

Syllabus

Subject

Subject / Group	11258 - Metabolic Integration and Personalised Nutrition / 1
Degree	Master's in Nutrigenomics and Personalised Nutrition
Credits	3
Period	1st semester
Language of instruction	Spanish

Professors

Lecturers	Office hours for students					
	Starting time	Finishing time	Day	Start date	End date	Office / Building
Ana María Rodríguez Guerrero amrodriguez@uib.es						You need to book a date with the professor in order to attend a tutoring session.

Context

Learning results:

- To apply the knowledge in metabolic regulation to the elucidation of the integration of the functioning of different organs and cell types.
- To analyse bibliographic sources to identify the mechanisms of the metabolic regulation of the main macronutrients: lipids, carbohydrates and proteins.
- To expose and defend with written and oral presentations the regulation and metabolic integration mechanisms in particular pathophysiological circumstances.

Lecturer: Dr. Ana M. Rodríguez is PhD in Biochemistry and associate professor of the University of the Balearic Islands, with three six-year research expertize stretches recognized by the Spanish Government and wide teaching experience at the University. She is also an active researcher; at present, her research is focused in the field of gene-nutrient interactions and the relationship of nutrients and early nutritional interventions with the prevention of metabolic disorders associated to energy control, obesity and associated disorders, including the effect on adipose tissue, skeletal muscle and brain health. She has participated in numerous international cooperative research projects.

Requirements

There are not specific requirements. The subject is strongly recommended for those students whose previous studies are Human Nutrition, Chemistry, Medicine, or similar.

Skills

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Specific

- * EE5 – Knowing the complexity of the metabolism of nutrients
- * E1 – Knowing the molecular basis of the interactions of nutrients with the genome and its expression
- * E6 – Integrating the knowledge about the main metabolic pathways and the role of nutrients in situations of health and disease

Generic

- * G10 – Capacity to articulate the knowledge in oral and written presentations
- * G12 – Capacity for developing their work in English (lingua franca of the discipline)
- * G9 – Ability to collect, to systematize and to critically analyse the research and professional bibliography of the discipline

Basic

- * You may consult the basic competencies students will have to achieve by the end of the Master's degree at the following address: http://estudis.uib.cat/master/comp_basiques/

Content

Range of topics

- Topic 1. Basic concepts in genetics and genome organization.
Introduction to genetics. Gene variants. Genome organization. Epigenetics. Basic concepts in gene expression regulation.
- Topic 2. Basic mechanisms for the control and integration of metabolism.
Basic elements in metabolic control at the molecular and cellular levels; introduction to intercellular communication and signalling transduction pathways.
- Topic 3. Gastrointestinal tract, digestion and absorption; regulatory bases.
Structure and function of the gastrointestinal system. Phases of digestion in the mouth, stomach and small intestine. Gastrointestinal motility. Salivary, gastric and intestinal secretions. Absorption of nutrients in the small intestine: monosaccharides, amino acids and peptides, lipid absorption, absorption with water and electrolytes and other processes in the small intestine. Balance of water in the gastrointestinal tract. The pancreas. Structure and function. Physiology of biliary secretions and enterohepatic circulation. The large intestine. Structure and function. Intestinal flora. Faeces.
- Topic 4. Nutrition and metabolism of carbohydrates and their regulation.
Destination of carbohydrates in our diet. Metabolism, and its regulation, of the main carbohydrates absorbed by the intestine: glucose, galactose and fructose. Non-glycaemic carbohydrates. Resistant starch, dietary fibre, oligosaccharides, fermentation in the colon.
- Topic 5. Nutrition and metabolism of lipids and their regulation.
Lipids in our diet. Lipid metabolism and its regulation: digestion, absorption and transport of lipids in our diet; circulating lipids: structure of lipoproteins and their metabolism; metabolism of cholesterol and phospholipids; metabolism of fatty acids. Lipid pools in the organism. Nutritional and metabolic effects of fatty acids in our diet. Effect of diet on serum lipids and lipoproteins.

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Topic 6. Nutrition and metabolism of proteins and other nitrogenated compounds; regulation and integration of protein metabolism.

Overview of protein metabolism. Protein and amino acid turnover. Protein synthesis. Regulation of translation. Post-translational events. Protein degradation and its regulation. Amino acid catabolism. Amino acid synthesis. Alterations in protein turnover. Interorgan amino acid metabolism. Transport of amino acids and peptides. Breakdown of amino acids in diet and role of specific organs. Molecules derived from amino acids. Non-proteinogenic metabolic functions of amino acids. Other nitrogenated compounds: metabolism of purine and pyrimidine nucleotides.

Topic 7. Integration of the metabolism of carbohydrates, lipids and proteins in the whole body.

Connections between the metabolism of carbohydrates, lipids and amino acids and proteins. Integrated overview of metabolism: daily rhythms in eating and metabolism. Summary: metabolic control and physiological state.

Topic 8. Personalised nutrition and metabolic integration in particular physiological situations: paradigmatic examples.

Metabolic integration and personalised nutrition related to: pregnancy, breastfeeding, fasting, physical training, cardiovascular illnesses, diabetes, cancer and ageing. Influence of genetic factors and individual phenotypes on metabolic integration.

Teaching methodology

The programmed activities have the main objective of allowing the students to get the basic and advanced knowledge in metabolic integration and personalised nutrition, with special emphasis in the mechanisms of metabolic regulation. Moreover, the combination of the different activities to be done is also focused in allowing the students to take advantage, in a practical way, of the learnt concepts in the interpretation of scientific data and in the development of specific topics related to the subject.

It is important to note that the students have the possibility of 2 itineraries for assessment (Itinerary A or Itinerary B), and they must decide which itinerary to follow.

In Itinerary A, the students must do/deliver the following items: the "Student's oral presentation (about a developed subtopic of topic 8)" (with slides), the "Practical cases" and the "Exam", but considering that in Itinerary A the students must do/deliver all the items in the dates proposed in the timetable of the subject for each item (it will be available at the beginning of the subject) or before. Furthermore, the students following itinerary A have the opportunity to sum 0.2 points to the final mark by attendance to the lessons and seminars and their participation in the lessons and in the seminars presented by the other students.

In Itinerary B, the students must do/deliver the same items (oral presentation with slides and practical cases) as in Itinerary A, but they have to do the "Final Exam", which has a higher weight in the global mark of the subject, taking into account that in Itinerary B the different items can be delivered later than in Itinerary A, since they can be delivered in the date for assessment at the end of the term or in the extraordinary assessment call.

Teaching language: a bilingual system will be used. The spoken language of the lessons will be mainly Spanish (althoug questions can be done and answered in English when necessary), and the teaching materials (slides, papers, books, etc.) will be in English.

In-class work activities (0.8 credits, 20 hours)

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Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Lessons	Large group (G)	Lessons in the classroom, with the explanation of the lecturer in an interactive way with the students, to know and understand basic and advanced concepts in metabolic regulation and integration of metabolism.	13
ECTS tutorials	Tutorial sessions	Small group (P)	To help the students with the theory contents and with the preparation of the works for assessment.	2
Assessment	Students' oral presentations (subtopics of topic 8)	Large group (G)	Each student must select (with approval of the lecturer) a specific subtopic from topic 8 and prepare and defend it by oral presentation, accompanied with a slide presentation. The slides of the oral presentation must also be delivered via Aula Digital in a specific date, and they must include the bibliography and other information sources, cited correctly, in every slide, and also at the end of the slide presentation (correctly formatted). The students must search for appropriate scientific bibliography and get well documented about the specific topic they have to defend, an aspect that will be taken into account in the assessment. For the oral defence, each student will have a maximum of 10-20' (it will be definitively established depending on the number of students) and, afterwards, the students must answer specific questions set by the lecturer.	4
Assessment	Exam	Large group (G)	<p>The objective is to consolidate the knowledge about metabolic integration and regulation of metabolism. The students must do an exam with test questions on aspects relating to metabolic regulation.</p> <p>Itinerary A: An exam will be programmed during the continuous assessment. It will be an exam with test questions, based on the theory concepts of the subject. If the student does not pass this exam, they will have another opportunity (retake) by doing the Final Exam.</p> <p>Itinerary B : Final exam with test questions, based on the theory concepts of the subject. This final exam can also be used for the retake of the exam done in the continuous assessment (in itinerary A). This exam will be done in the classroom at the end of the term, and it can also be done in the extraordinary assessment call, if necessary.</p>	1

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Aula Digital platform.

Distance education tasks (2.2 credits, 55 hours)

Modality	Name	Description	Hours
Individual self-study	Study of the theory contents of the subjects	To consolidate the contents given in the lessons. The students are advised to study the slides of the lessons and to consult the recommended bibliography.	20

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Modality	Name	Description	Hours
Individual self-study	Practical cases	The objective is to put in practice the theory concepts learnt in the subject by the interpretation of specific scientific bibliography. The students must read and understand two specific papers, and answer specific questions (by doing a questionnaire) about the two scientific articles (practical cases) relating to metabolic integration and personalised nutrition proposed by the lecturer. The questionnaire about the practical cases must be answered using the moodle platform (in the intranet) and there will be two possible calls with specific dates and time (the lecturer will inform the students about the two calls at the beginning of the course); each student must decide which call they will use (both in Itinerary A and B) and they can do it at home, or from any computer they choose. At the time of the start of the questionnaire, the students will have 1 hour to complete it. The specific articles (practical cases) will be available for students from the beginning of the course, so they will have time to read and understand them. The questions of the questionnaire will come from a bank of questions and every time a student opens the questionnaire, different questions will appear (randomly selected by the informatics system). The day set for final assessment of the subject at the end of the semester, in person in the classroom, can be used as "retake" for the practical case questionnaire, after the general exam of the subject, for those students who hadn't pass the questionnaire of the practical cases done before on-line.	15
Individual self-study	Preparation of the specific subtopic of topic 8 (for oral presentation)	To document and prepare the oral presentation.	20

Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

Student learning assessment

The students have the possibility of 2 itineraries for assessment (Itinerary A or Itinerary B), and they must decide which itinerary to follow.

In Itinerary A, the students must do/deliver the following items: the "Student's oral presentation (about a developed subtopic of topic 8)" (with slides), the "Practical cases" and the "Exam", but considering that in Itinerary A the students must do/deliver all the items in the dates proposed in the timetable of the subject for each item (it will be available at the beginning of the subject) or before. Furthermore, the students following itinerary A have the opportunity to sum 0.2 points to the final mark by attendance to the lessons and seminars and their participation in the lessons and in the seminars presented by the other students.

In Itinerary B, the students must do/deliver the same items (oral presentation with slides and practical cases) as in Itinerary A, but they have to do the "Final Exam", which has a higher weight in the global mark of the subject, taking into account that in Itinerary B the different items can be delivered later than in Itinerary A, since they can be delivered in the date for assessment at the end of the term or in the extraordinary assessment call.

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Frau en elements d'avaluació

In accordance with article 33 of Regulation of academic studies, "regardless of the disciplinary procedure that may be followed against the offending student, the demonstrably fraudulent performance of any of the evaluation elements included in the teaching guides of the subjects will lead, at the discretion of the teacher, a undervaluation in the qualification that may involve the qualification of "suspense 0" in the annual evaluation of the subject".

Students' oral presentations (subtopics of topic 8)

Modality	Assessment
Technique	Oral tests (retrievable)
Description	Each student must select (with approval of the lecturer) a specific subtopic from topic 8 and prepare and defend it by oral presentation, accompanied with a slide presentation. The slides of the oral presentation must also be delivered via Aula Digital in a specific date, and they must include the bibliography and other information sources, cited correctly, in every slide, and also at the end of the slide presentation (correctly formatted). The students must search for appropriate scientific bibliography and get well documented about the specific topic they have to defend, an aspect that will be taken into account in the assessment. For the oral defence, each student will have a maximum of 10-20' (it will be definitively established depending on the number of students) and, afterwards, the students must answer specific questions set by the lecturer.
Assessment criteria	Quality of the slide presentation and its oral defence, as well as the capacity to adapt to the established time for the oral presentation and the answers to specific questions asked by the lecturer. The document delivered with the slides (and the bibliography correctly included) will complement the assessment.

Final grade percentage: 40% for pathway A with a minimum grade of 5

Final grade percentage: 30% for pathway B with a minimum grade of 5

Exam

Modality	Assessment
Technique	Objective tests (retrievable)
Description	The objective is to consolidate the knowledge about metabolic integration and regulation of metabolism. The students must do an exam with test questions on aspects relating to metabolic regulation. Itinerary A: An exam will be programmed during the continuous assessment. It will be an exam with test questions, based on the theory concepts of the subject. If the student does not pass this exam, they will have another opportunity (retake) by doing the Final Exam. Itinerary B : Final exam with test questions, based on the theory concepts of the subject. This final exam can also be used for the retake of the exam done in the continuous assessment (in itinerary A). This exam will be done in the classroom at the end of the term, and it can also be done in the extraordinary assessment call, if necessary.
Assessment criteria	Objective test.

Final grade percentage: 30% for pathway A with a minimum grade of 4.5

Final grade percentage: 40% for pathway B with a minimum grade of 4.5

Practical cases

Modality	Individual self-study
Technique	Objective tests (retrievable)
Description	The objective is to put in practice the theory concepts learnt in the subject by the interpretation of specific scientific bibliography. The students must read and understand two specific papers, and answer specific questions (by doing a questionnaire) about the two scientific articles (practical cases) relating to metabolic



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integration and personalised nutrition proposed by the lecturer. The questionnaire about the practical cases must be answered using the moodle platform (in the intranet) and there will be two possible calls with specific dates and time (the lecturer will inform the students about the two calls at the beginning of the course); each student must decide which call they will use (both in Itinerary A and B) and they can do it at home, or from any computer they choose. At the time of the start of the questionnaire, the students will have 1 hour to complete it. The specific articles (practical cases) will be available for students from the beginning of the course, so they will have time to read and understand them. The questions of the questionnaire will come from a bank of questions and every time a student opens the questionnaire, different questions will appear (randomly selected by the informatics system). The day set for final assessment of the subject at the end of the semester, in person in the classroom, can be used as "retake" for the practical case questionnaire, after the general exam of the subject, for those students who hadn't pass the questionnaire of the practical cases done before on-line.

Assessment criteria Objective test.

Final grade percentage: 30% for pathway A with a minimum grade of 4.5

Final grade percentage: 30% for pathway B with a minimum grade of 4.5

Resources, bibliography and additional documentation

Learning resources:

PowerPoint presentations in lectures.

Use of Moodle environment to transmit content and materials and as an interactive communication tool.

Bibliographic materials (books, scientific articles, databases, etc.).

Basic bibliography

Research/review papers recommended by the lecturer.

