Universitat Autònoma de Barcelona

2020/2021

System Statics and Dynamics

Code: 102416
ECTS Credits: 6

Degree	Type	Year	Semester
2500897 Chemical Engineering	FB	1	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

Christian Neissner

Prerequisites

Knowledge of mathematics at the pre-university level, in particular basic algebra, systems of equations, functions of a single variable, derivatives and integrals of the most common functions, vectors, vector operations (addition, subtraction, scalar product, vector product).

Objectives and Contextualisation

Apply relevant knowledge from physics to allow understanding, describing and solving of typical problems in Chemical Engineering.

Competences

- Apply relevant knowledge of the basic sciences, such as mathematics, chemistry, physics and biology, and the principles of economics, biochemistry, statistics and material science, to comprehend, describe and resolve typical chemical engineering problems.
- Develop personal work habits.
- Develop thinking habits.

Learning Outcomes

1. Analyse concepts related with particle systems, kinematics and dynamics.
2. Develop critical thinking and reasoning
3. Develop scientific thinking.
4. Distinguish between scalar, vector and tensor magnitudes.
5. Manage available time and resources. Work in an organised manner.
6. Resolve elementary static and dynamic fluid problems.

Content

1. Measurement systems
2. Mathematical description of linear and circular movement
3. Forces and torques. Newton's laws
4. Static equilibrium
5. Work and Energy
6. Particle systems: Conservation of energy and linear and angular momentum
7. Fluid mechanics

Methodology

Notice: The proposed teaching methodology and assessment may be subject to change depending on attendance restrictions imposed by health authorities.

The teaching methodology will consist of learning activities in the format of lectures and seminars as well as sessions in smaller groups where exercices will be solved.

The lectures and seminars will develop the theoretical basis relating the physical world with the mathematical description that allows us to analyze it. This theoretical base will be illustrated with practical examples.

Group exercise sessions will deepen the application of the theoretical base to the analysis of practical problems of the physical world. These sessions will be guided by a professor, but they must have a high level of participation by students.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Exercise resolution sessions	15	0.6	1, 3, 2, 4, 6
Lectures	30	1.2	1, 3, 2, 4, 6
Seminars	5	0.2	1, 3, 2, 4, 6
Type: Autonomous			
Consulting with professors	6	0.24	1, 3, 2, 4, 5, 6
Exercise solving	39	1.56	1, 3, 2, 4, 5, 6
Study	48	1.92	1, 3, 2, 4, 5, 6

Assessment

Note: The proposed teaching methodology and evaluation may undergo some modification depending on the restrictions on attendance that the health authorities impose.

The competences of the subject will be evaluated by the Continuous Evaluation method, which will include two types: Delivery of Exercises (individual or collective) and Continuous Evaluation Tests.

The Continuous Assessment will be carried out in a total of 7 actions distributed throughout the study period. The types of actions will be:

2 instances of Delivery of Exercises (individual or collective) that will each have a weight of 14.5% in the final grade.

5 Continuous Assessment Test instances, of which 2 will have a weight of 14.5% each and 3 a weight of 14.0% each in the final grade.

Each Continuous Assessment Test will only contribute to the final grade if 35% of the maximum score of said test is reached.

Deliveries will consist of carrying out an analysis of a physical system before a deadline and summarizing said analysis in a report to be delivered in writing or by electronic means. This will allow students to demonstrate their understanding of the contents of theory and exercise solving classes and the acquisition of skills.

The Tests will consist of solving exercises and / or answering questions in writing or by telematic means, with a limited time. This will allow students to demonstrate their understanding of the contents of theory and exercise solving classes and the acquisition of skills.

The place, time and date of the Continuous Assessment Tests will be announced through the Moodle Classroom at least one week in advance. Also, the place, time and date to deliver the Individual Delivery will be announced through the Moodle Classroom at least one week in advance.

The place, time and date of the review of the results of the Continuous Assessment Tests will be announced through the Moodle Classroom 48 hours in advance.

The condition to passthe course willbeto obtain at least 50% of the maximum score.

The Non-Assessable condition will be applied to students who do not take any of the Continuous Assessment Tests without just cause.

The correction of the Continuous Assessment Tests and the Deliveries will take into account the correct application of the contents of the subject to solve the proposed exercises and also the way in which the solutions and results are presented. In particular, solutions will be required to be presented in an orderly manner, with an appropriate level of detail, and to follow a logical flow of resolution.

Without prejudice to other disciplinary measures deemed appropriate, and in accordance with current academic regulations, irregularities committed by the student that may lead to a variation in the grade of an act of evaluation will be rated with a zero. Therefore, copying or letting a practice or any other assessment activity be copied will involve suspending with a zero, and if it is necessary to pass it to pass, the whole subject will be suspended. The evaluation activities classified in this way and by this procedure will not be recoverable, and therefore the subject will be directly suspended without the opportunity to recover it in the same academic year.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Assignment of exercises (individual or collective)	29	2	0.08	1, 3, 2, 4, 5, 6
Continuous Evaluation Tests	71	5	0.2	1, 3, 2, 4, 5, 6

Bibliography

Any text of Introduction to Physics at the university level is appropriate for the subject. Volume 1 of the following bibliographic reference is taken as a standard reference:

AUTOR: Tipler, Paul Allen
TITOL: Física : para la ciencia y la tecnología / Paul A. Tipler, Gene Mosca
EDICIO: 6ª ed.

PUBLICACIO: Barcelona [etc.] : Reverté, 2010
ISBN: 9788429144291 (v. 1) (Vol. 1. Mecánica, oscilaciones y ondas, termodinámica)

There are many texts of pre-university mathematics that are suitable to review the prerequisites in mathematics of the subject. One of them is:

AUTOR: Colera, J., Oliveira MªJ., García, R.
TITOL: Matemàtiques 2, Modalitat Ciències i Tecnologia
EDICIO: 4ª ed.
PUBLICACIO: Barcanova Mayo 2007

Practically all of the Specific Competences of the subject are briefly explained in Wikipedia (http://es.wikipedia.org/wiki/Portal:Física) and in a more complete way although in English in HyperPhysics (http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html)

NOTE: The 5th edition of the Tipler text differs mainly in aesthetic aspects, and therefore is perfectly adequate to study.