80 FORT BROWN, BRONWSVILLE, TEXAS 78520 | (956) UTB-4YOU

UTRGV

BMED 4310: Medical Biochemistry

Instructor Name: Masoud M. Zarei Ph.D.

Fall 2015; MW 3:05-4:20; LHSB 1.410

COURSE SYLLABUS

COURSE DESCRIPTION

This advance level course employ knowledge of the general componets of eukaryotic cells to explain how different compontes of cell contribute to cellular and organism function.
This new Medical Biochemistry course will include small group tutorials, lectures, problem based learning and discussions of clinical case studies focusing on the Metabolism of human body and diseases.

PREREQUISITES

BMED 1101, BMED 1103 Corequisite of BMED 1102

AIMS FOR MODULE

Students should be able to understand the relationship between cell structure and function through the vehicle of cell and the relevancy of cell biology and histology to clinical practice.

TEXTBOOK(S) & OTHER RESOURCES

Textbook of Biochemistry with Clinical Correlations, 7th Edition

OUTLINE OF TOPTICS AND KEY TERMS

- **(BIOENERGETICS AND OXIDATIVE METABOLISM)**
  -Oxidative phosphorylation
  -Hydrogen ion gradient
  -Electron transport chain
  -Reduction potential
  -Cytochrome
  -Iron sulfur proteins
  -Coenzyme Q
  -FMN
  -FAD
  -Methemoglobin
- **(Proteins II Structure-Function Relationships in Protein Families)**
  -Oxidase

-Methemoglobin
-Carboxyhemoglobin

- **(Carbohydrate Metabolism I: Major Metabolic Pathways and their control)**
  -Ca^{2+} signaling
  -Ca^{2+} channels
- **(Bioenergetics and Oxidative Metabolism)**
- **(Carbohydrate Metabolism I)**
  -Epinephrine
  -GLUT 2
  -Ketoacidosis
  -Ketogenesis
  -Ketone bodies
  -Oxidative phosphorylation
- **(Amino Acid Metabolism)**
  -Glutamate dehydrogenase
  -Ornithine
  -Transaminase
  -Urea cycle
- **(Lipid Metabolism II: pathways of Metabolism of Special Lipids)**
- **(Digestion and Absorption of Basic Nutritional Constituents)**
  -Cytochrome P450 enzyme system
  -HMG-CoA reductase
  -Isoprenoid
  -Statin
  -Bile salts
  -Bile acids
  -7 α-hydroxylase, CYP7A1
  -Primary and secondary bile
- **(Lipid Metabolism II: pathways of Metabolism of Special Lipids)**
- **(Digestion and Absorption of Basic Nutritional Constituents)**
  -Bile acids
  -Bile salts
  -Cholestyramine
  -Conjugated bile salts
  -Ursodeoxycholic acid
- **(lipid Metabolism I & 2)**
  -Apolipoprotein
  -Chylomicron
  -HDL
  -LDL
  -Lipoprotein
  -VLDL
- **(Lipid Metabolism I&II)**
  -Apolipoprotein C-II (apoC-II)
  -Apolipoprotein E (apoE) 2 & 3
  -Lipoprotein lipase (LPL)

-Hepatic lipase (HL)

- **(Metabolic interrelationships)**
  -Ketone bodies
  -Triglyceride
  -Diglyceride
  -Monoglyceride

TIMELINE

25% of each lecture will be dedicated to highlights of each topics and the remaining 75% will be dedicated to clinical case presentations.

Objectives / Learning Issues

1. Know about the function of the electron transport chain (ETC)
2. Understand what factors may inhibit the ETC.
3. The biomedical process by which the therapy for cyanide poisoning works.
4. Recognize other ETC sites and agents of inhibition.
5. Understand the process by which CO causes symptoms.
6. Know how CO disrupts O_2 transport and uncouples the ETC
7. Understand how malignant hyperthermia is caused by the uncoupling of oxidative phosphorylation.
8. Understand the biochemical mechanism for the heat production.
9. Be familiar with the mechanism of how dantrolene reverses the effects.
10. Purposes of the pentose pathway.
11. Roles of the oxidative and non-oxidative pentose pathways.
12. Role of *glucose 6-phosphate dehydrogenase (G6PD)* in the pentose pathway.
13. Clinical consequences of *G6PD deficiency.*
14. Molecular mechanisms that cause the clinical consequences of *G6PD* deficiency.
15. Inheritance pattern of *G6PD* deficiency.
16. Understand regulation of glycogen and glucose production
17. Understand how insulin and epinephrine affect glucose levels
18. Be familiar with the regulation of glucagon
19. Know about diabetic ketoacidosis and biomedical mechanism
20. Be familiar with the urea cycle.
21. Know about amino acid metabolism.
22. Be aware of the biochemical means of removing excess ammonia.
23. Know about the role of HMG-CoA reductase in cholesterol synthesis
24. Know the mechanism of action of statin medications.
25. Understand the role of cholesterol on steroid synthesis.
26. Be aware that niacin decreases lipolysis in adipose tissue and VLDL synthesis in liver
27. Know about bile salt metabolism
28. Be able to identify where bile salts synthesized
29. Know where bile salts emulsify dietary fats
30. Describe the catabolism and metabolism of bile salts
31. Biochemical mechanism of action of cholestyramine and ursodeoxycholic acids
32. Know about cholesterol metabolism

33. Understand the role of serum lipoproteins
34. Be aware of the types of hereditary hyperlipidemias
35. Know why the LDL level is increased with familial hypercholesterolemia
36. Understand the metabolic changes in starvation
37. Be familiar with the formation of ketone bodies in starvation
38. Know about the oxidation of fatty acids
39. Be familiar with the metabolic change in fasting states as compared to starvation

EVALUATION/ASSESSMENT

Student Assessment:
Students will be divided in groups of 6.
Groups will be assigned clinical cases and the case studies and quizes will constitute 25% of their final grade.
75% of grade will be evaluated based on formal exams (Critical thinking problems/ multiple choices/comprehensive; 50% Individual test and 25% group).
Student will demonstrate their understanding of Medical Biochemistry concepts by solving clinical cases.
Departmental Assessment:
1) Three multiple choice exams will be used to assess the factual knowledge of students.
2) Clinical presentations and problems will be used to assess students critical thinking abilities.

KEY CONCEPTS

Chapter 6: The structure function of the connective tissue.
Chapter 7: Cartilage types, characteristics and locations as translated to their functions.
Chapter 8. Structure/ function of different muscle proteins.
Chapter 9. Functional characteristics of different type of neurons.
Chapter 10. Functional characteristics of different type of cells in human blood.
Chapter 11. Functional characteristics of different type of arteries and veins in human body.
Chapter 12. Functional characteristics of different cytokines in the immune system.

KEY SKILLS

1- How to do research using PubMed web site?
2- How to research and present the clinical cases?

Laboratory Exercise

N/A

GRADING POLICY

Alphanumeric Grading System

+/- Letter Grade	Grade Points	100-Point Scale Guide (Not prescriptive)
A+	4 grade points	(98-100)
A	4 grade points	(93-97.9)
A-	3.67 grade points	(90-92.9)
B+	3.33 grade points	(87-89.9)
B	3 grade points	(83-86.9)
B-	2.67 grade points	(80-82.9)
C+	2.33 grade points	(77-79.9)
C	2 grade points	(73-76.9)
C-	1.67 grade points	(70-72.9)
D+	1.33 grade points	(67-69.9)
D	1 grade point	(63-66.9)
D-	0.67 grade points	(60-62.9)
F	0 grade points	(Below 60)

To receive an A for the learning unit, the student must score an A in all associated modules.

ABSENCES AND MAKE-UP WORK

Students are expected to attend all classes. Students missing an assignment/exam/class for a valid, verifiable reason (doctor's note required) should consult with the instructor within 1 week of the absence. If the reason is accepted the make up test will be comprehensive test.

UNIVERSITY POLICIES

The UTRGV disability accommodation, mandatory course evaluation statement and sexual harassment statement are required on all syllabi. Additional policy statements are optional, such as those covering attendance, academic integrity, and course drop policies.

STUDENTS WITH DISABILITIES:
If you have a documented disability (physical, psychological, learning, or other disability which affects your academic performance) and would like to receive academic accommodations, please inform your instructor and contact Student Accessibility Services to schedule an appointment to initiate services. It is recommended that you schedule an appointment with Student Accessibility Services before classes start. However, accommodations can be provided at any time. **Brownsville Campus**: Student Accessibility Services is located in Cortez Hall Room 129 and can be contacted by phone at (956) 882-7374 (Voice) or via email at accessibility@utrgv.edu. **Edinburg Campus:** Student Accessibility Services is located in 108 University Center and can be contacted by phone at (956) 665-7005 (Voice), (956) 665-3840 (Fax), or via email at accessibility@utrgv.edu.

MANDATORY COURSE EVALUATION PERIOD:
Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (http://my.utrgv.edu); you will be contacted through email with further instructions. Online evaluations will be available Nov. 18 – Dec. 9, 2015. Students who complete their evaluations will have priority access to their grades.

ATTENDANCE:

Students are expected to attend all scheduled classes and may be dropped from the course for excessive absences. UTRGV's attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics; for observance of religious holy days; or for military service. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

SCHOLASTIC INTEGRITY:
As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarism, and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regulations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

SEXUAL HARASSMENT, DISCRIMINATION, and VIOLENCE:
In accordance with UT System regulations, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and so must report any instance, occurring during a student's time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at www.utrgv.edu/equity, including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect in an environment free from sexual misconduct and discrimination.

COURSE DROPS:
According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the "3-peat rule" and the "6-drop" rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.