

Course guide

240EQ221 - 240EQ221 - Protein Engineering

Last modified: 14/06/2023

Unit in charge: Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: **Academic year:** 2023 **ECTS Credits:** 6.0
Languages: Spanish

LECTURER

Coordinating lecturer: Juan Jesus Perez Gonzalez

Others: Luis del Valle Mendoza
Pere Garriga Solé

PRIOR SKILLS

Basic knowledge in biochemistry

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Apply knowledge of mathematics, physics, chemistry, biology and other natural sciences, obtained through study, experience, and practice, critical reasoning to establish economically viable solutions to technical problems.

Generical:

2. Possess independent learning skills to maintain and enhance the competencies of chemical engineering to enable the continued development of their profession.

Transversal:

3. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

TEACHING METHODOLOGY

Subject in process of extinction. There is no teaching, the students that enroll it do so only with the right to an exam.

LEARNING OBJECTIVES OF THE SUBJECT

The aim of the subject is to provide knowledge on the biosynthesis, structure and function of proteins. Furthermore, the techniques associated with gene cloning and expression of recombinant proteins. Provide knowledge of the protein design with specific properties.

STUDY LOAD

Type	Hours	Percentage
Hours large group	54,0	36.00
Self study	96,0	64.00

Total learning time: 150 h

CONTENTS

1. SYNTHESIS OF PROTEINS

Description:

Knowledge about the translation and expression of proteins

Specific objectives:

Structure of the genes: operationals and structural. Transcription and genetic code.

Structure and function of the RNA: mRNA, tRNA, rRNA and IRNA. The ribosome.

Translation. Post-translation modifications. Intracellular transit of proteins.

Related activities:

Use of biocomputing tools

Full-or-part-time: 50h

Theory classes: 16h

Practical classes: 10h

Guided activities: 4h

Self study : 20h

2. STRUCTURE AND FUNCTION OF PROTEINS

Description:

Provide knowledge about the structure of proteins

Specific objectives:

Secondary, tertiary and quaternary structure. Function of the proteins.

Structural flexibility of the proteins. Protein fold.

Related activities:

Use of the database pdb

Full-or-part-time: 20h

Theory classes: 6h

Guided activities: 2h

Self study : 12h

3. EXPRESSION OF RECOMBINANT PROTEINS

Description:

Provide knowledge about the expression of recombinant proteins

Specific objectives:

Expression of proteins in cellular culture, purification and characterisation of recombinant proteins

Related activities:

Expression and purification of recombinant proteins

Full-or-part-time: 25h

Theory classes: 6h

Laboratory classes: 4h

Guided activities: 5h

Self study : 10h

4. DIRECTED MUTAGENESIS

Description:

Provide knowledge about the directed mutagenesis

Specific objectives:

Directed mutagenesis. Functional tests and spectroscopies of analysis of the recombinant proteins.

Related activities:

Expression and purification of recombinant proteins

Full-or-part-time: 25h

Theory classes: 6h

Practical classes: 9h

Self study : 10h

5. ENZYMES

Description:

Description of the function of enzymes

Specific objectives:

Protein-ligand interactions. Enzyme mechanisms

Full-or-part-time: 20h

Theory classes: 4h

Practical classes: 4h

Self study : 12h



6. DESIGN OF PROTEINS WITH SPECIFIC FUNCTIONS

Description:

Analyse real cases of the novo design

Specific objectives:

Description of examples about modification and design of novo of proteins

Related activities:

Bibliographic research of examples using the directed mutagenesis for the protein design with new functions.

Full-or-part-time: 10h

Theory classes: 4h

Self study : 6h

GRADING SYSTEM

Subject in process of extinction. There is only one final test that corresponds to 100% of the final grade of the subject.