



Universitat de Lleida

DEGREE CURRICULUM **NUTRIGENOMICS**

Coordination: CASALI TABERNET, ANDREU

Academic year 2022-23

Subject's general information

Subject name	NUTRIGENOMICS				
Code	100628				
Semester	1st Q(SEMESTER) CONTINUED EVALUATION				
Typology	Degree	Course	Character	Modality	
	Bachelor's Degree in Human Nutrition and Dietetics	4	OPTIONAL	Attendance-based	
Course number of credits (ECTS)	6				
Type of activity, credits, and groups	Activity type	PRALAB	PRAULA		TEORIA
	Number of credits	0.8	1.4	0.8	3
	Number of groups	1	1	1	1
Coordination	CASALI TABERNET, ANDREU				
Department	BASIC MEDICAL SCIENCES				
Teaching load distribution between lectures and independent student work	Hours in class 60 Hours of study at home 90				
Important information on data processing	Consult this link for more information.				
Language	Catalan				
Distribution of credits	Theory 3 Classroom practices 2.2 Laboratory practices 0.8				

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
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Subject's extra information

This subject is optional for the fourth year and focuses on giving basic knowledge about nutrigenomics (the effect of the diet on gene expression) and nutrigenetics (what are the genetic differences between the human population that affect nutrient uptake and metabolism) . It is essential to have approved the subject of Biology and Genetics of 1st year to be able to study.

Learning objectives

- Revise and deepen the concepts, terminology and basic essential mechanisms related to the functioning of the genetic material.
- Obtain knowledge about the regulation of gene expression by nutrients, and how genetic variability determines the effect of these nutrients on metabolism.
- Obtain the necessary technical knowledge to understand the current scientific literature on nutrigenomics and nutrigenetics
- Being able to solve simple problems.

Competences

Competences

Specific Competences

CE1 Know the chemical, biochemical and biological foundations of application in human nutrition and dietetics

CE2 Know the structure and function of the human body from the molecular level to the complete organism, in the different stages of life

CE3 Know the statistics applied to Health Sciences

CE25 Know the nutrients, their functions and their metabolic utilization

CE34 Know the pathophysiological aspects of nutrition-related diseases

CE47 Manage the basic ICT tools used in the field of Food, Nutrition and Dietetics.

CE48 Know the legal and ethical limits of dietary practice

General Competences

CG1 Recognize the essential elements of the dietician-nutritionist profession, including ethical principles, legal responsibility and the exercise of the profession, applying the principle of social justice to professional practice and developing it with respect to people, their habits, beliefs and cultures

CG2. Develop the profession with respect for other health professionals, acquiring teamwork skills.

CG3. Recognize one's own limitations and the need to maintain and update professional competence, giving special importance to learning, autonomously and continuously, new knowledge, products and techniques in nutrition and food, as well as motivation for quality.

CG4. Communicate effectively, both orally and in writing, with people, health professionals or industry and the media, knowing how to use information and communication technologies, especially those related to nutrition and health. life habits.

CG5. Know, critically assess and know how to use and apply the sources of information related to nutrition, food, lifestyles and health aspects.

Basic competences

CB2 That students know how to apply their knowledge to their work or vocation in a professional way and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.

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

CB4 That students can transmit information, ideas, problems and solutions to both specialized and non-specialized audiences.

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

Transversal Competences of the UdL

CT1 Have a correct oral and written expression

CT2 Master a foreign language

CT3 Mastering ICT

CT5. Acquire essential notions of scientific thought.

Subject contents

1. Introduction

- Basic genetic concepts.
- Organization of DNA in the cell: the chromosomes. Nucleosomes
- Variation and inheritance; phenotype and genotype; gene, allele and locus; genetic and congenital character.

2. The human genome

- The Human Genome, structure levels of the genome
- First source of genetic variability: the replication of DNA.
- Second source of genetic variability: recombination.
- Techniques of analysis of genetic variability

3. Regulation of gene expression

- Concept of regulation of gene expression.
- Regulation for the remodeling of chromatin.
- Transcriptional regulation. The transcription factors.
- Gene regulation for nutrients: SREBPs, ChREBPs and nuclear receptors.
- Post transcriptional and translational regulation.

4. Epigenetics

- Epigenetic control of gene expression
- Epigenetic modifications: Methylation
- Epigenetic modifications: Post-induce modifications of the histones. Acetylation and Methylation. The genetic imprint
- The influence of the environment. Agouti mice and obesity

5. Mutagenesis

- Concept of mutation and polymorphism
- Types of mutations: chromosomal vs. genetic, dominant vs. recessive
- Variations in the name of genes. The case of the AMY1 gene.
- Mutations that affect the metabolism of carbohydrates.
- Mutations that affect the metabolism of amino acids.
- Mutations that affect the metabolism of urea.
- Mutations that affect metabolism of lipid hydrates.
- Mutations that affect energy metabolism (mitochondrial).

6. The inheritance

- Heritability in quantitative and qualitative characters. Relative incidence and correlation of twins.
- Morel inheritance. Modes of inheritance: autosomal dominant, autosomal recessive, linked to the X chromosome, maternal.
- Allelic and non-allelic systems. Epistasia

7. Genetic diagnosis and analysis techniques

- Type of genetic diagnosis
- Chromosomic diagnosis
- Direct and indirect molecular diagnosis

8: Nutrigenomics and diet

- Diet and the microbiome
- Diet and obesity
- Diet and cardiovascular diseases
- Diet and metabolic syndrome
- Diet and cancer

9: Genetic determinants

- Risk of hypertension and osteoporosis
- Sensitivity to salt and response to Ca ++
- The metabolism of alcohol and coffee

Practical activities

Computer room:

- Databases in genomics
- Identification of inheritance patterns
- Monographic exhibitions

Laboratory:

Analysis of the diet in tumor growth in a colon cancer model in *Drosophila*

Methodology

Type of activity	Description	Hours in class	Groups	Hours professors
Theory	Class	36	2	72
Computer class	Computer practices	16	2	32
Laboratory	Lab practices	8	2	16
TOTAL		60		120

Evaluation

Continuous assessment will be carried out in accordance with the following criteria:

1. Exams (60%).

There will be two tests, which will be worth 60% of the final mark (30% + 30%). The exam will consist of a questionnaire of test questions, theoretical questions of short answer, questions of reasoning or numerical problems.

Practical reports and laboratory work will only be considered if the average mark of the exams is greater than 4.5.

2. Monograph (30%)

At the beginning of the course, a series of topics will be proposed and each student will choose one to prepare a monograph. Each student will present a report that will be given to the teacher on the assigned date, and will be worth 15% of the final grade. Each month, each student will do a public exhibition of his work of 30', which will be worth 15% of the final grade.

3. Laboratory work (10%)

The laboratory work will be evaluated based on the practice book, in which the results will be presented and discussed, as well as answering a series of questions related to the activities carried out during the practice. Assistance to ALL practice sessions is a necessary condition for the work to be taken into account for the purposes of evaluation.

Students can have a tutorial session to review the notes of each block, which will agree with the person in charge of each blog. In no case will be issues related to evaluations outside the assigned sessions or by email.

In the event that following these criteria, a student does not reach the minimum mark of 5.0, he may submit to an extraordinary recovery test, which will be done during the semester's assessment period. In order to be entitled to the extraordinary test, the average mark of the two exams completed during the course must be at least 3.5. The extraordinary test will consist of the resolution of questions of type test (30%) and theoretical questions of short answer, questions of reasoning or numerical problems (70%) of the subject. The final mark of recovery will be the result of pondering the mark of this exam (60%), if it is greater than 4, with that of the monograph and practices of the course (40%).

Bibliography

Molecular Biology of the gene. 6th ed. Watson et al. 2008 Cold Spring Harbor Laboratory Press.

Genes IX. 9th ed. Lewin 2008 Jones and Batlett Publishers.

Lewin's essential genes. 2nd ed. Krebs et al. 2010 Jones and Batlett Publishers.

Genetics: analysis of genes and genomes. 7th ed. Hartl & Jones 2009 Jones and Batlett Publishers.

Genetics: a conceptual approach. 3rd ed. Pierce 2008 W.H. Freeman and Co.

Genetics: analysis & principles. 3rd ed. Brooker 2009 McGraw-Hill Higher Education.