27116 - Clinical Biotechnology

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	446 - Degree in Biotechnology
ECTS	9.0
Course	3
Period	Annual
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals
Main aims :

To cover the biotechnology applications in the clinical field, as well as, to emphasize the role of biotechnology in accelerating the understanding of the molecular basis of disease. This course deepens into the physio patho logy, diagnosis, therapeutic approaches and treatment of diseases.

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation
The learning project of this subject in based on:

A reinforcement of theoretical bases with involvement of students through a guided supervision. Students will prepare a subject of their interest and related to topics covered in this subject. Special emphasis will be paid to research aspects

with new and innovative approaches.

5.2.Learning activities

The working program is designed to achieve established goals and encompasses the following activities...

Theoretical sessions. Presential. 6 ECTS. Provide students basic background of the subject. Presentations, animations, videos and surfing the net will be elements used. Didactic materials will be available for the students through the private server of UNIZAR

Experimental work. 2 ECTS. This activity will provide training in laboratory analysis and data management.

Seminary sessions. Presential. 0.5 ECTS. Case-oriented approaches will deepen basic concepts of the subject

Presentation and discussion of a selected case. 0.5 ECTS. Students will review a particular topic in close supervision by a faculty member. This guidance will be set by appointed meetings. Eventually and in an open sesion, students will deliver their presentations to their mates and faculty members.

5.3.Program

Theoretical sessions

1. Clinical biotechnology introduction. Semiology. Definition of syndrome. Overview of clinical syndromes.

2. Diseases associated to carbohydrate metabolism. Classification of carbohydrate metabolism disorders. Deficiencies of intestinal glycosidases.

3. Pentosurias. Primary hyperoxalurias.

4. Disorders of galactose metabolism. Galactosemias. Hereditary fructose intolerance. Fructose metabolism disorders

5. Glucose metabolism disorders: Diabetes mellitus type I and II. Sequelae of diabetes mellitus.

6. Glycogen metabolism disorders. Glycogenosis.

7. Metabolism of lipoproteins. Overview of lipoprotein metabolism. Primary and secondary dyslipidemias. Classification.

8. Disorders affecting lipoprotein metabolism: Hyperchilomicronemias.Type III Hyperlipoproteinemia. Familial combined hyperlipidemia.

27116 - Clinical Biotechnology

9. Hypercholesterolemias. Authosomal dominant hypercholesterolemia. Hypoalphalipoproteinemias.

10. Disorders of protein metabolism. Overview of amino acid metabolism. Amino acid transport disorders.

11. Disorders of ammonium metabolism . Enzyme deficiencies in the urea cycle.

12 . Aminoacidopathies: Alcaptonuria. Albinism. Phenylketonuria. Tyrosinosis. Maple syrup urine disease. Other aminoacidopathies.

13. Disorders of the metabolism of purines and pyrimidines. Uric acid. Primary and secondary hyperuricemia.

14. Lysosomal storage disorders (I): Mucolipidosis and mucopolysaccharidosis.

15. Lysosomal storage disorders (II). Sphingolipidoses and other lysosomal diseases.

16. Enzymatic replacement therapy. The secretion of proteins. La glycosylation of proteins and mannose-6-phosphate receptors. Applications of protein engineering . Enzyme production.

17. Molecular bases of mitochondrial diseases.

18. Peroxisomal diseases.

19. Pathologies associated with oxidative stress. Molecular bases and therapeutic strategies.

20. The nucleic acids as therapeutic agents. Background. Oligonucleotidos and antisense RNA. Ribozymes. Aptamers. Current status and approaches.

21.- Therapy using siRNA. Introduction. Background. Requirements. Methods. siRNA as antiviral therapy. HIV. siRNA as antitumor therapy. siRNA in other diseases. Prospects.

22. Disorders in iron metabolism and hemoglobin. Anemia and poliglobulias. Hemochromatosis. Hemoglobinopathies. Thalassemia. Porphyrin metabolism. Porphyria.

23. Hemostasis disorders. Hypercoagulability status and hemorrhagic diathesis.

24. Laboratory tests of kidney function (Cystatin C, Creatinine clearance, PAH, osmolar, free water etc ...) and urinalysis. Renal Pathophysiology: failure, and nephrosis.

25.- Analytical exploration of pituitary hormones. Pathophysiology of gigantism, acromegaly and dwarfism. Basal and dynamic tests. Pathophysiology of prolactin disorders

26.- Analytical exploration of the neurohypophyseal hormones. Pathophysiology of diabetes insipidus.

27116 - Clinical Biotechnology

27. Biochemical markers of ischemic heart disease. Heart failure biomarkers.

28.Liver pathophysiology. Methods for assessing liver function.Analysis of the bile duct integrity.

29. Laboratory tests of gastric, pancreatic and intestinal function. Gastric and exocrine pancreatic pathophysiology.

30. Bone metabolism pathophysiology: calcium, magnesium and phosphate. Hypercalcemia, hypocalcemia, hyperparathyroidism and hypoparathyroidism.

31.- Analytical exploration of thyroid hormones. Pathophysiology of hyperthyroidism and hypothyroidism.

32.- Analytical exploration of the hypothalamic-pituitary-adrenal gland axis. Analytical examination of the adrenal glands.

33. Pathophysiology of Cushing's syndrome and Addison disease.

34. Pathophysiology of hypothalamic pituitary axis. Sex glands. Analytical study of male and female infertility.

Seminars

1. Autosomal dominant hypercholesterolemias

2. Anderson-Fabry disease.

3. Treatment of mitochondrial diseases.

4 - Cornelia de Lange syndrome. Genetic bases.

Laboratory program

1. Dyslipidemia: APOE genotyping

2. Biomarkers in lysosomal disorders. Plasma chitotriosidase activity. CHIT genotype

3. Genetic diagnosis of Gaucher disease.

4. Introduction to the laboratory of clinical pathophysiology. Quality control.

5. Cytomics. Analysis of blood count and blood differential image cytometry: clinical analysis, and sample storage

6. Urinalysis.

7. Blood analysis.

5.4.Planning and scheduling

Calendar of presential sessions and students' presentations .

Scheduled sessions and exam dates will be available through the Web of Facultad de Ciencias, Biotechnology section, at the following url: https://ciencias.unizar.es/grado-en-biotecnologia .

At the beginning of the academic year, the Degree's coordinator will set different groups of experimental sessions and their schedule in order to avoid overlapping with other subjects.

5.5.Bibliography and recomended resources

BB	Bioquímica clínica : texto ilustrado en color / Allan Gaw...[et al.] ; ilustrado por Robert Britton . - 2ª ed. Madrid [etc.] : Harcourt, cop. 2001
BB	Bioquímica clínica / autores, J.M. González de Buitrago Arriero...[et al.] . - 1a ed., 1a reimp. Madrid [etc.] : McGraw-Hill, 1999
BB	Bioquímica clínica y patología molecular / edición dirigida por X. Fuentes Arderiu, M. J. Castiñeiras Lacambra, J. M. Queraltó Compañó . - 2a ed. Barcelona [etc.] : Reverté, D.L. 1997
BB	Burtis, Carl A.. Tietz Textbook of Clinical Chemistry and Molecular diagnostics. 5th ed. WB Saunders Elsevier, 2012
BB	González de Buitrago Arriero, José Manuel. Patología molecular / J.M.González de Buitrago, J.M. Medina Jiménez Madrid [etc] : McGraw-Hill Interamericana, 2001
BB	Henry's clinical diagnosis and management by laboratory methods / [edited by] Richard A. McPherson, Matthew R. Pincus ; [associate editors, Naif Z. Abraham Jr. ... [et al.]]. 22nd ed. Philadelphia, PA : Elsevier/Saunders, c2011
BB	Sanjurjo Crespo, Pablo. Diagnóstico y tratamiento de las enfermedades metabólicas hereditarias / Pablo Sanjurjo, Antonio Baldellou Madrid : Ergon, D.L. 2001

27116 - Clinical Biotechnology

BB

The metabolic and molecular bases of inherited disease / editors, Charles R. Scriver ... [et al.] . 8th ed. New York : McGraw-Hill, cop. 2001 [4 vol.]

LISTS OF URLs:

Affymetrix - [http://www.affymetrix.com/about_affymetrix/outreach/index.affx]
Agilent Technologies - [http://www.genomics.agilent.com/GenericA.aspx?pagetype=Tutorials&subpagety
Genetic Home Reference - [http://ghr.nlm.nih.gov/condition/]
Human Genome Organisation - [http://www.hugo-international.org/]
Medline Plus - [http://www.nlm.nih.gov/medlineplus/]
National Center for Biotechnology Information - [http://www.ncbi.nlm.nih.gov/]
Online Mendelian Inheritance in Man - [http://omim.org/]
Orphanet. The portal for rare diseases and orphan drugs - [http://www.orpha.net/consor/cgi-bin/ClinicalLabs_Search_Simple.php?lng=EN&L
The Online Metabolic and Molecular Bases of Inherited Diseases (OMMBID) - [http://www.ommbid.com/]
VideoLectures.NET. Open access educational video lectures repository - [http://videolectures.net/]