

Mechanical Engineering College of Engineering and Applied Sciences

COURSE OUTLINE

Practical Science of Things

Mec104 – section 30-82263

SBC Category SNW, Tech

3 credit hours

Instructor: Dr. Thomas Rosati

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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 course covers a wide range of topics that look at everyday items and significant scientific theories and methodology. These will include;

Laws of motion for skating, falling objects, ramps, seesaws, wheels, and bumper cars.

Design analysis of motion on mechanical objects, including springs, bouncing balls.

Structural framework for controlling the motion of carousels, roller coasters, and bicycles.

Properties of fluid mechanics, wave motion, water properties and liquid distribution.

Analysis of the effects of gravity and aerodynamics on balloons, elevators, baseballs, Frisbees, airplanes, rockets, vacuum cleaners.

Thermodynamic systems, including woodstoves, incandescent light bulbs, air conditioners, and automobiles.

Resonance and Harmonic Waves in clocks, the spectrums of sound and light, and musical instruments.

The course will examine over 200 inventions and look at how they operate and illustrate various scientific principles.

COURSE LEARNING OBJECTIVES:

- Students will understand how the engineering design process is applied to various common everyday products
- Students will be able to demonstrate their understanding of scientific principles to explore natural phenomena through observation, hypothesis development, measurement and data collection, experimentation, and evaluation of evidence. Specific principles covered include the laws of motion, fluid mechanics, heat transfer and thermodynamics
- Students will be able to use scientific methods to synthesize information to make informed decisions on contemporary issues involving existing and emerging technology. Specific issues students will be asked to analyze include public safety and environmental impacts.
- Students will demonstrate an ability to apply technical scientific tools and methodology to solve problems associated problems based upon the scientific principles discussed in the course. Tools include the physical laws governing rigid-body motions, fluid behavior, and principles of thermodynamics and heat transfer applied to the operation of everyday mechanical devices.
- Students will develop personal expertise they will each share as a Real Science Project.

COURSE TEXT:

THE SCIENCE OF EVERYTHING : *HOW THINGS WORK IN OUR WORLD BY NATIONAL GEOGRAPHIC EDITORS*, ISBN 978-1-4262-1168

** NOTE about the textbook. It will be used in the course, so you will need the book. The softcover version is not available in the quantity needed for the course through the bookstore, so you can try online sources for the book. If you can't get the softcover version, you can order the hard cover version through the school book store. The textbook is not as comprehensive as you will need for the course, but I've also had to buy many high priced textbooks myself, so this book is interesting, sufficient to give you basic required information, and depending on the quality and version you get should only be between about \$5.00 and \$35.00

The ISBN number for the hardcover version is ISBN-13: 9781426211683

GRADING:

Mid-term exam 25%

A comprehensive final exam 25%

Chapter assignments 25%

Individual real science project 15%

Study guide development 10%

Each student will be responsible for developing a set of study notes on a chapter that will be shared with other students. Study notes can be submitted as a PowerPoint Q&A, or as a series of 20 possible test questions

Exams will be primarily based on material presented in the course and the student developed Study Guides. Each student in a Tool group will pick an invention from the book and will need to be ready to answer additional questions about that invention on the tests

Students will develop expertise they will share as an Individual Real Science Project. They will conduct a prearranged scientific demonstration of a scientific principle/ concept covered in the course. This expertise can be demonstrated through a PowerPoint Presentation, a 5-10 page paper, or multimedia demonstration.

GRADE RANGE:

A: 100-92%

A-: 92-90%

B+: 90-87%

B: 87-83%

B- 83-80%

C+: 79-77%

C: 77-75%

C-: 77-70%

D: 69-66%

F: 65-0%

CLASS SCHEDULE :

The course is fully online and based on the textbook *The Science of Everything* by National Geographic, material provided within the course, and student's ability to research topics through available Internet and college research materials.

This is an asynchronous, online course, delivered in the Blackboard (Bb) learning management system (LMS). That means that there will be no required real time interaction. You can create your own work schedule as long as you meet all course expectations, deliverables and due dates. All assignments and course interactions will utilize internet technologies. See "Technical

Requirements” section for more information.

The course will be generally self-paced with students given due dates for completion of each course requirement. All assignments are due by the posted due date. **No credit will be given for work submitted after the specified due date. Work submitted early**

Exams will have a window for completion.

Students will need to complete the mid-term between **October 21st and October 24th**

The Final Exam will need to be completed between **December 9th and December 13th**

Students who cannot complete the mid-term or final in the specified window will need to establish an alternate time and method to take their exams with the instructor **BEFORE** the stated start of the exam window.

Preferred Method of Contact with Instructor:

My preferred method of contact is via the Blackboard online forums. If you have a question, try and determine if it could pertain to others in the class. If so, post your question in the appropriate chapter discussion folder. If it is something that you feel is personal, or only would pertain to you, you can contact me by email at Thomas.Rosati@Stonybrook.edu. If you need to discuss something with me in another way, please email me so that we can set up a mutually agreeable time. I do not have regularly scheduled office hours for this class, but I will be teaching another class on campus on Monday and Wednesday mornings. I will respond to your emails as soon as possible, but please allow between 24-48 hours for a response with the large class size. Please utilize your Stony Brook University email when getting in touch with me as that is the preferred method of contact from the institution.

IMPORTANT: If at any point you should encounter any technical issues, please send an email to blackboard@stonybrook.edu, they can also be reached by telephone at 632-2777. You should also copy me on this email so that I am aware of the situation and if possible include a screen-shot of the issue.

Academic Policies:

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 are required to report any suspected instances of academic dishonesty to the Academic Judiciary. 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: 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.

University Student Conduct Code can be found at (check for most current version) <http://studentaffairs.stonybrook.edu/ucs/docs/universitystudentconductcode.pdf>

ADA & Disability Support Services (DSS) Statement: The Rehabilitation Act of 1973 – Section 504 applies to all postsecondary educational programs that receive federal assistance. Reasonable accommodations and academic assistance are provided to students with disabilities registered with the Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>.

Course Materials and Copyright Statement: Course material accessed from Bb, SB Connect, 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 and Student Conduct Codes.

Netiquette Guidelines:

The following are guidelines for participation on the discussion Board and in the course:

- Remember that with the absence of face-to-face communication it's easy to misunderstand
- Carefully review and read materials that you receive electronically to ensure that you fully understand the message
- Be sure to carefully re-read and understand what you will be sending in order to ensure that you are not misunderstood by anyone
- Discussion of a wide variety of opinions in higher education is encouraged, but it is important to be polite, and to clearly communicate if you disagree, and support your own ideas with academic sources over personal opinions
- Avoid cluttering your messages with excessive emphasis (stars, arrows, exclamations)
- If you are responding to a message, either include the relevant part of the original message in your message, or make sure refer to the original's contents so as to avoid confusion
- Be specific and clear, especially when asking questions
- DON'T GIVE YOUR RESPONSES the appearance of shouting; it makes the message less readable;
- Remember that not all readers have English as their native language, so make allowance for possible misunderstandings. And if English is not your native language and you do not understand something, please ask for it to be rephrased if it doesn't make sense to you.

Technical Requirements:

This course requires that you have access to the Internet. You are responsible for having a reliable computer and internet connection throughout the course. You will need to have access to, and be able to use the following software:

- ✓ A web browser (for instance, Google Chrome, Mozilla Firefox or Internet Explorer)
- ✓ Adobe Acrobat Reader (free)
- ✓ Adobe Flash Player (free)
- ✓ Microsoft Word (free to Stony Brook University students, go to

<https://it.stonybrook.edu/software/title/microsoft-office>)

Please note! You will be limited if you expect to complete your work on a smart phone or tablet Blackboard is not always compatible with Apple technologies. . Please submit Microsoft Word files , not PAGES formatted work.

Email and Internet

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. Even though you have been

given flexibility in when you do assignments, Please plan on checking your SBU email account regularly for course related messages. Five times a week to at least check your mail is suggested

To log in to Stony Brook Google Mail

Goto <http://www.stonybrook.edu/mycloud> and sign in with your NetID and password.

This course uses Bb for the facilitation of communications between faculty and students, submission of assignments, and posting of grades.

The Bb Course Site can be accessed at

<https://blackboard.stonybrook.edu>

Getting Technical Help:

Campus Network or Bb Outage

When access to Bb is not available for an extended period of time (greater than one entire evening - 6pm till 11pm) you can reasonably expect that the due date for assignments will be changed to the next day (assignment still due by midnight).

Help-Desk

You can call the SPD Online office at 631.632.9484 between the hours of 9:00am and 5:00pm, Monday through Friday or e-mail spd_online@stonybrook.edu.

For assistance after 5 PM or over the weekend, please contact the Open SUNY Technical Support, information can be found at <http://open.suny.edu/support/contact-us/current-students/>

Getting Help with Bb Learning Management System (LMS)

Students that need help with Bb can contact the TLT Student Help Desk by calling (631) 632-9602, emailing helpme@stonybrook.edu; more information is available via Stony Brook IT:

<http://it.stonybrook.edu/services/blackboard#section-6706>

Frequently ask questions about the Bb LMS along with tutorials are available here:

<http://it.stonybrook.edu/services/blackboard/navigate-manage>

Academic Support:

SPD Subject Guides - The SPD Subject Guide is a library website specifically designed to assist SPD students with their research. It contains all of the information referenced on this Blackboard page as well as recommendations for specific databases and a live librarian chat feature.

<http://guides.library.stonybrook.edu/spd>

Library Instruction Website - <http://library.stonybrook.edu/workshops-this-week-citationskills-worldcat-and-endnote-the-hsc/>

SBU Library Research Guides and Tutorials

<http://library.stonybrook.edu/research/research-basics/>