Course guide
390433 - DIB - Design of Biosystems Facilities

Last modified: 23/01/2025

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: BACHELOR'S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: EDUARD HERNANDEZ YAÑEZ

Others: INGRID MASALO - FRANCISCO IRANZO

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Design of processes and facilities for production of biological materials.

TEACHING METHODOLOGY

The teaching methodology is based on learning through practical cases. For this, the necessary information to carry out the following calculations will be provided in groups of three students:
- Control and programming of activities of an engineering project
- Definition of an aquaculture production process
- Design and calculations of the hydraulic installation of the process
- Design and calculations of the Low Voltage electrical installation of the process

Students must carry out a Technical Project at the Executive level that integrates the designs and calculations made and that contains the following documents:
- Doc I Memory and Calculation Annexes
- Doc II Plans
- Doc III Budgets

LEARNING OBJECTIVES OF THE SUBJECT

With the follow-up of this subject it is intended that the student reaches a series of knowledge, skills and abilities that allow them to approach the integral design of a facility for the production of biological material. After taking this course, the student will have the basic knowledge to understand what an Executive Engineering Project consists of in their professional field.

STUDY LOAD

Type	Hours	Percentage
Hours large group	40,0	26.67
Hours small group	20,0	13.33
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

INTRODUCTION

Description:
Introduction to the course. Design concept. Engineering projects: typology. Production Planning. Legal, environmental and technical constraints
Production systems. Process systems.

Related activities:
Task 1: Class theoretical explanation

Full-or-part-time: 14h
Theory classes: 6h
Self study : 8h

PLANNING THE PRODUCTION OF AQUATIC ORGANISMS

Description:
General data. Legal conditions. Production systems. Production scheduling. Technologies. Parameters of the production process. Environmental conditions. Choice and dimensioning of tanks. Space needs. Support systems (water, air, gases). Environmental aspects.

Related activities:
(ENG) Task 1: Theoretical explanation
Task 2: Resolution of exercises and cases

Full-or-part-time: 24h
Theory classes: 6h
Practical classes: 2h
Self study : 16h

DESIGN OF THE HYDRAULIC SYSTEM

Description:
Summary of the main parameters of the production process. Design flow. Conditioning factors and design parameters of pipes (pressure, speed, pressure drops). Selection of pipes. Typology and characterization of the control elements. Selection of pumping equipment. Expression of the results in annexes, plans and budget.

Related activities:
Activity 1: Theoretical explanation classes
Activity 2: Solving exercises and cases
Activity 3: Project of basic facilities of an aquaculture production process

Full-or-part-time: 41h
Theory classes: 9h
Practical classes: 8h
Self study : 24h

DESIGN OF THE ELECTRICAL INSTALLATION

Description:
Lighting: regulations, types of light sources, parameters (qualitative and quantitative), calculation process (manual and with Dialux software). Low Voltage electrical installation: Regulations. Type of receptors (force, lighting). Design process. Sizing of electrical lines (maximum intensity, voltage drop, short circuit). Protections Line diagram. Implementation of the results in the Project that is developed by each group of students.

Related activities:
Activity 1: Theoretical explanation classes
Activity 2: Solving exercises and cases
Activity 3: Project of basic facilities of an aquaculture production process

Full-or-part-time: 71h
Theory classes: 18h
Practical classes: 12h
Self study : 41h

ACTIVITIES

TASK 1: LECTURES

Full-or-part-time: 100h
Self study: 60h
Theory classes: 40h

TASK 2: RESOLUTION OF EXERCISES AND CASES

Description:
This activity takes place in a conventional classroom, in the context of small groups. The students carry out the activity in small work groups, referring to the contents on PLANNING THE PRODUCTION OF AQUATIC ORGANISMS
The teacher will guide the students during the presentation of cases. He will also teach examples of computational techniques that students will use during the activity.

Material:
Statements of exercises and cases
Use of spreadsheet (excel)

Full-or-part-time: 7h
Self study: 5h
Practical classes: 2h

TASK 3: PROJECT OF BASIC FACILITIES OF AN AQUACULTURE PRODUCTION PROCESS

Description:
Students must carry out an Executive Project that integrates the designs made and contains the following documents:
- Doc-I: Memory and Annexes
- Doc-II. Plans
- Doc-III. Budgets

The following calculation annexes will be developed:
Hydraulic installation indicating the following information: Purpose of the annex; Calculation bases with information on the nominal pressure, speed and load losses in the design pipes; pumping head and equipment selection.
Low Voltage electrical installation, containing the following data: Purpose of the annex; application regulations; relation of electric receivers of force and illumination; design principles; calculation formulas; results. This annex incorporates the lighting calculation using the Dialux Software.

Plans (Situation and location; Plant of each installation: electrical, hydraulic; section; hydraulic diagram of principle and single-line diagram)

Budget

Full-or-part-time: 43h
Self study: 25h
Laboratory classes: 18h

GRADING SYSTEM

The final note will be the result of the polynomial,
N1: multiple choice test on aquatic orgnanisms programming
N2: Individual assessment of hydraulic installation work, by monitoring each group
N3: Correction of the delivery of the hydraulic installation of the Project (activity 3 of the theoretical content)
N4: Final correction of the work that integrates activities no. 3 of the contents of theory, electrical installation
Nfinal: 0.20N1 + 0.25N2 + 0.15N3 + 0.40N4

EXAMINATION RULES.

Attendance and performance of the proposed activities is mandatory and if they are not carried out they will be evaluated with a 0
The works must be delivered within the term established by the teacher

BIBLIOGRAPHY

Basic:
- Portocarrero, Felipe; Gironella, Natalia. Redacción profesional : técnicas de redacción para la empresa del siglo XXI. Oleiros, La Coruña: Netbiblo, DL 2009. ISBN 9788497452472.

Complementary:
- Díaz Fernández, Mario. Ingeniería de bioprocesos. Madrid: Paraninfo, 2012. ISBN 9788428381239.
- Casp Vanaclocha, Ana. Diseño de industrias agroalimentarias. Madrid [etc.]: Mundi-Prensa, 2005. ISBN 848476219X.

RESOURCES

Audiovisual material:
- Nom recurs. Resource