

UCD School of Physics

Introductory Physics I - Syllabus - Calculus based

Summer Session 1 2018

1. Aims

The principal aim of this course is to provide a firm understanding of physical concepts and processes leaning heavily upon standard physics U.S. textbooks. Another principal aim of the course will be to apply the concepts learnt to recent advances in our understanding of science in general. In particular, ways in which biological and medical phenomena may be better understood from a physics viewpoint will be stressed, under the headings of physiology, diagnosis and therapy, and on scales from the cell through macro-organisms to the environment. The treatment of calculus is on the light side - it is used in instruction, but not heavily examined in the MCQ or written papers. This is more in keeping with the life sciences approach than that of the engineering disciplines.

2. Objectives

By the end of this course it is to be expected that the students will have acquired an understanding of the following concepts and principles:

- Velocity and acceleration of an object
- The gravitational force and the weight of an object
- Work and both potential energy and kinetic energy
- Torque and rotational motion
- Impulse and both linear momentum and angular momentum
- Pressure in a fluid and viscous flow
- Elastic deformation and oscillatory motion
- Wave motion
- Transmission of sound
- The properties of an ideal gas
- The nature of heat
- Thermodynamics

3. Materials List

The core text (which is **Calculus** based) is: '*Serway's Principles of Physics*' by Jewett & Serway (publisher: Thomson, 5th edition, 2013). Most of the assigned problems in the course will be taken from this book.

Please note this core text is supplied as an e-book free of charge to all students.

Required

Students are only allowed to use on this program *Non-graphing & Non-programmable calculators*. Use of Graphing & Programmable calculators is strictly prohibited.

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4. Teaching Methods

(a) Lectures

There are eight lectures per week scheduled for one hour.

(b) Homework/ Problem Solving

One set of problems will be handed out each week, which must be submitted for marking.

(c) Tutorial Workshops

There are two 1-hour workshops each week devoted to problem solving, these will be group-based, with each group comprising three students, graded as a group.

(d) Laboratory

Laboratory sessions are where practical learning experiments are performed. Here students will work in pairs and will be graded in pairs.

Independent Study

It is estimated that each module will require a minimum of 80 hours independent study.

5. Assessment

The course will be assessed by means of a mid-session quiz and final examination, as well as the Laboratory and the problem sets.

	Date	Weighting
Problem Sets/Tutorials	Weekly Assessment	15%
Mid-Session Quiz	1 Exam – Mid Term	10%
Final Examination	1 Exam – End of Term	50%
Laboratory	Weekly	25%

6. Program Director

Prof Padraig Dunne

Program Manager

Mr John Brennan - Room 110, UCD School of Physics, Science
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UCD School of Physics

Introductory Physics II- Syllabus - Calculus based

UCD Summer Physics Session 2 2018

1. Aims

The principal aim of this course is to provide a firm understanding of physical concepts and processes leaning heavily upon standard physics U.S. textbooks. Another principal aim of the course will be to apply the concepts learnt to recent advances in our understanding of science in general. In particular, ways in which biological and medical phenomena may be better understood from a physics viewpoint will be stressed, under the headings of physiology, diagnosis and therapy, and on scales from the cell through macro-organisms to the environment. The treatment of calculus is on the light side - it is used in instruction, but not heavily examined in the MCQ or written papers. This is more in keeping with the life sciences approach than that of the engineering disciplines.

2. Objectives

By the end of this course it is to be expected that the students will have acquired an understanding of the following concepts and principles:

- The concepts of electric fields and electric potentials
- An appreciation of electric currents
- The concept of magnetic fields
- Electromagnetic waves
- The refraction of light
- Geometric optics
- Optical instruments
- The interference of light and other electromagnetic waves
- Wave/particle duality
- Early quantum mechanics
- Atomic physics
- Nuclear structure
- Radioactivity

3. Materials List

The core text (which is **Calculus** based) is: '*Serway's Principles of Physics*' by Jewett & Serway (publisher: Thomson, 5th edition, 2013). Most of the assigned problems in the course will be taken from this book.

Please note this core text is supplied as an e-book free of charge to all students.

Required

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UCD School of Physics

Introductory Physics II- Syllabus - Calculus based

UCD Summer Physics Session 2 2018

4. Teaching Methods

(a) Lectures

There are eight lectures per week scheduled for one hour.

(b) Homework/ Problem Solving

One set of problems will be handed out each week, which must be submitted for marking.

(c) Tutorial Workshops

There are two 1-hour workshops each week devoted to problem solving, these will be group-based, with each group comprising three students, graded as a group.

(d) Laboratory

There are two 3-hour laboratory afternoons each week in which a new experiment is performed each afternoon. Here the students will work in pairs and will be graded in pairs.

Independent Study

It is estimated that each module will require a minimum of 80 hours independent study.

5. Assessment

The course will be assessed by means of a mid-session quiz and final examination, as well as the Laboratory and the problem sets.

	Date	Weighting
Problem Sets/Tutorials	Weekly Assessment	15%
Mid-Session Quiz	1 Exam – Mid Term	10%
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