27122 - Introduction to Systems Biology

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	446 - Degree in Biotechnology
ECTS	6.0
Course	
Period	Second semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

For students enrolled in the subject, places, times and dates of lectures and practical sessions will be public via Bulletin Board advertisements of the grade on the platform Moodle at the University of Zaragoza, https://moodle2.unizar.es/add/, and in the moodle page for the course. These routes will be also used to communicate enrolled students their distribution by groups of practical sessions, which will be organized by the coordination of degree. Provisional dates will be available on the website of the Faculty of Sciences in the corresponding section of the Degree in Biotechnology: https://ciencias.unizar.es/grado-en-biotecnologia.

In this web there will be also available the dates of exams.

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process designed for this subject is based on the following:

This course is scheduled to address an intensification of theoretical knowledge with student participation. This strategy will allow the student to revise a topic closely with an outstanding professional. This approach of a research aspect will provide them tools for a subsequent professional development.

5.2.Learning activities

The program is offered to help the students to achieve the expected results and includes the following activities:

- **Theoretical classes.** 4 ECTS. The contents of the lectures are given in the program of the subject in section 5.3.
- **Work and presentation of a topic:** 2 ECTS. This activity is that students collect information on a particular topic, aided by the teacher. Professor monitor at all times the individual work of students by scheduling tutoring sessions. Finally, the works are presented and debated in class.
- **Complementary activities:** Seminars and lectures by experts will be announced during the development of the course.

5.3.Program

The contents of the lectures are:

1. Introduction to Systems Biology and Synthetic Biology.
2. Basics and applications of genomics.
3. Epigenomics and metagenomics.
4. Transcriptomics.
5. Technical principles of proteomics.
6. Identification of peptides and proteins.
7. Characterization of posttranslational modifications of proteins.
8. Differential analysis and comparison of proteomes.
9. Proteomics interactions.
10. Combinatorial expression libraries of peptides and proteins.
11. Large-scale trials by immobilization of peptides, proteins, antibodies and ligands.
12. Proteomics systems. Protein interaction networks. functional networks.
13. Fundamentals of metabolomics.
14. Lipidomics.
15. Software tools and computer in genomics, proteomics and metabolomics.
16. Integration of metabolic pathways and cellular communication and its usefulness to know pathology mechanisms

5.4.Planning and scheduling

Schedules of lectures and problems will coincide with the officially established and will be available at: https://ciencias.unizar.es/grado-en-biotecnologia.

The places, calendar and groups for training and practical sessions will be established in coordination with the rest of maters at beginning of course. The Coordinator will produce the groups of students for these activities at beginning of course to avoid overlaps with other subjects.

5.5.Bibliography and recomended resources
- Gomase, Virendra. Transcriptomics: Expression Pattern Analysis. VDM Verlag, 2009
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- Functional genomics : a practical approach / Edited by Stephen P., Hunt and Rick Livesey . - repr. 2007 New York : Oxford University Press, 2007
- Saccone, Cecilia. Handbook of comparative genomics : principles and methodology / Cecilia Saccone, Graziano Pesole Hoboken, NJ : Wiley-Liss, cop. 2003
- Lovri?, Josip. Introducing proteomics : from concepts to sample separation, mass spectrometry and data analysis / Josip Lovri?. Chichester ; Hoboken, NJ : Wiley-Blackwell, 2011
- Debasis Bagchi, Francis C. Lau, Manashi Bagchi (Ed.). Genomics, Proteomics and Metabolomics in Nutraceuticals and Functional Foods. Wiley-Blackwell, 2010
- Xia, Xuhua. Bioinformatics and the Cell: Modern Computational Approaches in Genomics, Proteomics and Transcriptomics. Springer, 2010
- Kahl, Günter. The Dictionary of Genomics, Transcriptomics and Proteomics. 4th ed. Wiley-Blackwell , 2009
- Cakmak, Ali. Mining Metabolic Networks and Biomedical Literature: Knowledge Discovery and Analysis. VDM Verlag, 2010
- Mahdavi, Mahmood A.. Computational Approaches In Systems Biology. LAP Lambert Academic Publishing, 2009
- Modelling biological systems / Frederic P. Miller, Agnes F. Vandome, John McBrewster (ed.) . Beau Bassin : Alphascript Publishing, 2010
- Miller, Frederic P.. Metabolic Pathway: Biochemistry, Chemistry, Chemical reaction, Enzyme, Catalysis, Cofactor (biochemistry), Homeostasis, Organism, Metabolism, Enzyme, Catabolism, Metabolic network modelling. Alphascript Publishing, 2010
- El Kaissi, Muhieddine. Metabolic Network Visualization. Proquest, Umi Dissertation Publishing, 2011
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- Smolke, Christina D.. The Metabolic Pathway Engineering Handbook (2 vol.). CRC Press, 2009
- Alon, Uri. An introduction to systems biology : design principles of biological circuits / Uri Alon Boca Raton : Chapman & Hall/CRC, cop. 2007
- Systems biology : a textbook / Edda Klipp ... [et al.] . 2nd. repr. (2012) Weinheim : Wiley-VCH, 2009
- Voit, Eberhard O.. A first course in systems biology / Eberhard O. Voit . New York and London : Garlan