昆山杜克大学
DUKE KUNSHAN UNIVERSITY

PHY 141K

General Physics I

Fall 2015

Dates / contact hours: Fall 2015, Session 1, 300 contact minutes per week for seven weeks
Academic Credit: 1 course
Areas of Knowledge: NS, QS
Modes of Inquiry: STS
Course format: Course will consist of lectures, hands-on demonstrations, problem-solving recitation sections, and labs.

Instructor's Information

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Prerequisite(s), if applicable

Prerequisites: one year of college calculus (or equivalent) such as Mathematics 105L, 106L, or 21. Mathematics 122 recommended. Closed to students having credit for Duke University Physics 151L, 153L, or 161L.

Course Description

First part of a two-semester, calculus-based, physics survey course for students planning study in medicine or the life sciences (the second semester course may be developed in the future for DKU). Topics: kinematics, dynamics, systems of particles, conservation laws, statics, gravitation, fluids, oscillations, mechanical waves, sound, thermal physics, and the laws of thermodynamics. This course will cover 75-80% of the material in the Duke Physics 141L (lecture) and Physics 141R (recitation) courses. Some of the problem-solving sessions that constitute the Duke 141R course will be incorporated into optional office hours. Exams will be take-home exams so that class time is not used. The 300 minutes of contact time per week will be three 75 minute lectures per week (with some classroom demonstrations) plus a 75 minute laboratory. Labs will emphasize the collection and analysis of data for comparing real world observations to theoretical models, as well as elementary statistics needed for the analysis of experimental data.

Course Goals / Objectives

Students will be expected to learn basic physics principles and apply them to solve simple physics problems. There will be six labs intended to be identical to the labs currently implemented in the Duke University version of the course. These labs will focus on mechanics and teach data collecting and analysis. They will require write ups that are intended to teach students to make careful measurements, analyze their data, and effectively communicate their findings.

Required Text(s)/Resources

Halliday, Resnick, Walker, "Fundamentals of Physics", Vol. 1, 10th ed. (ISBN-978-1118230718)

Recommended Text(s)/Resources

None.

Additional Materials (optional)

None

Course Requirements / Key Evidences

Students will be asked to do roughly 2 problem sets per week. There will be regular quizzes to test acquisition of concepts, and three midterms and a final exam that will contain more involved problem solving. Students will also be asked to complete 6 labs as part of a team of 3 or 4 students and submit individual written reports**.**

Technology Considerations, if applicable

In lecture I will mostly use the blackboard. There will be physical demonstrations using physical objects (e.g., gyroscopes) and I also have demonstrations that I have made that I show to the students using an AV system linked to my computer. These are java applets, Mathematica applets, and movies that I have downloaded from the internet or made myself which dynamically illustrate physics concepts.

The labs will use the ioLab technology recently developed by Prof. Matt Selen of UIUC. These devices are currently being used in the Duke University version of the course in Spring and Summer 2015. These devices allow measurement of motion, forces, and can even make electrical/thermal measurements. They allow for an easy interface with computer programs that allow students to easily perform fairly sophisticated data analysis.

Assessment Information / Grading Procedures

- Homework: 10%
- Quizzes: 10%
- Lab: 10%
- Midterm 1: 15%
- Midterm 2: 15%
- Midterm 3: 15%
- Final Exam: 25%

Diversity and Intercultural Learning (see Principles of DKU Liberal Arts Education)

Though this course will not address issues related to cultural diversity, team-based problem solving and labs will encourage communication and intellectual exchange amongst students and faculty.

Course Policies and Guidelines

- **COURSE POLICIES AND GUIDELINES:**
  Instructors' expectations for all assignments and activities will be made as explicitly as possible, given the likelihood of a wide range of background conventions and habits among the students. The Duke Kunshan University Community Standard will be discussed and adhered to.

- **ACADEMIC INTEGRITY:**
  Each student is bound by the academic honesty standard of the Duke Kunshan University. Its Community Standard states: "Duke Kunshan University is a community composed of individuals of diverse cultures and backgrounds. We are dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Members of this community commit to reflect upon and uphold these principles in all academic and non-academic endeavors, and to protect and promote a culture of integrity." Violations of the DKU academic honesty standard will not be tolerated. Cheating, lying, falsification, or plagiarism in any practice will be considered as an inexcusable behavior and will result in zero points for the activity.

- **CLASS ATTENDANCE:**
  Students are responsible for all the information presented in class. Class attendance and participation are important components of the learning experience. All students are expected to participate during class time.

- **POLICY ON MAKE-UP WORK/EXAMS:**
  Students are allowed to make up work only if missed as a result of illness or other unanticipated circumstances warranting a medical excuse, consistent with DKU policy. You must notify the instructor in advance if you will miss an exam or project deadline. Documentation from a health care provider is required upon your return to class. Project extensions requested for medical reasons must be negotiated at the time of illness.

The use of mobile phones, tablets, and laptops is not permitted during the class, except when approved by the instructor.

Tentative Course Outline or Schedule

I plan to meet with students four times a week for an hour and 15 minutes. Three days will be lectures and physical demonstrations and video demonstrations. One meeting will be a lab. I will have extensive office hours in which the students can come to discuss homework problems. I anticipate covering the following topics in each week of the course.

- Week 1: Motion in 1, 2, and 3 Dimensions, Vectors
- Week 2: Force and Motion, Kinetic and Potential Energy, Conservation of Energy, Work
- Week 3: Center of Mass, Conservation of Momentum
- Week 4: Rotation, Rolling Motion, Torque, Angular Momentum, Statics
- Week 5: Gravitation, Fluids
- Week 6: Oscillations, Waves on a String
- Week 7: Sound, Thermodynamics

In the course at Duke I give three midterms and weekly quizzes. To save class time these will be given outside of class.