Principles of Medical Physiology  
Course Syllabus

Course Number: GMS 6400C
Credit Hours: 6 credit hours
Course Format: This online course is tailored for asynchronous distance learners.

COURSE DESCRIPTION
Principles of Medical Physiology (GMS6400C) teaches the functions of the human body at a level required for clinical medicine. The course covers normal physiology, as well as selected diseases. Concepts are organized by systems: Endocrine, Cardiovascular, Respiratory, Renal and Gastrointestinal. Additional content includes a Foundational Basics introductory section on the cell, body fluids and autonomic nervous system and a final Integration section which applies the physiological principles learned to special situations (Pregnancy, Aging, Exercise, Stress). 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 ~20 – 30 min.

TARGET AUDIENCE
This course is designed to meet the needs of individuals wanting to pursue a career in medicine or biomedical research. This course will provide a foundation for students who have not met the entry requirements for medical school and for those wishing to enhance their applications into Masters and PhD programs in the medical sciences.

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.

CONTACTS
Bruce R. Stevens PhD, Professor of Physiology and Functional Genomics, stevensb@ufl.edu; Tel: 352-392-4480. Peter Sayeski PhD, Professor of Physiology and Functional Genomics, psayeski@ufl.edu; Tel 352 392-1816.

SCHEDULE
This is a 15 week 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 human body; 2) knowledge of the physiology of the major systems: endocrine, cardiovascular, muscle, respiratory, renal, and gastrointestinal, as well as selected diseases that affect these systems; 3) integration of these individual facts in order to understand how organ systems work independently and interdependently in the body. One example of this integration is in the control of acid base balance. Other examples covered in this course are in the integrated responses to pregnancy and exercise as well as pathophysiologic responses to aging.

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

1. Understand the normal functions of the individual body systems at a level required for an understanding of clinical medicine.
2. Understand how these systems act in an integrated manner to regulate overall body functions.
3. Understand how failure of these normal physiologic functions and integrations are associated with some diseases.
4. Demonstrate the ability to apply physiological principles of clinical relevancy by multiple choice examinations and Quiz exercises.

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.
4. Opportunity for clarification of the material via email.
5. Practice on-line quizzes (not for grade) to advance the understanding of the material provided in lectures.
6. Example exam questions (not for grade) to test knowledge and prepare for each examination.
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. Author: Bruce M. Koeppen & Bruce A. Stanton. ISBN: 9780323393942.

COMMUNICATION WITH FACULTY
If a student is unclear regarding parts of a topic, the student is encouraged to contact the relevant lecturer via Canvas messaging.

STRUCTURE OF CONTENT
The course content is structured into Blocks. The six Blocks are: Foundational Basics+Endocrine Part 1; Endocrine Part 2; Cardiovascular+Muscle; Respiratory; Renal; and Gastrointestinal+Integrated Physiology. The content of the Blocks is shown later in this syllabus.

COURSE CALENDAR and RECOMMENDED TIME MANAGEMENT
The calendar of all course event is shown in an accompanying figure. 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. Also, each Exam is available to complete at any time during the semester. For each Block the course content lecture titles should be viewed in the order shown later in this syllabus. For Block 1 and Block 6 in particular, note in the following Figure our recommended calendar dates for breakdown of when to view the videos and PDFs of the content in those Blocks—as a guide to help in managing time, students may use these recommendations or may alternatively adapt your own learning pace.
EXAMINATIONS AND GRADING
There will be 6 multiple choice examinations, each covering the contents of a Block. Exam 1 covers Foundational Basics + Endocrine Part 1; Exam 2 covers Endocrine Part 2; Exam 3 covers Cardiovascular + Muscle, Exam 4 covers Respiratory, Exam 5 covers Renal, and Exam 6 covers Gastrointestinal + Integrated Physiology. All exams 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 all examinations at a computer that meets the technical requirements of ProctorU including a web cam and microphone. Students will make the arrangements for exam proctoring. **We recommend you make an appointment with ProctorU at least two weeks in advance of each exam date.** All costs of these exams are covered in the registration costs. You may schedule your exams any time during the semester, as long as the exams are scheduled by the due date listed on the exam. Scores are reported as a percent. The points used to compute final grades will be determined after all exams have been completed. The final grade is based simply on the overall percentage of points covering all 6 Exams; in other words the contribution of each Exam to the final percentage is weighted according to the number of questions on each Exam. The final letter grade for the entire course will be issued within 72h after the due date for the six exams.

**Grading scale:** A final numerical score for the entire course will be computed at the end of the semester for each student. After dropping his/her single lowest exam, the points will then be computed based on the five remaining exam scores. The faculty may also factor in other considerations in adjusting scores to a possibly higher score. A final letter grade will be assigned as follows, per University of Florida standards:

- 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**
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](http://graduateschool.ufl.edu/media/graduate-school/pdf-files/handbook.pdf)

Students are expected to abide by the [University of Florida Academic Honesty Guidelines](http://graduateschool.ufl.edu/media/graduate-school/pdf-files/handbook.pdf) 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 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/](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/](https://ufl.bluera.com/ufl/). Summaries of course evaluation results are available to students at [https://gatorevals.aa.ufl.edu/public-results/](https://gatorevals.aa.ufl.edu/public-results/).
# BLOCK 1

**PHYSIOLOGY FOUNDATIONAL BASICS**  
Section Coordinator Bruce Stevens Ph.D. ([stevensb@ufl.edu](mailto:stevensb@ufl.edu))

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<tbody>
<tr>
<td>Introduction to Foundational Basics Section</td>
<td>Stevens</td>
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<tr>
<td>Transporters, Pumps, and Channels – Part I</td>
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<tr>
<td>Transporters, Pumps, and Channels – Part II</td>
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<tr>
<td>Physiology of Voltage &amp; Concentration Gradients – Part I</td>
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<td>Body Fluids I</td>
<td>Baylis</td>
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<td>Receptors and Signaling – Part I</td>
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<td>Autonomic Nervous System – Part III</td>
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**ENDOCRINE Part 1**  
Section Coordinator Jaya Kolli M.D. ([jkolli@ufl.edu](mailto:jkolli@ufl.edu))

<table>
<thead>
<tr>
<th>Section</th>
<th>Author</th>
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<tbody>
<tr>
<td>Introduction to the Endocrine Section</td>
<td>Conrad</td>
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<tr>
<td>Introduction to Endocrinology Physiology</td>
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<tr>
<td>Hypothalamus and Pituitary – Part I</td>
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<td>Adrenal Medulla – Part I</td>
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<td>Adrenal Medulla – Part II</td>
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<td>Adrenal Cortex – Part I</td>
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<td>Adrenal Cortex – Part II</td>
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<td>Thyroid Hormones – Part I</td>
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<td>Clinical Correlation: Thyroid – Part I</td>
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<td>Clinical Correlation: Thyroid – Part II</td>
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<td>Quiz covering Foundational Basics plus Endocrine Part 1</td>
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* *Block 1 Multiple Choice Exam #1 on Foundational Basics + Endocrine Part 1*
ENOCRINE Part 2
Section Coordinator Jaya Kolli M.D. (jkolli@ufl.edu)

Calcium/Phosphate Regulation - Part I
Calcium/Phosphate Regulation – Part II
Calcium/Phosphate Regulation – Part III
Calcium Phosphate Regulation – Par IV
Fluid Balance & Cardiovascular Control
Growth Hormone – Part I
Growth Hormone – Part II
Blood Glucose Regulation – Part I
Blood Glucose Regulation – Part II
Blood Glucose Regulation – Part III
Reproduction (Sexual Differentiation – Part I)
Reproduction (Sexual Differentiation - Part II)
Reproduction Male – Part I
Reproduction Male – Part II
Reproduction Female – Part I
Reproduction Female – Part II
Reproduction Female – Part III
Reproduction Female – Part IV
Reproduction Pregnancy – Part I
Reproduction Pregnancy – Part II
Reproduction Pregnancy – Part III
Reproduction Pregnancy – Part IV
Special Topic: Carbohydrate Metabolism in Pregnancy
Clinical Correlation : Assisted Reproductive Technologies – Part I
Clinical Correlation: Assisted Reproductive Technologies – Part II
Quiz

* Block 2 Multiple Choice Exam #2 on Endocrine Part 2
The Structure of Muscle
The Molecular Structure of Muscle
Muscle Function and Regulation – Activation
Muscle Function and Regulation – Force Modulation I
Muscle Dysfuction and Disease – Force Modulation II
Comparing Skeletal and Cardiac Muscle
Comparing Skeletal, Cardiac and Smooth Muscle
Clinical Correlation-Muscular Dystrophy

Introduction to Cardiovascular Physiology I
Introduction to Cardiovascular Physiology II
Cardiac Cycle
Electrocardiogram I
Electrocardiogram II
Electrocardiogram III
Cardiac Ion Channels I
Cardiac Ion Channels II
Quiz 1
Hemodynamics, Arteries I
Hemodynamics, Arteries II
Venous Return
Fetal Circulation
Pulmonary Circulation I
Pulmonary Circulation II
Neural Control I
Neural Control II
Neural Control III
Local Control of Blood Flow
Regulation of Arterial Pressure
Microcirculation
Integrated Control of Cardiovascular System I
Integrated Control of Cardiovascular System II
Shock and Heart Failure – Clinical correlation
Quiz 2

* Block 3 Multiple Choice Exam #3 on Muscle and Cardiovascular
Introduction to Respiration Section
Introduction and Functional Anatomy
The Respiratory Pump and Lung Volumes
Lung Compliance Part I
Lung Compliance Part II
Airway Resistance Part I
Airway Resistance Part II
The Work of Breathing Part I
The Work of Breathing Part II
Alveolar Ventilation and Gas Composition Part I
Alveolar Ventilation and Gas Composition Part II
Gas Diffusion Part I
Gas Diffusion Part II
Oxygen Transport Part I
Oxygen Transport Part II
Quiz 1
Oxygen Content Part I
Oxygen Content Part II
CO₂ Transport and Content
Clinical Correlation: O₂ and CO₂ Assessment Part I
Clinical Correlation: O₂ and CO₂ Assessment Part II
Pulmonary Circulation Part I
Pulmonary Circulation Part II
Clinical Correlation: Pulmonary Edema Part I
Clinical Correlation: Pulmonary Edema Part II
Acid-Base Part I
Acid-Base Part II
Respiratory Control Part I
Respiratory Control Part II
High Altitude Respiration
Quiz 2
Clinical Correlation: Case Studies Part I
Clinical Correlation: Case Studies Part II

* Block 4 Multiple Choice Exam #4 on Respiratory Physiology
Introduction to Renal Physiology Section
General Functions of the Kidney. Renal Anatomy
Clearance- Part I
Clearance Part II
Renal Hemodynamics – Part I
Renal Hemodynamics – Part II
Renal Hemodynamics – Part III
Renal Hemodynamics – Part IV
Renal epithelial sodium transport
Control of sodium balance – Part I
Control of sodium balance – Part II
Control of sodium balance – Part III
Control of sodium balance – Part IV

Quiz 1

Renal handling of Calcium and Phosphate
Renal handling of Potassium
Concentration and Dilution – Part I
Concentration and Dilution – Part II
Concentration and Dilution – Part III
Concentration and Dilution – Part IV
Acid/Base Balance – Part I
Acid/Base Balance – Part II
Acid/Base Balance – Part III
Kidney Diseases

Quiz 2

* Block 5 Multiple choice Exam #5 on Renal Physiology
### GASTROINTESTINAL
Section coordinator Bruce Stevens Ph.D. ([stevensb@ufl.edu](mailto:stevensb@ufl.edu))

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<tbody>
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<td>Introduction to Gastrointestinal Physiology Section</td>
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<tr>
<td>Gastrointestinal Nervous System &amp; Motility Part I</td>
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<td>Gastrointestinal Nervous System &amp; Motility Part III</td>
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<td>Gastrointestinal Nervous System &amp; Motility Part IV</td>
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<td>Phases of Digestion and Salivary Gland Physiology</td>
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<td>Exocrine Pancreas</td>
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<td>Small Intestine Epithelium and Protein Digestion/Absorption</td>
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<td>Carbohydrate Digestion/Absorption</td>
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<td>Liver and Gallbladder Part I</td>
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<td>Lipid Digestion and Absorption Part I</td>
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<td>GI Electrolytes and Fluids Part I</td>
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<td>Summary map of digestion and absorption</td>
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<td>Study guides: GI hormones and GI regulators</td>
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<td>Gastrointestinal Commensal Microbiota – Part I</td>
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<tr>
<td>Gastrointestinal Commensal Microbiota – Part II</td>
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<tr>
<td>Quiz</td>
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### INTEGRATED PHYSIOLOGY
Section Coordinator Peter Sayeski Ph.D. ([psayeski@ufl.edu](mailto:psayeski@ufl.edu))

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<tr>
<td>Pregnancy Physiology: Maternal – Part I</td>
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<td>Pregnancy Physiology: View from the Fetus</td>
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<td>Aging Physiology: Kidney</td>
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<td>Integration: Muscle and the cardiovascular system</td>
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<td>Exercise Physiology and Cardiovascular – Part I</td>
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<td>Stress</td>
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<td>Quiz</td>
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* Block 6 Multiple choice Exam #6 on Gastrointestinal + Integrated Physiology*