

MEC 105 - Spring Semester 2021

Online Course

Stony Brook University Department of Mechanical Engineering College of Engineering and Applied Sciences

MEC 105: Everyday Science

Course Instructor: Jahangir Rastegar

Course TA: Ian Bonnell

OFFICE HOURS: The course is offered as a fully asynchronous online course. "Office hours" will be done through online interaction (Email/Blackboard)

INSTRUCTOR CONTACT INFORMATION: Jahangir.Rastegar@stonybrook.edu

TA CONTACT INFORMATION: ian.bonnell@stonybrook.edu

COURSE DESCRIPTION: A practical introduction to the science and engineering of objects and phenomena in everyday life. The basic principles that underlie the operation common to modern devices such as xerographic copiers, tape recorders, computers, microwaves, lasers, CDs, plastics, nuclear weapons, and magnetic resonance imaging (MRI) are developed by investigating how they work. The scientific method, engineering design methodology, safety, and environmental impacts are discussed in the context of these practical applications.

TOPICS AND TENTATIVE SCHEDULE:

Topic	Description	Text Chapters	Schedule
1	Mechanics: Laws of Motion and Energy; Mechanical Advantage and Friction; Wave and Turbulence	1-3	Feb 1 - Feb 12
2	Mechanics: Fluids and Pressure; Thermodynamics	4-5	Feb 15 - Feb 26
3	Natural Forces: Gravity; Magnetism	6-7	Mar 1 - Mar 12
4	Natural Forces: Power and Electricity	8	Mar 15 - Mar 26
Midterm			March 25
5	Natural Forces: Light, Radiation	9-10	Mar 29 - Apr 9
6	Materials and Chemistry: Elements; Polymers and Resins; Nanotechnology	11-13	Apr 12 - Apr 23
7	Biology and Medicine: Food and Drink; Cell Biology; Health and Medicine	14-16	Apr 26 - May 7

Course Pre/co-requisites: Satisfaction of entry skill in mathematics requirement (Skill 1) or satisfactory completion of DEC C or satisfactory completion of SBC QPS

COURSE LEARNING OBJECTIVES:

- Understand the methods scientists use to explore natural phenomena including observation, hypothesis development, measurement and data collection, experimentation, and evaluation of evidence. The scientific method will be learned in the context of the scientific principles enabling the many practical applications addresses in the course.
- Understand the natural world and the major principles and concepts that form the basis of knowledge in the natural sciences. Specific principles include the laws of motion, fluid mechanics, heat transfer and thermodynamics.
- Make informed decisions on contemporary issues involving scientific information and problem solving. Tools include the physical laws of rigid-body motions, fluid behavior, and principals of thermodynamics and heat transfer applied to the operation of everyday mechanical devices. Students will develop the ability to identify and apply these analysis tools to common engineering designs.
- Design, understand, build, or analyze selected aspects of the human-made world. Students will understand the engineering design process as applied to various common everyday products.

This course is approved to satisfy D.E.C. and/or the SBC, the objectives must address how the course outcomes relate to the specified D.E.C or SBC category.

Opportunities this course provides for students to acquire the knowledge or skills necessary to achieve the course learning outcome(s).

D.E.C. Competencies: Basic Math Students will be required to use formulas and mathematic skills found to solve Engineering and Physics questions. Students will need to determine the proper formula or equation to use to solve a problem. Students will have minimal need to derive or use complex computation to arrive at a solution. Students will need to produce technical writing that is factual and annotated for origin. Students will also be asked to synthesize data and use subjective analysis based on specified data.

SBC Competencies: Demonstrate Versatility Engage Global Issues (GLO) Address Problems using Critical Analysis and the Methods of the Humanities Master Quantitative Problem Solving Understand, Observe, and Analyze Human Behavior & the Structure and Functioning of Society Study the Natural World Understand Technology Explore Interconnectedness Examine significant relationships between Science or Technology and Social Sciences Pursue Deeper Understanding Experiential Learning Social and Behavioral Sciences Science, Technology, Engineering, and Mathematics Prepare for Life-Long Learning Practice and Respect Critical and Ethical Reasoning Evaluate and Synthesize Researched Information Write Effectively within One's Discipline.

COURSE REQUIREMENTS: Text: National Geographic- Science of Everything Published by The National Geographic Society; ISBN 978-1-4262-1168-3

GRADING: Based on a Midterm (20%) and a comprehensive final exam (22%). There will be 6 class assignments (48%), One project - creating a course-based PowerPoint presentation (10%).

The course grading is based on a weighted sum of all assignments. Final grades will be based on the following scale:

A: 100-92%, A-: 92-90%, B+: 89-87%, B: 86-84%, B-: 83-80%, C+: 79-75%, C: 75-70%, D: 69-65% and F: 65% or less

Make-up exams must be arranged prior to the exams. Make-up exam policy is consistent with university policy on:

- (1) Student Participation in University Sponsored Events
http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/policies_expectations/participation_univponsored_activities.php
- (2) University policy on Final Exams:
http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/records_registration/final_examinations.php
- (3) New York State Education Law regarding Equivalent Opportunity and Religious Absences
http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/policies_expectations/equivalentopportunity_religiousabsences.php

MEETING SCHEDULE: The Class and all Exams are online through BLACKBOARD. There are no live class meetings for the course.

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, if any, are necessary and appropriate. All information and documentation is confidential.

The course has been developed using universal design principles. Because of the nature and flexibility of submitting assignments, accommodations for needing additional time is part of the course. Due dates are reasonable to meet any accommodation needs. Exams are untimed.

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 Technology & Management, 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 University 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.

Students are expected to attend every class, report for examinations and submit major graded coursework as scheduled. If a student is unable to attend lecture(s), report for any exams or complete major graded coursework as scheduled due to extenuating circumstances, the student must contact the instructor as soon as possible. Students may be requested to provide documentation to support their absence and/or may be referred to the Student Support Team for assistance. Students will be provided reasonable accommodations for missed exams, assignments or projects due to significant illness, tragedy or other personal emergencies. In the instance of missed lectures or labs, the student is responsible for *insert course specific information here (examples include: review posted slides, review recorded lectures, seek notes from a classmate or identified class note taker, write lab report based on sample data)*. Please note, all students must follow Stony Brook, local, state and Centers for Disease Control and Prevention (CDC) guidelines to reduce the risk of transmission of COVID. For questions or more information click [here](#).