



IDENTIFYING DATA

Computational Genomics

Subject	Computational Genomics			
Code	V02M123V01209			
Study programme	(*)Máster Universitario en Ciencias Biolóxicas: Bioloxía Molecular, Computacional e Ambiental e Bio-Industrias			
Descriptors	ECTS Credits	Type	Year	Quadmester
	6	Optional	1st	2nd
Language	English			
Department				
Coordinator	Canchaya Sanchez, Carlos Alberto			
Lecturers	Amigo Lechuga, Jorge Canchaya Sanchez, Carlos Alberto Galindo Dasilva, Juan González Peña, Daniel			
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Web				
General description				

Competencies

Type A	Code	Competences Specific
	A1	(*)To know the scientific method and the correct use of the scientific terminology as well as to acknowledge the contribution that scientific research provides to the overall knowledge and professional practice.
	A2	(*)Ability to describe and to analyse biological diversity, the mechanisms determining the interactions with the biotic and abiotic environment and being able to select those which might have technical applications.
	A3	(*)Ability to manage and/or to develop basic tools for validating and analysing data by means of statistics and bioinformatics.
	A4	(*)To know the ethical and legal aspects governing the collection and the handling of biological samples, organisms and habitats.
	A5	(*)Ability to design, evaluate and implement models of biological structures, systems and processes.
	A6	(*)To learn the sampling techniques and the instrumental methodologies, in the field and laboratory, for their application in the Biological Sciences
	A7	(*)To have an integrated view of the R&D processes and their possible transfer to the industrial sector. Planning and supervising facilities together with managing their human and economic resources.
	A8	(*)Ability to classify, evaluate, conserve, restore and manage natural and productive systems. Developing and implementing land management and sustainability plans.
	A9	(*)To understand and know how to apply quality control systems and safety protocols in any biological laboratory of the public or private sector.
	A10	(*)To acquire the professional ability to teach and spread Biology and to offer expertise advice for elaborating scientific, technical and socioeconomic biology reports. Address environmental consulting.

A11 (*)To perform an individual Master Project (critical and in-depth study) under the supervision of a tutor in a research or working environment demonstrating that skills have been acquired.

Type B Code Competences Transversal

B1	(*)Dissemination of results and conclusions of the biological studies, in oral and written English, through complex presentations that address ideas related with R&D in Biology.
B2	(*)Managing computational, laboratory, field and industrial techniques in order to obtain, process and apply the acquired information.
B3	(*)Disseminating and broadcasting ideas in contexts both academic and non-specialised.
B4	(*)Reflecting on social and ethical responsibilities.

Learning aims

Subject competences	Typology	Competences
Explore and extract information from biological databases specialized in genomic data	Know How	A3 B2
Process and analyze massive datasets produced by high-throughput sequencing methods	Know How	A1 A3 B2
Assemble genomes and transcriptomes with and without reference sequences.	Know How	A3 A6 B2
Predict and annotate functions and variants in genomes and transcriptomes	know Know How	A3 A10 B2

Contents

Topic	
Analysis of next generation sequencing data	Search for similarities Data Formats and manipulation
Genome and Transcriptome	de novo Assembly Assembly with references
Annotation	Functional Annotation Variant Calling

Planning

	Personalized attention	Assessment	Ordinary class hours A	Face-to-face hours outside the classroom Guided academic environment B	Student's work factor C	Outside the classroom hours D	Total hours (A+B+D) E
Master Session	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	20	0	0.5	10	30
Classroom work	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10	0	0	0	10
Autonomous troubleshooting and / or exercises	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	0	0	108	108
Multiple choice tests	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2	0	0	0	2
Total hours E:							150
Work load in UVIGO ECTS credits:							6

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Master Session	The professor will present the theoretical framework of each subject
Classroom work	The students will perform exercises and solve problems with the professor's assistance
Autonomous troubleshooting and / or exercises	The students will perform exercises and solve problems by themselves

Personalized attention

	Description
Master Session	Professors will provide assistance online (forum, discussion list, chat) to answer their questions when required
Autonomous troubleshooting and / or exercises	Professors will provide assistance online (forum, discussion list, chat) to answer their questions when required
Classroom work	Professors will provide assistance online (forum, discussion list, chat) to answer their questions when required

Assessment

	Description	Qualification
Master Session	Proactive participation and attentiveness of the students will be evaluated	5
Autonomous troubleshooting and / or exercises	Efficient and Diligent work, as well as autonomy will be evaluated	60
Classroom work	Attentiveness to the instructions and positive attitude will be evaluated	5
Multiple choice tests	Students will perform an exam on the subjects discussed during the course	30

Other comments and second call

Sources of information

Gibson and Muse, A primer of genome science, 3rd Edition, 2009

Rodriguez-Ezpeleta, Hackenberg and Aransay., Bioinformatics for high throughput sequencing, 1st Edition, 2012

McKenna A, Hanna M, Banks E, Sivachenko A, Cibulskis K, Kernytzky A, Garimella K, Altshuler D, Gabri, The Genome Analysis Toolkit: a MapReduce framework for analyzing next-generation DNA sequencing data, , 2010

Recommendations

Subjects that continue the syllabus

Systems Biology/V02M123V01212

Structural Biology/V02M123V01211

Molecular Evolution/V02M123V01210

Subjects that it is recommended to have taken before

Knowledge Discovery/V02M123V01113

Statistical and Mathematical Methods in Bioinformatics/V02M123V01112

Programing for Bioinformatics/V02M123V01111
