

Massachusetts Bay Community College  
Design Engineering Technology

***Project Design MN-271***

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***Course Description:***

This course is designed for design engineering technology students within the mechanical engineering discipline.

The course will cover computer-assisted manufacturing utilizing numerical control part programming using Mastercam X6 Cad/Cam software. Emphasis will be based upon toolpath programming for 3-axis milling and drilling machines. Students will develop practical skills in wireframe and surface models for multi-axis machining, within a laboratory based curriculum. Advanced manufacturing techniques and technologies will enable them to understand the operation and control of software used in the modern manufacturing machine shop.

***Upon completion of this course students will:***

- Acquire an understanding of the application of computers and part design.
- Comprehend the process of Cad and Cam within the manufacturing environment.
- Understand the mechanical process of part programming.
- Improve their mechanical engineering design knowledge.
- Enhance their ability to communicate effectively w/machine shop personnel.
- Have the necessary skills to design from concept through implementation.

***To successfully complete this course, students must:***

- Attend class on a timely basis.
- Complete all homework assignments.
- Pass all quizzes and tests.
- Complete laboratory assignments.
- Attend vendor machining visits

Course Outcomes:

1. Acquire an understanding of the application of computers and their use in the advanced manufacturing machine shop.
2. Understand the processes and machining capabilities of Mastercam X6 Cad/Cam software.
3. Apply and set-up of machine tools and fixtures.
4. Ability to understand mill, lathe, wire EDM and rapid prototyping machines.
5. Utilize Cad/Cam geometry for machining by setting part material, machining position and toolpath set-up.
6. Use the proper machine tools such as hss, carbide, and ceramic tools to machine pockets, contours, through holes and taps.
7. Apply Cad functions to create lines, arcs, fillets, chamfers, and threads.
8. Improve mechanical design knowledge by the creation of singular parts and assemblies.
9. Gain the ability to communicate machining processes and procedures with engineering personnel and machinists, and determine the efficient process to effectively design and machine mechanical parts.
10. To understand the importance of dimensions to properly design mechanical parts.
11. To set machining parameters such as feeds and speeds to effectively machine mechanical parts based upon material requirements.
12. To understand the terminology of machine tools and their use with milling machines and lathes.
13. Have the necessary skills to design from concept through machining by use of a Cad/Cam design system.
14. To verify tooling and machining operations allowing for proper material removal and effective uninterrupted machining.
15. Understand the different manufacturing and machining technologies that are available to the Design Engineer and Machinist.
16. Critical thinking is practiced to solve Cad/Cam design and manufacturing methods and procedures to manufacture parts efficiently.
17. Machining operations such as drilling, contour, pocketing, facing and threading are PC based Cad/Cam programming operations.



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