

MEC105 Spring 2017 Online Course

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)

Course Instructor: Thomas Rosati

Section: 01

Office Hours: The course is offered as a fully online course. "Office hours" will usually be done through online interaction(Email/Discussion Board) Meeting can be arranged on campus if needed.

Instructor and TA contact information: **Thomas.Rosati@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:

- Basic Mechanics-The Laws of Motion and Mechanical Advantage; Fluids, Pressure, and Thermodynamics
- Natural Forces- Magnetism ; Radiation
- Material Science- Elemental Science; Compounds and Polymers; The Eye of Needle- Nano-Technology and Quantum Mechanics
- Human Science- You are what you Eat (and Drink); Fantastic Voyage -Cellular Mechanics and Gene Technology; Improving and Extending Life Expectancy- Pharmacology and Human Repair
- Engineering Design- Evaluating Quality

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.

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 in order 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 two tests; a midterm (15%), and a comprehensive final exam (20%). There will 9 class assignments (45%), a chapter review (5%) and one Engineering design project (10%). There will be opportunities for earning extra credit for additional work. 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: 65-0%

MEETING SCHEDULE

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