CAD / Certificate

Division of STEM

This program prepares students to demonstrate an array of MassBay Community College graduation competencies and gain employment as a drafter or a CNC programmer in the mechanical, manufacturing or architecture industries. By completing all program requirements, the program provides students with skills to use a variety of CAD software and advanced manufacturing tools.

Successful graduates of the program will be able to:

1. **Apply knowledge of mathematics, science, and engineering**, to decide how to approach problems and implement solutions in the engineering field and in everyday life.
    a. Understand and implement fundamentals of the mechanical design process;
    b. Demonstrate proficiency in advanced CAD skills by creating complex drawings using various CAD software such as SolidWorks or Revit.
2. **Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability**, with the awareness of the need to attend to diverse local laws, regulations, technical standards, and cultural expectations.
    a. Gather and analyze system and component requirements necessary for mechanical product / building development or redesign;
    b. Develop a solution that satisfies given parameters including convenience feasibility, manufacturability and safety;
    c. Produce professionally detailed engineering drawings through computer-aided design.
3. **Function on multidisciplinary teams** to meet the needs of diverse clients.
    a. Collaborate effectively with clients and peers in a variety of disciplines, such as electrical engineering, computer science and biotechnology;
    b. Understand the needs of all team stakeholders and deliver requirements in a timely fashion.
4. **Identify, formulate, and solve engineering problems**, using the engineering design approach to research, brainstorm, design, and test solutions.
    a. Apply analytical reasoning, creative processes, and knowledge of CAD technology to resolve design issues.
5. **Understand professional and ethical responsibility**, including the need to meet applicable standards and codes.

   a. Extrapolate information, data and specifications from technical resources and standards for application on drawings, projects and reports.
6. **Communicate effectively**, explain, discuss, and evaluate designs, and engage productively in peer review.
   a. Produce effective projects, such as physical models, and documentation, such as engineering drawings and reports;
   b. Produce verbal presentations, detailed engineering sketches, CAD drawings, and project reports.
7. **Understand the impact of engineering solutions in a global, economic, environmental, and societal context** and apply that knowledge to evaluate designs.
   a. Consider effectiveness, efficiency, sustainability and manufacturability in all design solutions
8. **Recognize the need for, and be able to engage in lifelong learning**, and understand concepts of quality, timeliness, and continuous improvement.
   a. Critically read and evaluate research about mechanical engineering innovation, tools and application.
9. **Identify and discuss contemporary issues** related to engineering challenges facing the world.
10. **Use the techniques, skills, and modern engineering tools necessary for engineering practice**, design, and manufacturing, including scientific instruments and modeling and simulation software.
   a. Develop professionally detailed 2D and 3D engineering drawings through computer-aided design, using the most current CAD/CAM software;
   b. Create 3D Models as proof of concept using 3D Printing technology;
   c. Use productivity software, such as Microsoft Office for project documentation.