Universitat Autònoma de Barcelona

2023/2024

Molecular Anthropology

Code: 100752
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OT	4	2

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Prerequisites

It is recommended to have acquired the basis of the courses of Genetics, Molecular Genetics, Human Biology, Health and Environment, and Evolution.

Objectives and Contextualisation

The course of Molecular Anthropology is integrated in the field of Human Biology. It is a relatively new field of research, in fact, there have been less than 50 years since Emil Zuckerkandl, in the symposium "Classification and Human Evolution" (1962, Wartenstein Burg, Austria), formally introduced the designation. As the name suggests, Molecular Anthropology, focuses on the study of human evolution and variation using molecular tools.

The main objective of this course is to deepen in the study of the tools and methods used in the study of variation and evolution of humans. In this regard, it stresses the Human Genome Diversity Project as a turning point for Molecular Anthropology since it has played a key role in changing perspective of Molecular Anthropology from genetics to genomics. The most recent projects to analyze human variation, the 1000 Genomes and HapMap, will be discussed. The problems of the study of human genetic variation in both recent and ancient remains will be explored. Also, the genetic variation as a tool to reconstruct the evolutionary history and for mapping disease susceptibility variants and with pharmacogenomic interest will be approached.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Analyse and interpret the origin, evolution, diversity and behaviour of living beings.
- Apply statistical and computer resources to the interpretation of data.

- Be able to analyse and synthesise
- Be able to organise and plan.
- Characterise, manage, conserve and restore populations, communities and ecosystems.
- Design and carry out biodiagnoses and identify and use bioindicators.
- Isolate, identify and analyse material of biological origin.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Understand the biological characteristics of human nature.

Learning Outcomes

1. Analyse a situation and identify its points for improvement.
2. Analyse present and past intra-population and inter-population variability in our species.
3. Analyse the sex- or gender-based inequalities and the gender biases present in one's own area of knowledge.
4. Analyse the sustainability indicators of the academic and professional activities within the area, integrating the social, economic and environmental dimensions.
5. Apply statistical and computer resources to the interpretation of data.
6. Be able to analyse and synthesise.
7. Be able to organise and plan.
8. Critically analyse the principles, values and procedures that govern the exercise of the profession.
9. Identify the biological characteristics of human nature at all levels of organisation.
10. Interpret human variability as a source of individualisation.
11. Interpret values of human demography and epidemiology.
12. Manipulate human samples and perform morphological, molecular and chromosome determinations for the diagnosis and prevention of diseases.
13. Propose new methods or well-founded alternative solutions.
14. Propose projects and actions that incorporate the gender perspective.
15. Propose ways to evaluate projects and actions for improving sustainability.
16. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
17. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
18. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
19. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
20. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
21. Work in teams.

Content

THEORY:
Unit 1. Foundations of molecular anthropology: from morphology to the HapMap Project and the 1000 genomes project
Unit 2. Tools and Methods in Molecular Anthropology
Unit 3. Genetic variations in humans and other primates: Diversity, phylogeography and selection
Unit 4. Quantitative Genetics: applications in molecular anthropology
Unit 5. Confluence of molecular anthropology and epidemiology
Unit 6. Ancient DNA: problems and applications
Unit 7. Application of molecular anthropology in forensic sciences

SEMINARS:
Research in Biological Anthropology

Presentation of group work

COMPUTER PRACTICES:

HapMap Project
1000 genomes project
Applications in Genetic Epidemiology
Definitions of work themes and bibliographical search

LAB PRACTICES:
DNA extraction and PCR
Detection of SNPs
DNA sequencing

Methodology

The development of the training activities of the course is based on: theory classes, seminars, classroom practices and laboratory and computer practices, each of them with its specific methodology. Likewise, a series of activities are proposed that will allow the student to take an active role in the teaching-learning process.

Classes of theory: The student acquires the scientific knowledge of the subject by attending theory classes. These are classes with TIC-TAC support in which the teacher exposes the subject but also asks for the participation of the student. Likewise, activities are proposed that allow the student to intervene more actively in the teaching-learning process. In this sense, some theoretical sessions are devoted to topics related to group work carried out by students, both for the resolution of doubts and the presentation of key concepts, as well as for the presentation of the work itself. The audiovisual material used in class can be found by the student in the Moodle space of the subject.

Seminars: Specialists are invited and in advance the student will be provided with the topics to be debated in the seminar; students will have to prepare the seminars collaboratively with their classmates and present the group work done.

Classes of practices: The knowledge acquired in theory classes and in personal study are applied to the resolution of practical cases. Students work in small groups allowing them to acquire the ability to work in groups and analysis and synthesis. It also allows to apply statistical resources in the interpretation of data. The student can access the practice guides through the Moodle space

The main vehicular language will be Catalan. However, all the support material will be in English. The work of the subject (both digital support and oral presentation) can be done in Catalan, Spanish or English.Students whouse the English language will have a plus in the final grade of thework of up to 1 point.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Computer practices	8	0.32	2, 5, 9, 10, 6
Laboratory Practices	10	0.4	2, 5, 9, 10, 12, 6, 7, 21
Seminars	4	0.16	2, 5, 9, 11, 20, 19, 18, 16, 17, 6, 7, 21
Theory classes	28	1.12	2, 3, 1, 9, 10, 11, 20, 19, 18, 16, 17, 6, 7, 21
Type: Supervised			
Tutorship (individual or group)	4	0.16	
Type: Autonomous			
Group work: Research project proposal	40	1.6	8, 4, 2, 3, 1, 5, 9, 11, 15, 13, 14, 20, 19, 18, 16, 17, 6, 7, 21
Individual Study	30	1.2	2, 9, 10, 11, 12, 20, 19, 18, 16, 17, 6, 7
Participation in learning activities	6	0.24	9
Practice report	14	0.56	2, 5, 10, 12, 6, 7
Preparation of seminars and internships	6	0.24	2, 5, 9, 6, 21

Assessment

Continuous assessment

For the evaluation of the subject, a continuous assessment model will be followed. The participation of the student, the preparation and presentation of the group work (research project proposal), the practical materials, the critical summary of a group work and the exam rate will be taken into account, in the following proportions:

Exam: 35%

Group work (research project proposal): 30%

Critical summary of a group work: 10%

Student participation in learning activities: 5%

Training materials: 20%

In the development of all the activities, including those of the theoretical typology, the student will be asked to

previously prepare some concepts, and in the case of the group work, the whole process of elaboration during the semester will be taken into account.

Group work (both digital support and oral presentation and defense) can be done in Catalan, Spanish or English. Students who use the English language will have a bonus in the final grade of the group work of up to 1 point.

There will be an integrative examination of the contents of the subject that students must overcome with a minimum of 4.

Recovery: in the case of necessity, the note of the group work and the integrative examination can be recovered. To participate in the recovery, students must have been previously evaluated in a set of activities the weight of which equals a minimum of two thirds of the total grade of the subject. Therefore, the students will obtain the "Not Evaluable" qualification when the evaluation activities carried out have a weight lower than 67% in the final grade.

The grade of the summary evaluation can be raised, in this case, the classification that will be considered will be the last one, regardless of whether it is superior or inferior to that obtained previously.
The weighted average mark of the different evaluable parts (Participationof the student in the face-to-face and virtual learning activities, Practical materials, Group work, Critical summary of a group work, Examination) must be equal to or greater than 5.0.

Single assessment

This subject provides for the single assessment system, with attendance at practicals and seminars being compulsory. In this sense, the unique assessment consists of carrying out the following activities:

1) Written test that includes the entire program of the subject. This test will consist of test-type and written questions, in which the resolution of some problems is included. This test represents 50% of the final grade and a minimum grade of 4 is required to pass the subject. It will take place on the day of the summative assessment of the subject.

2) Research project proposal: in the case of a single assessment, the research project proposal will be developed individually and periodic submissions are not required. During the course of the semester, students who take single assessment will be able to set up tutorials with the teaching staff if they need it. The final delivery of the project in written format will be made on the same day that the summative assessment of the subject is scheduled. This activity represents 30% of the subject grade.

3) Practice materials: it is carried out individually following the same instructions as presented in the continuous assessment section. It will be handed in on the same day that the summative assessment of the subject is scheduled and represents 20% of the grade of the subject.

Recovery: in case of need, the grade of the written test can be recovered,on the same day as the recovery exam for the subject is scheduled.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Critical summary of a group work	10%	0	0	8, 1, 6, 7
Exam	35%	0	0	10, 11, 6, 7
Participation in learning activities	5%	0	0	8, 2, 3, 1, 5, 9, 12, 6, 21
Practical materials	20%	0	0	12, 20, 19, 18, 16, 17

Preparation, presentation and defense of group work (research project proposal)	30%	0	0	8, 4, 2, 3, 1, 5, 15, 13, 14, 20, 19, 18, 16, 17, 6, 7, 21

Bibliography

Basic bibliography:

Crawford MH. 2007. Anthropological Genetics: Theory, Methods and Applications. Cambridge University Press. (http://eds.b.ebscohost.com/eds/detail/detail?vid=0&sid=e31c3e2b-9132-47be-8a0c-72002e84078e%40pdc-v-ses)

Destro-Bisol G. 2010. Molecular Anthropology in the Genomic Era. Journal of Anthropological Sciences, 88:93-112 (http://www.isita-org.com/jass/Contents/2010vol88/PDFonline/20834052.pdf)

Relethford J. 2013. The Human Species: An Introduction to Biological Anthropology. 9th Edition. McGraw-Hill.

Stoneking, M. 2016. An Introduction to Molecular Anthropology. John Wiley & Sons, Incorporated (https://ebookcentral.proquest.com/lib/UAB/reader.action?docID=4719165&ppg=185)

Specific bibliography, Webs and Videos:

It will be given during the course.

Software

-Jamovi Stats. Open. Now. (https://www.jamovi.org/)

-PAST (http://priede.bf.lu.lv/ftp/pub/TIS/datu_analiize/PAST/2.17c/download.html)

-HaploView (https://www.broadinstitute.org/haploview/haploview)

-BioEdit (https://www.nucleics.com/DNA_sequencing_support/Trace_viewer_reviews/BioEdit/)

-Sequence Scanner Software v2.0 (https://www.thermofisher.com/es/es/home/life-science/sequencing/sanger-sequencing/sanger-dna-sequencing/sa)

-Arlequin (http://cmpg.unibe.ch/software/arlequin35/)

-Genepop on the Web (https://genepop.curtin.edu.au/)

-Network (https://www.fluxus-engineering.com/sharenet.htm)

-Neighbor (Phylip) (https://evolution.gs.washington.edu/phylip/doc/neighbor.html)