Universitat Autònoma de Barcelona

2019/2020

System Statics and Dynamics

Code: 102416
ECTS Credits: 6

Degree	Type	Year	Semester
2500897 Chemical Engineering	FB	1	1

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

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

The competences acquired will be evaluated by the Continuous Evaluation method, through Continuous Evaluation Tests and Individual Assignments.

There will be 2 Continuous Evaluation Tests distributed throughout the period. The tests will each have a weight of 43% of the overall score (86% in total for the two tests). The tests will last 110 minutes and consist of solving in writing some exercises similar to those explained during the classes.

The Continuous Evaluation Tests will accumulate points towards the overall score as long as a grade of 35% of the total score is obtained in each one of them.

There will be an Individual Assignment, which will have a weight of 14% of the overall score. The work will consist of writing a short report on the analysis of a physical system in order to demonstrate the comprehension of the theory and exercise classes.

The place, time and date of the Continuous Evaluation Tests will be announced through the Moodle Classroom at least one week in advance. Also, the place, time and date to hand in the Individual Assignment 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 Evaluation Tests will be announced through the Moodle Classroom 48 hours in advance.

The condition to pass the course will be to obtain at least 50% of the overall score through scores accumulated in the two Continuous Assessment Tests and the Individual Delivery.

Students who do not initially pass the course may attend the Recovery Tests. A student attending these tests waives the results previously obtained in the corresponding Continuous Evaluation Test, and the points obtained in the Recovery Test will be applied to the calculation of accumulated points that will determine the final grade.

The condition of "Not Presented" to the course will be applied to students who do not attend any of the Continuous Evaluation Tests without just cause.

Grading of the Continuous Evaluation and Recovery Tests, and of the Individual Assignment, will take into account the correct application of the contents of the course to solve the exercises proposed and also the form 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, any irregularities committed by the student that could lead to a variation of the grade of an evaluation act will be scored with a zero. Therefore, copying or allowing to copy a test or any other evaluation activity will involve failing with a zero grade, which may result in failing the whole subject. Evaluation activities where this procedure is applied will not be recoverable, and therefore the subject may be failed directly 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)	14	3	0.12	1, 3, 2, 4, 5, 6
Continuous Evaluation Tests	86	4	0.16	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.