Advanced Renal Physiology and Pathophysiology  
Course Syllabus

Course Number:  GMS 6414

Credit Hours:  2 credit hours

Course Format:  This online course is tailored for asynchronous distance learners.

COURSE DESCRIPTION

This is an advanced graduate class, also suitable for postdoctoral students which will expose students to in depth discussion and understanding of several aspects of kidney function, as follows: Physiological control of glomerular filtration and glomerular function in renal disease; regulation of renal sodium excretion; morphology of renal transporters; renal mechanisms of acid base balance; the renal physiologic responses to normal pregnancy. The teaching faculty is drawn from a wide range of disciplines and are all actively involved in research on their areas of expertise. The structure of this course involves 1). Lectures by research faculty on areas of their expertise and 2). Tutorial style discussions on original articles which expand on the didactic lecture material.

TARGET AUDIENCE

This course is designed for individuals wishing for an in-depth understanding of kidney physiology and pathophysiology. This course will be useful for students who have not met the entry requirements for medical school and who are interested in a career in Nephrology medicine; for those wishing to enhance their applications into Masters and PhD programs in the medical sciences in renal research.

PREREQUISITES

This course requires a BA or BS and a strong science foundation with at least 5 full semester courses related to biology, chemistry and/or physics. In addition, Principles of Medical Physiology (GMS6400c) or equivalent are required.

CONTACTS

The course coordinator is Chris Baylis Ph.D., Professor of Physiology and Medicine and Director of the UF Hypertension Center. baylisc@ufl.edu
SCHEDULE
This is a half semester long course that is offered during the 2nd part of the Spring and Summer semesters. It is designed to be taken as part of the Medical Physiology Certificate course and should be preceded by GMS 6400C and GMS 6410.

COURSE GOALS
The kidney is the primary regulator of all the body fluid compartments and controls both volume and composition. This course explores: 1). The mechanisms by which filtration of fluid occurs at the glomerulus. 2). Some current ideas on the causes of progression of chronic kidney disease. 3). Molecular aspects of structural and functional regulation of renal sodium excretion. 4). Advances in the molecular understanding of the kidney and acid base balance. 5). The complex renal adaptations that occur in renal hemodynamics and sensing and control of sodium balance during normal pregnancy.

LEARNING OUTCOMES
Upon completion of this course, students will be able to:
1. Understand how the renal circulation and the tubular epithelium play unique and interdependent roles in the regulation of body fluid balance and composition.
2. Understand the consequences of a loss of renal function and how this may progress in chronic kidney disease.
3. Understand how the collecting duct plays a key role in the final regulation of total body sodium.
4. Understand the importance of ammonia transporters in the renal mechanism of acid base balance.
5. Develop an in depth understanding of some of the research contributions that are shaping our current views on kidney physiology and pathophysiology.
6. Present individual research papers in a critical manner and in the context of the material already discussed

LEARNING RESOURCES
1. Recorded lectures with PowerPoint presentations, workshops and virtual laboratory exercises will be provided on the course website.
2. Tutorial (informal) discussions of research articles will be available EITHER as an online discussion using bulletin board and discussion website, or in real time using webcam. The real time sessions will also be recorded and posted online.
3. Online Q/A bulletin board and discussion website where students can post questions, which faculty will answer within the bulletin board.
4. There is no textbook for this course. Lectures will be accompanied by notes in PowerPoint format. References for original articles will be provided which students can access through the PUBMED using the University of Florida log-on.
EXAMINATIONS AND GRADING

A numerical grade will be given at the end of the module and will represent an average between the grades of all participating faculty. The assessment will be 25% on each of 2 sessions (mid-term and final) in which each student presents one specific paper that is related to the material that has been discussed. A final, open book written examination will be worth the remaining 50%.

The grade will be scored as follows:

Grading scale:

A numerical grade will be given at the end of the course and will be scored as follows:

- 93-100% = A
- 90-92% = A-
- 87-89% = B+
- 83-86% = B
- 80-82% = B-
- 77-79% = C+
- 73-76% = C
- 70-72% = C-
- 67-69% = D+
- 63-66% = D
- <63% = E

GRADING POLICY

Failure to attend the live tutorial discussions and paper presentations will receive a 0 for that class. In some circumstances where an absence is essential this will be waived, but the student must obtain the prior approval of the instructor.

ACADEMIC HONESTY

Please review the complete policy of the University of Florida regarding academic dishonesty, found in the online student handbook at:


Students are expected to abide by the University of Florida Academic Honesty Guidelines and to adhere to the following pledge:

“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied:
"On my honor, I have neither given nor received unauthorized aid in doing this assignment."
Course Outline:

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<tr>
<th>Date</th>
<th>Subject</th>
<th>Teacher</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Introduction to the kidney. Renal hemodynamics</td>
<td>Baylis</td>
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<td>Renal hemodynamic adaptations during normal pregnancy.</td>
<td>Conrad</td>
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<td>Pregnancy and renal disease</td>
<td>Baylis</td>
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<td>Week 2</td>
<td>Tutorial discussion based on assigned papers</td>
<td>Baylis, Conrad</td>
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<td>Nitric oxide and angiotensin II in the control of renal hemodynamics.</td>
<td>Baylis</td>
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<td>Derangements of NO and ANGII in renal disease.</td>
<td>Baylis</td>
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<td>Week 3</td>
<td>Chronic Kidney disease</td>
<td>Tantravahi, Clapp</td>
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<td>Pathology of the kidney in different forms of CKD</td>
<td>Tantravahi, Clapp</td>
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<td>Tutorial discussion based on assigned papers</td>
<td>Baylis, Tantravahi, Clapp</td>
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<td>Week 4</td>
<td><strong>Midterm Paper presentation</strong></td>
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<td>Regulation of renal sodium excretion by the collecting duct. Signaling</td>
<td>Gumz</td>
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<td>events. Circadian clock and kidney function</td>
<td>Gumz</td>
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<td>Week 5</td>
<td>Regulation of sodium balance during normal pregnancy. States of</td>
<td>Baylis, Gumz/Baylis</td>
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<td>dysregulated sodium balance</td>
<td>Gumz/Baylis</td>
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<td>Tutorial discussion based on assigned papers</td>
<td>Gumz, Baylis</td>
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<td>Week 6</td>
<td>Acid base balance; General Ammonia transporters</td>
<td>Weiner</td>
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<td>Morphology of the tubule and renal transporters.</td>
<td>Verlander</td>
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<td>Week 7</td>
<td>Tutorial discussion based on assigned papers</td>
<td>Verlander, Weiner</td>
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<td><strong>Final Paper presentation</strong></td>
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<td><strong>Open Book final exam</strong></td>
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Please note that this is an advanced, up to date, research based course and the content will vary according to recent advances.