

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.*

An entry-level graduate with an Associate of Applied Science Degree in Mechanical Engineering Technology, Mechanical Design Option Sinclair Community College will be able to:

Learning Outcomes	Related Courses
1. Utilize computer software to enhance technical communication. Write computer programs and use computer software to solve problems.	MET 198, 203, 260; IET 198; DRT 196, 198; ENG 121, 122, 113; HUM/EGR 132
2. Accurately apply mathematical solutions to define mechanical systems. Use dimensional analysis to help create and verify mathematical representations of mechanical systems.	MAT 131, 132, 133; MET 104, 203; PHY 131
3. Create free body diagrams to represent static and dynamic equilibrium so as to calculate forces in machines and structures.	MET 203; PHY 131; MAT 131, 132; QET 132
4. Analyze motions, velocities and accelerations of objects and the forces and torques necessary to create or created by those conditions.	MET 203, 204; PHY 131; MAT 133
5. Calculate stresses in members of machines and structures. Establish failure modes and safe-working limits based on characteristics of engineering materials.	MET 203, 207; QET 132; EET 119
6. Solve fluids technology problems by applying the concepts of fluid mechanics. Apply concepts of thermodynamics and to analyze thermal energy systems.	MET 203, 204, 205, 225; PHY 132

Learning Outcomes	Related Courses
7. Specify and select commercially available mechanical and control components, integrated with custom designed parts to create a finished machine.	MET 228, 231, 232; EET 119; PSY 229

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. Coursework in the MET program consists of hands-on application of a concept. Students go through lab exercises and learn to use equipment appropriately. Most exercises involve using equipment for measuring, collecting data and then analyzing that data. The analysis step will lead the students to a conclusion. The lab exercises substantiate the lecture. Students are assessed for lab competence and lecture concepts. Labs are part of MET 205, 207, 228 and QET 132-133. Computer labs are included in MET 205, 207 and 228.

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

All mechanical design majors are required to enroll in MET 231, Machine Design I, and MET 232, Computer Aided Machine Design Project. Each class is two hours of lecture and two hours of laboratory.

In both MET 231 and 232, students must demonstrate competency in machine design principles by successfully solving problems that are given to them through the lecture and laboratory sessions. Students are assessed for competency in completing "mini projects." One example of a project would be to design a garage door opener. MET 231 and 232 require that all previous knowledge and skills acquired in MET classes be applied to various scenarios in solving various machine design problems. A mid-term and final examination are used to assess student performance level in each class. An example of a problem students might solve would be to size and design a system that will accomplish its purpose as defined by stated facts/guidelines. Machine Design covers clutch and brakes, gears, springs, linkages, etc.

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

Most students perform well in both MET 231 and 232 since students with inadequate skills generally withdraw earlier from the program. MET 231 includes computer-aided design techniques. MET 260, Engineering Technology Applications

with Computers, has been revised to include MathCAD. Students who come into MET 231 now have a background in MathCAD so that they can concentrate on demonstrating design proficiency, not on acquiring skills using the software package.

Many MET majors are already working when they enroll in the program. Some students enroll in MET to assist them in achieving promotions, some are personal interest students, and some want to transfer to four-year institutions. Some transfer to University of Dayton through the dual admission agreement and do well there.

- 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 department has found that the industry doesn't always have an accurate idea of what two-year technical degrees can do. The program receives high marks from students and employers. The MET curriculum is a traditional one. Changes need to be made judiciously so that the program is kept current but retain the focus on a two-year program.

The department is focusing on assessment methodologies and learning outcomes over the next two years because of new requirements for TAC/ABET accredited programs. The new requirements stipulate that the program being evaluated has the responsibility to demonstrate learning.

- 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.

Writing is reinforced throughout the program through the use of required written laboratory reports in every MET lab course. Research papers are also required in some classes. Writing assignments are part of these courses: MET 104, 205, 207, 228, 231, 232.

- 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 emphasized through the communications general education requirement. The Department is anticipating changing the communications requirement to COM 206 (from COM 211) to better focus on interpersonal communication skills.

MET 104 requires an oral presentation and students also work in teams.

- 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 have to think to solve problems in MET 203 (Statics) because there is not set process to follow. MET 204 (Dynamics with Kinematic Analysis) and 207 (Strength of Materials) also emphasize thinking skills. Most of the MET courses require students to use thinking 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.

Values/community/citizenship skills are reinforced through informal discussions in courses.

- * 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.