1. SP211 General Physics I

2. 4 credit hours, 3 recitation hours, 2 laboratory hours

3. Course Coordinator: Prof Paul Mikulski

4. Textbook: Fundamentals of Physics, Halliday, Resnick and Walker, 10th edition

   a. Supplemental materials: Wiley Plus online system

5. Specific course information

   a. The first of a two course sequence emphasizing the fundamental principles of classical physics and a variety of applications. Topics include mechanics, electricity, magnetism, wave motion, fluids, sound, and light. Lectures, recitations, hands-on laboratories, and large-scale demonstration lectures are employed.

   b. Prereq: SC112 or SC151; Coreq: SM221 or SM223 or SM251 or approval of department chair.

   c. Required course

6. Specific goals for the course

   a. At the conclusion of the course, students will be able to:

- **Recognize** basic physical quantities in language, connect them with their mathematical definition, and **demonstrate** a direct algebraically-driven calculation from the definition.
- **Conceptualize** fundamental key quantities and **refine / modify** their intuitions about their physical world with the help of dynamic visualizations. *(This is specifically NOT driven by calculations.)*
- In problems driven by a single key concept or idea, **construct** basic connections between quantities to **breakdown / illustrate** the main idea.
- Reliably **employ** advanced mathematics as a means to **explore** and **produce** calculations in the context of a rich, multi-faceted problem. *(The main target here is typically problems that require vector fluency.)*
- **Develop** and **implement** techniques for tracking work and keeping calculations reliable. *(This refers to simple problems where techniques [such as sketches, dimensional analysis] ensure confident analysis and calculation.)*

- ☐ **Apply** skills from previous core courses to physics problems that are largely single main concept problems utilizing differential or integral calculus.

b. This course introduces the following Student Outcomes

- ☐ (a) an ability to apply knowledge of mathematics, science, and engineering
- ☐ (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- ☐ (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- ☐ (d) an ability to function on multidisciplinary teams
- ☐ (e) an ability to identify, formulate, and solve engineering problems
- ☐ (f) an understanding of professional and ethical responsibility
- ☐ (g) an ability to communicate effectively
- ☐ (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- ☐ (i) a recognition of the need for, and an ability to engage in life-long learning
- ☐ (j) a knowledge of contemporary issues
- ☐ (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

7. Topics covered:

- Kinematics,
- Vectors and Multi-Dimensional Motion
- Relative Motion
- Newton's Laws
- Work and Energy
- Center of Mass
- Impulse and Momentum
- Rotational Motion
- Torque and Angular Momentum
- Gravity
- Fluids at Rest
- Simple Harmonic Motion
- Introduction to Waves
- Sound