

Spring 2019

Stony Brook University
Department of Mechanical Engineering
College of Engineering and Applied Sciences
MEC 105: Everyday Science
This course satisfies the DEC category E
This course satisfies the SBC category SNW, Tech (proposed)

Instructor:

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Office hours: Mondays and Wednesdays: 10:00 – 12:00 PM.

Lectures: Wednesdays, online at 11am

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:

- The Laws of Motion, addressing Skating. Falling Balls. Ramps. Seesaws. Wheels, and Bumper Cars
- Design and analysis of Mechanical Objects, including Spring Scales. Bouncing Balls, Carousels and Roller Coasters, and Bicycles
- Design and analysis of Fluidic systems, including Balloons, Water Distribution, Elevators, Balls and Frisbees, Airplanes and Rockets, Vacuum Cleaners
- Design and analysis of Thermal systems, including Woodstoves, Incandescent Light Bulbs, Air Conditioners, and Automobiles
- Principles of Resonance and Mechanical Waves applies to Clocks, Violins and Pipe Organs

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 engineering design. Specific issues include public safety and environmental impacts.

- Demonstrate an ability to apply technical tools and knowledge to practical systems 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

Include course objectives. If 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. See the DEC descriptions in the Bulletin. Include a brief description of the opportunities this course would provide for students to acquire the knowledge or skills necessary to achieve the course learning outcome(s)

COURSE REQUIREMENTS:

Text.

How Things Work: The Physics of Everyday Life, Louis A. Bloomfield, SBU edition, John Wiley & Sons, New York

GRADING:

Based on the 3 best of 4 exams (3 section exams and a comprehensive final exam) counting for 25% each and 8 in-class quizzes counting for the remaining 25%. There are opportunities for earning up to 10% extra credit. A: 100-95%, A-: 94-90%, B+: 89-85%, B: 84-80%, B- 79-75%, C+: 74-70%, C: 69-65%, D: 64-55% and F: 54-0%

DISABILITY SUPPORT SERVICES (DSS) STATEMENT (must be the following language)

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (631) 632-6748. They will determine with you what accommodations, if any, 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 Disability Support Services. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>]

ACADEMIC INTEGRITY STATEMENT (must be the following language as approved by the undergrad council):

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 are 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/uaa/academicjudiciary/>

CRITICAL INCIDENT MANAGEMENT (must be the following language as approved by the undergrad council):

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.