Course guide
390433 - DIB - Design of Biosystems Facilities

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: 2022 ECTS Credits: 6.0 Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: EDUARD HERNANDEZ YAÑEZ
Others: INGRID MASALO - JOAN MAJO ROCA - 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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>40,0</td>
<td>26.67</td>
</tr>
<tr>
<td>Hours small group</td>
<td>20,0</td>
<td>13.33</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
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</tbody>
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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: 7h 30m
Theory classes: 3h
Self study : 4h 30m

CONTROL AND PROGRAMMING ACTIVITIES OF A PROJECT

Description:
Basic definitions of a project. Introduction to programming techniques. Classic programming, Gantt chart. Graph-based methods, PERT and ROY. Program Evaluation and Review Technique (PERT). Use of Project software. Exercises with statements about the programming and planning of different types of activities.

Related activities:
Activity 1: Classes theoretical explanation
Activity 2:

Full-or-part-time: 25h
Theory classes: 6h
Practical classes: 4h
Self study : 15h

PLANNING THE PRODUCTION OF AQUATIC ORGANISMS

Description:

Related activities:
(ENG) Task 1: Theoretical explanation
Task 3: Study of the parameters for the dimensioning of a production facility for aquatic organisms

Full-or-part-time: 25h
Theory classes: 6h
Practical classes: 4h
Self study : 15h
DESIGN OF THE HYDRAULIC SYSTEM

Description:

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: 37h 30m
Theory classes: 9h
Practical classes: 6h
Self study: 22h 30m

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: 55h
Theory classes: 16h
Practical classes: 6h
Self study: 33h

ACTIVITIES

TASK 1: LECTURES

Full-or-part-time: 100h
Theory classes: 40h
Self study: 60h
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 CONTROL AND PROGRAMMING OF ACTIVITIES OF A PROJECT, as well as 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) and specific project programming software (PROJECT)

Full-or-part-time: 20h
Practical classes: 8h
Self study: 12h

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: 30h
Laboratory classes: 12h
Self study: 18h

GRADING SYSTEM

The final note will be the result of the polynomial,
N1: programming work with Microsoft Project
N2: design work for an aquaculture production process
N3: intermediate correction of the work that integrates the activities n°3 of the contents of theory, hydraulic installation
N4: final correction of the work that integrates the activities n°3 of the contents of theory, electrical installation (group)

Nfinal: 0.15N1 +0.15 N2 +0.30 N3 +0.40 N4

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:

Complementary:

RESOURCES

Audiovisual material:
- Nom recurs. Resource