SABANCI UNIVERSITY

Faculty of Eng. & Natural Sci.
NS 213
Basic Concepts of Physics for Scientists and Engineers

Instructor:

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Course Content

Observing and understanding the workings of nature and expressing this understanding in models and mathematical language is fundamental to the study of science and technology. This course introduces the basic concepts of physics and the methods of modeling and solving problems in science. The subjects to be covered are (mathematical content is noted in parentheses):

1. Mechanics: Newton's Laws of Motion. Energy Momentum and Angular Momentum. The Kepler problem. The study of systems near stable equilibrium: harmonic oscillators. Periodic motion; (the sinusoidal functions). Exponential damping and growth (the exponential function).

2. Statistical physics: The ideal gas law derived from mechanics. Meaning of temperature and pressure. Boltzmann definition of entropy based on the number of possible states (probability), with one simple example, the partitioning of a gas of N molecules into two half volumes: In a macroscopic system (large N), the most probable situation is much much more probable than anything else- the 2nd Law of Thermodynamics.

3. Electromagnetism. Electric and magnetic fields. The concepts of flux and circulation. Maxwell's Equations and applications in the simplest geometry of two parallel plates (simple line and surface integrals). Electromagnetic wave propagation (the wave equation).

4. Quantum Physics. The Bohr model of the atom. Wave-particle duality and the Uncertainty Relation are needed to understand the properties of matter: What determines the size and structure of an atom? Relation between wavelength and system size. Why is there a Periodic Table ? The Pauli Principle.

TEXT BOOK:

Science of Nature I, M. Ali Alpar (uploaded in the main page under "text book" folder)

Read Chapters 1 to 5, we will stars with a summary of Chapters 4 and 5.

GRADING:

- Midterm Exam I

- Midterm Exam II

- Final Exam

You should take at least any two of these exams with 50 % weight for each. There is no make-up exam. For those who took all three exams, we will count the exams with the highest two grades to calculate the letter grade.

Questionnaires: 10 % (There will be 8 -12 (or more) questionnaires which are given at random times in some of the lectures. In these questionnaires, you are asked simple questions and/or the points that you did not understand in the current subject, which provide a feed-back for the instructor to clarify these points in the following lectures. This additional 10% could be considered as a bonus in your total grade. There won't be make up for the questionnaires that you fail to attend, even if you have reasonable excuses. To compensate for this, we do not count 3 of the questionnaires. (For instance, if 12 questionnaires are given in a particular semester, those who attend 9 (or more) get full 10 %). The questionnaires will be given in SUCourse. You should bring your own device to the classroom (mobile phone, ipad..) for you to submit your answers on-line. Only those who are currently present in the class or in the on-line connection can attend the given questionnaire. **During the lectures you are allowed using electronic devices only for questionnaires.**

Your total grade is converted into letter grade as follows:

85 - 100:	A	55 – 59:	C
80 – 84:	A-	50 – 54:	C-
75 – 79:	B+	45 – 49:	D+
70 – 74:	B	40 – 44:	D
65 – 69:	B-	< 40 : F	
60 – 64:	C+		

Academic Integrity

In the exams each student will be evaluated only for her/his own work. Students are encouraged to work and study together. But what you put down on exam papers should be your own work in your own words. If your friends want to use of your paper in exams, assignments or quizzes, to allow this is not helping them. Such behavior, as all forms of cheating, is unfair and disrespectful, to yourself, to all the students in the class, to your teachers and teaching assistants, and to the university. A student involved in cheating has misused the trust extended to him or her. Violations of academic integrity will result in zero grades, both for those who cheat and those who allow and help them. These students may also face disciplinary action. In all such situations we will ask you to have a face-to-face meeting with your faculty member. We have mutual trust and respect for each other as individuals sharing in a collaborative learning experience. This is very valuable for all of us, and having to lose this trust and respect would be very regrettable.