

Molecular Anthropology

Code: 100752
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OT	4	2

Contact

Name: Cristina Maria Pereira Dos Santos
Email: cristina.santos@uab.cat

Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages

All supporting materials will be in English. Classes will be taught mostly in Catalan. Students performing the course work in English will have a plus in the final classification of the work of up to 1 point.

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; The student must prepare the seminars collaboratively with their classmates.

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 whose English language will have a plus in the final grade of the work 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	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 virtual 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

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, 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: 30%

Critical summary of a group work: 10%

Student participation in face-to-face and virtual 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 (Participation of 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.

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 face-to-face and virtual 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	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-se>
)

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_analize/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/si>)
- 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>)