

East Tennessee State University
Engineering Technology, Surveying, & Digital Media

ENTC 2200 Machine Tool Technology Spring 2017

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Course GAs Mr. Ahmed Alamany, Mr. Long Le

I Course Description

Machine Tool Technology (4 hours)—Safe use of metalworking machine tools and accessories including the mill, lathe, saw, drill press, and surface grinder with an emphasis on safety. Precision measuring tools and hand tools. Machining characteristics of commonly machined metals. Cutting speeds and feed rates. Cutting tool types, geometry, and applications. Lecture and laboratory.

Prerequisites: ENTC 2170 (CADD) and MATH 1720 Pre-Calculus.

Overview: Machining technology concerns the use of metalworking machine tools to shape materials by removing chips (and occasionally by abrasion [waterjet], electrospark disintegration [EDM], or chemical attack [CM & ECM]). Machining is the primary manufacturing process because (in addition to producing finished products) it is used to make the equipment and tooling for the other manufacturing processes. This course provides theoretical and hands-on instruction in the safe use of metalworking machine tools and accessories and in shop practices and processes.

II Course Objectives

As an outcome of successful completion of the course, the student should:

- Describe the safety precautions observed in modern machine shops.
- Safely operate common metalworking machine tools.
- Describe the machining characteristics of commonly machined metals.
- Explain cutting speeds and calculate spindle speeds and feed rates.
- Develop a logical sequence of operations for machining a product.
- Understand common cutting tool types, geometry, and applications.
- Correctly use and care for hand tools and precision measuring tools used with metalworking machine tools.

Note: Course outcomes are in alignment with ABET Criterion 2 a. (appropriate mastery of the knowledge, techniques, skills, and modern tools of the discipline) and f. (an ability to identify, analyze, and solve technical problems. Additionally, aspects of ABET Criterion 2 k. (a commitment to quality, timeliness, and continuous improvement) are impacted.

III Required Texts and Materials**Required Texts:**

Youssef, H.A. & El-Hofy, H. (2008). *Machining Technology: Machine Tools and Operations* from CRC Press. (Full textbook chapters in PDF format are available for downloading at no charge for ETSU students through the ETSU Library's ENGnetBASE: Engineering Handbooks online database at <http://libs.etsu.edu/links/engnet.html>. If you'd rather purchase a hardback edition or an E-book, use these numbers for your Google searches: Print ISBN: 978-1-4200-4339-6 / eBook ISBN: 978-1-4200-4340-2.)

Hemphill, W.K. & Stanton G.C (1997). *Language Skills Handbook*, (On-line Ed.), Johnson City, TN: East Tennessee State University.
Available URL: <http://www.etsu.edu/scitech/langskil>

Quizzes and lab project drawings and procedures must be downloaded from the course website or taken/submitted via the D2L (ETSU's on-line portal).
(Available early in term; see course web site info on first page for URLs.)

Required Materials:

- **EYE PROTECTION:** A pair of safety goggles or safety glasses with side shields.
- **FOOT WARE:** Close toe shoes only. Sandals, flip-flops, "barefoot" running shoes are **NOT** appropriate; wearers will not be able to work or watch demonstrations in the lab.

SMALL TOOLS (available at local industrial supply stores (Granger or Fastenal) or online):

- Steel rule, full flexible, satin chrome finish, 6-inch, 5R graduation (10ths & 100ths one side, 32nds & 64ths other side). Note: Rigid scales, shiny finish, or coarsely graduated rules are **NOT** acceptable.
- A set of standard (inch) hex keys (Allen wrenches) such as Eklin #91.
- End Mill*, 2-flute, high speed steel, ½ inch diameter, ½ inch shank, single end.
- Tool Bit*, ground, high speed steel (preferably type M-2), size 5/16 inch square.

Note: As part of your departmental fee money, you will be provided with one (1) of each item marked '*'; if the tool becomes unusable, you are responsible for purchasing another. See your instructor for replacement options.

Recommended Materials and/or Texts:

- A six inch (6") or eight inch (8") dial or digital caliper
- A zero-to-one inch (0 - 1") micrometer or digital micrometer.
- Kibbe, R.R., Neely, J.E., White, W.T, & Meyer, R.O., (2010). *Machine Tool Practices*, 9th Ed. Upper Saddle River, NJ: Prentice Hall. ISBN-13: 9780135015087.
(Note: A used 7th or 8th Edition (ISBN-13: 9780131188969) of this text is also OK).
- Kalpakjian, S. & Schmid, S.R. (2010). *Manufacturing Engineering and Technology*, (6th Ed.). Upper Saddle River, NJ: Prentice Hall. ISBN-13: 9780136081685
(Note: A used 4th or 5th Edition (ISBN-13: 9780131489653) of this text is also OK)

IV Attendance Policy

Attendance, as noted below, is counted for grading purposes. Students are expected to attend each class session. Attendance will be taken at some time during each class meeting. Absence at roll call is considered as absence for the entire period. Students are responsible for missed lectures and laboratories.

If you know you are going to be absent from class for an authorized University activity, please let the instructor know beforehand. When unexpected problems arise, contact the instructor by E-mail or phone as soon as possible.

Students are responsible for the material covered in all class sessions as well as all assignments. Demonstrations will not be repeated.

Parking on Campus

On-campus parking may be problematic. Plan accordingly.

Project success will depend upon individuals showing up and actively participating in class and working in the lab during normally scheduled course meeting times. Students are expected to be “on station”—either in the classroom or prepared for working in the lab(s) with safety glasses and appropriate clothing and footwear—before the class begins at 9:20 a.m.).

No whining.

V Honor Code, Academic and Classroom Misconduct:

2016 ETSU Undergraduate Catalog, Student Conduct and Rights, [Honor Code](#):
 “East Tennessee State University is committed to developing the intellect and ethical behavior of its students. Students found to be in violation of policies on plagiarism, cheating, and/or fabrication will be held accountable for their actions. Any knowledge of academic misconduct should be reported. Students are expected to act with honesty, integrity, and civility in all matters.”

From the 2016 ETSU Undergraduate Catalog's section on Student Conduct and Rights, Student Disciplinary Policies, [Academic and Classroom Misconduct](#) (URL:)

“(2) Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly, through participation or assistance, are immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions which may be imposed through the university's academic misconduct policy as a result of academic misconduct, the instructor has the authority to assign an “F” or a zero (“0”) for the exercise or examination, or to assign an “F” in the course.”

For additional information, please see the [2016 ETSU Plagiarism Policy](#).

VI Evaluation and Grading

Minimum Percentage Score for Grades

| | | | | | |
|----|-----|---|-----|----|-----------|
| | | A | 93% | A- | 90% |
| B+ | 87% | B | 83% | B- | 80% |
| C+ | 77% | C | 73% | C- | 70% |
| D+ | 67% | D | 63% | D- | Below 60% |

A test, exercise, or paper may be given (or submitted) early for a University sponsored absence (please provide suitable notice, if possible). Make-up tests may be given at the discretion of the instructor and only if a student presents suitable documentation (evidence) explaining the (emergency) absence to the instructor.

It is expected that the **student** will accept the primary responsibility for achieving the course objectives and will **through self-initiative** complete **all** assignments.

| Description | Points | Percentage |
|-----------------|-------------|------------|
| Attendance | 100 points | 5% |
| Quizzes & Exams | 500 points | 25% |
| Laboratory work | 1400 points | 70% |
| Total | 2000 points | 100% |

Note: Thirty-five points (2.5% of 1400 pts) are deducted for each error (tolerance or specification not met).

| | | |
|--|--------------|-------|
| a) Incomplete project (significant effort demonstrated) | (500 points) | (25%) |
| b) Project is not submitted or incomplete project (no demonstrated effort) | (0 points) | (0%) |

A test, exercise, or paper may be given (or submitted) early for a University sponsored absence (please provide suitable notice, if possible). Make-up tests may be given at the discretion of the instructor and only if a student presents suitable documentation (evidence) explaining the (emergency) absence to the instructor. Quizzes and exams may include any material covered in the lectures, assigned readings, videos, classroom discussions or exercises.

Students with documented needs for note taking, test taking, or other classroom accommodations should make arrangements with the instructor early in the term. Contact the ETSU Disability Services

Voice: (423) 439-8346; Fax: (423) 439-8489; TDD: (423) 439-8370

URL: <http://www.etsu.edu/students/disable/>

VII. Access to University and Departmental Facilities

Students may work in labs only in the presence and under the supervision of a state employee (faculty member or graduate assistant). **Students may never work alone.** The dates and times of additional laboratory access will be posted during the term.

The University's Syllabus Attachment page is available on-line at the following URL: <http://www.etsu.edu/reg/academics/syllabus.aspx>.

To log onto any University PC or the "ETSU" network, you must know & use your ETSU user/E-mail name and password. If you do not know your ETSU user name, please contact the ETSU Office of Information Technology Services (ITS) at 423-439-4648 or shdesk@goldmail.etsu.edu. As access to the department's PC labs may be limited, it is suggested that, for computer work other than CADD, you consider using PC labs on the main campus. For information on location and operating hours of other University computer labs, visit the ITS web site at the following URL: <http://www.etsu.edu/its/>.

Hours of operation of the University's library are posted at the library and in various handouts. For more information contact the Sherrod Library at 423-439-5308.

Information regarding public safety and emergency preparedness at ETSU is available at the following URL: <http://www.etsu.edu/safety/>.

VIII. Food, Drinks, and Tobacco Products

Food, drinks, and the use of tobacco products (of any type) are never permitted in any of the University labs. Heavily caffeinated beverages may be consumed during the really boring lectures; please be careful and clean up after yourself. Tobacco products of all types are no longer permitted on campus*. Tobacco is bad for you; any and all types can and will eventually kill you. You have been warned; don't play cute. Resistance is futile. (*except, of course, in your own vehicle in a designated parking area)

Machine Tool & Wood Technologies Laboratories Procedures & Rules

All students are expected to exercise caution with respect to the health and safety of themselves and others. When in class or in the lab for an activity or demonstration, the following procedures and regulations are to be observed at all times:

- a) If you are not certain that what you are doing is a safe procedure, then **DON'T DO IT!** Ask an instructor—that's what they are here for!
- b) Safety goggles or safety glasses with side shields must be worn whenever you are in the laboratory. This is a state law as well as a part of the federal Occupational Safety and Health Act (OSHA) wherein **EMPLOYEES** as well as employers can be heavily fined for unsafe practices.

Students without eye protection will not be permitted
in the laboratory until eye protection is secured.

- c) **NEVER WORK ALONE.** Always ensure that someone is available and aware that you are working in the lab.
- d) A state employee (e.g., faculty member, knowledgeable Graduate Assistant, full time departmental staff member, etc.) **MUST** be present for you to operate powered machine tools in the laboratory.
- e) Report all injuries (no matter how minor) to your instructor—to protect yourself.
- f) Scuffling, "horse-play," and "practical" jokes are considered to be the acts of idiots and are not tolerated in the laboratory.
- g) Excessively long hair can be hazardous around machinery and must be restrained.
- h) Be certain all safety devices and guards are in place and operational. **Do not operate unguarded machines.**
- i) Never blow compressed air towards another person.
- j) Only one person should be operating a machine at any one time.
- k) Be certain the work piece and cutter are securely and safely mounted in your machine. If you are not certain, ask your instructor to check your setup.
- l) Keep your fingers away from revolving cutters and work.
- m) **NEVER** operate a machine while wearing gloves. The glove could become caught in the machine and pull your hand or arm into the machine.
- n) **NEVER** leave a running machine unattended.
- o) Always stop a machine to make adjustments, take measurements, remove chips, or to lubricate and keep loose tools from accumulating on the machine.
- p) Use a brush (or pliers) to remove chips (never your hands).
- q) Roll up your sleeves and remove all rings, watches, bracelets, necklaces, neckties, or anything else that might conceivably become caught in a machine.
- r) Do not leave chuck keys in a chuck (lathe or drill press), even for an instant.
- s) **NEVER** operate or be in the vicinity of rotating equipment if you are under the influence of any prescription medications or recreational pharmaceutical substances that alter your mood &/or affect your judgment, balance, wakefulness, etc. If you are in a compromised state, inform your instructor that you are unable to participate in the class or lab activity. Likewise, if you are suspected of being under the influence, you will be asked to leave the lab area for your safety and the safety of your fellow classmates.
- t) Lift heavy objects safely, preferably using mechanical devices. If you **MUST** be a hero and lift manually, at least do it correctly. Lift with the legs, keeping the spine vertical. Remember, spinal injuries are permanent—they never completely heal.

Rules & Guidelines for Departmental Rooms & Computer Labs

- a. Food or drinks are not to be consumed in the classroom or the lab areas. (Note: Bottled water may be brought into room; keep a lid on it.) The classroom, lab, and break areas must be kept clean at all times; please clean up your mess when you leave.
- b. No tobacco products—of any type—may be consumed; ETSU is a tobacco-free campus.
- c. Computer Files: Save and save often. Save on at least two different physical media: i.e., one hard drive (typically, on the STUDENT drive or folder) & at least one removal media (e.g., USB drive, E-mail attachment, CD-R, etc.).
- d. No unauthorized personnel (e.g., girl or boyfriends, significant others, children, roommates, tattoo buddies, etc.) are allowed in the computer, machine tool or other labs
- e. Do not give the door combination, usernames, &/or passwords to anyone.
- f. Be respectable of others when using the external speakers. It is strongly recommended that you bring your own headphones or ear buds.
- g. Follow all directions when submitting assignment files electronically. Put all of your files on the STUDENT drive in the proper directory. PCs are often subject to surprise re-formatting.
- h. Store your files on the lab machines at your own risk. All temporary files will be deleted on Saturday morning. All data files are subject to erasure after the last semester final is given.
- i. Students may never install any software on any lab machine.
- j. Do not change desktop settings or screen savers. Store any desktop icons and shortcuts in your user-account directory.
- k. Do not remove or install equipment (e.g., personal laptops) to the network. Use the wireless.
- l. Do not illegally copy software.
- m. No viewing or downloading pornographic or obscene materials in the lab; ETSU's Acceptable Use Policy is applicable for all usage of PCs and/or E-mail account(s).
- n. Do not lock the computers for more than 15 minutes (i.e., bathroom breaks are acceptable but don't go to lunch and expect to return to the same computer.
- o. Do not turn the machines off. Log out and turn of the monitor when finished.
- p. Promptly report any problem(s) to your instructor, to Ms. Loretta Fritz (mbradley@etsu.edu) or the technical support workers. When reporting difficulties, please note the machine name, the nature of the problem, and any out of the ordinary events, error messages, etc. Use the "Fault Report" logs when available.
- q. It is a **REALLY GOOD IDEA** to place a "Contact_Info.txt" file in your USBs' root directories containing your name, E-mail(s) and cell &/or home phone numbers.
A. Really. Good. Idea.