Stony Brook University

MEC 325 – Manufacturing Processes

Syllabus by Austin Giordano

Course Description:

Introduces traditional and modern manufacturing processes, their capabilities, and limitations. The properties of engineering materials are discussed in the context of manufacturing applications. Examples of topics to be discussed include additive processes (casting, 3D printing, etc.), subtractive processes (milling, turning, etc.), forming processes (forging, bending, extrusion, etc.), and joining processes (welding, mechanical fastening, etc.). Hands-on experience with various manufacturing processes.

Pre/corequisites: MEC 203, MEC 225 or MEC 226 Credits allocated: 3 credits.

Instructor: Austin Giordano
Contact: Email: austin.giordano@stonybrook.edu Office hours: Tues. & Thurs., 11:30 am - 1:00 pm
Office: Heavy Engineering 152

Textbook:

Groover, "Fundamental of Modern Manufacturing", 6th Edition, Wiley 2016

Assignments and Expectations: Homework problems have been assigned for the duration of the semester and have been posted along with their solutions. Homework is not graded, due to the prevalence of website selling solutions to homework sets. Homework is assigned solely for the benefit of the student, so that they may practice the principles discussed during lectures, evaluate their understanding, and, in part, prepare for examinations. There will also be two laboratory projects that must be completed and submitted.

Video Project: There will be a video project for which students will produce a video documenting and demonstrating a manufacturing process. Details to be announced. Project Due 4/22/2024, and Peer Review due 4/29/2024.

Lab work: Students will form lab groups as instructed. Lab groups are responsible for conducting experiments and design work as instructed. It is each student's responsibility to ensure that the group functions well and achieves the assigned goals. Students found to be making insufficient contributions to their group's work will be removed from the group and will receive a grade of zero for all lab work, at the sole discretion of the instructor.

> **Lab Roles:** Each lab experiment has 4 roles: the draftsperson who completes the mechanical drawing of the part using proper geometric dimensioning and tolerancing standards, the machinist who completes the machine operations to fabricate the part as designed (this person creates and submits the G-Code required for processing), the inspector who is responsible for using proper metrology techniques to measure the finished part and for reporting on compliance and/or deviations from the dimensions of the original drawing, and the project manager who is responsible for coordinating the other tasks and ensuring that the project is completed on schedule and to spec. Each student will perform a different role for each lab project.
>
> **Lab Grading:** Each student is responsible for the drawing the group produces, the part the group produces, the inspection that the group performs for each lab, and the submission of the assignment (either performing the task themselves or supporting and double-checking the team member performing the task). Instructors will also grade the accuracy of the part manufactured by the

group. All students in a group will receive the same grade, unless differential grading is deemed appropriate by the instructor, in which case the student(s) failing to contribute adequately will receive a grade of zero instead. Refer to the lab grading rubric for details. Late submissions will receive a grade of zero.

Lab Due Dates:

The report for lab 1 is due: TBA.
The report for lab 2 is due: TBA.

Lab Safety: All safety training must be completed by 01/31/2024. At the sole discretion of the instructor, any student may be removed from the laboratory for any unsafe conduct, at any time, and for any duration. At the sole discretion of the instructor, these students may be barred from returning to the lab for any duration, including future semesters, preventing retaking the course. Affected students will receive grades of zero for all missed lab work, up to and including the complete course grade. Your safety is our top priority, and as such, this policy is not negotiable. Using university equipment and/or facilities to create or attempt to create weapons or other items with significant injurious capacity will result in instant failure of the course, and a permanent and irrevocable ban from the laboratory, at the instructor's sole discretion.

Exams/Term Project: Two midterm exams and a final exam. The date of exams will be determined at a later date. The final exam was scheduled by the registrar. Exams will be closed book and open notes; students may have notes they have prepared in their own handwriting; no printed materials. In place of any or all exams, the instructor, at their discretion, may substitute term projects to be worth an equivalent percentage of the semester grade.

Course Learning Objectives and Activities:

Upon completion of the course, students will be able to:

1. Ability to analyze subtractive manufacturing processes and select appropriate feeds and speeds for cutting tools and materials.
2. Ability to analyze additive manufacturing processes and identify the effects of thermal transitions on materials during processing.
3. Ability to analyze joining processes and identify standard symbols and notation for engineering design.
4. Ability to analyze forming processes and calculate force requirements.
5. Produce a multimedia video podcast term project containing a professional presentation of manufacturing process(es) or an engineering system.

Assessment & Grading:

Percentage/Points	Activity/Assignment
10	Midterm 1
10	Midterm 2
20	Video Project
30	Final Exam
20	Lab Projects
10	Participation
100	**Total Possible**

Letter Grades:

Final grades assigned for this course will be based on the percentage of total points earned and are assigned as follows:

A (100-94)	A- (93-90)	B+ (89-87)	B (86-82)
B- (81-79)	C+ (78-76)	C (75-72)	C- (71-68)
D+ (67-64)	D (63-60)	F (59 or below)	

Late Work Policy:

I will accept late work only in extenuating circumstances, with requisite proof to verify this circumstance. Discuss with your group members if something comes up, then contact the instructor/TAs.

Cell phone and electronic device policy: Cellular phones or other communication devices are not permitted in labs and are especially prohibited from exams. If you are found to be in possession of such a device during an exam, you will be ejected from the exam and will receive a grade of zero.

Excused absences: This only applies for exams; there is no penalty for missing a regular lecture, and therefore no need for an excused absence from a regular lecture:

> **For religious observance:** From the university policy statement regarding religious holidays, students will be expected to notify their professor in advance, but definitely before the final date of the 'add/drop' period of their intention to be out for religious observance. Notification of intention to be out for a religious holiday MUST be made through the CEAS Undergraduate office.
> **For medical necessity (illness, etc.):** For hopefully obvious reasons, students may not come to the lectures when ill. Students are excused from lecture attendance due to illness without penalty or documentation; just arrange with a classmate to get any notes that you miss. Requests for a medically excused absence for an exam require documentation and approval and must be made through the CEAS office; I cannot handle or assess medical documents, so do not send them to me under any circumstances.

The CEAS office or their designee with assess your request and provide the instructor with appropriate instructions. You must include your name, SBID#, and the course number when contacting CEAS in regard to your absence. Making a false request for an excused absence is an act of academic dishonesty and will be prosecuted accordingly.

Statement on Academic Dishonesty:

Academic dishonesty is an extremely serious offense and will not be tolerated in any form. Academic dishonesty in general is the presentation of intellectual work that is not originally yours. Examples include, *but are not limited to*, copying or plagiarizing class assignments including homework, reports, designs, and other submitted materials; copying or otherwise communicating answers on exams with other students; bringing unapproved aids, either in physical (written) or electronic form to an exam; obtaining copies of an exam prior to its administration, etc. Academic dishonesty violates both the ethical and moral standards of the Engineering profession and all infractions related to academic dishonesty will be prosecuted to the fullest via the CEAS CASA committee. For you, the honest student, academic dishonesty results in lower class curves, hence a depression in your GPA and class standing, while cheapening the degree you earn. Please note that failing to provide proper citations in a paper or report constitutes plagiarism and will be prosecuted accordingly. Be sure to cite your sources![1]

[1]Dr. Jon Longtin, Department of Mechanical Engineering, Stony Brook University

Allowed Calculators:

For both security and uniformity in this class **only** the following calculators will be allowed to be used on the midterm and final exams. There will be no exceptions.

Casio: All FX-115 and FX-991 models. Any Casio calculator must contain fx-115 or fx-991 in its model name.

Hewlett Packard: The HP 33s and HP 35s models, but no others.

Texas Instruments: All TI-30X and TI-36X models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name.

Course Delivery Mode and Structure:

This is an in-person course, delivered in-person. Students must be mindful of all course expectations, deliverables and due dates.

Course schedule

Topic 1	Introduction, Syllabus, Lab and Video Project Introduction
Topic 2	Engineering Materials and their Properties (2-9)
Topic 3	Subtractive manufacturing (20): Theory
Topic 4	Subtractive manufacturing (21): Machines
Topic 5	Subtractive manufacturing (22,24): Cutting tools, Grinding
Topic 6	Additive manufacturing (10-11): Casting, molding
Topic 7	Additive manufacturing (12-13, 32): Plastic and glass working, Rapid Prototyping
Topic 8	Additive manufacturing (15-16): Powders, ceramics
Topic 9	Forming Processes, bulk (17-18): Extrusions, forming, forging
Topic 10	Forming Processes, sheet (19): Sheetmetal forming
Topic 11	Joining (28-30): Welding, brazing, soldering, adhesives
Topic 12	Joining (31): Mechanical fastening
Topic 13	Post-processing (26-27): Heat treatment, surface treatment
Topic 14	Special Topics

How We Will Communicate:

Course-related questions should be asked during lectures, office hours, or by email. I strive to respond to your emails as soon as possible, but I generally get to reply in approximately 48 hours. Your Stony Brook University email must be used for all University related communications. You must have an active Stony Brook University e-mail account and access to the Internet. All instructor correspondence will be sent to your SBU e-mail account. Please plan on checking your SBU email account daily for course related messages.

Technical Requirements:

This course uses Brightspace for the facilitation of communications between faculty and students, submission of assignments, and posting of grades. You are responsible for having a reliable computer and Internet connection throughout the term. Caution! You will be at a disadvantage if you attempt to complete all coursework on a smart phone or tablet. It may not be possible to submit the files required for your assignments.

The following list details a minimum recommended computer set-up, and the software packages you will need to have access to, and be able to use:

- PC with Windows 10
- Latest version of Chrome, Firefox or Explorer; (A complete list of supported browsers and operating systems can be found on the My Institution tab of the Blackboard website.)
- Sufficient RAM, CPU, GPU, and storage to properly run all required software.
- High speed internet connection
- Printer
- Word processing software (Microsoft Word, Pages, Microsoft Office, etc.)
- Ability to download and install software applications and plug-ins (note: you must have administrator access to install applications and plug-ins).
- Video recording and editing hardware and software.
- Animation software
- Autodesk Fusion360
- Cura

Technical Assistance:

If you need technical assistance at any time during the course or to report a problem with Blackboard you can:

- submit a help ticket on the web at http://it.stonybrook.edu/services/itsm)
- call (631) 632-9800 (technical support, log-in issues, computer support, Wi-Fi, software & hardware)
- call (631) 2-CELT [631-632-2358]
- Note that the course instructor cannot provide technical assistance.

Students are bound by the following statement, to which they must agree:

"Academic integrity is expected of all students at all times, whether in the presence or absence of members of the faculty. Understanding this, I declare that I shall not give, use, or receive unauthorized aid in this examination. I have been warned that any suspected instance of academic dishonesty will be reported to the appropriate office and that I will be subjected to the maximum possible penalty permitted under University guidelines."[2]

University Policies

Student Accessibility Support Center Statement:

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Acces-

[2]Dr. Noah Machtay, Department of Mechanical Engineering, Stony Brook University

sibility Support Center. For procedures and information go to the following website: https://ehs.stonybrook.edu//programs/fire-safety/emergency-evacuation/evacuation-guide-disabilities and search Fire Safety and Evacuation and Disabilities.

Academic Integrity Statement:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Professions, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management:

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Understand When You May Drop This Course:

It is the student's responsibility to understand when they need to consider disenrolling from a course. Refer to the Stony Brook Academic Schedule for dates and deadlines for registration: http://www.stonybrook.edu/commcms/registrar/calendars/academic_calendars

Incomplete Policy:

Under emergency/special circumstances, students may petition for an incomplete grade. Circumstances must be documented and significant enough to merit an Incomplete. If you need to request an incomplete for this course, contact me for approval as far in advance as possible.

Course Materials and Copyright Statement:

Course material accessed from Brightspace, SB Connect, SB Capture or a Stony Brook Course website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the copyright holder is a violation of the Federal copyright law, as well as a violation of Stony Brook's Academic Integrity.