Medical Renal Physiology

Course Syllabus

Course Number: **GMS 6401**

Credit Hours: 2 credit hours

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

COURSE DESCRIPTION

Medical Renal Physiology (GMS6401) teaches the functions of the renal system of human body at a level required for clinical medicine and basic research in medical physiology. The course covers normal physiology, as well as selected diseases. Concepts are taught using a combination of lectures, research assignments, and online problem sets. The research assignments are designed to help the student understand the integration of renal physiology with genetics, genomics, molecular biology, and cellular physiology as a basis for a better understanding of human disease. The ultimate goal is for students to develop an understanding of the integrated functions of the normal body and "problem solving" and "critical thinking" skills in evaluating clinical situations. Each recorded lecture lasts between 20 and 30 min.

TARGET AUDIENCE

This course is designed to meet the needs of individuals wanting to pursue a career in medicine, biomedical research, or in teaching topics related to physiology and medicine. For example, this course is designed to provide critical knowledge for individuals who wish to teach renal physiology at the secondary and post-secondary levels. However, this course will also provide a foundation for students who are wishing to attain or enhance knowledge of medical renal physiology.

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. A minimum undergraduate GPA = 2.0 is required for admission. Co-enrollment or prior passing grade in GMS 6440 is required for enrollment in this class.

CONTACT

Jaya Kolli, M.D., Lecturer, Department of Physiology and Functional Genomics. Please use the email function within Canvas to contact Dr. Kolli.

SCHEDULE

This is a self-paced course that is offered in the Spring, Fall and Summer.

COURSE GOALS

Physiology is the science of how the body functions, and is the basis for understanding modern clinical medicine and the biomedical sciences. This course will provide: 1) a foundation understanding of the basic functions of the kidney; 2) integration of individual facts in order to understand how organ systems work independently and interdependently in the body. One example of this integration is in the understanding of the aging kidney.

LEARNING OUTCOMES

Upon completion of this course, students will be able to:

1. Understand the normal functions of the kidney at a level required for an understanding of clinical medicine.
2. Understand the endocrine, vascular, and neural mechanisms controlling normal renal function at a level required for an understanding of clinical medicine.
3. Understand how these systems act in an integrated manner to regulate overall body functions.
4. Understand how failure of these normal physiologic functions and integrations are associated with some diseases.
5. Demonstrate the ability to apply physiological principles of clinical and basic science relevancy by multiple choice examinations, research assignments, and problem sets.

LEARNING RESOURCES

1. Recorded video lectures with PowerPoint presentations will be provided on the course website.
2. Recorded video clinical correlation(s) and/or case studies relating to the basic science material.
3. Lecture notes for each video lecture are available as PDF downloads enabled for direct note taking.

Recommended text (not required, but highly recommended): "*Ganong's Review of Medical Physiology, Twenty-Fifth Edition*" 2016. Authors: Kim E. Barrett, Susan M. Barman, Scott Boitano, & Heddwen L. Brooks. ISBN: 9780071825108.
Free online: https://accessmedicine.mhmedical.com/Book.aspx?bookid=1587#96462619.9.
Recommended text (not required, but useful): Student may wish to supplement the course videos and PDF handout by purchasing an online version of "*Berne & Levy Physiology, 7th Edition*" 2018. Authors: BruceM.Koeppen & Bruce A. Stanton. ISBN: 9780323393942.

COMMUNICATION WITH FACULTY

If you have questions about the material or the course, please contact the course director (Dr. Kolli) using the email function in Canvas.

STRUCTURE OF CONTENT

The course content is structured into sub-topical groups of lectures that are accompanied by Problem Sets. Problem Sets are designed to help the student master the course material. These problem sets are completed as take-home assignments, and are graded.

There are 2 Functional Genomics self-guided Research Assignments, which are designed to help the student integrate the concepts of physiology with functional genomics and human diseases of genetic origin. These research assignments are also completed as take-home assignments and are also graded.

COURSE CALENDAR and RECOMMENDED TIME MANAGEMENT

The videos and corresponding PDF notes are available throughout the entire time the course is open, from the first day through the end of the course on the day the grades are reported to the Registrar. However, the Exam is open ONLY during the window of time shown on the website. The course lectures should be viewed in the order shown later in this syllabus.

TECHNICAL REQUIREMENTS

To view the online videos, a high-speed internet connection is required, as well as a web browser with the latest Microsoft Silverlight plugin installed.

EXAMINATION AND GRADING

There will be one multiple choice examination covering the material taught in the lectures. The exam will be monitored by ProctorU, a UF chosen service that allows the students to complete their exams at home while still ensuring academic integrity. Students will take the exam at a computer that meets the technical requirements of ProctorU, including a web cam and microphone. Students will make the arrangements for exam proctoring. The exam may be taken any time during the window of availability; however, it can only be taken once.

We recommend you make an appointment with ProctorU at least two weeks in advance of your preferred exam date. The cost of the exam is covered in the registration costs. The points used to compute final grades will be determined after all assignments and the exam have been completed. Scores are reported as a percent.

GRADING SCALE:

A numerical grade will be given at the end of the course and will be scored as follows, per University of Florida standards:

93-100% = A
90-92.99% = A-
87-89.99% = B+
83-86.99% = B
80-82.99% = B-
77-79.99% = C+
73-76.99% = C
70-72.99% = C-
67-69.99% = D+
63-66.99% = D
<63% = E

The final examination accounts for 35% of the total grade, Functional Genomics Research Assignments 30% of the total grade, and Problem Sets 35% of the grade.

GRADING POLICY

There are no make-up exams unless otherwise granted by the course coordinator prior to an examination date. Failure to take an exam without prior permission from the course coordinator will be recorded as 0.

ACADEMIC HONESTY

Please review the complete policy of the University of Florida regarding academic dishonesty, found in the online student handbook at: http://graduateschool.ufl.edu/media/graduate-school/pdf-files/handbook.pdf.

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."***

IMPORTANT NOTICE ABOUT PLAGIARISM

Plagiarism is not tolerated at the University of Florida. Plagiarism may be punishable by expulsion from the course or the certificate program. If the plagiarism is detected after the certificate has been awarded, the certificate may be rescinded.

The University of Florida has an honor code that defines plagiarism as follows:

> Section 3a: Plagiarism.
>
> A student shall not represent as the student's own work all or any portion of the work of another. Plagiarism includes but is not limited to:
>
> 1. Quoting oral or written materials including but not limited to those found on the internet, whether published or unpublished, without proper attribution.
> 2. Submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student.
>
> Please note that intent is not an element of this kind of violation so it is important to take great care to complete the written assignments in your own words.
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> For a complete description of the UF Honor Code and procedures, please visit: https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/
>
> For a good discussion about plagiarism and how to properly cite your sources, please visit: http://mediasite.video.ufl.edu/Mediasite/Play/adaa44500eaf460a84f238e6b9a558f9

COURSE EVALUATION POLICY

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

MEDICAL RENAL PHYSIOLOGY (2 credit hours)

Lecture 1: Introduction to Renal Physiology
Lecture 2: General Functions of the Kidney, Renal Anatomy
Lecture 3: Clearance I
Lecture 4: Clearance II
Problem Set 1: Clearance

Lecture 5: Renal Hemodynamics I
Lecture 6: Renal Hemodynamics II
Lecture 7: Renal Hemodynamics III
Lecture 8: Renal Hemodynamics IV
Problem Set 2: Renal Hemodynamics.

Functional Genomics Research Assignment 1: Polycystic Kidney Disease
(instructions are provided in the course materials)

Lecture 9: Renal Epithelial Sodium Transport
Lecture 10: Sodium Balance I
Lecture 11: Sodium Balance II
Lecture 12: Sodium Balance III
Lecture 13: Sodium Balance IV
Problem Set 3: Sodium Balance

Lecture 14: Renal Handling of Calcium and Phosphate
Lecture 15: Renal Handling of Potassium
Problem Set 4: Calcium, Phosphate, and Potassium

Lecture 16: Concentration and Dilution I
Lecture 17: Concentration and Dilution II
Lecture 18: Concentration and Dilution III
Lecture 19: Concentration and Dilution IV
Problem Set 5: Concentration and Dilution

Lecture 20: Acid/Base I
Lecture 21: Acid/Base II
Lecture 22: Acid-Base III
Problem Set 6: Acid-Base

Lecture 23: Clinical Correlation: Kidney Diseases
Lecture 24: Clinical Correlation: The Aging Kidney
Problem Set 7: Kidney Dysfunction

Functional Genomics Research Assignment 2: Bartter’s Syndrome and Gitelman's Syndrome

Final Examination (multiple-choice; please schedule this with ProctorU)