Course guide
390213 - GEO - Geomatics

Last modified: 06/06/2023

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).
BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: LYDIA SERRANO PORTA

Others: RAFAEL VIDAL
JOSÉ M. YÚFERA

TEACHING METHODOLOGY

In the hours of directed learning the basic concepts of the subject will be exposed and practical problems will be solved using GIS software. Practices will be carried out on IP connectivity with a generic sensor platform designed ad-hoc for the subject.
The hours of autonomous learning will have to be devoted to carrying out evaluable practices, study of the syllabus, practical exercises and problems, tutorials, consultations in library and Internet and preparation of exams.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, the student will have to know the foundations of the GIS (Geographic Information Systems), the basic GIS analysis tools and operations and identify their potential application in the field of biological systems. In addition, the student will have to know the basics and potential applications of remote sensing in the field of biological systems, and perform image analysis operations using specialized software.
Likewise, at the end of the course, students must know the general functioning as well as the benefits and limitations of the GPS. In addition, students should know the general functioning and the elements of an IP network, such as Internet, and thier basic configuration. In terms of their applications , the student must be able to compare the current wireless technologies at the level of benefits and know the concept of Internet of Things (IoT) as well as the elements and thecnologies associated to IoT.

STUDY LOAD

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

Total learning time: 150 h

CONTENTS

1. INTRODUCCIÓ A LA GEOMÀTICA

Description:
Introduction
Fundamentals of cartography and geodesy.

Related activities:
Activity 1. Classes of theory and practical exercises
Activity 2. Final evaluation individual test

Full-or-part-time: 6h
Theory classes: 6h

2. GEOGRAPHIC INFORMATION SYSTEMS

Description:
Definition, components and applications
Vector and raster GIS analysis operations

Related activities:
Activitat 1. Classes teòriques
Activitat 2. Prova individual d'avaluació final
Activitat 3. Classes pràctiques de SIG i teledetecció

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

3. REMOTE SENSING

Description:
Definition, components, types and applications
Physical fundamentals
Sensors and platforms
Digital image analysis

Related activities:
Activitat 1. Classes teòriques
Activitat 2. Prova individual d'avaluació final
Activitat 3. Classes pràctiques de SIG i teledetecció

Full-or-part-time: 10h
Theory classes: 6h
Laboratory classes: 4h

4. Conceptes bàsics de sistemes de comunicacions

Description:
Exemples d'aplicació
Concepte de sistema de comunicació: digital/analògic, transmissor, receptor, canal, velocitat de propagació i de transmissió, atenuació, xarxa.
Representació de dades: binari, ASCII, hexadecimal, resolució, signe, escala logarítmica (dB, dBm)
Unitats: Bit, byte, Hz

Related activities:
(ENG) Activitat 1. Classes teòriques
Activitat 2. Prova individual d'avaluació final
Activitat 4. Internet de les Coses: conceptes bàsics i aplicació

Full-or-part-time: 5h
Theory classes: 3h
Laboratory classes: 2h

5. Sistemes de posicionament per satèl·lit

Description:
Òrbites
Coordenades i posicionament
Portadora i modulació

Related activities:
Activitat 1. Classes teòriques
Activitat 2. Prova individual d'avaluació final
Activitat 4. Internet de les Coses: conceptes bàsics i aplicació

Full-or-part-time: 8h
Theory classes: 6h
Laboratory classes: 2h

6. Xarxes sense fils

Description:
Espectre i bandes de freqüències
Equació de Friis
Soroll e interferències
Tecnologies
Concepte d'accés al medi

Related activities:
Activitat 1. Classes teòriques
Activitat 2. Prova individual d'avaluació final
Activitat 4. Internet de les Coses: conceptes bàsics i aplicació

Full-or-part-time: 7h
Theory classes: 5h
Laboratory classes: 2h

7. Internet

Description:
Model TCP/IP, concepte de protocol
Xarxes LAN: Ethernet, commutadors
IP, adreçament, routers
Capa de transport: protocols, port
Capa d'aplicació: Web i DNS

Related activities:
Activitat 1. Classes teòriques
Activitat 2. Prova individual d'avaluació final
Activitat 4. Internet de les Coses: conceptes bàsics i aplicació

Full-or-part-time: 10h
Theory classes: 6h
Laboratory classes: 4h

GRADING SYSTEM

BIBLIOGRAPHY

Basic:
- Chuvieco Salinero, Emilio. Teledetección ambiental : la observación de la tierra desde el espacio. 3ª ed., actualizada. Madrid: Ariel, 2008. ISBN 9788434480773.
- Sanz Subirana, Jaume; Juan Zornoza, J. Miguel; Hernández Pajares, Manuel. GNSS data processing. Noordwijk: ESA Publications Division, 2013. ISBN 9789292218867.
- Stevens, W. Richard; Wright, Gary R.; Fall, Kevin R. TCP/IP illustrated. Reading, MA [etc.]: Addison-Wesley, 1994-1996. ISBN 0201633469.
- Gutiérrez Puebla, Javier; Gould, Michael. SIG : sistemas de información geográfica. Madrid: Síntesis, 1994. ISBN 8477382468.

Complementary:
- Leick, Alfred. GPS satellite surveying [on line]. 3rd ed. New York [etc.]: John Wiley & Sons, 2004 [Consultation: 18/07/2022]. Available on: https://onlinelibrary-wiley-com.recursos.biblioteca.upc.edu/doi/book/10.1002/9781119018612. ISBN 0471059307.
- Comer, Douglas E. Internetworking with TCP/IP. 6th ed. Upper Saddle River: Prentice-Hall International, 2014. ISBN 9780136085300.
- Tanenbaum, Andrew S.; Wetherall, David J. Computer networks. 5th. ed.. Harlow: Pearson Education, 2013. ISBN 9781292024226.
- Stallings, William. High-speed networks : TCP/IP and ATM design principles. Upper Saddle River, N.J.: Prentice Hall, 1998. ISBN 0135259657.

RESOURCES

Hyperlink:
- Wireshark
- Pàgina web del fabricant de la plataforma Arduino
- QGIS. Resource

Other resources:
https://qgis.org/ca/site/