DEPARTMENT REPORT
OF
PROGRAM LEARNING OUTCOMES ASSESSMENT

Department: Automation and Control Technology with Robotics

Program (Degree): Automation and Control Technology with Robotics

Type of Degree: X AAS ____ AA ____ AS ____ ATS ____ AIS

Chairperson: Jeff Donbar (Interim) Date: February 28, 2008,

Person(s) Interviewed: Jeff Donbar

I. Program Curriculum: A description of the basis for the program curriculum (i.e., how it is derived and validated). Include accreditation organizations, advisory committees or external groups that influence curriculum. Describe curriculum review activities including the review of course master syllabi.*

The Automation and Control Technology (ACT) program focuses on application and control of electromechanical systems. Areas of study include a concentration on electronics, computers, programming, industrial controls, work cells, and all areas of automated manufacturing applications typically used in local industry.

On the advice of the ACT department advisory committee, a complete curriculum review process was conducted during the spring of 2005. The result of this effort was an updated curriculum that was approved by the advisory committee and faculty and implemented in fall quarter 2006. Three courses were revised extensively and three new courses were created to meet the requirements of local industry. Several courses from existing programs were incorporated into the ACT curriculum. This revised Associate Degree now prepares students for employment in the Miami Valley or for transfer to a BSET program. Feedback from both students and employers regarding the changes has been extremely positive.

The articulation with Miami University at Middletown (MUM) has been quite successful. Over half the graduates in the past two years have continued to pursue their BSET degree at MUM. The department has recently been approached by the University of Dayton's Manufacturing Engineering Technology about creating an articulation agreement. This new agreement will be completed by summer 2008.
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II. <u>Program Learning Outcomes</u>: A description of what you intend for students to know (cognitive), think/feel (affective), or do (psychomotor), when they have completed your degree program. A suggested manageable number of outcomes should be in the range of five to ten. Describe Program Learning Outcomes review activities.*

An entry-level graduate with an Associate of Applied Science Degree in Automation & Control Technology from Sinclair Community College will be able to:

Learning Outcomes	Related Courses
1. Conduct simple mechanical repairs on typical electromechanical systems, from replacing, wiring, fluid power valving, piping, electromechanical devices, and other items that were original to the equipment, to installing new system modifications, then returning the system to operational specifications.	EGR 100, 217, 250, 278
2. Diagnose electronic system problems using appropriate test instrumentation, schematics, technical reference manuals and determine if fault is electrical, electronic, software, or mechanical in nature. Recommend appropriate repair process and initiate repair.	EET 119, 139, 166, 198
3. Utilize various computer software packages found in industry: CAD, robot programming languages, C programming, computer operating systems, word processing as necessary to perform repair/ modification/design tasks and document repair action.	EGR 128, 161, 210, 220, 252, 255; ETD 101, 128
4. Repair electrical and electronic systems, from devices, subsystems, wiring/cabling to circuit board level, and return to correct operation after testing.	EGR 144,231, 232, 278, Electives

Learning Outcomes	Related Courses
5. Integrate electronic control equipment into typical small CIM environment so that overall system performs to specification. Equipment includes: discrete devices, PLC's, sensors, robot application programming, communication hardware/software, and computer related hardware.	EET 281,282 EGR 232, 244, 255, 278; EGR Elective SRM 211
6. Integrate into work cell the appropriate Fanuc robot for the application. Select necessary end-of-arm tooling, and develop/edit motion control program for the application, using available software features and/or options.	EGR 128, 210, 244, 252 278; EGR Electives

III. **<u>Assessment Method(s)</u>:** A measurable indicator of success in attaining the stated learning outcome(s). The methodology should be both reliable and valid. Please describe in detail.

a. Formative Assessment Methods(s) and Description: a measurable indicator of student in-progress success in attaining the stated learning outcome(s).

The department continues to utilize hands-on assessment through student involvement in laboratory work and practice applications. EGR 128, Robotics in CIM Systems, is the most popular course in the curriculum. It has been developed into a general introduction to automation using the PLTW CIM curriculum. This course is a pre-requisite for all other courses. Students are exposed to different robot operation systems, sensors, software, and other basic information.

The department uses projects in multiple courses. As students progress to the 200-level courses, the projects become more involved. A robotics work cell is used in the students' capstone project to highlight a variety of skills learned in the curriculum. Students are being challenged by use of more open-ended problems. Additional emphasis is being placed on problem-solving skills leading the department to look at a systems approach to problem solving.

b. Summative Assessment Method(s) and Description: a measurable indicator of end-of-program success in attaining the stated program learning outcome(s).

EGR 278 is the capstone course for this program. It is a project-based course that permits students to highlight their strengths and demonstrate proficiency in the

knowledge and skills acquired in the program. The department chairperson interviews students who have successfully completed EGR 278 to assess the department's performance in providing learning opportunities for the Engineering Division's Core Competencies.

IV. Results: A description of the actual results of overall student performance gathered from the summative assessment(s). (see III.b.)

ACT students demonstrated their high achievement at the 2006 and 2007 National Robotics Challenge. Students have received both Gold and Silver awards in categories such as maze robot, sumo robot, and robot construction.

The 2007 Capstone class constructed a robot that was used by the Theatre department in their production of Something's Afoot.

Employer feedback on recent graduate has been extremely positive. Graduates are employed at Motoman, Hartzell Propeller, and Combined Technologies Group

V. Analysis/Actions: From analysis of your summative assessment results, do you plan to or have you made any adjustments to your program learning outcomes, methodologies, curriculum, etc.? If yes, describe. If no, explain.

Two years into a major curriculum change and all indications are the changes have improved the skills of graduates. Students are being hired into jobs with local industry or pursuing their BSET degrees at Miami-Middletown. Both employers and Miami faculty indicate Sinclair ACT students are well prepared for either situation. The department will continue to monitor both of these areas and to ensure students are obtaining the necessary skills to succeed in either area. The department will explore the possibility of teaching some courses in a hybrid format to allow greater access to students.

The department continues to work to maintain state-of-the-market technology in their laboratories with many changes required on a less-than-one-year cycle.

Department faculty are planning to embed assessment in key courses using the continuous improvement plan that will be developed following the analysis of the survey and interview data from local industry. This has been completed in EGR 128 and the feedback has been used to improve the course.

VI. General Education: Are you using any tool(s) to assess any of the three primary general education outcomes* (communication, thinking, values/citizenship)? If so, describe.

a. Where within the major do you assess written communication? Describe the assessment method(s) used. Describe assessment results if available.

To be effective in today's industrial climate students need the ability to express themselves by using both written and oral communication skills. Technical reports and projects are assessed as a part of the normal grading process in the program.

b. Where within the major do you assess oral communication? Describe the assessment method(s) used. Describe assessment results if available.

To be effective in today's industrial climate students need the ability to express themselves by using both written and oral communication skills. In appropriate classes, students' oral presentations are assessed as a part of the normal grading process in the program.

c. Where within the major do you assess thinking? Thinking might include inventing new problems, seeing relationships and/or implications, respecting other approaches, demonstrating clarity and/or integrity, or recognizing assumptions. Describe the assessment method(s) used. Describe assessment results if available.

Students use logical steps to solve problems and complete projects. Thinking skills are assessed by evaluating students' application of troubleshooting principles to diagnose problems and isolate system faults.

d. Where within the major do you assess values/citizenship/community? These activities might include behaviors, perspective, awareness, responsibility, teamwork, ethical/professional standards, service learning or community participation. Describe the assessment method(s) used. Describe assessment results if available.

Teamwork and group participation are required in many of the courses. The department encourages and sponsors student teams to compete in various professional society events such as the Society of Manufacturing Engineers' Robotics competition.