



Middleburgh Central School  
Technology Department

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**COMPUTER AIDED DESIGN AND MANUFACTURING COURSE OUTLINE**

Fall 2009

Instructor: Mr. Gray [sgray@middleburgh.k12.ny.us](mailto:sgray@middleburgh.k12.ny.us)

1 credit

**Prerequisites:** Open to students in grades 11&12 who have successfully completed Design and Drawing for Production. Students who wish to take this course in grade 10 must have special permission from the instructor.

**Course Description:** This course provides advanced and applied experiences on the topics that were discussed in Design and Drawing for Production, using new techniques and multiple solid modeling software packages. Students will learn 3-dimensional drafting techniques with AutoCAD and Solidworks™. These software packages will allow you to design, draw and analyze components and assemblies on the computer in a virtual-reality environment. Students will also learn how Solidworks™ and AutoCAD can be used in conjunction with MasterCAM to generate computer automated CODE that is used by the TechnoCNC machine. This course will consist of a variety of classroom and hands on activities including:

- Unit 1- History & Purpose for Computer Aided Drawing and Manufacturing
- Unit 2- Computer Networking, Printing, Software and Hardware
- Unit 3- Concept and Detail Drawings
- Unit 4- AutoCAD Refresher from DDP
- Unit 5- Advanced AutoCAD, 3-D, Isometrics, Solids
- Unit 6- Solidworks Refresher from DDP
- Unit 7- Advanced Solidworks - Animator, Fluid Hydraulics, Cosmo Works
- Unit 8- Introduction to CNC Machining
- Unit 9- Basic M&G CODE Programming
- Unit 10- Specifications of the TechnoCNC Machine
- Unit 11- Using the TechnoCNC Interface
- Unit 12- Router Tooling - Choose the right tool for the job
- Unit 13- Jigs and Fixtures
- Unit 14- Introduction to MasterCAM
- Unit 15- Converting DWG & SLDPRP parts to MasterCAM
- Unit 16- Creating Toolpaths
- Unit 17- Cutting CNC Materials, Plastic, Wood, Aluminum, Steel, Machineable Wax
- Unit 18- Budgeting, Job Estimating & Scheduling
- Unit 19- Reverse Engineering & Prototyping
- Unit 20- Mass Production

**Career Possibilities:** Mechanical / Structural / Civil Engineer, Draftsman, Tradesman, Machinist

**Course Objectives:** The overall objective of this course is to provide students with experiences in advanced CAD/CAM techniques necessary in the development of CNC machined parts.

*At the completion of this course, students . . .*

1. *will be knowledgeable of the various types and characteristics of CAD/CAM software used in industry.*
2. *will have acquired advanced CAD skills, necessary to become successful in the field of drafting.*
3. *will be familiar with safe operating procedures and maintenance of the TechnoCNC machine.*
4. *will have gained experience estimating costs and timeline for CNC machined projects.*
5. *will be familiar with generating advanced drawings for a CNC machined Prototype.*
6. *will have gained experience with the design, programming and fixtures for mass production projects.*
7. *will be knowledgeable in machineable materials and the tooling needed to cut them.*

### **Notebooks:**

It is required that students keep a daily notebook (a three-ring style preferred), for notes and handouts. The binder will become an excellent resource of information for use later on in their studies, or if they pursue a job in this field in the future.

### **Supplies:**

Each student must come to class prepared each day with the following:

(2) #2 Pencils with erasers, (2) Ball Point Pens, (1) Spiral Notebook, (1) 3-ring binder

**Text:** The following texts will be provided for this course

AutoCAD Basics, Autodesk

Advanced AutoCAD, Autodesk Basic Residential Plumbing Systems, Black and Decker

Solidworks Tutorial, Solidworks

Advanced Solidworks, Solidworks

MasterCAM Tutorial, Allegheny Educational

TechnoCNC Tech Manual, TechnoCNC

### **Conduct:**

Students are reminded to ensure that at all times their actions and language are appropriate and professional.

### **Safety:**

Students will be instructed in safety procedures for particular activities and tools and equipment to be used, and are expected to follow these safety guidelines. Students should dress appropriately for lab. Excessively loose clothing poses a safety hazard and should be avoided. Students must use safety glasses when using the TechnoCNC machine.

**STUDENTS WHO CARELESSLY OR DELIBERATELY ENDANGER THEMSELVES OR OTHERS BY THEIR ACTIONS WILL BE IMMEDIATELY DROPPED FROM THE COURSE.**

### **Cell Phones:**

Under no circumstances are students allowed to use cell phones during class, this also includes text messaging. Students will be asked to leave the class if your cell phone rings or if you disregard this rule. Students removed from class it will count as an un-excused absence.

### **Attendance:**

Registration in a course assumes **FULL** participation in that course. Attendance is the responsibility of the student, and all class members are expected to attend each class. Students will be provided with adequate time to complete assignments. All work must be completed and turned in before any scheduled absence. It is very important that students are in class every day. If a student misses a class, it is their responsibility to make up the work and adhere to the project outline. Attendance will be taken at the beginning of class. Students who show up later than 20 minutes to class will be marked absent for that day. If a student will miss a class because of a lesson or a field trip, they must inform the instructor PRIOR to missing the class, and must get the notes and assignments they missed when they return. All work is due on the date specified; **no late work will be accepted** unless prior arrangements are made with the instructor.

**Grading:**

A grading rubric will be completed for each project turned in. All project work must be handed in on time and successfully completed for full credit. Students will be quizzed after each unit using the SyconEyes software installed on each of their computers. The quizzes will be used as an enforcement of topics discussed in the unit. There will be one major test per quarter which will outline the progress that the student has made during that quarter. Students with less than a 90 average at the end of the year will take a comprehensive final exam.

The student's grade will be based on the following:

<u>Quarterly Grades</u>		<u>Course Grade</u>	
<b>Classwork</b>	<b>300 pts</b>	<b>1<sup>st</sup> Quarter Ave</b>	<b>=20%</b>
<b>Projects</b>	<b>300 pts</b>	<b>2<sup>nd</sup> Quarter Ave</b>	<b>=20%</b>
<b>Quizzes</b>	<b>100 pts</b>	<b>3<sup>rd</sup> Quarter Ave</b>	<b>=20%</b>
<b>LectureExam</b>	<b>200 pts</b>	<b>4<sup>th</sup> Quarter Ave</b>	<b>=20%</b>
<b>Behavior</b>	<b>50 pts</b>	<b>Technopalooza</b>	<b>=10%</b>
<b>Participation</b>	<b>50 pts</b>	<b>Portfolio</b>	<b>=10%</b>
<b>Total Pts./Qtr.</b>	<b>1000 pts</b>	<b>Final Average</b>	<b>=100%</b>

Failure to complete all course requirements will constitute a failure in this course.

**Portfolio:**

The students will engage in a number of detailed projects and drawings throughout the year. Often these projects just get discarded, and only the memory of them remains. Each student will create a 3-ring style portfolio at the end of the year. This portfolio will include all of the drawings that they completed as well as hand-outs and notes that they obtained. The portfolio must have tabs for each component within and will have a professional cover page. This portfolio will equate to 50% of their Final Exam Grade, which will be an accurate representation of their progress throughout the year. The CAD/CAM Portfolio is due no later than June 10<sup>th</sup> 2010.

**Technopalooza 2010: "Our Tenth Anniversary"**

The MCS Technology department is very proud of their students work throughout the year. Technopalooza is an annual event, which is both a fundraiser for the Technology Department and a fun night of classic cars and technology exhibits. As a showcase of student work, The Middleburgh Central School Technology Department proudly announces Technopalooza 2010 on Friday, June 11<sup>th</sup> 2010, from 5-9PM. Students will be required to attend and present their work to the community. Their attendance and participation will equate to 50% of their Final Exam grade. If for some reason the student cannot attend the event, arrangements must be made 2-weeks prior to the event with the instructor.

I \_\_\_\_\_ have read the above course outline and have shared the information listed above with my Parent / Guardian. I will come to class prepared each day and will do my best to satisfy the requirements as stated above. I will also keep my school computer access in good standing, so I may continue to be enrolled in this course, and utilize the school's drafting software.

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Parent / Guardian Signature

\_\_\_\_\_  
Date