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.

COMMUNICATION WITH FACULTY
If a student is unclear regarding parts of a topic, the student is encouraged to email the relevant lecturer directly.

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. However, each Exam is open ONLY during the windows of time shown on the website and denoted in the Figure below. 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, as long as the student is prepared to take the Exam during the allotted time window.
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 will receive your individual exam grades within 24h after the last day of the window of time when the exams are open. 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 exam #6 has been completed.

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** 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."
# BLOCK 1

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

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

<table>
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<tr>
<th>Topic</th>
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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>Hypothalamus and Pituitary – Part II</td>
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<td>Adrenal Medulla – Part I</td>
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<td>Adrenal Cortex – Part I</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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<tr>
<td>Quiz covering Foundational Basics plus Endocrine Part 1</td>
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</tr>
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</table>

* Block 1 Multiple Choice Exam #1 on Foundational Basics + Endocrine Part 1
BLOCK 2

ENDOCRINE Part 2
Section Coordinator Kirk Conrad M.D. (kpconrad@ufl.edu)

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

* Block 2 Multiple Choice Exam #2 on Endocrine Part 2
# BLOCK 3

**MUSCLE and CARDIOVASCULAR**
Section Coordinator Charles Wood Ph.D. ([woode@ufl.edu](mailto:woode@ufl.edu))

<table>
<thead>
<tr>
<th>Course Title</th>
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<tr>
<td>The Structure of Muscle</td>
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<td>The Molecular Structure of Muscle</td>
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<td>Muscle Function and Regulation – Activation</td>
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<td>Muscle Function and Regulation – Force Modulation I</td>
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<tr>
<td>Muscle Dysfunction and Disease – Force Modulation II</td>
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<td>Comparing Skeletal and Cardiac Muscle</td>
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<td>Comparing Skeletal, Cardiac and Smooth Muscle</td>
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<td>Clinical Correlation-Muscular Dystrophy</td>
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<td>Introduction to Cardiovascular Physiology I</td>
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<td>Introduction to Cardiovascular Physiology II</td>
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<td>Cardiac Cycle</td>
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<td>Electrocardiogram I</td>
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<td>Electrocardiogram II</td>
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<td>Electrocardiogram III</td>
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<td>Cardiac Ion Channels I</td>
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<tr>
<td>Cardiac Ion Channels II</td>
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<td>Quiz I</td>
<td>Faculty</td>
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<td>Hemodynamics, Arteries I</td>
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<td>Hemodynamics, Arteries II</td>
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<td>Venous Return</td>
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<td>Fetal Circulation</td>
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<td>Neural Control I</td>
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<td>Neural Control III</td>
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<td>Local Control of Blood Flow</td>
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<td>Regulation of Arterial Pressure</td>
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<td>Microcirculation</td>
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<td>Integrated Control of Cardiovascular System I</td>
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<td>Integrated Control of Cardiovascular System II</td>
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<tr>
<td>Shock and Heart Failure – Clinical correlation</td>
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<tr>
<td>Quiz 2</td>
<td>Faculty</td>
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</tbody>
</table>

*Block 3 Multiple Choice Exam #3 on Muscle and Cardiovascular*
**RESPIRATORY PHYSIOLOGY**
Section Coordinator: Peter P. Sayeski, Ph.D. (psayeski@ufl.edu)

- 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
## BLOCK 5

### RENAL

Section Coordinator Charles Wood Ph.D. ([woode@ufl.edu](mailto:woode@ufl.edu))

<table>
<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td>Introduction to Renal Physiology Section</td>
<td>Baylis</td>
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<tr>
<td>General Functions of the Kidney. Renal Anatomy</td>
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<td>Clearance- Part I</td>
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<td>Renal Hemodynamics – Part I</td>
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<td>Renal Hemodynamics – Part IV</td>
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<td>Control of sodium balance – Part I</td>
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<td>Control of sodium balance – Part IV</td>
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<td>Renal handling of Calcium and Phosphate</td>
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<td>Renal handling of Potassium</td>
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<td>Concentration and Dilution – Part I</td>
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<td>Acid/Base Balance – Part I</td>
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<td>Acid/Base Balance – Part III</td>
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<td>Kidney Diseases</td>
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<tr>
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* **Block 5 Multiple choice Exam #5 on Renal Physiology**
BLOCK 6

GASTROINTESTINAL
Section coordinator Bruce Stevens Ph.D. (stevensb@ufl.edu)

Introduction to Gastrointestinal Physiology Section Stevens
Gastrointestinal Nervous System & Motility Part I Stevens
Gastrointestinal Nervous System & Motility Part II Stevens
Gastrointestinal Nervous System & Motility Part III Stevens
Gastrointestinal Nervous System & Motility Part IV Stevens
Phases of Digestion and Salivary Gland Physiology Stevens
Exocrine Pancreas Stevens
Gastric Physiology Part I Stevens
Gastric Physiology Part II Stevens
Small Intestine Epithelium and Protein Digestion/Absorption Stevens
Carbohydrate Digestion/Absorption Stevens
Liver and Gallbladder Part I Stevens
Liver and Gallbladder Part II Stevens
Lipid Digestion and Absorption Part I Stevens
Lipid Digestion and Absorption Part II Stevens
GI Electrolytes and Fluids Part I Stevens
GI Electrolytes and Fluids Part II Stevens
Summary map of digestion and absorption Stevens
Study guides: GI hormones and GI regulators Stevens
Gastrointestinal Commensal Microbiota – Part I Mai
Gastrointestinal Commensal Microbiota – Part II Mai
Quiz Stevens

INTEGRATED PHYSIOLOGY
Section Coordinator Peter Sayeski Ph.D. (psayeski@ufl.edu)

Introduction to Integrated Physiology Section Baylis
Pregnancy Physiology: Maternal – Part I Baylis
Pregnancy Physiology: Maternal – Part II Baylis
Pregnancy Physiology: View from the Fetus Wood
Aging Physiology: Kidney Baylis
Aging Physiology: Cardiovascular Delp
Integration: Muscle and the cardiovascular system Walter
Exercise Physiology and Cardiovascular – Part I Delp
Exercise Physiology and Cardiovascular – Part II Delp
Exercise Physiology and Lungs Sayeski
Stress Wood
Quiz Faculty

* Block 6 Multiple choice Exam #6 on Gastrointestinal + Integrated Physiology