Course Syllabus

Course #: ROB 1020 **Course Name:** Robotic Operations

Division: Engineering and Industrial Technology

****

Class Days: TBA **Class Time:** TBA
Location: Classroom: E109 Laboratory: E103
Credit Hours: 3 **Contact Hours:** **Lab Hours:** 2 **Lecture Hours:** 2

****

Instructor: Thomas Bowes **Office Location:** D213
Phone: 419-334-8400 ext 2122 **Email Address:** tbowes@terra.edu
Office Hours: TBA
Division Office/Location: E107 **Division Fax: 419-334-2300**
Full-time Contact Person: Thomas L. Bowes **Phone(s):** 419-463-6678

****

Course Description:
ROB 1020 Robotic Operations

Robot programming, program elements, and editing will be continued. Robot classifications and system parts and CIM requirements are now reinforced. Multiple popular robot systems such as ABB and FANUC are used as well as Allen Bradley and Siemens programmable logic controllers using software to program and develop flexible robotic work cells. This includes programming and an introduction to interfacing both PLC and robot systems.

Prerequisite(s): ROB 1010

Corequisite(s): None

Entry Level Skills and Knowledge:
ROBO 1010 or equivalent work experience with robots and programmable logic controllers.

Required Texts, Supplies and Equipment:
Robotics an Introduction by James Rehg
Industrial Electronics by Thomas Kissell
Three-ring notebook with dividers
Safety glasses
Pencil

Grading:
A = 100 – 95 **B** = 94-89 **C** = 88-84 **D** = 83-79 **F** = 79-0

Proposed State-wide Guidelines Modification
(Based on faculty input from General Faculty Meeting 11/30/2005)
To replace current general education learning outcomes

1. **Communicate effectively**
2. **Evaluate arguments in a logical fashion**—Competence in analysis and logical argument are explicit learning goals for most general education programs, although these skills go by a variety of names (e.g., critical thinking, analysis, logical thinking, etc.). **Students will be able to demonstrate competence in problem solving in communication, mathematics, and in team settings.**
3. **Demonstrate an understanding of cultural differences and the knowledge of how to work effectively in a global and diverse culture and society.**

4. **Employ the methods of inquiry characteristic of natural sciences, social sciences, mathematics, and the arts and humanities**; general education introduces students to methods of inquiry in several fields of study and thereby prepares students to integrate information from different disciplines.
5. **Engage in our democratic society**—one of the overarching goals of general education is to prepare students to be active and informed citizens; the development of a disposition to participate in and contribute to our democracy is of equal importance to the goal of having the skills to do so intelligently.

Learning Outcomes 1-3 will be measured for all students through the CAAP assessment (Writing, Mathematics, and Critical Thinking) and through the e-portfolio (Writing and Cultural Diversity). Outcomes 1 and 2 will also be assessed through course and program assessment for applied degree programs.

Learning Outcomes 1-5 will be assessed in specific courses included in the Transfer Module.

Technical Education

Learning Outcomes:

General Education

1. **Communicate effectively**
2. **Evaluate arguments in a logical fashion**—Competence in analysis and logical argument are explicit learning goals for most general education programs, although these skills go by a variety of names (e.g., critical thinking, analysis, logical thinking, etc.). **Students will be able to demonstrate competence in problem solving in communication, mathematics, and in team settings.**
3. **Employ the methods of inquiry characteristic of natural sciences, social sciences, mathematics, and the arts and humanities**; general education introduces students to methods of inquiry in several fields of study and thereby prepares students to integrate information from different disciplines.

1. Identify unsafe conditions in a robotic work cell and follow all safety procedures.
2. Identify different robot systems: Learn different teach pendants and controllers
3. Identify the types of robot languages and programming concepts.
4. Identify types of robot path control and coordinate systems with different movement.
5. List applications for different program data and register functions with data manipulation.

6. Utilize different PLC programming functions from different PLC systems.

Assessment of Student Learning:
This course may include a project that is one of several that will be used by faculty to assess student academic performance in the program. A panel of faculty will review all (projects or whatever assessment activity you are doing), then assess and summarize the academic performance of students at this point in the program. The results of this assessment will be shared among the department faculty, used to identify needed changes or improvements, and submitted to the Student Academic Assessment Committee as part of the college's overall student academic assessment effort.

Assessment Project and Measurement in course (if any):

Plan of Work:

Session	Date	Activities	
1.		Syllabus and discuss course objectives and content	Review Chapter 1
2.		Introduction to **ABB** and the **FANUC** robot systems	Handouts
3.		**SAFETY IN THE WORK CELL**	Chapter 1& 10 Rehg
4.		Robot Geometry Systems	Chapter 2 Rehg
5.		**Allen-Bradley RSLINX** and **RSLOGIX TI** PLC	LAB manual
6.		Robot Teach Pendants and Controllers **ABB** and **FANUC**	Hand-outs
7.		Teach Pendants and Controllers continued:	
8.		Teach Pendants and Controllers continued:	
9.		**TEST I Written and LAB**	
10.		Basic Robot Programming	Hand-outs
11.		Robot Programming Continued:	Hand-outs
12.		Programming Continued:	Hand-outs
13.		Registers, Subprograms, S-Codes	Hand-outs

14.	Registers, and continued:	Hand-outs
15.	ASEA registers	**LAB project**
16.	FANUC	Hand-outs
17.	ABB, ASEA and FANUC	
18.	Open Labs	
19.	Open Labs	
20.		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		

Course Requirements:

1. Identify unsafe conditions in a robotic work cell and follow all safety procedures.

2. Identify different robot systems: Learn different teach pendants and controllers

3. Identify the types of robot languages and programming concepts.

4. Identify types of robot path control and coordinate systems with different movement.

5. List applications for different program data and register functions with data manipulation.

6. Students will gain an understanding of the purpose and versatility of robot program and utilization from several different types of robots with work cell integration.

7. Students will be exposed to advanced uses of Frame, PNS, RSR, and TCP commands.

8. Students will be taught register data usage. Teach pendant program editing will be used and manipulated in multiple robot systems.

9. Students will further develop hands-on applications using these newly learned programming skills and programming techniques.

10. Students will program the GMF A-00 pneumatic Z axis.

11. Students will learn programming of programmable logic controllers with Allen-Bradley RSLINX, RSLOGIX and Siemens S 7 software.

Policies

Course Withdrawing: If for any reason you need to withdraw from this course, be certain that you do so according to College procedure. It is your responsibility to know and follow this procedure. If you simply stop coming to class, without officially withdrawing from the course, your grade is an automatic "F." Please follow official College procedure for withdrawing from this or any course.

College Academic Policies are located in the College Catalog. A copy of the current catalog may be picked up in any of the division offices or admissions. The list of college policies is also available online at https://www.terra.edu/register/Collegecat/policies.asp.

Support Services: The College offers a number of support services to assist in your success in this course and all courses. Among these services are the Writing & Math Center in B105, the Office of Learning Support Services, which coordinates the campus disability services and tutoring programs, the computer labs, and the computers in the atriums.

Any student who feels he/she may need an accommodation based on the documentation of a disability should contact the Office of Learning Support Services privately to discuss his/her specific issues. Please contact the OLSS at (419) 334-8400 X 208 or visit 100 Roy Klay Hall (Building A) to coordinate reasonable accommodations.

If you have a documented disability and are receiving academic accommodations through the Office of Learning Support Services, please schedule a meeting with your instructor in a timely manner so that we may discuss how these services will be arranged.

Tutoring services are available to students beginning the second week of every quarter. Students requesting tutoring services should obtain a tutor request form from the OLSS in 100 Roy Klay Hall (Building A) or online at the Terra website. Please note that instructor verification and acceptance of the Student Learner Agreement is necessary for all tutoring requests. All requests should be submitted to 100 Roy Klay Hall (Building A).

Proposed State-wide Guidelines Modification
(Based on faculty input from General Faculty Meeting 11/30/2005)
To replace current general education learning outcomes

6. **Communicate effectively**
7. **Evaluate arguments in a logical fashion**—Competence in analysis and logical argument are explicit learning goals for most general education programs, although these skills go by a variety of names (e.g., critical thinking, analysis, logical thinking, etc.). **Students will be able to demonstrate competence in problem solving in communication, mathematics, and in team settings.**
8. **Demonstrate an understanding of cultural differences and the knowledge of how to work effectively in a global and diverse culture and society.**

9. **Employ the methods of inquiry characteristic of natural sciences, social sciences, mathematics, and the arts and humanities**; general education introduces students to methods of inquiry in several fields of study and thereby prepares students to integrate information from different disciplines.
10. **Engage in our democratic society**—one of the overarching goals of general education is to prepare students to be active and informed citizens; the development of a disposition to participate in and contribute to our democracy is of equal importance to the goal of having the skills to do so intelligently.

Learning Outcomes 1-3 will be measured for all students through the CAAP assessment (Writing, Mathematics, and Critical Thinking) and through the e-portfolio (Writing and Cultural Diversity). Outcomes 1 and 2 will also be assessed through course and program assessment for applied degree programs.

Learning Outcomes 1-5 will be assessed in specific courses included in the Transfer Module.