

ECE485 – Programmable Logic Controllers ABET Syllabus

Catalog Data: ECE 485/585: Programmable Logic Controllers. Three (3) credit hours. Programmable Logic Controllers: Credit 3. Programmable Logic Controllers, ladder logic programming, advanced PLC operation and related topics.

Prerequisite: ECE 383 or permission of instructor Prerequisite topics: knowledge of assembly language programming and high-level programming language.

Textbook: (Optional) M. Rabiee, Programmable Logic Controllers: Hardware and Programming, Goodheart-Willcox, 2002.

Contact Hours and Additional Course Information:

The course meets multiple lecture periods weekly with a total of 150 minutes of lecture contact per week. The course is an elective in the electrical engineering program and in the computer engineering option.

Relationship of Course Toward Meeting ABET Student Outcomes:

The course supports instruction for Student Outcomes C, F, G, I, and K as required by ABET Criterion 3 and ABET Program Criteria. The relationships are indicated in the Course Learning Objectives.

The course does not include direct assessment for Student Outcomes.

Course Learning Objectives:

The overall course objective is to teach electrical engineering and computer engineering students the fundamental concepts, methods of analysis, and design of programmable logic controllers and systems. Specific objectives include the following:

1. Design a PLC system, component, or process to meet a set of specifications. (Outcome C)
2. Design, conduct, and interpret a validation test of a PLC system. (Outcome C)
3. Students gain an understanding of the role of PLCs in safety critical systems. (Outcome F)
4. Demonstrate effective communication through writing proficiency at the level expected for a junior engineering student and the use of engineering graphics. (Outcome G)
5. Identify the benefits of trade journals and web-based PLC resources of information for life-long learning. (Outcome I)
6. Recognize the need to use modern tools to assist solving problems. (Outcome K)
7. Identify and apply appropriate modern technologies to an assigned task. (Outcome K)
8. Students gain proficiency with LogixPro, a PLC simulation software package, and utilize this software package to solve problems on a wide-range of PLC problems. (Outcome K)
9. Students gain proficiency with Allen Bradley RSLogix, a PLC programming package, and utilize this software package to solve problems on a wide-range of PLC problems. (Outcome K)
10. Problem and examination solutions and background material are given on a course Web site. Students are required to access that information. (Outcome K)

Student Outcome Measure Assessments:

The course does not include direct assessment for Student Outcomes.

Contribution of Course to Meeting the ABET Professional Component:

- Skills required, used, and developed include PLC programming, ladder logic and PLC system design.
- Estimated Content: Engineering Science 0.5 credits, and Engineering Design 2.5 credits

Relationship of Course to Program Educational Objectives:

The course supports Program Objective 1 by increasing the ability to identify, formulate, and solve engineering problems; using modern engineering techniques and tools.

Topics Covered During Class:

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| 1. Programmable Logic Controller (PLC) Overview | (1 hr) |
| 2. PLC and Control System Components | (2 hrs) |
| 3. Relay Logic Diagrams | (2 hrs) |
| 4. PLC Programming | (2 hrs) |
| 5. Programming Logic Gate Functions in PLCs | (1 hr) |
| 6. PLC Timer Functions | (2 hrs) |
| 7. PLC Counter Functions | (2 hrs) |
| 8. PLC Math Functions | (3 hrs) |
| 9. PLC Logic Functions | (3 hrs) |
| 10. PLC Compare, Jump, and MCR Functions | (1 hr) |
| 11. PLC Subroutine Functions | (1 hr) |
| 12. PLC Sequencer Functions | (2 hrs) |
| 13. PLC Interrupts | (2 hrs) |
| 14. Process Control | (4 hrs) |
| 15. PLC Networks | (4 hrs) |
| 16. PLC Applications and Case Studies | (7 hrs) |
| 17. Midterm examinations | (2 hrs) |
| 18. Comprehensive final examination | (2.5 hrs) |

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