

GM provides many students for this program. Some sections are running exclusively for GM. The program is also active in corporate training for needs specific to General Motors. Those needs don't impact the degree program to any great extent.

II. Program Learning Outcomes: 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.*

No changes have been made to the program outcomes since the last assessment interview.

An entry-level graduate with an Associate of Applied Science Degree in Electromechanical Engineering Technology with Robotics 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.	MET 155; EER 148, 163; EGR 250; EGR Electives
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.	EGR 101; EER 131, 132, 136, 137, 138, 145
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 101, 128, 201, 248, 252, 261
4. Repair electrical and electronic systems, from devices, subsystems, wiring/cabling to circuit board level, and return to correct operation after testing.	EGR 251; EER 123, 145, 165

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, computer related hardware.	EET 281; EGR 215, 252, 261; EGR Elective
6. Integrate into work cell the appropriate GMFanuc 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, 248, 252; EGR Electives

III. **Assessment Method(s):** 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 is trying to do more hands-on assessment. There is more involvement in lab 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 robotics. This course is a pre-requisite for all other courses. Students are exposed to different robot operation systems, software, and other basic information. Students don't progress in the degree if they don't do well in this course.

The department is moving towards use of more course projects. As students progress to the 200-level courses, the projects become bigger. A robotics work cell is used to engage students in hands-on active learning. 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 offered infrequently (once a year) because of the number of students in the program who have it as a degree requirement. It is a project-based course and needs to be revised in order to make it a true capstone. One concern is lack of consistency from student to student. Students often use work-related problems to complete the required project and some of these projects are too limited in scope to match the capstone curriculum. Eight to nine students graduate per year, but many of them are not required to do the capstone since they came into the program before it was required. Occasionally, a course substitution is made in the degree requirements if someone needs the course but there are not enough students enrolled to make the course viable. More than one faculty

member has responsibility for teaching the capstone. If EGR 278 is not offered, EGR 252, 254, and IET 201/202 can be used to support the content area. Many courses have similar content which is approached from differing perspectives.

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

Students in the capstone do well in completing the projects.

The department lacks a “critical mass” of information on the summative assessment process. Indirect information that is gathered from students helps to shape the course content. The department is trying to move into a more generic process, not just focused on General Motors, but is limited in this regard by the number of students who are enrolled in the program.

The majority of students find positions in the Dayton area. A few are placed in Michigan and Illinois, but most graduates don't move out of the area. The GM students are already employees. Most graduates work for Motoman or Automated Systems, Inc., but the department is surprised to find that some find positions in technical sales.

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.

The Robotic Grippers Initiative has been integrated in all courses so that the content will be more consistent.

The department is working on adapting courses to include a broader scope. This has been prompted by the Advisory Committee request for training the “super maintenance technician.”

There are a number of courses in transition in this department: The department is trying to maintain upgraded technology, but many changes are on a less-than-one-year cycle. A big part of the effort in this department is staying up to date with technology. In particular, the department needs to update lab equipment.

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.

Engineering students need background in mathematics and reading. Many have chosen Engineering because of its hands-on focus; they are less interested in academics. Many of them can improve their oral and written communication skills. The chair has the written and oral communication checklists but they are not actively used. The entire faculty is working on this, but there is no departmentally specific initiative at this time. The dual admission relationship with MUM is expected to create more emphasis on general education within the department.

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

The new curriculum focus has required them to write reports, pointing to the need to upgrade those skills.

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

No information given by the department on oral communication.

- 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.

Changes are needed within the program to help students use logical steps to solve problems and complete projects. Students need to be taught how to organize a project.

- 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.

No information given by the department on values/citizenship/community.

- * Note: The oral communication checklist and the written communication checklist developed by the General Education Committee were adopted for college-wide use during the 1997-98 academic year by Academic Council. Thinking Guidelines developed by the General Education Committee are being piloted by faculty during the 1998-99 academic year.

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

Learning Outcomes	Related Courses
1. Demonstrate technical engineering skills appropriate to program requirements.	IET 101, 115, 111, 135; IET electives; DRT 106; QET 101, 201; EGR 115
2. Analyze engineering problems (general and technical) and make appropriate decisions. .	IET 101, 111, 115, 135; EGR 206
3. Demonstrate science and mathematical skills required for occupational needs.	MAT 131, 132, 133; PHY 131, 132
4. Demonstrate the principles of industrial engineering technology through application of the computer.	IET 198; DRT 198; MET 198
5. Use sound business practices in relation to people management.	IET 126; PSY 229
6. Identify new changes in career field and build personal skills to maintain state-of-the-art competencies.	IET 110, 130, 201, 202, 205, 207
7. Demonstrate applied and theoretical techniques in the areas of process engineering and facilities layout.	IET 101, 130, 201, 202, 205, 207, 216
8. Demonstrate appropriate technical communication skills (written, verbal, and drawing).	ENG 111, 121, 122; DRT 106, 198; MET 918; COM 211

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

Formative assessment is completed on a course-by-course basis. Courses use tests and projects to assess student learning. The IET classes are limited in size to allow for hands-on coursework. Courses follow the modular curriculum format developed through the NSF grant. Each course uses teamwork and simulation exercises to create a learning environment within the context of manufacturing. Students work in teams to solve problems like configuring a workstation for assembly.

IET 101 (Work Methods Analysis and Improvement), is the introductory course. Tech Prep provides a type of formative assessment between high school and the SCC program. IET 277 (Tech Prep Project) is a type of formative assessment and is used as a substitution for the IET 198 (Computer Programming Applications in Engineering Technology) series.

The department emphasizes alignment of the curriculum to the “real world.” For instance in IET 207, students write a memo to a supervisor plus prepare professional documentation detailing the plans for a project idea.

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

The department has been using a special topics course, IET 297, as a substitute capstone course while the IET capstone is being developed. IET 216 (Industrial Facilities Layout), is close to a summative assessment course, but it is not used in that way.

During Spring of 2000, students are enrolled in IET 278 as a substitution capstone. IET 278 has a manufacturing emphasis making it not really appropriate for students in the Industrial Engineering Technology program. In IET 278, Sinclair students are working collaboratively with students from Wright State University (WSU) and Ohio State University (OSU) on the design of a robot. The collaborative project was created by the participating colleges in order to simulate a common work environment where engineers and industrial technicians must work together on projects as a team. The WSU and OSU students are responsible for the robot’s design while the Sinclair students provide feedback on the manufacturing and industrial capability of the robot. Instructors from all colleges monitor the students and the project.

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

There has been good results with the UD transfer program. The SCC students who do well at Sinclair also do well at UD. There is some concern over the number of students who withdraw from UD. The department thinks this is due to the transfer of “D” grades that is now possible with the transfer module policy.

Students who are completing the capstone project (described above) are gaining experience in the political and social aspects of the work environment that will help them better prepare for work in IET jobs.

- 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.

Course integration is improving student skills. A piece-meal approach is no longer used. Greater numbers of IET students go through the entire sequence. That increases the need to develop the curriculum and shore it up with master syllabi. The department is looking at course sequencing and common course content. One

application of this approach is the use of a common product (the “robotic gripper” scenario) throughout all courses. The common theme helps students to link individual courses to the “big picture” of the IET degree program outcomes.

The department is continuing to work on the development of standard course notebooks with all instructional presentations on PowerPoint so that part-time faculty can follow the same course content exactly. Over 50% of the faculty are part-timers, so there is a great need for common content. The outcomes are valid and have been validated by industry and the advisory committee. The key now is working on the internal issues of course consistency. Every course and every instructor is evaluated each quarter by the department. The department is monitoring what and how things are done in each 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.

Written and oral communication skills are stressed, but the department is not using the checklists for assessment in these areas. More is being done in terms of addressing general education needs, but more can be done. The ABET accreditation process impacts the general education requirements.

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

Written communication skills are stressed, but the department is not using the checklist for assessment in this area.

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

Oral communication skills are stressed, but the department is not using the checklist for assessment in this area.

- 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.

Projects required in the technical courses emphasize the use of problem solving skills. This reinforces critical thinking throughout the curriculum.

Teamwork modules are used to simulate the factory floor. These teams develop and practice team problem solving skills.

- 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.

No response given by department.

- * Note: The oral communication checklist and the written communication checklist developed by the General Education Committee were adopted for college-wide use during the 1997-98 academic year by Academic Council. Thinking Guidelines developed by the General Education Committee are being piloted by faculty during the 1998-99 academic year.

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

Formative assessment is completed on a course-by-course basis. PLA 106 and 150 assess student learning through tests and written reports. Other courses in the program use a combination of labs and teamwork activities. In lab, students complete exercises and projects. The classes are usually small so teamwork is particularly appropriate for groupwork.

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

Summative assessment for the plastics/composites program is in progress. The program currently has approximately 15 students enrolled; two of these students are scheduled to graduate at the end of the fall quarter. A capstone course will eventually be used for summative assessment. For the first few students, a cooperative education internship will be required so that the department chair can observe student skills and abilities in the workplace. The department will use the internship option until the capstone course is in place. In Fall of 1999 there were less than ten students in the program.

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

Informal feedback indicates that students do well. All graduates are fully employed.

- 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.

The Plastics and Composites program typically draws students who are already active in that employment area. Most of the entering students have a strong, but limited practice base, with very little theory. Younger students (Tech Prep) don't typically enroll in this program, although the department would like to be able to attract younger students.

Some of the courses have been modified through use of student feedback. Recycling was added to PLA 106 by student request. Also, more emphasis is being placed on the design aspect of plastics.

Many of the students who are enrolled in this program take the plastics courses but do not finish the degree program. Several of them are interested in the certificate program, and the local Society of Plastics Engineers is encouraging Sinclair to develop and promote certificates. The local employers want to have graduates in this area, but they would prefer emphasis on more plastics/composites content and reduce general education, mathematics, and science requirements. Local employers want technicians but don't often value a generally educated employee.

The department has discussed offering the plastics/composites as a short-term certificate program consisting of six Plastics courses. Employers often send students to the program for cross-training purposes or to develop trouble-shooting skills. Other students are enrolled in order to acquire training that would help them get promoted. Another scenario is the employer wants the student trained in an attempt to flatten the organization. All of these examples speak to the need for some short-term training in the Plastics industry.

The program has a strong plastics piece; it does, however, need to place more emphasis on developing the composites part of the curriculum.

All of these factors may contribute to a revisiting of the program outcomes.

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.

Most students have little exposure to general education courses before taking the plastics curriculum. This lack of general education impacts their communication and mathematics skills in particular.

Because the Plastics and Composites curriculum is linked to the IET curriculum, there is an emphasis on general education as mandated by ABET. Oral and written communication skills, critical thinking and problem-solving skills are all required.

Student choice on sequencing and completion of courses does impact the attention that the department can give to general education skill development.

None of the departmental faculty uses the general education checklists which have been developed by the college.

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

Students often perform poorly on writing assignments. Most instructors grade papers for content only. Employers don't encourage completion of the general education courses so most students do not take the English courses.

None of the departmental faculty uses the general education checklists which have been developed by the college.

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

Presentations that have been required in classes were a disaster so they are not usually required now. Teamwork activities encourage oral communication development.

None of the departmental faculty uses the general education checklists which have been developed by the college.

- 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.

The courses in the Plastics program often require design and problem solving skills. Open-ended projects are used requiring students to think independently of the instructor.

- 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.

The department tries to help students learn professional behaviors such as being on time, meeting deadlines, and coming prepared. The IET program is discussing the possibility of implementing a policy of “three strikes you’re out” to use as a consequence for excessive absences.

Course content also addresses the ethics, responsibility and liability of modes of failure. A module may need to be developed about professionalism, codes of ethics and professional organizations. Students might be asked to address ethical dilemmas in case study format.

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No program outcomes are available for the Aviation Technology/Professional Pilot and Airway Science Option. This is an option under the primary program. The course and lab work for becoming a pilot is determined by the Federal Aviation Administration (FAA). There are minimal flight hours, as well as practical test standards, that students must pass.

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

No information given.

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

Not available at this time.

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

Not available at this time.

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.

Courses and curriculum have been developed for the Aviation Science degree program, the Option in Professional Pilot and Airway Science and the certificate in Aviation Maintenance.

The Advisory Committee last met in Fall of 1998. Because there has been little activity in the program, the direction is unclear. Several members of the Committee are still interested in exploring and expanding the program and its options.

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.

Information is not available at this time.

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

Information is not available at this time.

- 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.

Information is not available at this time.

- 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.

Information is not available at this time.

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