamentals of Artificial Intelligence
- B. Computer System Operation
  - 1. Basic Computer Structure
  - 2. Computer Processing Activities
  - 3. Analog and Digital Variables
  - 4. Computer Architectures
- C. Basic Electricity and Magnetism
  - 1. Transducers and Energy Conversion
  - 2. Basic Electricity Concepts
    - a. Current
    - b. Resistance
    - c. Voltage ( Potential Energy)
  - 3. Fundamental Relationship between Electricity and Magnetism
  - 4. Motors and Generators
  - 5. Biological Systems and Electricity Relationships
- D. Electronic Devices and Digital Electronics
  - 1. Semiconducting Devices
  - 2. Basic Digital Relationships
  - 3. Important Digital Circuits and Devices
    - a. Encoders and Decoders
    - b. Multiplexors and Demultiplexors
    - c. Adders
    - d. Memory Circuits - Flip Flops
    - e. Counters, Latches, Registers
  - 4. Digital to Analog and Analog to Digital Conversion
- E. Gathering Input from Systems and Output Control
  - 1. Transducers - Theory and Type as Computer Input
  - 2. Conversion of Energy - What is Power versus Energy
  - 3. Low Power control of High Power - Computer Output
  - 4. ADC and DAC Devices
- F. Programming a Computer System
  - 1. Software, Hardware, Firmware
  - 2. Structured Software
  - 3. Software Processes and Useful Tools
    - a. Subroutines
    - b. Macros
    - c. Tasks
- G. High Level Programming Languages
  - 1. Machine Code and High Level Languages
  - 2. Compilers, Interpreters, and Assemblers
  - 3. Cross Compilers
  - 4. Real Time Processing

5. Program Development Environment
- H. Planning a Design
  1. Description of Problem and Objectives
  2. Conversion of Specifications into a Design
  3. Modular Design
    - a. Benefits
    - b. Module Independence
  4. Implementation
  5. Design Testing
  6. Troubleshooting and Debug

#### IV. **Course Assignments:**

##### A. Reading Assignments

1. Reading assignments on C-Based Lego Training CD
2. Web Documents
3. Instructor Handouts

##### B. Projects, Activities, and other Assignments

1. Microprocessor Processing Labs
2. Digital Simulator Lab
3. Lego C - Based Language Tutorial Labs
4. Design Robot to Specification
5. Student Project to Design Individual Robot

##### C. Writing Assignments

#### V. **Methods of Evaluation/Assessment:**

- A. Objective Quizzes
- B. Performance based Lab Projects
- C. Demonstration of Individual Robotics Project
- D. Final Exam

#### VI. **Methods of Instruction:**

- A. Discussion
- B. Demonstration
- C. Computer Assisted Instruction
- D. Lecture
- E. Laboratory

#### VII. **Textbooks:**

##### Required

##### Optional

#### VIII. **Supplies:**

- A. Batteries to power robots