Course Title: Robotic Work Cells
Semester Course Prefix and Number: PAS 2275
Old Quarter Course Prefix and Number:
Number of Credits: 4
Semester(s) Offered: Fall
Class Size: 24
Number of Lecture Credits: 0
Number of Lab Credits: 4
Number of Lab Hours: 8
Number of Studio/Demonstration/Internship Credits:

Course Purpose Code:
0 — Developmental Courses
1 — Non-transferable, General Education
2 — Technical course related to career programs
3 — College course which has the primary goal of applying certain concepts (e.g. vocal ensemble)
4 — Other college course not considered a part of general education (MNCTC) (e.g. computer science, health, physical education)
5 — Course which is intended to fulfill the Minnesota Transfer Curriculum (MNCTC) requirements or intended for transfer.
9 — Continuing Education/Customized Training specialized credit course (not occurring in 0-5)

Catalog Description:
This course covers basic robotic principles through applied theory and practical lab applications. The course will cover all of the individual components that it takes to make up a total robotic system. The construction, programming, and operation of the training robot used is identical to most industrial robots which are being used in industry. The training robot will be integrated into workcells with actual industrial sensors and equipment.

Prerequisites and/or recommended entry skills/knowledge:
Course Prerequisite(s):
EIAT/PAS 1253, EIAT/PAS 1233, EIAT/PAS 1243, EIAT/PAS 1295, & EIAT/PAS 1244
Reading Prerequisite: None
Composition Prerequisite: None
Mathematics Prerequisite: None

Career Programs and Transfer Majors Accessing this Course:
Process Automation Systems Diploma
Process Automation Systems AAS

Minnesota Transfer Curriculum Goal(s) partially met by this course if applicable:
(Notes: No more than two goals may be met by any one course. Curriculum Committee review and the Chief Academic Officer's approval are required.)
0.  X  None
1.  Communications
2.  Critical Thinking
3.  Natural Sciences
4.  Mathematical/Logical Reasoning
5.  History and the Social and Behavioral Sciences
6.  The Humanities and Fine Arts
7.  Human Diversity
8.  Global Perspectives
9.  Ethical and Civic Responsibility
10. People and the Environment
Learning Outcomes: (including any relevant competencies listed in the Minnesota Transfer Curriculum)

Following the completion of this course the student will be able to demonstrate the ability to:

1. exhibit professionalism
2. identify robot system elements
3. inspect robot mechanical connections
4. inspect robot electrical connections
5. identify three robot safety regions
6. interface controller and robots
7. program single axis moves
8. program multiple axes moves
9. execute pick & place routine
10. demonstrate accuracy specifications
11. demonstrate repeatability specifications
12. use I/O auxiliary output port
13. use I/O auxiliary input port
14. describe material handling techniques
15. demonstrate material handling techniques
16. describe basic hardware maintenance
17. describe palletizing application techniques
18. demonstrate palletizing application techniques
19. describe vacuum gripper operation
20. describe mechanical gripper types
21. calculate robot payload
22. confirm computer/controller operation
23. write material handling program
24. demonstrate four modes of operation
25. diagram program flow

Student Assessment Methods:

Lab assignments, worksheets, papers, and tests.

Use of Instructional Technology: (includes software, interactive video and other instructional technologies):

Power Point Software, videos, robotic control lab facilities and equipment

Outline or Statement of Major Course Content:

This course covers basic industrial robotic principles through applied theory and practical lab applications. The course will cover the individual components and system interfacing that it takes to make up a total robotic work cell. The construction, programming, and operation of industrial robots are presented through hands on exercises. Lab exercises will require integrating pneumatic and NC robots, position sensing, and motion control into work cells over seen by a programmable logic controller. Application of work cell equipment will require in depth review of manufactures operating manuals and documentation.

Additional Special Information: (special fees, directives on hazardous materials, etc.)

Laptop Computer Lease

Transfer Information: (Please list colleges/majors that accept this course in transfer.)

None
## Approvals:

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**Distribution:**  
Original – Administrative Office

**Copies:**  
Curriculum Committee Chair, AASC Chair, Transfer Specialist, Originating Faculty Member, Scheduler, Records, Student Services, Learning Center, Library

**Revised:**  
October 2006