Universitat de Lleida

DEGREE CURRICULUM

PHYSICS

Coordination: CHEMISANA VILLEGAS, DANIEL

Academic year 2021-22

PHYSICS 2021-22

Subject's general information

<table>
<tr><td>Subject name</td><td>PHYSICS</td></tr>
<tr><td>Code</td><td>101402</td></tr>
<tr><td>Semester</td><td>1st Q(SEMESTER) CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Bachelor's Degree in Architectural Technology and Building Construction</td><td>1</td><td>COMMON</td><td>Attendance-based</td></tr>
</table>
</td></tr>
<tr><td>Course number of credits (ECTS)</td><td>9</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
<table>
<tr><th>Activity type</th><th>PRAULA</th><th>TEORIA</th></tr>
<tr><td>Number of credits</td><td>4.5</td><td>4.5</td></tr>
<tr><td>Number of groups</td><td>1</td><td>1</td></tr>
</table>
</td></tr>
<tr><td>Coordination</td><td>CHEMISANA VILLEGAS, DANIEL</td></tr>
<tr><td>Department</td><td>ENVIRONMENT AND SOIL SCIENCES</td></tr>
<tr><td>Teaching load distribution between lectures and independent student work</td><td>40% lectures
60% independent student work</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>Spanish: 100%</td></tr>
<tr><td>Distribution of credits</td><td>7 theoretical credits
2 practical credits</td></tr>
</table>

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CERESUELA TORRES, JESUS MIGUEL	jesusmiguel.ceresuela@udl.cat	2	
CHEMISANA VILLEGAS, DANIEL	daniel.chemisana@udl.cat	2,5	
MAESTRO BALAGUER, SANTIAGO	santiago.maestro@udl.cat	4	
SOLANS BARÓN, ALEJANDRO	alejandro.solans@udl.cat	,5	

Subject's extra information

The subject is in the 1st semester of the 1st year of teaching. It belongs to the module of "Basic Training", specifically in the field "Scientific Fundamentals".

It is **COMPULSORY** that the students bring the following elements of individual protection (EPI) to the practices at the laboratory.

- White laboratory gown from UdL (unisex)
- Protection glasses
- Mechanical protection gloves
- Security helmet
- Reflective vest
- **Safety footwear (*)**

All these items, with the exception of the safety footwear, can be purchased through the shop Údels of the UdL:

C/ Jaume II, 67 baixos
Centre the Cultures i Cooperació Transfronterera

http://www.publicacions.udl.cat/

(*) The safety footwear must be acquired by the student to any individual protection equipment provider, and must meet the requirements S1 + P (head and antiforce template) according to what is established by EN ISO 20345

The use of other elements of protection (for example caps, masks, gloves of chemical or electrical risk, etc.) will depend on the type of practice to be done. In that case, the teacher will inform of the necessity of specific EPI.

Not bringing the EPI's described or not fulfilling the norms of general security that are detailed below imply that the student can not access to the laboratories or have to go out of them. The no realisation of the practices for this reason imply the **consequences in the evaluation** of the subject that are described in this course guide.

GENERAL NORMS OF SECURITY IN LABORATORY PRACTICES

- Keep the place of realisation of the practices clean and tidy. The table of work has to be free from backpacks, folders, coats...
- No short trousers or short skirts are allowed in the laboratory.
- Closed and covered footwear is compulsory in the laboratory.
- Long hair needs to be tied.
- Keep the laboratoy gown laced in order to be protected from spills of chemicals.
- Bangles, pendants or wide sleeves are not allowed as they can be trapped.
- Avoid the use of contact lenses, since the effect of the chemical products is much bigger if they enter between the contact lense and the cornea. Protection over-glasses can be purchased.
- No food or drink is allowed in the laboratory.
- It is forbidden to smoke in the laboratories.
- Wash your hands whenever you have contact with a chemical product and before going out of the laboratory.
- Follow the instructions of the teacher and of the laboratory technicians and ask for any doubt on security.

For further information, you can check the following document of the *Servei de Prevenció de Riscos Laborals de la UdL*: http://www.sprl.udl.cat/alumnes/index.html

Learning objectives

- Interpreting the data obtained in an experiment and draw conclusions
- Derive and determining a requirement set forth in the problems
- Set the basic mathematical models out of solid and fluid mechanics, electrical and thermal circuits
- Apply appropriate mathematical tools to solve numerical problems
- Reasoning the numerical results of the issues by applying physical concepts
- Extract and understand the basic content of a problem in terms of the fundamental principles of mechanics
- Use of different mathematical approaches to solve physical problems

Competences

Degree-specific competences

- **GEE1**. Aptitude to apply the knowledge related with numerical and infinitesimal calculus, linear algebra, analytical and differential geometry, techniques and probabilistic methods and statistical analysis.
- **GEE2**. Applied knowledge of the principles of general mechanics, the statics of structural systems, the geometry of masses, the principles and methods of analysis of the elastic behaviour of the solid.

Degree-transversal competences

- **EPS1**. Capacity to solve problems and prepare and defence arguments inside the area of studies.
- **EPS2**. Capacity to gather and interpret relevant data, within the area of study, to judge and think about relevant subjects of social, scientific and ethical nature.
- **EPS5**. Capacity of abstraction and of critical, logical and mathematical thinking.
- **EPS6**. Capacity of analysis and synthesis.

Subject contents

Topic 0. Systems of Units and Vectors

Topic 1. Systems of forces.

-Moment of forces.

-Torque.

-Resultant of a system of forces.

Topic 2. Distributed forces.

-Center of gravity and center of mass.

-Moment of inertia.

Topic 3. Statics.

-Types of support.

-Conditions of equilibrium.

-Analysis of Structures.

-Internal Forces

Topic 4. Elasticity.

-Elastic properties of solids.

-Deformation bands.

-Hooke's law.

-Strain-rates andtheir calculation.

Topic 5. Fluid statics.

-Fundamental equation of fluid statics.

-Forces on submerged surfaces.

-Principle of Archimedes.

-Balancing submerged and floating bodies.

Topic 6. Fluid Dynamics.

-Continuity equation.

-Bernoulli Theorem.

-Applications and consequences.

-Real fluids.

-Viscosity.Pouseuille-equation.

Topic 7. Direct Current (DC).

-Electricity. Current density.

-Ohm's Law. Electrical resistance.

-Generators and receivers. And counter electromotive electromotive force.

-Association of resistance.

Methods-resolution grids. Leies Kirchhoff.

-Measuring instruments. Voltmeter,ammeter, multimeter.

Topic 8. Altern Corrent (AC).

-Resistors, inductors and capacitorsin AC

-Impedance complex. Phasor diagram. Generalized Ohm's law.

-Parallel and series RLC circuit

-Electrical engineering

Topic 9. Heat and heat transfer

-Temperature, heat and internalenergy

-Thermal expansion

-Conduction, convection and radiation

-Thermal-Circuits

Methodology

The development of the subject is based on four actions:

1) Master classes
Exposure of the concepts , principles and relations of each topic
Approach examples illustrating the application
2) Problem resolution classes

Discussion and resolution of problems and applications related to the concepts of each topic
The proposed problems are basically those of the subject collection of problems
3) Lab
Practical demostration of the concepts reached
4) Work
Group work and oral presentation

*Classes will be imparted virtually (50%) and presencially (50%).

Development plan

Week	Methodology	Topic	Lecture hours	Autonomous work hours
1	Master class. Problems.	Subject presentation and topic 0. Systems of units and vectors	6	9
2	Master class. Problems.	Topic 1. Systems of forces.	6	9
3	Master class. Problems.	Topic 1.Systems of forces.	6	9
4	Master class. Problems.	Topic 2. Distributed forces.	6	9
5	Master class. Problems.	Topic 3. Statics	6	9
6	Master class. Problems.	Topic 3. Statics	6	9
7	Master class. Problems.	Topic 4. Elasticity	6	9
8	Master class. Problems.	Topic 4. Elasticity	6	9
9		Evaluation. Written exam, topics 1-4		
10	Master class. Problems.	Topic 5. Fluid statics	6	9
11	Master class. Problems.	Topic 6. Fluid dynamics	6	9
12	Master class. Problems.	Topic 6. Fluid dynamics	6	9
13	Master class. Problems.	Topic 7. Direct current	6	9
14	Master class. Problems.	Topic 8. Altern current	6	9
15	Master class. Problems. Group work	Topic 9. Heat and heat transfer. Work presentation	6	9
16		Evaluation. Written exam, topics 5-9.		
17				
18		Tutoring period		

19		Recovery exams		

Evaluation

Exams :
1st exam (25 %) , will be held in the ordinary period.
2nd exam (40 %) , will be held in the ordinary period.
Recovery exam (65 %) , will be held in the ordinary period.

Lab (15 %).

Group work (20 %) . It will be held in pairs and delivered / exposed at the end of the course .

AN AVERAGE EXAMS' DEGREE OF 3 WILL BE NECESSARY TO PASS THE SUBJECT

Bibliography

BASIC BIBLIOGRAPHY

BEER, F.P., E. RUSELL JOHNSTON,1997: Mecánica vectorial para ingenieros: Estática. Ed.McGraw-Hill.

GERE, J.M,TIMOSHENKO, S.P,1988. Mecánica de materiales. Iberoamérica 4ed.

GILES,R.V., EVETT, J.B., LIU, C., 1994. Mecánica de los fluidos e hidráulica. Ed. Schaum

KLEIN,S.A., 2004. Engineering Equation Solver Manual. F-Chart Software.

MERIAN, I.- 1998 - Estática – Reverté

RAMOS,M.C. , IBAÑEZ, M. 2003. Mecánica para Ingeniería. Problemas. Ediciones de la Universidad de Lleida.Eines 43.

RILEY,W.F., STURGES, L.D. - 1995 - Ingeniería mecánica: Estática - Reverté

RECOMMENDED BIBLIOGRAPHY

GONZÁLEZ,F. - 1995 - La física en problemas - Ed. Tebar Flores.

JACKSON,J.H., WIRTZ, H.G. - 1985 - Estática y resistencia de materiales – McGraw Hill

MATAIX, C.1982. Mecància de fluidos y máquinas hidráulicas. Ed. Castillo, 1982

WELLS,D.H., SLUSHER, H.S. - 1984 - Física para ingeniería y ciencias – McGraw Hill

VÁZQUEZ,M., E. LÓPEZ, 1988: Mecánica para ingenieros: Estática. Universidad Politécnicade Madrid. EUIT Obras Públicas.

TIPLER P.A- 1994: FÍSICA - Ed. Reverté.

SERWAY,W.A., JEWET, J.W. 2003. - 1997: Física - Ed. McGraw-Hill.