

East Tennessee State University
BLUE/ENTC 4957-002
Special Topics: Acoustic Guitar Building
Fall 2021

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Homepage: ETSU E-Learning (AKA D2L) is available at <https://elearn.etsu.edu/>
Course GA Mr. Nick Matta & Mr. Holger Olesen

Covid-19/SARS-CoV-2/Coronavirus Response

Please get fully vaccinated and wear a mask or other appropriate face covering to class. Getting vaccinated and wearing a mask that covers your nose and mouth communicates the care and respect you have for yourself, the care and respect you have for those you live with, and the care and respect you have for other members of this classroom community. The best evidence we have, from public health professionals, is that getting vaccinated provides protection from hospitalizations. Wearing masks is one of the best ways to protect against the spread of COVID-19 and its variants and other airborne illnesses. For the safety of your classmates, your instructor(s) and staff; **if you choose not to wear a mask, you may not be able to participate fully in lab activities face-to-face.** If you forget your mask the department will have a few available each day to distribute. Students with medical conditions that inhibit their ability to wear masks should register through [disability services](#). The ETSU policy on face coverings is available on-line via the following URL: <https://www.etsu.edu/policies/health-safety/facecoverings.php>. Additional information including the revised Academic Calendar for the Spring 2021 semester is available at <https://www.etsu.edu/coronavirus/>.

I. Course Description

ENTC 4957/5957 Special Topics in Technology:

“Special topics of current interest to groups of students concerning content not presented in regular course offerings. [This course] may be repeated for credit if material covered is significantly different or advanced.”

Acoustic Guitar Building:

This three (3) credit hour lecture & lab offering (ENTC 4957/5957-001; Fall 2021) is a limited-enrollment, cross-listed course wherein student will build a customized acoustic guitar and learn the fundamentals of luthiery and woodworking.

Course topics and projects will include:

- a) Building their own BBT-style OM-sized acoustic guitar from a kit and learning of the interplay of structural elements comprising a typical cross or X-braced string instrument;
- b) Using common luthier's tool, techniques, and technologies (templates, go-bar decks, model-specific forms, radiused sanding dishes, etc.) and learning how CADD and CNC equipment are used to design and fabricate various tools for building quality "hand-built" instruments;
- c) Operating hand and power tools in a safe and efficient manner;
- d) Learning the fundamentals of luthiery including fabrication tools, techniques, and processes required for creating a performance-worthy instrument (e.g., intonating, filing nut and bridge for appropriate string heights, etc.); and
- e) Learning playing fundamentals of their instrument (basic music theory chord fingerings, reading tablature, playing styles, etc.).

This particular course should qualify as a discipline-specific elective for students in either the Bluegrass, Old and Country Music Studies (BOTCMS) program or Engineering Technology (ET) within the Manufacturing ET, Product Development & Industrial Technology concentrations.

II. Objectives

Upon the successful completion of the course, the student will be able to

- Demonstrate the various skills, techniques, and use of technologies necessary to assemble and set up a performance-level acoustic guitar using common luthiers' tools and equipment in a safe and efficient manner;
- Identify the structure and articulate the purpose of major components of an acoustic guitar and other stringed instruments; and
- Understand and master the use of tools, tooling, and techniques fundamental to the art and trade of luthiery.

Note: For Engineering Technology students, course outcomes are in alignment with ETAC of ABET Criterion 3.B.1. Student Outcomes: 1.) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline; and 3.) an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical

environments; and an ability to identify and use appropriate technical literature; as well as 3.B.2 ETAC of ABET MET Program Criteria: 6.) Graduates must demonstrate the ability to apply the following to the solution of manufacturing problems to achieve manufacturing competitiveness: a. materials and manufacturing processes; and b. product design process, tooling, and assembly.

III. Texts, Materials & Supplies:

Required Textbooks:

Hunt, Doug (2018). *Instructions: STEM guitar project acoustic guitar*.

Available URL: <https://tinyurl.com/STEMGuitarsAcoustic2018>.

Aikens, M. & Singer, T. (2010). *Guitar primer*. Dayton, OH: National Center for Manufacturing Education. [Doc. available via course D2L Contents tab]

Aikens, M. & Singer, T. (2010). *Exploring innovative STEM education through guitar design and manufacture workbook* (Ver. 1006.1). Dayton, OH: National Center for Manufacturing Education. Available URL:

<http://guitarbuilding.org/wp-content/uploads/2014/06/Final-Workbook-Rev2-7.16.10.pdf>

Hemphill, W.K., Shafer, S.P. & Bernard, J.M. (2016). *Design standards & best practices for CADD/CAM/CNC*. Available URL for Rev G document:

http://faculty.etsu.edu/hemphill/pdf/ETSU_Standards-CADD_CAM_CNC-RevG.pdf

ETSU College of Applied Science & Technology (2001). *Language Skills Handbook*, (On-Line Ed.). Johnson City: Author.

Available URL: <http://faculty.etsu.edu/hemphill/langskil>

Other on-line reading or viewing materials may be assigned during the class. Check the class' D2L page for details &/or instructions.

Recommended Textbooks:

Coleman, E. & Erlewine, D. (2010). *Fret Work Step-By-Step, 2/E*. Athens, OH: Stewart-MacDonald. (URL for ordering information:

<https://www.stewmac.com/luthier-tools-and-supplies/supplies/books-plans-dvds/fretting/fret-work-step-by-step.html>).

Note: Mr. Hemphill has an active StewMax membership (for discounted price).

French, R.M. (2009). *Engineering the guitar: Theory and practice*. New York: Springer. ISBN-13: 978-0-387-74368-4.

Forbes, B. (2013). *Acoustic guitar making: How to make tools, templates, and jigs*. Queen Creek, AZ: Westfarthing Woodworks. ISBN-13: 978-1492206446.

Required Materials

- A pair of **safety goggles or glasses** (impact-resistant lenses; side shields recommended) is **required** whenever we are in the lab or where eye hazards exist.
- **Foot Ware: Close toe shoes only.** Sandals, flipflops, "barefoot" running shoes are NOT appropriate; wearers will not be able to work or watch demonstrations in the lab.
- **Covid-19 PPE:** Appropriate PPE (e.g., a face mask or covering) must be worn correctly at all times when on-campus, especially indoors or in crowded areas. (See above)
- Personal Ear Protection (disposable ear plugs provided as necessary in lab)
- Small Tools (provided (*) or available at local hardware/industrial supply stores or on-line):
 - Steel rule*: full flexible, satin chrome finish, 6-inch or longer, fractional inch graduations one side and metric graduations on the other (e.g. Asimeto 606-10-4).

Recommended Materials & Supplies

- (Black) 3 & 3 tuners (14:1, 16:1, or 18:1 gearing)
- Binding (0.060" x 0.250") Wood, fiber, or plastic

These and other customization opportunities and order consolidation (at discounted pricing) will be discussed in class.

IV. Assignments & Evaluation

It is expected that the **STUDENT** will accept the primary responsibility for achieving the course objectives and will **through self-initiative** fulfill all programmatic learning expectations and contractual obligations on time.

All out of class communications should be accomplished using ETSU's E-mail facilities, D2L group discussions/digital dropbox areas, &/or virtual classroom applications. As a registered student, you have access to accounts on the E-mail ("Z-name"@goldmail.etsu.edu) and D2L servers. Contact the ETSU OIT Help desk (439-4648) for more information. Copies of all class-related E-mails should be CC'ed to the instructors' accounts.

For team communication, you will be expected to use E-mail, group-based Discussion Boards, data transfer, file sharing, etc.

V. Attendance

Snow/ice: ETSU seldom cancels classes; cancellation announcements are made using text alerts and local media. WETS, 89.5 FM is ETSU's radio station.

VI. Attendance Policy

Attendance will be taken at some time during each class meeting. **Your presence and participation is important.** As an integral member of at least one project team, you will be expected to be present for all team meetings during class periods dedicated to lab activity. The Spring term Mon/Wed sections will meet nominally 30 times; each meeting represents approximately 3¹/₃% of the available classroom time. Any/all quizzes &/or exam and term project assignments will be announced at least five (5) calendar days prior to the test/due date.

Three or more **unexcused** absences may result in reducing your grade; i.e., an A becomes an A-, an A- becomes a B+, and so on. 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 phone or E-mail as soon as possible.

Due to the nature of this course, significant out-of-classroom time commitment is expected (e.g., customized design prototyping, mold fabrication & preparation, materials preparation; part finishing; etc.) When suitable supervision is present, lab facilities will be available during the class meeting times as well as on select Tuesday, Thursday &/or Friday afternoons &/or during posted open lab hours.

Students are responsible for the material covered in all class sessions as well as all assignments.

Cancellations, Alerts, & Emergencies: ETSU seldom cancels classes; cancellation announcements will be made using text alerts, local television and radio. Visit <https://www.getrave.com/login/etsu> to register your mobile devices to receive official ETSU notifications, alerts, and emergency communications. The University's radio station is WETS, 89.5 FM (URL: <https://www.etsu.edu/wets/>).

VII. V Academic Integrity & Misconduct

([from ETSU Undergraduate Catalog, Policies & Procedures, Student Conduct & Rights, and Institutional Disciplinary Rules](#))

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.

Academic and Classroom Misconduct:

(1) The instructor has the primary responsibility for maintenance of academic integrity and controlling classroom behavior, and can order the temporary removal or exclusion from the classroom of any student engaged in disruptive

conduct or conduct that violates the general rules and regulations of the institution for each class session during which the conduct occurs. Extended or permanent exclusion from the classroom, beyond the session in which the conduct occurred, or further disciplinary action can be effected only through appropriate procedures of the institution.

(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.

Copying/Sharing/Stealing CADD &/or CNC Assignment Files

Copying &/or appropriating—with or without permission of the original file creator—another student's work and calling it your own is plagiarism. ETSU does not and will not tolerate this serious type of academic misconduct. **Sharing files with other students is itself an act of academic misconduct.** CADD files can be easily copied, transferred electronically, and shared. However, please also note that your instructor is not an idiot and can, just as easily, electronically compare students' work. Even within seemingly identical assignments, there will be myriad differences among submitted drawings.

Everyone caught sharing, copying &/or turning in nominally identical files as his &/or her own work effort will receive zero (0) points for that assignment. A second instance of academic misconduct will result in failure of the class (F) for any/all students. All instances of plagiarism/academic misconduct will be documented and reported subject to published [University policies](#) and college/departmental procedures. If another charge of academic misconduct has been made in any ETSU class against one of the students involved, the instructor will work with the CBAT dean's office to determine the appropriate penalty for repeat offenders of academic misconduct.

In situations involving allegations of plagiarism or the theft of file(s), the instructor reserves the right to require any student(s) to resubmit one or more similar assignment(s)—with appropriate modifications—to demonstrate proficiency, understanding and competence. If determined that academic misconduct did occur, assignment grade and/or course grade will be adjusted accordingly, the actions will be documented and the individual(s) subject to relevant University policies & procedures.

VIII. VI Evaluation and Grading

- 1. Acoustic Guitar Building and Customizing activities 80%
- 2. Quizzes &/or Tests..... 5%
- 4. Attendance & participation (individual &/or team) 15%

Fabrication Activities:

To maintain appropriate levels of social distancing and low-density environments, it is expected that students may be assigned to small teams when working in the lab on certain days (e.g., either on Tuesday or Thursday). When working in teams, please maintain awareness of place, appropriate levels of hygiene, and the need for PPE always to limit the possibility of social/community spread. Failure to follow precautions may result in loss of lab access; please play nice.

Theory/Practice/Performance Activities:

At the conclusion of the course, each student is expected to be able to demonstrate certain fundamentals of playing a stringed instrument including but not limited to playing scales using multiple strings, playing chords, reading guitar tablature, and playing at least one song.

It is the student's responsibility to verify prior to the last weeks of the course that all gradable work has been recorded by the instructors. Omissions discovered after the course ends will not be corrected.

Minimum Percentage Score for Grades

	A 93%	A- 90%
B+ 87%	B 83%	B- 80%
C+ 77%	C 73%	C- 70%
D+ 67%	D 60%	F 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.

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 at <https://www.etsu.edu/students/ds/> or Voice: (423) 439-8346; Fax: (423) 439-8489; TDD: (423) 439-8370

IX. Access to University & Departmental Labs, Facilities & Services

For information on location and operating hours of other University computer labs, see the University's syllabus supplement at the following URL: http://www.etsu.edu/reg/documents/PDF/Spring_2011_Syllabus_Attachment.pdf

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 439-4337.

There **MUST** be an authorized, supervisory ETSU employee present whenever students are working in lab areas. This is especially true for labs with rotating &/or automated machinery or equipment. Special written permission must be secured if you desire to work in any labs outside of normal lab hours. See your instructor, staff, or the graduate assistant(s) for additional information.

Access to the department's computer resources for CADD may be limited. For generating DXF-formatted drawings &/or the CNC/3D printing "G-code" programs, it is suggested that you use other PCs (e.g., personal laptop or desktop or an ETSU lab machine) and transmit CNC files to the Machine Tool lab PCs using "sneaker net" (a.k.a USB thumb drive) or via E-mail attachment.

Many CNC controllers—specifically, the ToolPath program for the XYZ CNC router—use variants of the (pre-Windows) DOS operating system. Accordingly, you should remember **to limit CNC file names to the old 8.3 filename.ext DOS file naming standard to ensure compatibility** with newer operating systems (e.g., Windows NT, 2000, XP, Vista, 7, etc.) that allow for long file names.

Mental Health: College can be a very stressful environment. Students often have questions about mental health resources, whether for themselves or a friend or family member. There are many resources available for students on or off the ETSU main campus including:

- If you or a friend are in immediate crisis, call 911
- ETSU Counseling Center (423) 439-4841
- ETSU Behavioral Health & Wellness Clinic (423) 439-7777
- ETSU Community Counseling Clinic: (423) 439-4187
- National Suicide Prevention Lifeline: 1-800-273-TALK (8255).

Campus Safety and Security: ETSU strives to provide a safe and secure educational experience. Information regarding all aspects of the University's general emergency procedures is available at <http://www.etsu.edu/safety>. To register for approved ETSU emergency communications & other important information via text message &/or E-mail, visit <https://www.getrave.com/login/etsu>.

Coronavirus/Covid-19 Response—Special Circumstances

Other instructional elements may require your on-campus presence in the laboratory interacting with instructional mission critical equipment and tools. When on campus, please respect and adhere to all rules, policies, and procedures relating to the safety of students, faculty, and staff. This includes the correct wearing and use of appropriate personal protective equipment (PPE) such as face masks, face shields, eye protection, clothing, etc. as well as maintaining appropriate social distancing protocols to prevent droplet spread.

For activities requiring team meetings, students are encouraged to minimize risk by conducting meetings using video-conferencing applications (AKA "Zoom meetings"). When meeting with students, faculty, &/or staff; please remain cognizant of appropriate measures of social distancing.

If/when you witness instances of inappropriate PPE usage &/or inadequate social distancing; while it is indeed appropriate to mention questionable behaviors when done privately, gently, and with all due respect, if you are uncomfortable doing it yourself, please bring the inappropriate behaviors to the attention of one of the faculty or staff. Remember, just because you may be right doesn't mean you have to be a jerk. Likewise, when someone brings to attention your behavior or actions, please don't immediately go on the defensive and engage in an ideological battle of wills. Many of those around you have their own, or family members, friends, and colleagues with underlying medical issues that place them at significant risk.

We all are trying to survive this. As articulated previously, your continued flexibility, understanding, patience, and cooperation are all extremely appreciated. Please be nice. Rant over. Thank you.

X. Food, Drinks, and Tobacco Products

Food and drinks are never permitted in any of the departmental labs. In certain lecture-type classrooms, food and lidded or screw-capped beverages may be permitted by the instructor (please clean up afterwards). Heavily caffeinated beverages may be consumed during the boring lectures. Students seldom can afford the cash replacement cost of damaged or ruined equipment; keep beverages off CNC equipment, wooden surfaces, and tooling. Thank you.

ETSU is a tobacco-free campus.

The use of any type of tobacco products (repeating: any type) is completely prohibited in and around all University buildings including doorways, sidewalks, and pretty much everywhere else except in personally owned vehicles. Do not litter. Tobacco "juice" is a gross biohazard. It is recommended that you quit using all forms of tobacco sooner rather than later. You've been warned; don't play cute.

Rules & Guidelines for ENTC /Departmental Rooms & Computer Labs

- No food, drinks, or tobacco products are to be consumed in the classrooms or lab areas. (Note: Bottled water may be brought into the labs.) The classroom, lab, and break areas must be kept clean; please clean up your messes.
- No tobacco products—of any type—may be consumed or used inside the building.
- Only bottled water may be brought into the labs. No liquids on machines!
- Save and save often. *Save on at least three different physical media:* i.e., one hard drive (typically, on the STUDENT drive or folder), at least one E-mail server, & removal media (e.g., USB drive, CD-ROM/DVD, or 3-½", 5-¼" or 8" FDD).
- No unauthorized personnel are allowed in the computer labs (e.g., girl or boyfriends, significant others, children, roommates, tattoo buddies, etc.)
- Do not give the door combination, usernames, &/or passwords to anyone.
- Be respectable of others when using external speakers. It is strongly recommended that you bring your own headphones or ear buds.
- Follow all directions when submitting assignment files electronically. Put all of your files on the STUDENT drive in the proper directory.
- 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.
- Students may never install any software on any lab machine.
- Do not change desktop settings or screen savers. Store any desktop icons and shortcuts in your Z-account directory.
- Do not remove or install equipment (e.g., personal laptops) to the network.
- Do not illegally copy software.
- No viewing or downloading pornographic materials in the lab; ETSU's Acceptable Use Policy is applicable for all usage of PCs and University-related E-mail account(s).
- 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.
- Do not turn the machines off. Log out and turn of the monitor when finished.
- Promptly report any problem(s) to your instructor, to Ms. Loretta Fritz <bradleyl@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.

Machine Tool & Wood Technologies Laboratories Procedures and Rules

All students are expected to exercise caution with respect to the health and safety of themselves and others. When the class is 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) Report all injuries (no matter how minor) to your instructor—to protect yourself.
- d) Scuffling, "horse-play," and "practical" jokes are considered to be the acts of idiots and are not tolerated in the laboratory.
- e) Excessively long hair can be hazardous around machinery and must be restrained.
- f) Be certain all safety devices and guards are in place and operational. Do not operate unguarded machines.
- g) 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.
- h) Never blow compressed air towards another person.
- i) Only one person should be operating a machine at any one time.
- j) Be certain the work piece and cutter is securely and safely mounted in your machine. If you are not certain, ask your instructor to check your setup.
- k) Keep your fingers away from revolving cutters and work.
- l) **NEVER** operate a machine while wearing gloves. The glove could become caught in the machine and pull your hand or arm into the machine.
- m) **NEVER** leave a running machine unattended.
- n) Always stop a machine to make adjustments, take measurements, remove chips, or to lubricate and keep loose tools from accumulating on the machine.
- o) Use a brush (or pliers) to remove chips (never your hands).
- p) Roll up your sleeves and remove all rings, watches, bracelets, necklaces, neckties, or anything else that might conceivably become caught in a machine.
- q) Do not leave chuck keys in a chuck (lathe or drill press), even for an instant.