Course guide
390219 - ISM2_MF1 - Measuring Systems and Instruments

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.
Degree: MASTER'S DEGREE IN ENABLING TECHNOLOGIES FOR THE FOOD AND BIOPROCESSING INDUSTRY (Syllabus 2014). (Compulsory subject).
MASTER'S DEGREE IN ENABLING TECHNOLOGIES FOR THE FOOD AND BIOPROCESSING INDUSTRY (Syllabus 2020). (Optional subject).
Academic year: 2023 ECTS Credits: 5.0 Languages: Spanish, English

LECTURER
Coordinating lecturer: Marcos Quilez Figuerola
Others: Isabel Achaerandio Puente, Amelia Nápoles Alberro, Marcos Quilez Figuerola, Daniel Rodríguez Rius, Francesc Tarrés Ruiz

PRIOR SKILLS
Graduate students in science, engineering or technology disciplines with a diploma in areas close to agricultural engineering, food engineering, chemical or biosystems engineering, equivalent to 240 ETCS

REQUIREMENTS
Presentality, participation in external visits and the topics discussed in class.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES
Specific:
1. Determination of the applicability to the food and bioprocesses sector of sensors and instrumentation techniques for measuring and data acquisition. Ability to detect the advantages and limitations of the diverse technologies and measurement equipments.
2. Ability to choice the measurement and aquisition data instrumentation in order to optimize the efficiency of the agri-food and biotechnological industries. Designing the implementation of the use and maintenance protocols of such systems.
3. Identification of the opportunities and knowledge of the scientific basis of nanotechnology application in the treatment of bioproducts. Identification of the benefits and risks of nanotechnology applied to food packaging and conservation.

Generical:
4. Ability to apply the language and techniques of industrial management in the agrifood and biotechnological sector
5. Identification of the industrial technologies with larger future impact and develop new applications of such technologies in the food and biotechnological industry.
6. Ability to identify and use monitoring systems in quality control of food products.
7. Ability to assess and improve the design of processes and products considering social and environmental impacts.
Transversal:
8. 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.

9. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

TEACHING METHODOLOGY
We indicate here the repertoire of teaching methods to be applied in the different training activities according to the teaching plans of the subject.
Lecture or conference: presentation of knowledge by university professors or by external specialists.
Participatory classes: collective solving exercises, conducted group discussions with the lecturer and other students in the classroom; classroom presentation of an activity individually or in small groups.
Lab / Workshop: realization of designs, measurements, verifications, etc.; and presentation of results in oral or written form individually or in small groups.
Theoretical and practical works: conducted classroom activity or exercise, individually or in small groups, with the advice of the lecturer.
Project or short works: based on the realization, individually or in groups, of a work of reduced complexity or scope.

Information search: Activity related to a case or problem, each student or each group is assigned a role under which they must intervene in the development of the situation.
Evaluation activities.

LEARNING OBJECTIVES OF THE SUBJECT
This course is a second part after the sensing and acquisition of data in which the students gets detailed vision of different methods and techniques of measurement and their applications.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>35,0</td>
<td>28.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>72.00</td>
</tr>
</tbody>
</table>

Total learning time: 125 h

CONTENTS

**Nanotechnology and biomaterials**

**Description:**
Nanomaterials for food applications

**Full-or-part-time:** 7h 30m
Theory classes: 7h 30m
Computer vision

Description: Computer vision for food applications.

Full-or-part-time: 7h 30m
Theory classes: 7h 30m

3D Printing

Description: 3D printing for food applications.

Full-or-part-time: 5h
Theory classes: 5h

Thermal Analysis

Description: Thermal analysis for food applications

Full-or-part-time: 5h
Theory classes: 5h

Data acquisition

Description: Use of data acquisition systems for computerized measurement and control.

Full-or-part-time: 10h
Theory classes: 10h

GRADING SYSTEM

Ongoing assessment.

The final qualification is calculated in the following way, according to the marks obtained in every topic.

\[ NF = 1,5/7 * N1 + 1,5/7 * N2 + 1/7 * N3 + 1/7 * N4 + 2/7 * N5 \]

NF: qualification
N1: Nanotechnology and biomaterials
N2: Computer Vision
N3: 3D Printing
N4: Thermal Analysis
N5: Data Acquisition

EXAMINATION RULES.

Presentiality. Continuous monitoring. Short tests.
BIBLIOGRAPHY

Basic:

Complementary: