

# MESABI RANGE COMMUNITY & TECHNICAL COLLEGE

## Course Outline

Course Title: **Robotic Work Cells**  
Semester Course Prefix and Number: **PAS 2275**  
Old Quarter Course Prefix and Number:

Submitted By: **Scott Norcia**  
Approval Date:  
Revision Date: **11/23/11**

Number of Credits: **4**  
Semester(s) Offered: **Fall**  
Class Size: **24**  
Negotiated by AASC on: (date)

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 (MNTC) (e.g. computer science, health, physical education)
- 5 – Course which is intended to fulfill the Minnesota Transfer Curriculum (MNTC) 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. <input checked="" type="checkbox"/> None                                | 6. <input type="checkbox"/> The Humanities and Fine Arts     |
| 1. <input type="checkbox"/> Communications                                 | 7. <input type="checkbox"/> Human Diversity                  |
| 2. <input type="checkbox"/> Critical Thinking                              | 8. <input type="checkbox"/> Global Perspectives              |
| 3. <input type="checkbox"/> Natural Sciences                               | 9. <input type="checkbox"/> Ethical and Civic Responsibility |
| 4. <input type="checkbox"/> Mathematical/Logical Reasoning                 | 10. <input type="checkbox"/> People and the Environment      |
| 5. <input type="checkbox"/> History and the Social and Behavioral Sciences |  |

**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 auxillary output port
13. use I/O auxillary 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.

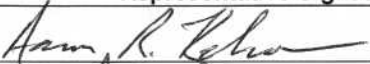
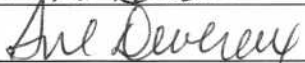

**Additional Special Information:** (special fees, directives on hazardous materials, etc.)

Laptop Computer Lease

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

None

**Approvals:**

Body	Representative Signatures	Date
Curriculum Committee		11-29-11
Faculty Association		12-5-11
Academic Affairs Standards Committee		11-29-11
Chief Academic Officer		

**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