
Universidad de Ingeniería y Tecnología

Course Syllabus - Course 2017-1

1. **Course number and Name :** ME0019 Physics I
2. **Credits:** 4 credits
3. **Hours per session (Lecture and Lab):** 1 – Theory; 3 – Practical/Advice
Total number of sessions (Lecture and Lab): 15 – Theory; 15 – Practical/Advice
4. **Instructor's or course coordinator's name, e-mail and attention hours:**

Coordinador:

- Daniel Akamine Ramirez dakamine@utec.edu.pe
Office Hours: to be coordinated individually

Instructors:

Theory:

- Alexander Peña apena@utec.edu.pe
Office Hour: to be defined

Laboratory:

- Melchor Llosa mllosa@utec.edu.pe
Office Hour: to be defined

5. Text book, title, author, and year

a. Basic:

- Sears, Zemansky, Young, Freedman: "Universitary Physics", Vol. I, 13a ed. Pearson, 2013.
- Gil, Salvador. "Experimentos de Física, usando las TIC y elementos de bajo costo", 1ra ed. Buenos Aires. Argentina. Alfaomega Grupo Editor, 2014.
- Baird, D.C. "Experimentation, An Introduction to Measurements Theory and Experiments Design", 2da ed. Prentice Hall. 1991.

6. Specific course information

a. Brief description of the content of the course

The course develops the knowledge and skills to recognize, evaluate and apply the effects of physical phenomena related to mechanics in the field of engineering. In the industry, the control of processes, the operation of machines, their maintenance, etc., are always governed by some kind of physical manifestation. Because of this, it is important for the student to understand the fundamentals of physical phenomena, the laws that govern them, their manifestation and how to detect them. The present course will allow the student to understand and identify the physical phenomena related to mechanics so that they can control their effects on some technical process

b. Prerequisites or co-requisites: none

- c. Indicate whether a required, elective, or selected elective course in the program:**
Required

7. Specific goals for the course

a. Student outcomes for the course

At the end of the course the student will be able to:

- a2: Ability to apply science knowledge (level 1)
- b1: Ability to design and carry out experiments (level 1)

The course addresses the following outcomes of the ICACIT / ABET student: a, b

b. Course objectives or expected results from learning

- - Identify and differentiate scalar and vectorial magnitudes.
- - Distinguish the basic principles of the phenomena that govern classic physics (classical mechanics).
- - Apply the basic principles to specific situations and be able to associate them with real situations.
- - Analyze some of the physical phenomena as well as their application to real situations.

8. Brief list of topics to be covered

1. Work, Energy and Power
 - a) Definition of work and the relationship between work and energy
 - b) Power and Efficiency
 - c) Gravitational and elastic potential energy
 - d) Conservative and non-conservative forces
2. Kinematics
 - a) Position, velocity and acceleration vector
 - b) Angular velocity and acceleration
 - c) Relationship between linear and angular kinematics
 - d) Energy in the rotational movement
3. Newton's three laws
 - a) Newton's 3 laws and their application in particles
 - b) Moment of a Force
 - c) Rotation of a Rigid Body
 - d) Amount of linear and angular movement

9. Methodology and evaluation system

Methodology:

The course will be divided into three main themes, Work, Energy and Power, Kinematics and Newton's Three Laws. Each main theme will be presented and evaluated over two weeks. The entire course will be covered in six academic weeks. The entire course will be repeated three times throughout the semester. The first and second repetition will last six weeks. In the third repetition, the course will no longer be presented, it will only be evaluated. The third repetition will last only three weeks. The schedule is at the end of Syllabus.

The contents of the course will be presented through videos and slides made available to students before the start of classes. The student will have to understand the content and will be able to consult in the teacher's advisory hours or during the practice sessions (second session of the chronology of the course).

The chronology of the main themes will be:

First session - 1.1 (1 academic hour): Talk, presentation of the main theme and practical applications in engineering. Presentation of list of experiments proposed to be developed.

Second session - 1.2 (3 academic hours): Advising, session to develop problems and absolve students' doubts. The methodology will be similar to that of a directed practice. Students will be able to work in groups. No theory will be dictated.

Third session -2.1 (1 academic hour): Online quiz of the main theme.

Fourth session -2.2 (3 academic hours): Qualified practice that will consist of several problems.

In parallel, the student must design and perform an experiment related to the main subject studied and present the results following the schedule of the experimental evaluation.

Experimental Assessment:

For each main topic, the student must execute an experiment that the student himself will design. Before the execution, student will validate his experiment and the procedure with course instructor: Melchor Llosa. The student can use the Physics laboratory (L104) if he considers it necessary, in which he will have the guidance laboratory assistant. During the semester, the student must develop three experiments 1° Work-Energy-Power 2° Kinematics and 3° Newton's Law. 1° experiment will be due in week 6, 2° experiment will be due in week 12, 3° experiment will be due in week 15. During the auditoriums sessions, a set of proposals of experiments will be presented. Once the experiment is done, it must be registered in a video and a laboratory test will be given.

The flowchart of the experimental evaluation will be:

1) Perform experiment 1 and record it in a video, can separate time (day and time) to use the laboratory or can do it in another location

2) Separate time in the laboratory to present the video to the assistant, upload it to the Canvas and give the Quiz

3) If you do not pass the Quiz, return to point 1

4) If you pass, the video will go to the second reviewer who will again evaluate the quality of the video presented and the answers to the Quiz.

5) If it is disapproved by the reviewer, go to point 1

6) If the approver reviewer passes to experiment 2 and repeats for this purpose steps 1 to 5

7) If the approved reviewer passes to experiment 3 and repeats for this purpose steps 1 to 5

8) Three attempts are allowed per experience

The video must be presented in MP4 format of minimum video size of 480 and 24 FPS and

audio of 128 kb / s with white background and time limit of 3 minutes. The video must start with the name of the student and the title of the experience and also in its content the student must include the measurement program, which will demonstrate that he has elaborated the design of the experiment.

If the student does not complete the experience, he will be disapproved with a grade of zero (0) in that category. The videos will be evaluated according to the rubric.

Theoretical/Practical Assessment

For each main topic, there will be 2 theoretical-practical evaluations. The first one will be an online evaluation (Online quiz of the main topic), the second one a written evaluation (graded Test). To access the graded Test, the student must approve the online quiz. In case of disapproval, the theoretical-practical grade will be the grade of the online quiz for that main topic. The graded Test will be the resolution of a group of problems related to the main topic.

The course will be repeated three times according to the attached schedule. In the first repetition, the student will be able to have a maximum grade of 20 in any of the evaluations. In the second repetition, the student will be able to have a maximum grade of 17. In the third repetition, the student will be able to have a maximum grade of 14.

If the student approves a main topic, he / she will be exonerated of the following repetitions. If the student wishes to be evaluated in an approved main subject in the next repetition, he / she must redo the 2 evaluations (online quiz, qualified practice) again. The grade obtained on the next repetition will replace the previous grade, regardless of whether it is greater or less than the previous grade.

Evaluation Method

Each main topic will have a grade. All topics are important. Students must pass all three major topics to pass the course. Therefore, the grade for each main topic will be the minimum grade of the theoretical-practical evaluation and the experimental evaluation at the end of the course.

All three topics are important. Final grade will be the minimum grade of all three main topics.

Course Schedule

Semana		Trabajo, Energía y Potencia					Cinemática					Las tres leyes de Newton				
		Charla Auditorio	Asesoría	Quiz online	Práctica calificada	Presentación de resultados (Experimento)	Charla Auditorio	Asesoría	Quiz online	Práctica calificada	Presentación de resultados (Experimento)	Charla Auditorio	Asesoría	Quiz online	Práctica calificada	Presentación de resultados (Experimento)
1.1	Repetición 1	x				x					x					x
1.2			x													
2.1				x												
2.2					x											
3.1							x									
3.2								x								
4.1									x							
4.2										x						
5.1												x				
5.2													x			
6.1	Repetición 2					x					x			x		x
6.2															x	
7.1		x														
7.2			x													
8.1				x												
8.2					x											
9.1							x									
9.2								x								
10.1									x							
10.2										x						
11.1	Repetición 3					x					x	x				x
11.2													x			
12.1														x		
12.2															x	
13.1				x												
13.2					x											
14.1									x							
14.2										x						
15.1														x		
15.2															x	
16.1																
16.2																

Quiz online deberá ser aprobado para acceder a la práctica calificada. Si desaprueba, la nota del tema principal será la nota obtenida en el quiz online en esa repetición.

Repetición 1

Repetición 2 (esta nota reemplaza al de la repetición 1)

Repetición 3 (esta nota reemplaza al de la repetición 1 y 2)

Trabajo, Energía y Potencia

Trabajo, Energía y Potencia

Trabajo, Energía y Potencia

Cinemática

Cinemática

Cinemática

Las tres leyes de Newton

Las tres leyes de Newton

Las tres leyes de Newton

Nota final: La mínima obtenida de los tres temas principales en la última repetición que dió el alumno.