TEACHING PLAN FOR

Introduction to Bioinformatics

1. Basic description

Name of the course: Introduction to Bioinformatics
Module: Introduction to Bioinformatics
Academic year: 2016-2017
Year: 2016
Term: First and Second
Degree / Course: First
Code: 51101
Number of credits: 6
Total number of hours committed: 150
Teaching language: English
Lecturer: Ferran Sanz, Mar Carrió, Hafid Laayouni, Consuelo Serra, Mar Garreta.
Timetable: See official calendar

2. Presentation of the course

This is a general Introduction to the field of Bioinformatics and to the word of the University. It has three different parts,

1. Introduction to Bioinformatics: talks given by expert of the field of Bioinformatics.
2. Introduction to the University: general aspects of how the University works.
3. Introduction to Data Analysis.

The subject takes place in the first and second term of the first academic year. Introduction to the University and to Bioinformatics will be done during the first term and Introduction to Data Analysis during the second term.

3. Competences to be worked in the course
Complete (crossing the curriculum and the list of competences)

General competences	Specific competences
CB1, CB3, CB4, CB5, CG1	CE7, CE8, CE9

I. General competences

CB1. That the students have demonstrated to have acquired the knowledge and understanding in a field of study that starts from the basis of general secondary education, and is typically at a level that although it is supported by advanced textbooks, includes some aspects that involve knowledge of the forefront of their field of study.

CB3. That the students have the ability to gather and interpret relevant data (usually within their field of study) to make judgments that include reflection on relevant social, scientific or ethical subjects.

CB4. That the students can convey information, ideas, problems and solutions to both specialist and non-specialist audiences.

CB5. That the students have developed those skills needed to undertake further studies with a high degree of autonomy.

II. Specific competences

CE7. To demonstrate knowledge, skills and appropriate practices in the area of the biology of organisms and biosystems.

CE8. To identify meaningful and reliable sources of scientific information to substantiate the state of arts of a bioinformatic problem and to address its resolution.

CE9. To apply statistical and computational methods to solve problems in the fields of molecular biology, genomics and medical research and population genetics

Learning outcomes

RA7.1. Describe models of evolution within and between species, and use the necessary tools for the study of molecular evolution.

RA7.2. Enumerate the evolutionary history of the human lineage from its relationship with other primates to the emergence of anatomically modern humans and their adaptation to different environments.

RA8.1. Use efficiently specific search tools and resources from databases and information related to biomedicine and bioinformatics.

RA8.2. Quote valid sources of scientific information to support the state of the arts of a bioinformatic problem.

RA9.1. Identify and use appropriate statistical methods to each type of data.

RA9.2. Use the appropriate methods for complex data, with an emphasis on dimensionality reduction approximations.

4. Contents

This subject will have three different parts:
1. Introduction to Bioinformatics (talks given by expert of the field of Bioinformatics). Seminars tend to deal with the current state of the art, areas of knowledge and challenges in the professional and productive field of bioinformatics. Basic and applied fields of research relevant to the context of bioinformatics and biomedicine. Seminars include some of following subjects
   - Big Data analysis
   - Clinical Data analysis
   - Bioinformatics in pharma
   - Evolutionary Genomics
   - Genomic Medicine
   - Frontiers in Informatics
   - Databasing
   - Agrogenomics
   - Chemogenomics
   - Business around bioinformatics
   - Systems and networks biology.
   - Genetic Epidemiology

   Responsible: Ferran Sanz

2. Introduction to the University

General aspects of how the University works. Characteristics of the degree. Study strategies, learning techniques and finding information. Intuitive introduction to various concepts, phenomena, principles and methods studied in bioinformatics to give students an idea of real-life problems and help them interpret biological phenomena and formulate them mathematically, as well as helping to confirm/reinforce students' interest in bioinformatics and biomedical research.

Library sessions deals with following issues,
Digital competences
How to use IT services: computer rooms, printers & photocopiers, laptops and WiFi
How to find the information resources I need for my subjects

How to find the information resources I need for producing academic work
PubMed: biomedical database

Responsible: Mar Carrio

3. Introduction to Data Analysis
This part will take place in the second term in coordination of Biostatistics and Data Analysis subject. Please refer to the work plan (PDA) of this subject for information on this part.

Responsible: Hafid Laayouni

5. Assessment

Part I
This part consists of a weekly lecture on a relevant issue related to Bioinformatics. After each conference will be a space for discussion. This is a subject that should made a strong impact: a series of 10 lectures given by recognized specialists. After each session, each student will do a little (maximum of 1000 characters with spaces) abstract that will deliver within one week. The abstract must summarize the key points of the talk. The file is in pdf format and will be delivered through a ESCI Module with the title: SEMxx-surname, where xx is the number of seminar (01, 02, 10 ...) and last name is the name of the student.

Participation in the seminars is a key objective of the course. Given the number of students, a turn of participation will be set at random and previously communicated to students. Students who have done their question should send everyone to the ESCI Module a file explaining the question asked and when possible response received by the speaker. If there are opportunities to do more of the questions assigned, students who wish can do so. These additional participations will also be taken into account in the final mark.

This part does not include any re-evaluation exam as all the scores are based on the continuous assessment.

Part II
Assessment of this part will take place by presentations in groups done during the last session of this part.

Part III
This part will take place in the second term in coordination of Biostatistics and Data Analysis subject. Please refer to the work plan (PDA) of this subject for information on the assessment of this part.

Assessment elements	Time period	Type of assessment		Assessment agent			Type of activity	Grouping		Weight (%)
		Compulsory	Optional	Lecturer	Self-assess	Co-assess		Indiv	Group (#)	
Delivery of abstracts (part I)	Approximately weekly sessions	x		x			Conceptual and pursuit of the subject	x		20
Participation in lectures, questions and comments (part I)	After each talk session	x		x				x		20
Work in group (part II)		x		x			Conceptual and pursuit of the subject	x	x	15
Evaluation part II, first term	Presentations in group	x		x			Synthesis	x		15
Evaluation I, part III, second term	Exam schedule Mid second term	x		x			Synthesis	x		30

Working competences and assessment of learning outcomes:

	CB1	CB3	CB4	CB5	CE7	CE8	CE9
Delivery of abstracts	x	x	x	x	x	x	x
Participation in lectures	x	x	x	x	x	x	x
Evaluation I	x	x	x	x	x	x	x
Evaluation II	x	x	x	x	x	x	x

6. Bibliography and teaching resources

- Basic bibliography
  - o Biomedical informatics: computer applications in health care and biomedicine. New York, NY : Springer, cop. 2006
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- Teaching resources
  - o Lecture notes: Slides will be made available before the classes.
  - o Exercise lists (part 3).
  - o Tutorials for practical sessions (part 3)

7. Methodology

The workload of the course amounts to 300 hours. It is recommended that students follow the work plan outlaid in section 8 of this document. Work is divided into 3 types of activities: those developed in class (plenary, seminar and practical sessions), directed work (assignments) and autonomous work.

a) Plenary lessons: sessions where the teacher introduces and explains the course contents defined in the previous section. Plenary sessions of part I consist of talks given by expert of the field. Plenary lessons of part II and III include definitions, introduction to the most relevant methodologies.

b) Seminar sessions: In the seminar sessions will take place control tests on the exercise lists. Correction of lists of exercises. Discussion of results and explanation.

c) Part II includes practical sessions to learn the use of a statistical software. Practical sessions include discussion on the type of data to analyse, the appropriate statistical analysis to apply. Specific examples of data analysis will be used

8. Scheduling activities

Week	Activity in the classroom Grouping/type of activity	Activity outside the classroom Grouping/type of activity
Week 1 19/9	Introduction session: Objectives of the course. Syllabus presentation. Grading policy. Class dynamics. Introduction to Bioinformatics. First Talk 1. Students discussion and questions	abstract
Week 1 20/9	Introduction to University - Library	
Week 1 21/9	Introduction to University	
Week 1 23/9	Introduction to University Group A /B	
Week 2 26/9	Introduction to University	
Week 2 30/9	Talk 2. Students discussion and questions	abstract
Week 2 30/9	Introduction to University - Library	
Week 3 3/10	Introduction to University	
Week 3 7/10	Talk 3. Students discussion and questions	abstract
Week 4 10/10	Introduction to University	
Week 4 13/10	Introduction to University – Library Group A /B	
Week 4 14/10	Talk 4. Students discussion and questions	abstract
Week 5 19/10	Risk prevention laboratory	
Week 5 20/10	Talk 5. Students discussion and questions	abstract

Week 6 27/10	Talk 6. Students discussion and questions	abstract
Week 7 31/10	Talk 7. Students discussion and questions	abstract
Week 8 9/11	Talk 8. Students discussion and questions	abstract
Week 9 14/11	Talk 9. Students discussion and questions	abstract
Week 9 16/11	Introduction to University	
Week 10 23/11	Talk 10. Students discussion and questions	abstract
Week final exams		

Activities of part 3 will take place in second term. Detailed information of this part will be included in Biostatistics and Data Analysis workplan (PDA)

La còpia i/o plagi total o parcial als treballs i/o exàmens comportarà suspendre l'assignatura amb una qualificació de zero sense dret a recuperació, sense perjudici de l'aplicació de les altres sancions previstes al Reglament de Règim disciplinari dels estudiants de la Universitat Pompeu Fabra en funció de la gravetat de la infracció.

Total or partial copy and/or plagiarism will imply a failure in the subject with a final grade of zero points and no access to the make-up exam. According to the academic regulations specified in the Disciplinary rules for students of Universitat Pompeu Fabra, other additional sanctions may apply depending on the seriousness of the offence.