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Regular Office Hours: 11:45 a.m.- 12:00 p.m. and 2:45 p.m.- 3:00 p.m.

COURSE TITLE

2011-2012 MACHINE TECHNOLOGY 1 COURSE SYLLABUS

COURSE DESCRIPTION

Introduces safety procedures, bench work, hand tools, precision measuring instruments, drill presses, cut-off saws, engine lathes, manual surface grinders, and milling machines.

It is a three-block course and so counts as such with the students' home school transcript. Topics covered include the basic skills for the safe preparation, tool selection, set-up, operation, and preventative maintenance of conventional mills, lathes, saws, grinders, and multiple hand tools. In addition students are introduced to precision measuring instruments to .0001". Students learn to utilize standardized blueprints, high-speed steel and carbide tooling, Trigonometry, and Geometric symbols to refine their skills. Successful completers will sit for National Occupational Competency Testing Institute (NOCTI) Precision Machining certifications. This class meets Monday through Friday from 12:15pm to 2:35pm. For more a complete Scholastic Calendar, please visit our website: <http://www.nhgs.tec.va.us/>

www.nhrec.org

COURSE PREREQUISITES

This course is designed as the first year of a two-year program.

REQUIRED TEXT

Machine Tool Practices, Kibbe et al, 8th Ed. 2006 Prentice Hall ISBN 0-13-118896-8

COURSE FEES

Activity Fee to include Skills USA Membership	\$16.00
Machinist's Tool Kit (The Student Retains Ownership)	\$50.00
NOCTI Certification Exam	<u>\$18.50</u>
Total Fees	\$84.50

EVALUATION OF STUDENT PERFORMANCE & GRADING

Employability Skills	15%
Related Content (Class Assignments, Projects, Quizzes)	40%
Skills (Practical and Written Tests)	45%
Total Weight	100%

In addition, extra credit efforts are encouraged.

INSTRUCTIONAL PHILOSOPHY

Each student is a unique person with their own set of learning strengths and weaknesses. The instructor observes and tailors the course presentation in an attempt to bring all learners to a common level of understanding. Students are expected to meet all of the course goals (listed below) and be able to demonstrate their understanding of the underlying concepts. 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 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

Students will learn how to:

- A. Follow safety procedures working in the shop environment with conventional machinery.
- B. Use precision measuring instruments, read GD&T blueprints, create secure work-holding tactics, and plan multiple tool/task job sequencing along with depth training on machine shop terminology and the decimal system.
- C. Utilize geometry symbols and trigonometry, Cartesian & polar coordinate systems, absolute & Incremental positioning to achieve desired results in the conventional environment to tolerances within .001".
- D. Utilize materials strengths and weaknesses to calculate feed and speed rates for a wide variety of machining operations, and correctly choose lubricants & coolants.
- E. Utilize logic to plan jobs involving hand and power tools.
- F. Maintain conventional equipment through good housekeeping, preventative maintenance, and tool care.

MAJOR COURSE PROJECTS

Students will be expected to:

- A. Create simple hand-drawn isometric drawings and learn the difference between American and European style of drawings, i.e., 1st angle and 3rd angle projection.
- B. Describe material strengths and weaknesses and apply this knowledge to tool choices, speeds & feeds and work-holding tactics.
- C. Develop tooling sequence and processes to achieve desired results according to part specifications.
- D. Prepare and maintain parts travelers and hand-drawn sketches & documentation to accompany stock from the materials storage racks through production and into Q/A.
- E. Perform Q/A inspections to verify that completed parts are within specification.
- F. Utilize learned skills to create more complicated projects with inter-locking components at individual and team levels.

FINAL PROJECT OUTLINE

Objectives

Each student will select a final course project to plan, design, manufacture, Q/A and test from several available options. These projects will take no longer than one class period to plan and execute in their respective conventional setups machines. Hand finishing will be permitted, but only to smooth minor tool marks. The final product must work according to schematic.

Building and Other Requirements

Final projects must be made from the specified material in the given specifications. Each student will be given the required materials; however unlimited runs will not be permitted due to budgetary and time restrictions. Access to the machinery will be scheduled in advance, so students must be ready to utilize the machines during their window of opportunity. The final project must be accompanied by a portfolio containing appropriate parts travelers sketches & documentation, Q/A check offs, and video of the operational product.

Evaluation

The finished product will be evaluated as follows:

- A. 20% The individual components are completed within the allowed time window.
- B. 20% All components are properly documented.

- C. 20% All components fall within specified dimensions and fit.
- D. 20% The finished project must complete its task as per specification (i.e., gears must turn, press fit components must press fit, etc.)
- E. 20% The student properly maintained the tooling, work-holding fixtures, and machinery during their portion of the project.

INSTRUCTIONAL DELIVERY PLAN

Introduction to project construction and class operation:

The instructor introduces the class to the exciting applications of conventional machining and to sample projects completed by former students. He or she asks students to name and describe as many other applications of machinist's skills as possible. The instructor distributes the course syllabus and a list of projects from which students choose enough to fulfill the course requirements. Students may propose and – with instructor approval- complete alternative projects which equal or exceed those required for the course but fall within the student's demonstrated abilities. The instructor discusses, demonstrates, and outlines safety procedures in shop activities and the use of tools, and conventional machinery. He or she outlines class operational procedures, including projects to be completed by individual students and those designed for group participation. Group projects are designed to allow each student to complete each step and learn all of the academic and technical information for that step. The evaluation and grading system is introduced at the beginning of the course to advise students of the standards they will be expected to meet to pass the course and achieve high marks for their efforts.

Class Operation:

The instructor provides direction and manages the class, but gives students as much responsibility as possible for planning, designing, and doing research to complete projects. In brief class assemblies, the teacher lectures and demonstrates particular concepts. The instructor provides parameters for students to use resources such as technical manuals, journals, resources from other technicians in the community and other teachers. The students maintain portfolios for projects and maintain the timelines specified at the beginning of each project.

Monitoring, evaluating, and grading performance:

Each student is required to assemble a three-ring portfolio of knowledge and skills for future reference from the class entire as well as individual flat binder portfolios for each project. In addition to the skills addressed by each project, a few thought-provoking questions are included to challenge students to use previously acquired concepts from mathematics and technology disciplines. Students are encouraged to watch television shows such as "How It's Made", "Myth Busters", "Monster Machines", and the like to stimulate materials and mechanical inquiry. The instructor conducts periodic class discussions to emphasize key points, check understanding, and prevent knowledge gaps. Students are called upon to explain concepts in class and are asked to demonstrate it from time-to-time.

ASSESSMENT PLAN

Performance Standards – Grades for the course entire will be based on the following levels of performance:

Grade	Performance Standard
A	Independent Learner Did research, designed and planned; applied academic skills; evaluated work and made adjustments; did quality work; needed little help from the instructor; sought and found resources independently; demonstrated knowledge with a grade of 90 or above; produced a quality portfolio; was an interactive and dynamic addition to any team; demonstrated an strong work-ethic, care of equipment, and pride in housekeeping; carried themselves with professionalism and maturity.
B	Semi-Independent Learner Did research, designed and planned; needed some help from the instructor; did quality work with few flaws; needed feedback from the instructor to realize work did not meet standards; redid work to meet standards; demonstrated knowledge with a grade of 80 or better; produced a better-than- average portfolio; was sometimes reluctant to participate in team activities; sometimes needed correction regarding work-ethics and housekeeping; behavior was sometimes less than professional and mature.
C	Dependent Learner Needed help to research, design, and plan or had to be given detailed plans; relied a great deal on the instructor or other classmates; required significant help to produce quality product; final product still did not meet standards; demonstrated knowledge with a grade of 70 or higher; was reluctant to participate in team activities; behavior and work-ethic often needed supervision; was sometimes careless with equipment care and housekeeping.
F	Failure Did not complete projects; if project was complete, they were of such low quality that they did not pass Q/A; did not document projects; did not show demonstrated criteria for determining quality; scored less than 70 on knowledge tests; produced a poor portfolio or none at all; did not participate in classroom and team activities; disregarded work environment safety, housekeeping, equipment care; did not demonstrate professional and mature demeanor

STUDENT EVALUATION

Students will be evaluated as follows:

Evaluation Criteria	Method of Evaluation	Percent
Daily Participation	Attendance, Class Behavior, Participation, Lab Work, Team Participation	15
Projects	Portfolios, written and oral presentations, quality of finished products	20
Performance	Adequacy of competency performance (technical, academic, and safety)	15
Tests	Unit quizzes and tests on related technical and academic knowledge, practical application tests.	25
Final Examination	Comprehensive and cumulative knowledge (technical and related academics) and application of knowledge to realistic field related problems or projects.	25

STUDENT COMPETENCY RECORD (SCR)

Required student competencies are set forth by Virginia's Department of Education. These requirements are based on the idea that letter or numerical grading systems do not adequately document students' achievements and abilities. As such, this course is designed to meet and exceed these expectations. The complete SCR can be reviewed at:

http://www.cteresource.org/verso2/scrs/trade_and_industrial_education/precision_machining_technology_i/2009/8539/8539_scr.doc

ATTENDANCE POLICY

The importance of regular attendance cannot be over-emphasized. The courses at NHREC are very fast paced and skills introduced today are based on those learned yesterday. Even short periods of absenteeism can cause dramatic declines in students' comprehension, achievement, and resultant grade. The following is taken directly from the current student handbook:

STUDENT ATTENDANCE POLICY

All students are expected to attend classes promptly every day and to remain for the entire class period. The following rules shall govern student attendance:

1. Five (5) or more unexcused absences (failure to attend class) in any nine-week grading period will result in a grade of "F".
2. Twelve (12) or more unexcused absences within a semester will result in a grade of "F" for the semester.
3. It is the responsibility of the student to provide documentation for **any and all** absences and to request and complete all make-up work within five (5) school days upon return to school. Competencies and other work must still be accomplished.
4. Three (3) unexcused tardies shall constitute one (1) unexcused absence. The principal/director may grant exceptions. Students who arrive on school transportation after the bell has rung shall not be marked tardy if they report to class immediately. Students who arrive at New Horizons by any means other than school transportation shall be marked tardy whenever they enter class after the bell has rung.
5. Three (3) early dismissals shall constitute one (1) unexcused absence.

To be dismissed early from class, students must have written parental permission.

Early dismissals are always verified by telephoning parents or guardians regardless of the student's age. Remember, students are never to leave school grounds without permission from the appropriate school administrator or his/her designee. New Horizons is a closed campus.

6. Under **exceptional circumstances**, students may be excused for a home school activity that has been **pre-approved** by the principal/director.
7. A combination of unexcused tardies and early dismissals equaling three (3) shall constitute one unexcused absence.
8. Failure to attend class for at least one and one-half (1 ½) hours is an absence.
9. **Appealed absences:** At the end of a quarterly marking period or a semester (within five (5) days of the end of the period during which the absences occurred), students who have incurred absences in excess of the four (4) or twelve (12) absences allowed may appeal in *writing* to the principal/director for a waiver of the attendance policy. Absences not falling into the categories below may not be appealed. The decision of the principal/director is final, and only one waiver per school year per student will be allowed.

ABSENCES, WHICH MAY BE, EXCUSED AND/OR APPEALED:
(ALL DOCUMENTATION MUST BE SUBMITTED WITHIN 5 DAYS)

- A. Absence due to an illness. A physician's note must be submitted within **five (5) days** certifying that the absence was at his/her recommendation.
- B. Absence due to a court appearance. A copy of the subpoena or other court document must be submitted.
- C. Absence due to death in immediate family. Supportive documentation must be submitted
- D. Absence due to extenuating or exceptional circumstances. The student must submit supportive documentation, and there must be instructor input prior to the principal's/director's decision to permit a waiver. Under only exceptional circumstances will a principal/director consider the waiver of suspension days.

For the complete handbook, please visit:

<http://nhrec.org/careertechnicalcenter/>

1. Above All Else, Use Common Sense
2. Always Check The Machine For Proper Speeds & Alignments. Do Not Assume It Is Correct, Because It Is NOT.
3. Always Wear Your Safety Goggles
4. Clean Chips With A Brush, Never Your Hand
5. Do Not Operate Machinery When Under The Influence Of Prescription, Over-The-Counter, or Other Medications
6. Do Not Touch Moving Parts or Cutting Tools While In Operation
7. Do Not Touch Other Person's Setups
8. Do Not Use Files Without Handles
9. Get Help When Lifting Heavy, Long, or Awkward Objects
10. Hard Toed Shoes Required
11. If You Are Not Trained, Do Not Try To Use A Machine
12. If You Do Not Remember Your Training, Ask Before You Try To Use A Machine
13. Immediately Clean Up Any Spilled Oil, Chips, Loose Material or Any Other Hazards To Maintain A Clean & Safe Shop
14. Keep All Machines Oiled And Clean
15. Know Where First Aide Kits, Fire Extinguishers, Eye Wash Station, and Cut-Off Switches Are Located.
16. Long Pants Required
17. Loose Clothing Is Not Allowed
18. Loose Hair Is Not Allowed
19. Never Walk Away From A Running Machine
20. No Cut Off Shirts
21. No Horseplay
22. No Jewelry Allowed
23. Report Any Equipment Faults
24. Report Any Injuries or Illness Immediately
25. Report Worn Out or Broken Tools