

PRECISION MACHINING
2018-2019 SYLLABUS
Mr. Barclay

Course Description

PRECISION MACHINING prepares individuals to apply technical knowledge and skills in all aspects of shaping metal parts. Instruction involves making computations relating to work dimensions, tooling and feeds and speeds of machining. Emphasis is placed upon bench work and the operation of lathes, power saws, milling machines, grinders, drills and computer operated equipment (CNC). Instruction also includes the use of precision measuring instruments such as layout tools, micrometers and gauges; methods of machining and heat treatment of various metals; blueprint reading; and the layout of machine parts. Instruction prepares students to operate all types of hand and computer controlled machines.

Required Background

To be successful in this program, you must:

- Possess basic math and communication skills
- Be able to work with others as a team
- Be prepared to apply a quality effort into your career education

Philosophy

Instruction is split between academic theory and practical applications. In this pursuit, students are assigned projects, which become more and more advanced as skills are mastered. These skills will be tested with written, virtual, and real world quizzes, tests, exams, and projects.

This course is heavily reliant upon mathematics and spatial orientation. It is critical that the student learn to envision 3D environments and related material science concerning work holding, machine processing, material removal, inter-part relationships, and fits and tolerances to be successful. The students will progress from hand tool through conventional power machinery and computer operated machine tools throughout the course.

Students will work independently and in joint teams to produce projects involving interlocking parts. In this vein, the student gains experience with teamwork in a dynamic environment. By assuming the roles of team members as well as team leaders, roles related to real world manufacturing environments emphasized and encouraged.

Students will have the opportunity to participate in field trips to local manufacturers and machine shops. There will be guest lecturers as well as job coaching and interviewing experiences.

Course Goals or Standards

- Possess knowledge of safe work practices and conduct oneself safely in a workshop environment.
- Measure to a high degree of accuracy, utilizing precision measuring instruments.
- Perform math calculations involving fractions, decimals, and angles.
- Utilize Machinery's Hand Book to determine logic to plan jobs, analyze materials strengths and weaknesses, calculate feed and speed rates for a wide variety of machining operations, and correctly choose lubricants & coolants.
- Read, understand and communicate in the language of the machining field.
- Understand operations and employ basic machine tool practices in the manufacturing process.
- Analyze, interpret, and utilize blueprints used in the machining process.
- Prepare to enter into an entry level position in the precision machining field or proceed to post-secondary training in a college or technical school for advanced instruction.

Major Assignments or Assessments

Technical Performance Projects: Throughout the course, the students will be assessed on various machining related task as they acquire skills necessary for entry into the machining trades.

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|---------------|--------------|
| • Safety | • Grinders |
| • Bench work | • Lathe |
| • Layout | • Mills |
| • Maintenance | • Blueprints |
| • Metallurgy | • Math |
| • Drill press | • CNC |
| • Saws | |

Applied Academics Projects: Throughout the course, students will be assessed on use, solving, and analytical skills necessary to function in the machining field.

- Portfolio
- Generate and write and implement process plans for completion of projects.
- Analyze and solve math problems necessary for completion of machined projects.
- Write a two page essay based on common core standards
- Weekly Journal prompts

NIMS / NOCTI Certification is the final evaluation within the program to access the acquisition of job readiness skills in the machining field (NIMSSkills.org). **Note:** For seniors, 10% of the student's final grade will be determined from the results of the NIMS and NOCTI exams and the portfolio will determine 10%. For juniors and sophomores, the Career Readiness Grade level requirements will determine 20% of the student's final grade.

The Bureau of Career Technical Education (BCTE) has mandated the use of NIMS Level I online tests as the acceptable occupational competency assessment for concentrators anticipated to graduate from career and technical education programs. The NIMS assessments are drawn from industry-validated metalworking standards. Both performance and theory (written) assessments are developed and piloted by the industry. Students enrolled in the following approved programs are required to use the NIMS Level I credential tests:

- 48.0501 Machine Tool Technology/Machinist

The BCTE and NIMS have partnered to provide NIMS testing in eleven Level I metalworking credential areas. This includes both performance and theory exams. These certification areas include:

1. Measurement, Materials and Safety
2. Job Planning, Benchwork, and Layout
3. Manual Milling
4. Manual Turning Between Centers
5. Manual Turning with Chucking
6. Manual Surface Grinding
7. Manual Drill Press Operations
8. CNC Turning: Programming Setup and Operations
9. CNC Milling: Programming Setup and Operations
10. CNC Turning: Operator
11. CNC Milling: Operator

PDE Established Requirements of NIMS

Advanced Level – In order to achieve a Pennsylvania Skills Certificate, a student must pass **four** or more credentialing tests before graduation, with at least **three** from areas 3-11 in the above list.

Competent Level – In order to achieve a Pennsylvania Certificate of Competency, a student must pass **three** credentialing tests before graduation, with at least **two** from areas 3-11 in the above list.

Basic Level – Any student not meeting the requirements for the competent level.

The Pennsylvania Department of Education and NIMS both recognize the Measurement, Materials and Safety and Job Planning, Benchwork and Layout tests as being Basic Skills tests as opposed to Machining skills tests. Therefore, only one of these two tests can be counted towards the Pennsylvania certificates.

Assessment and Grading Plan

All students will be required to dress professionally and in uniform.

How Your Grades are Determined:

A. Daily Grade – 60%	(visual examination by instructor)
• Attendance	10 points
• Attitude	10
• Follows safety procedures	20
• Performance	10
• Ability to remain on task	20
• Ability to follow instructions	10

- Care of equipment, machinery, and tools 10
 - Clean up 10
- 100 points total**

B. Projects / Task – 20%

- Ability to work on own
- Precision
- Does own math calculations
- Does a neat job and is precise (good finish, no burrs, within size tolerance)

C. Test – 20%

- Quizzes
- Safety Testing
- Blueprint

Make-up work (according to GCCTC Student Handbook) may be given upon request of the student for excused absences. Students have **three** days upon return from absence to **request and turn in** any make up work.

The final grade will be distributed according to the sending school’s grading scale:

Final Grade	CHS	JMHS	MHS	WCHS	WGHS
A	100-93	100-92	100-90	100-90	100-90
B	92-85	91-82	89-80	89-80	89-80
C	84-75	81-70	79-70	79-70	79-70
D	74-65	69-60	69-60	69-60	69-60
F	64 and below	59 and below	59 and below	59 and below	59 and below

Classroom Discipline

Students must adhere to the GCCTC Student Handbook Policies and Conduct Expectations. If students violate ANY of the policies the following interventions will be used:

- **First Offense** - Warning (offenses of a serious nature will be handled in cooperation with administration immediately)
- **Second Offense** - Phone Call or Email home and/or a referral to guidance counselor
- **Third and Subsequent Offenses** - Referral to Administration

By signing below you acknowledge having read and understand the Precision Machining Course Outline and Course Policies. Parents/ guardians and students will be notified if any changes need to be made to the course policies. If you have additional questions and/or comments you may call the school at (724) 627-3106 to speak with the teacher or email Mr. Barclay at barclayr@greenectc.org.

Guardian/ Parent Signature:

Date:

Student Signature:

Date:
