AMERICAN COLLEGE *of* THESSALONIKI

Division of Science and Technology

SNCP 120: University Physics I, for Science & Engineering

FALL2019

Lecture Syllabus (4 credits)

Instructors: Dr. Ioannis P. Antoniades (Section L),
Dr. Konstantinos Kanakoglou (sections K,M,N)
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Office hours (I. Antoniades): Tuesday 15:00 – 15:45 and Tuesday, Thursday 17:40-18:10 .
Office hours (K. Kanakoglou): Monday, Tuesday, Thursday 16:00 – 17:00.

REGULAR CLASS/LAB HOURS:

Section	Monday	Tuesday	Wednesday	Thursday	Friday (LAB)
M	10:00–11:40	10:00–11:40		10:00–11:40	10:00–11:55
N	12:00–13:40	12:00–13:40		12:00–13:40	12:00–13:55
K	14:00–15:40	14:00–15:40		14:00–15:40	14:00–15:55
L	16:00–17:40	16:00–17:40		16:00–17:40	16:00–17:55

Classes will be held at the ground floor of "Kyrides Hall" (Fab lab).

EXTRA PROBLEM SOLVING SESIONS/TUTORIALS
(Instructor: Ms. Eleni Lykartzi)

Section	Monday	Tuesday	Wednesday	Thursday	Friday
M			12:00–13:00		
N			13:00–14:00		
K			15:00–16:00		
L				10:00–11:00	

The Location of Problem Solving Sessions will be announced in class.

Course description

This course meets 3 times a week in 2x50 minute sessions. It is designed to introduce students to the fundamental principles of Mechanics. Topics to be covered include Dynamics, Work, Kinetic and

Potential Energy, Systems of Particles, Momentum, Collisions, Rotation, Torque and Angular Momentum, Statics. As far as specific Systems and Force Laws we will look at Fluids, Oscillations, and Gravity.
A detailed list of the textbook Chapters/Sections covered in this course can be found in *Appendix I*.

Learning goals

In this course, we want you to learn how to analyze mechanical systems using Newton's laws. Inparticular, youwillbe taught to:

1. Describe motion graphically and algebraically in terms of velocity, acceleration and trajectory
2. Apply calculus to the study of mechanics
3. Identify the forces acting on a system, and represent these by a suitable vector diagram
4. From your analysis of these forces, explain the motion of a system based on Newton's laws of motion
5. Understand the principles of conservation of momentum, energy, and angular momentum, and be able to use these principles to analyze bodies and systems of particles
6. Analyze the motion of rigid bodies in rotation
7. Determine the forces, torques and angles of systems of bodies in static equilibrium
8. Understand the basic principles of Newton's theory of gravitation
9. Understand basic Fluid statics and dynamics
10. Analyzeoscillatorymotion.

TextbookandMaterials

1. **University Physics, 14th edition, by Young & Freedman, Pearson.**
   Young, Hugh D. Sears and Zemansky's university physics : with modern physics. – 14e (global edition)ISBN 13: 978-1-292-10040-0;

2. Access to **MasteringPhysics** on-line learning support system.
   http://www.pearsonmylabandmastering.com/global

3. **Scientific calculator (without CAS built-in functionality)**

Attendance

Students are required to attend their assigned section. It is the student's responsibility to keep a record of the absences made.

ACT Absence Policy

Students are expected to attend and participate in all of their courses throughout the term, including the first week. Those who fail to do so may be administratively withdrawn from individual courses of the College. **This may affect the students' scholarship and financial aid eligibility.**

A student is considered to have successfully attended a course if s/he has attended **75% of the course lectures**. A student is considered to have successfully attended a course if he/she has attended **75% of the course lectures**. Thus, for a typical ACT course with 42 hours of contact time, the maximum number of absences stands at **10 hours per course.** This policy applies to all ACT students, degree-seeking and Study Abroad. **Please note that absences are**

counted on an hourly basis. Absences due to participation in school-related trips and activities may count toward this limit.

Grading

Two midterm exams and a comprehensive final exam will be given. During the semester there will also be several required on-line homework assignments available via Mastering Physics. Homework is graded automatically via **MasteringPhysics™** upon submission. Instructor will give feedback in office hours on missed questions. Homework will be due usually every Monday at 12:00 midnight, unless otherwise required by the instructor. Finally, 2-3 short quizzes (30'-45') will be given in the beginning of lecture testing knowledge of material covered in the homework of the previous week.

The **final grade** for the course will be computed as follows:

20% –Homework
15% – 1st MidTerm exam
15% – 2nd MidTerm exam
25% – Final exam
10% - Short quizzes
15% - Physics Lab (see details later in the syllabus)

Grading will be performed using an absolute scale.

GradeDescription	% points	US LetterGrade	US pointgrade
Excellent	95-100	A	4.0
VeryGood (high)	90-94	A-	3.67
VeryGood (low)	85-89	B+	3.33
Good (high)	80-84	B	3.0
Good (low)	75-79	B-	2.67
Satisfactory (high)	70-74	C+	2.33
Satisfactory (low)	65-69	C	2.0
Fail	0-64	F	0

AcademicIntegrity

Students must comply with the ACT College-wide Policy on Academic Integrity (See Appendix II for relevant policies).

ClassroomExpectations

- Students are expected to come to class on time, stay for the whole class, refrain from side conversations, and be courteous to the professor and their fellow students.
- Phones or any other form of technology should be silenced before class.

- Texting, using Facebook and surfing the Internet during class is not conducive to learning. If this type of behavior becomes disruptive, the professor may ask a student to leave class for that lecture period.
- There will be no make-up exams or extensions to the homework deadlines.

How to prepare for each lecture:

Students must prepare for every lecture by reading in advance the appropriate chapter of the assigned textbook and/or supplementary material provided by the instructor. **Students are expected to monitor instructor's announcements and/or extra material posted on the course's web site at http://moodle.act.edu. A copy of the powerpoint slides used in lecture will be available at Moodle.** ***Check Moodle regularly for an up-to-date, day-by-day schedule of reading assignments for each chapter*.**

The instructor reserves the right to make changes in the course syllabus during the semester. If changes are made, students will be officially notified in class and the changes will be posted at Moodle.

SNCP 120L: University Physics I, for Science & Engineering, Laboratory

Fall 2019

Laboratory Syllabus (1 credit)

Labs will be held at "Kyrides Hall" at the Anatolia East Campus (Fab Lab)

Lab material

- Local Laboratory handouts will be provided by the instructor (available via http://moodle.act.edu/).

Course description

SNCP 120L is a 2 hour laboratory course to accompany SNCP 120. The laboratory exercises are designed to illustrate the principles described in SNCP 120. Many of the experiments are scheduled to follow the lecture topics however, the lab is not meant to follow the lecture course on a day-by-day basis. A separate grade is assigned for this laboratory course.

Learning goals

Physics is an experimental science. The purpose of this laboratory is to expose the student to various Mechanics topics through experimentation, and to develop the student's laboratory skills. Studentswilllearn:

- The general procedures for conducting various elementary physics experiments.
- How to operate common physics laboratory equipment.
- How to collect, organize, analyze and report experimental data.

Indicative Grading:

The final lab grade will be computed as follows:

- **20%** –Laboratory participation, attendance and successful completion of the experiments.
- **70%** – Lab reports, Post-lab questions. Students will work in small groups. However, each student will have to submit his/her own lab report. Guidelines on how to prepare lab reports will be given during the first lab session by the instructor. Lab reports will be due at the beginning of the following week's lab session. Each lab report must include at minimum: An Introduction to the experiment, Data collected/used, Analysis/Plots, Answers to all Question asked within the lab, Final Conclusions, and References and/or Acknowledgements
- **10%** – Final exam addressing all labs conducted during the semester.

Attendance:

Students must attend the lab section they are assigned to. **No more than two (2) absences are allowed during the semester.If more than two (2) absences occur, the student automatically fails the laboratory course and no lab credit is received.** If a lab session is missed, the student is responsible for obtaining the data from his/her lab partners and submitting a lab report. Submitting a lab report late will result in a 5% per day penalty over the total points of the lab report. A summary

of the ACT absence policy is attached at the end of the syllabus. Lab reports will be due usually on Wednesdays of the week after the lab session, unless otherwise required by the instructor.

Safety:
Students are notrequired to wear lab-coats. Closed-toed shoes and long trousers/skirts must be worn in the laboratory. Unauthorized experimentation is strictly prohibited. Safety rules will be discussed extensively during the first lab session.

Miscellaneous supplies: A scientific calculator and a lab notebook.

How to prepare for each experiment:
Students must prepare for lab experiments by reading the appropriate chapter of the lab manual and/or instructor assigned supplementary material provided by the instructor, in advance of attending the lab. Students are expected to monitor the instructor's announcements and/or extra material posted on the course's web site at http://moodle.act.edu.

Indicative List of experiments

This course will include laboratories on:

1. **Measurements**
2. **Describing 2D Motion: Extracting measurements of projectile motion**
3. **Coplanar Forces and Statics**
4. **Work & Energy: Free fall and pendulum**
5. **Conservation of Momentum**
6. **Describing rotational motion: Maxwell's Wheel**
7. **Vibrations**

The instructor reserves the right to make changes in the course syllabus during the semester. If changes are made, students will be officially notified in class and the changes will be posted at Moodle.

Appendix I – Textbook Sections covered in this class

Sections in **bold** will be presented in detail in lecture, while ones in regular font will be presented in summary and upon the discretion of the instructor.

MECHANICS

1 UNITS, PHYSICAL QUANTITIES, AND VECTORS

1.1 The Nature of Physics
1.2 Solving Physics Problems
1.3 Standards and Units
1.4 Unit Consistency and Conversions
1.5 Uncertainty and Significant Figures
1.6 Estimates and Orders of Magnitude
1.7 Vectors and Vector Addition
1.8 Components of Vectors
1.9 Unit Vectors
1.10 Products of Vectors
Summary
Questions/Exercises/Problems

2 MOTION ALONG A STRAIGHT LINE

2.1 Displacement, Time, and Average Velocity
2.2 Instantaneous Velocity
2.3 Average and Instantaneous Acceleration
2.4 Motion with Constant Acceleration
2.5 Freely Falling Bodies
2.6 Velocity and Position by Integration
Summary
Questions/Exercises/Problems

3 MOTION IN TWO OR THREE DIMENSIONS

3.1 Position and Velocity Vectors
3.2 The Acceleration Vector
3.3 Projectile Motion
3.4 Motion in a Circle
3.5 Relative Velocity
Summary
Questions/Exercises/Problems

4 NEWTON'S LAWS OF MOTION

4.1 Force and Interactions
4.2 Newton's First Law
4.3 Newton's Second Law
4.4 Mass and Weight
4.5 Newton's Third Law
4.6 Free-Body Diagrams
Summary
Questions/Exercises/Problems

5 APPLYING NEWTON'S LAWS

5.1 Using Newton's First Law: Particles in Equilibrium
5.2 Using Newton's Second Law: Dynamics of Particles
5.3 Frictional Forces
5.4 Dynamics of Circular Motion
5.5 The Fundamental Forces of Nature
Summary
Questions/Exercises/Problems

6 WORK AND KINETIC ENERGY

6.1 Work

6.2 Kinetic Energy and the Work–Energy Theorem

6.3 Work and Energy with Varying Forces

6.4 Power

Summary

Questions/Exercises/Problems

7 POTENTIAL ENERGY AND ENERGY CONSERVATION

7.1 Gravitational Potential Energy

7.2 Elastic Potential Energy

7.3 Conservative and Non-conservative Forces

7.4 Force and Potential Energy

7.5 Energy Diagrams

Summary

Questions/Exercises/Problems

8 MOMENTUM, IMPULSE, AND COLLISIONS

8.1 Momentum and Impulse

8.2 Conservation of Momentum

8.3 Momentum Conservation and Collisions

8.4 Elastic Collisions

8.5 Center of Mass

8.6 Rocket Propulsion

Summary

Questions/Exercises/Problems

9 ROTATION OF RIGID BODIES

9.1 Angular Velocity and Acceleration

9.2 Rotation with Constant Angular Acceleration 283

9.3 Relating Linear and Angular Kinematics

9.4 Energy in Rotational Motion

9.5 Parallel-Axis Theorem

9.6 Moment-of-Inertia Calculations

Summary

Questions/Exercises/Problems

10 DYNAMICS OF ROTATIONAL MOTION 308

10.1 Torque

10.2 Torque and Angular Acceleration for a Rigid Body

10.3 Rigid-Body Rotation about a Moving Axis 314

10.4 Work and Power in Rotational Motion

10.5 Angular Momentum

10.6 Conservation of Angular Momentum

10.7 Gyroscopes and Precession

Summary

Questions/Exercises/Problems

11 EQUILIBRIUM AND ELASTICITY

11.1 Conditions for Equilibrium

11.2 Center of Gravity

11.3 Solving Rigid-Body Equilibrium Problems

11.4 Stress, Strain and Elastic Moduli

11.5 Elasticity and Plasticity

Summary

Questions/Exercises/Problems

12 FLUID MECHANICS

12.1 Density
12.2 Pressure in a Fluid
12.3 Buoyancy
12.4 Fluid Flow
12.5 Bernoulli's Equation
12.6 Viscosity and Turbulence
Summary
Questions/Exercises/Problems

13 GRAVITATION

13.1 Newton's Law of Gravitation
13.2 Weight
13.3 Gravitational Potential Energy
13.4 The Motion of Satellites
13.5 Kepler's Laws and the Motion of Planets
13.6 Spherical Mass Distributions
13.7 Apparent Weight and the Earth's Rotation
13.8 Black Holes
Summary
Questions/Exercises/Problems

14 PERIODIC MOTION

14.1 Describing Oscillation
14.2 Simple Harmonic Motion
14.3 Energy in Simple Harmonic Motion
14.4 Applications of Simple Harmonic Motion
14.5 The Simple Pendulum
14.6 The Physical Pendulum
14.7 Damped Oscillations
14.8 Forced Oscillations and Resonance
Summary
Questions/Exercises/Problems

Appendix II – Policies

College-wide Policy on Academic Integrity

All academic divisions at ACT, both undergraduate and graduate, will apply the following policy on academic integrity:

“A student committing an act of Academic Dishonesty in a given course will receive an F (0 percentage points) in the assignment where the academic infraction took place. If a student commits an act of Academic Dishonesty for a second time in the same course, this student will receive a failing grade in that course.

The individual faculty is responsible for enforcing the policy in a conscientious manner, for reporting all cases to the Academic Standards & Performance Committee (AS&PC) for record-keeping and for informing the affected students of their right to appeal the faculty’s decision to the AS&PC. Faculty must also insert the college’s policy on Academic Integrity in their course syllabi.”

Statement on Academic Integrity

"The College has the responsibility of maintaining the highest possible standards of academic integrity for the purpose of ensuring the quality of education it provides, underscoring its dedication to fostering a love of learning for its own sake, and of protecting those who rightly practice integrity in their academic affairs. It is the responsibility of the student to be informed about the college's policy on Academic Integrity, to refrain from infractions of that policy and from conduct, which may lead to suspicion of infractions, and to refrain from aiding or encouraging others in such infractions. It is the responsibility of the faculty to establish and maintain an environment which is conducive to Academic Integrity."

Academic Honesty

"Academic Dishonesty is the violation of Academic Integrity, committed by engaging in any form of unethical behavior which violates acceptable standards of scholarly conduct. Such practices as cheating on examinations, submitting borrowed or purchased papers and/or prepared bibliographies as one's own, plagiarizing, falsifying or copying lab reports, or aiding another person in any of the above infractions of Academic Integrity, constitute acts of Academic Dishonesty."

Academic Standards & Performance Committee

A student may appeal an initial decision made by an individual faculty to a formal body called the Academic Standards & Performance Committee (an existing standing Committee), chaired by the Director of Academic & Student Affairs.

The AS&PC will meet as needed to evaluate appeals on alleged cases of academic dishonesty referred to the Committee by an involved party. Each case referred to the Committee will have a separate hearing (several hearings could conceivably take place during a single session of the Committee). Cases sent before the Committee deemed invalid will be dismissed. The AS&PC will keep records of all academic infraction cases, whether appealed or not and it will reserve the right to invite a student who has breached repetitively the school’s policy to a hearing that may lead to sanctions ranging from failure of an assignment, to failure of a course, semester-long dismissal from the college, expulsion from the college.