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|----------------|--------------------------------------------|
| Academic year | 2014-15 |
| Subject | 10287 - Circadian Control of Energy Intake |
| Group | Group 1, 1S |
| Teaching guide | A |
| Language | English |

Subject identification

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|--------------------------|----------------------------------------------------------------------------------------|
| Subject | 10287 - Circadian Control of Energy Intake |
| Credits | 0.4 de presencials (10 hours) 1.6 de no presencials (40 hours) 2 de totals (50 hours). |
| Group | Group 1, 1S (Campus Extens) |
| Teaching period | 1st semester |
| Teaching language | English |

Professors

| Lecturers | Horari d'atenció alumnes | | | | | |
|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------|-----|------------|-------------|--------|
| | Starting time | Finishing time | Day | Start date | Finish date | Office |
| Juana Sánchez Roig joana.sanchez@uib.es | You need to book a date with the professor in order to attend a tutorial. | | | | | |

Contextualisation

Professor

Dr. Juana Sánchez Roig, is currently Ramón y Cajal Researcher at the Laboratory of Molecular Biology, Nutrition and Biotechnology, University of the Balearic Islands. She has published regularly since 2002 a total of 50 international articles in prestigious journals such as J Clin Metab Endocrin, Endocrinology, Molecular Nutrition and Food Research, Plos One, Obesity Research, British Journal of Nutrition, Pflügers Archiv European Journal of Physiology, BBA-Molecular Basis of Disease, International Journal of Obesity, the Journal of Nutritional.

Subject.

Most organisms on Earth are capable of predicting the light–dark phases and restricting their activity to certain hours throughout the 24-h cycle. By developing an endogenous circadian (circa – about and dies – day) clock, which is entrained to external stimuli, animals ensure that physiological processes are performed at the optimal time (Froy O. The circadian Clock and metabolism. Clinical Science 120:65-72, 2011). Emerging evidence suggests that circadian clock function is closely linked to metabolic homeostasis and that rhythm disruption can contribute to the development of metabolic disease

Requirements

Skills





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Specific

- * E3 - Apply knowledge of the discipline for health promotion.

Generic

- * G10 - Ability to articulate knowledge in oral and written presentations.
- * G11 - Advanced comprehension of the global context in which the specialty area develops.
- * G12 - Ability to develop their work in English (language internationally recognized scientific discipline).
- * CB8 - Students should be able to integrate knowledge and handle complexity, and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
- * CB6 - Possess knowledge and understanding to provide a basis or opportunity for originality in developing and / or implementing ideas, often within a research context.
- * G9 - Ability to collect, organize and critically analyze the research literature and professional 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

Theme content

Subject 1. Introduction to Chronobiology

Subject 1.- Introduction to Chronobiology

1.1.- Chronobiology

1.2.- The Biological Clock

A) The location of the mammalian biological clock

B) Hierarchical organization of circadian clocks

1.3.- The synchronization mechanisms of the circadian timing system

1.4.- The molecular mechanism of the circadian clock

1.5.- Bibliography

Subject 2. Chronobiology in Nutrition

Subject 2.- Chronobiology in Nutrition

2.1.- Relationships between Metabolism and Circadian Rhythms

2.2.- Neural Pathways Linking Circadian and Metabolic Systems

2.3.- The Food-Entrainable Oscillator

2.4.- Nutrient Signaling and Circadian Components

2.5.- Chronobiological aspects of obesity

A) Background

B) Epidemiological evidence

C) Genetic evidences

D) Summarizing

2.6.- Bibliography

Subject 3. Specific examples hormones or condition involved in the circadian control of food intake





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Teaching methodology

In-class work activities

| Modality | Name | Typ. Grp. | Description | Hours |
|----------------|---------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Theory classes | Lectures in the presence of Professor | Large group (G) | Explanation of the contents in lectures Monographic sessions supervised orgaven by the professor on a topic of special interest Seminars given by the students. In groups,the students will presentand defen in a public session a work. | 10 |

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 Campus Extens platform.

Distance education work activities

| Modality | Name | Description | Hours |
|-----------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------|-------|
| Individual self-study | | Studying the material of the lectures Reading the RecommendedBibliography | 20 |
| Group self-study | Preparation of a seminar | Reading the literature related to the work to be prepared. Preparation of the oral presentation of the topic in group | 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 activities will be graded with a score of 0-10. The average of the marks obtained in the different sections must be at least 5 to pass the course.

We propose two routes: A and B.

The route A is the continuous assessment and the student requires assistance to classroom activities. The itinerary B, for students who have and can demonstrate their incompatibility to attend classroom activities.

The final mark of the course is the sum of scores:





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Itinerary A

1. Objective test. 45% of the final mark corresponds to the final exam
2. Jobs and projects. 55% of the final mark corresponds to the mark obtained in the oral presentation group work and the assist other students's seminars

Itinerary B

1. Objective test. 45 % of the final mark corresponds to the final exam
2. Jobs and projects (30% of the final mark). Bibliographic revision of a work proposed by the professor
3. Test of real or simulated tasks (problem solving or case). 25 % of the final mark. Questionnaire regarding the seminars prepared by other students

Lectures in the presence of Professor

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|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modality | Theory classes |
| Technique | Objective tests (non-retrievable) |
| Description | Explanation of the contents in lectures Monographic sessions supervised or given by the professor on a topic of special interest Seminars given by the students. In groups, the students will present and defend in a public session a work. |
| Assessment criteria | Evaluation of the acquired knowledge |

Final grade percentage: 45%

Individual self-study

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|---------------------|----------------------------------------------------------------------------|
| Modality | Individual self-study |
| Technique | Objective tests (non-retrievable) |
| Description | Studying the material of the lectures Reading the Recommended Bibliography |
| Assessment criteria | |

Final grade percentage: 0%

Preparation of a seminar

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|---------------------|-----------------------------------------------------------------------------------------------------------------------|
| Modality | Group self-study |
| Technique | Papers and projects (non-retrievable) |
| Description | Reading the literature related to the work to be prepared. Preparation of the oral presentation of the topic in group |
| Assessment criteria | Evaluation of acquired attitudes |

Final grade percentage: 55%

Resources, bibliography and additional documentation

Basic bibliography

1. Froy O. Metabolism and Circadian Rhythms – Implications for Obesity. *Endocrine Reviews* 31(1):1-24, 2010
2. Froy O. The circadian Clock and metabolism. *Clinical Science* 120:65-72, 2011
3. Garaulet M., et al., The chronobiology, etiology and pathophysiology of obesity. *International Journal of Obesity* 34, 1667–1683, 2010





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4. Gómez-Abellán P., et al. Chronobiological aspects of obesity and metabolic syndrome. *Endocrinología y Nutrición* 59(1):50-61, 2012
5. Mendoza J. et al. Circadian Clocks: Setting Time by Food. *Journal of Neuroendocrinology* 19: 127-137, 2006
6. Kovac J., et al. A Time to Fast, a Time to Feast: The Crosstalk between Metabolism and the Circadian Clock. *Mol Cells* 28: 75-80, 2009
7. Green CB., et al. The Meter of Metabolism. *Cell* 134:728-742, 2008

Complementary bibliography

- 1.- A Preprandial Rise in Plasma Ghrelin Levels Suggests a Role in Meal Initiation in Humans. Cummings et al., *Diabetes* 50:1714–1719, 2001
- 2.- Circadian rhythm of plasma leptin levels in upper and lower body obese women: influence of body fat distribution and weight loss. Langendonk et al. *J Clin Endocrinol Metab* 83(5):1706-12, 1998
- 3.- Clock genes are implicated in the human metabolic syndrome. Gómez Abellán et al. *International Journal of obesity* 32, 121–128, 2008
- 4.- Daily Changes in Hypothalamic Gene Expression of Neuropeptide Y, Galanin, Proopiomelanocortin, and Adipocyte Leptin Gene Expression and Secretion: Effects of Food Restriction. Xu et al. *Endocrinology* 140: 2868–2875, 1999)
- 5.- Diurnal rhythms of leptin and ghrelin in the systemic circulation and in the gastric mucosa are related to food intake in rats. Sánchez et al. *Pflugers Arch - Eur J Physiol* 448: 500–506, 2004
- 6.- Time-Restricted Feeding without Reducing Caloric Intake Prevents Metabolic Diseases in Mice Fed a High-Fat Diet. Hatori et al., *Cell Metabolism* 15: 1–13, 2012
- 7.- Impaired Insulin Signaling in Human Adipocytes After Experimental Sleep Restriction: A Randomized, Crossover Study. Broussard et al. *Ann Intern Med* 157(8):549-557, 2012

