

Function of the Human Body
Spring Semester 2017

OVERVIEW: Function of the Human Body builds upon core molecular and anatomical disciplines presented in the first semester. Major organ systems will be explored in an integrative fashion covering all aspects from physiology to metabolic biochemistry and nutrition. Emphasis is placed on understanding key concepts of normal physiological and biochemical systems in healthy humans. Selected aspects of pathophysiological processes will be discussed to illustrate how an understanding of normal function can be applied to clinical medicine. For students to succeed and perform their very best in this challenging course, it is mandatory for them to master the ability to read and interpret graphs and think logically. The need to wrestle with challenging concepts, verbalize mechanisms, and reconstruct graphs with peers cannot be overstated. Comprehension and mastery of integrated FHB materials will prepare students for second-year courses in the curriculum, the USMLE board exams part I, as well as the clinical years.

COURSE GOALS:

A. MEDICAL KNOWLEDGE

- Explain the fundamental cell biological, histological and physiological properties of the major organ systems, including: the nervous system; the cardiovascular and circulatory system including the lymphatics and special circulations; the pulmonary system; the gastrointestinal system and metabolism; the renal system; the endocrine system; male and female reproductive systems.
- Describe the regulation of each of the major organ systems by neural, endocrine, paracrine, and autocrine mechanisms and the signal transduction mechanisms employed.
- Explain the fundamental principles of positive and negative feedback and describe how manipulating feedback loops can be used in clinical diagnosis.
- Explain the membrane properties and ionic current mechanisms of excitable cells, and the function of action potentials in different types of excitable cells, including neurotransmission and excitation-contraction coupling.
- Discuss the autonomic nervous system and how it regulates the major organ systems.
- Explain the impact of dysfunction of each major organ system on the other systems.
- Explain the clinical tests commonly used to assess the normal function or pathology of the major organ systems, including blood tests, ECGs, biopsies, MRIs, spinal taps, respirometry, urinalysis, endocrine challenge tests, pregnancy tests.
- Describe the major macronutrients and critical minerals, compounds, amino acids and vitamins that are essential to balanced nutrition and whole body energy balance, and the signs, symptoms, etiology and treatment/prevention recommendations for dietary deficiencies or excesses.

B. INTERPERSONAL AND COMMUNICATION SKILLS

- Demonstrate the ability to effectively communicate and work collaboratively together with peers in the small group setting to successfully address problems of physiological significance.
- Contribute to the education of peers by actively engaging in small group discussion and problem solving exercises.

C. PRACTICE-BASED LEARNING AND IMPROVEMENT

- Critically self-evaluate performance in the course to identify strengths and personal limitations in either physiological knowledge or the ability to integrate physiological information to use in evaluation of cases; develop learning goals to address any deficiencies and actively seek out assistance from appropriate sources to successfully remediate these deficiencies.
- Participate in simulation and ECG laboratory sessions and self-evaluate performance and demonstrate ability to incorporate classroom knowledge of physiology into the clinical setting.

D. PROFESSIONALISM

- Demonstrate professional behavior by completing all course requirements, including course evaluations, in a timely manner.
- Demonstrate professionalism by behaving in a professional, courteous and respectful manner when engaged in course activities or interacting with course faculty and staff.
- Demonstrate responsibility and accountability by attending and being punctual at all required course activities.
- Demonstrate professional behavior by requesting any excused absence from required course activities well ahead of the scheduled date.
- Demonstrate professional behavior by responding to direct communication from the Course Director in a timely fashion, particularly in circumstances when a face-to face meeting is requested to discuss issues related to academic performance.
- Demonstrate professional and ethical behavior by honestly completing course examinations without attempting to seek an advantage by unfair means; and by reporting any unethical behavior of peers to the course administration.

FACULTY: The success of FHB depends critically on the many dedicated and experienced faculty who teach the course. Approximately fifty professional scientists and clinicians with demonstrated commitments to medical education cooperate in presenting lectures, facilitating small-group learning sessions, or leading laboratories and conferences. Individual faculty members are approachable and available for student questions.

SECTIONS: FHB is partitioned into four main sections, each of which is followed by a sectional examination every four to six weeks. As the course develops, students will recognize that unifying physiological principles keep recurring among the various organ systems. Students are encouraged to integrate the material as much as possible, minimizing the memorization of facts and maximizing a comprehension of concepts.

Section 1: Nerve, Muscle, Heart & Circulatory Physiology

Section 2: Pulmonary, Renal & Acid-Base Physiology

Section 3: Gastrointestinal, Metabolic, & Nutrition Physiology

Section 4: Endocrine & Reproductive Physiology

TEXTBOOKS: The required textbook for this course is *Physiology* by Berne et al, 6th Ed. In addition, there are several **recommended** textbooks that are applicable to each topic (see list below). Class notes and/or PowerPoint slides with learning objectives will be posted online prior to each lecture. Sectional exam questions will be generated from lectures, conferences, labs, and small group problems as well as other

learning experiences within each section of the course. Students are **strongly encouraged** to read relevant materials in one of the recommended texts before coming to lecture. This practice will greatly enhance your understanding of the lecture being presented.

- **REQUIRED: Physiology** (Berne, Levy, Koeppen & Stanton, 6th edition, 2008, Mosby)

RECOMMENDED:

- **Medical Physiology** (Boron and Boulpaep, 2003, Saunders)
- **Physiology** (Costanzo, 4th edition, Saunders)
- **Respiratory Physiology – The Essentials** (West, 9th Edition, 2012, Lippincott)
- **Vander's Renal Physiology** (Eaton & Pooler, 7th Edition, 2009, McGraw Hill)
- **Textbook of Biochemistry with Clinical Correlations** (Devlin, 6th ed., 2006, Wiley-Liss)
- **Endocrine Physiology** (McGraw Hill-Lange, 4th ed., 2013, Molina)

LEARNING EXPERIENCES: There are six types of learning experiences in FHB, enabling the student to approach the didactic material from various perspectives. Progress in the course is assessed by objective sectional examinations and small group quizzes. A detailed FHB Course Schedule reports the session titles, times and locations for all activities within the course. This schedule should be followed carefully since planned variations occur from week to week.

- **Physiology Lectures**
- **Small Group Problem-Solving Sessions**
- **ECG Laboratory**
- **Conferences**
- **Simulations**
- **Lecture Review Sessions**

LECTURES: Fundamental concepts in cellular and organ system physiology and biochemistry will be presented in lecture format. Each lecture will list Key Concepts and Learning Objectives to help focus your studying. Audio and PowerPoint Slides of each lecture are available as video recordings for review purposes. However, it is strongly encouraged that every attempt is made to attend lectures, as it facilitates direct interaction with the lecturing faculty and with student peers. Students can expect faculty to exhibit a desire to teach, provide clear explanations and answers to student questions, and a desire to effectively communicate knowledge about the function of the human body.

SMALL GROUP PROBLEM-SOLVING SESSIONS (total = 20): Medical and graduate students will be assigned to one of twenty-four small groups, each consisting of six to seven students. Each small group session is scheduled for 2 hours. The small groups will meet within designated learning clusters (SDLs). There will be two faculty facilitators for each small group session. Facilitators will typically rotate in different rooms throughout the block, which is designed to facilitate student interaction with as many different faculty as possible. However, certain facilitators may be assigned to the same room for every session in the block in an attempt to provide consistency and stronger connections with a single faculty member. This might not always be feasible, as it depends on faculty availability in any given block. NOTE: Topics addressed in small-group sessions will be tested on sectional exams.

Quizzes (total = 10): There will be a 5-question quiz distributed to all students during the last 30 minutes of select small group sessions. The quizzes are open book/notes, but must be completed individually and without discussion with fellow students. Quizzes should be turned in to the faculty member facilitating the small group session. Quizzes will be graded and count cumulatively for 5% of the final grade.

Attendance: The small-group sessions are designed to foster interpersonal and communication skills within a healthcare team so attendance is mandatory. Students are required to attend (sign-in sheet) and actively participate in all small groups sessions. Students are allowed 2 absences due to unforeseen circumstances and full points will be credited for those missed days. Students must notify the Course Director about the intended absence prior to the missed session to receive points for missed quizzes. More than 2 absences will result in a negative professionalism comment in your final grade record and no points

will be given for more than 2 missed quizzes. There will be no makeups allowed for missed quizzes.

PHYSIOLOGY LAB:

- **Electrocardiogram and Blood Pressure (LAB 1):** All students will record their own ECGs, blood pressure and determine their mean frontal plane vector from their ECG recordings.

CONFERENCES: Conferences are teaching sessions conducted with half the class at a time (designated as groups A & B) in the Case-Method Rooms (CMRs). Conferences focus on specific topics in a mini-lecture and/or discussion format. These sessions are designed for more interactions between students and professors, offering students the opportunity to ask and answer questions. Conference handouts accompanying lecture notes allow students to prepare appropriately before attending these important sessions.

SIMULATIONS: We have two computer simulations designed to illustrate physiological principles and concepts in a dynamic and integrative format. These sessions are presented to half the class at a time to encourage student participation.

- **Cardiac Cycle and Heart Sounds (SIM 1):** This computer simulation illustrates the dynamic changes in pressures and volumes of the heart and circulatory system during the normal cardiac cycle. We will also discuss the origins of the heart sounds and cardiac murmurs.
- **Human Patient Simulator (SIM 2):** The Human Patient Simulator (Vince) will be used to illustrate the dynamic interactions of the heart and circulatory system under normal and pathological conditions.

LECTURE REVIEW SESSIONS: At the end of each section and prior to the examination for that section, voluntary reviews will be conducted by lecturing faculty in Tobin Hall (LH 190). Students having difficulty with the material are encouraged to contact individual faculty. One major mistake students make is that they fail to utilize their faculty in mastering difficult concepts. The primary focus should be on learning, not just passing exams. Students can evaluate their own understanding of the material by their ability (or lack of ability) to verbally explain physiological concepts to their peers.

EXAMS AND GRADING: There will be four examinations following each major section in FHB written in a board-style question format. During the administration of each exam no PDAs, cell phones, calculators or food will be permitted, and students will not be allowed to ask questions. This board-style policy promotes an even playing field for all students in the course and minimizes disruptions. Grading for each sectional exam will be determined by raw point totals, giving equal weight to each written question. In other words, the grade will be calculated as total number of points (total number of correct answers) divided by the total number of possible points (total number of questions) in the course. The number of questions on each exam is proportional to the time spent on the individual topics (including lectures, small group sessions, conferences, labs and simulations). Typically, sectional exams have approximately 70-90 multiple choice questions, depending on the amount of material presented in each section of the course. After each exam, students will receive their total of number of correct answers. Final grading categories for the course will be absolute percent scores based on total number of points achieved from exams. Quizzes will cumulatively count for 5% of the total grade. The final grading scale is as follows:

- **Honors** : 90% or higher
- **High Pass** : 80-89%
- **Pass** : 70-79%
- **Fail** : less than 70%

Those students failing to meet the minimum requirements for the course are required to meet with the Course Director at the completion of the course to discuss the remediation process. Students will have an opportunity to remediate their final grade by taking a comprehensive written examination during the month of July, approximately one week before 2nd-year orientation begins. Students unable to successfully remediate

will receive a failing grade in FHB. Remediated passes will be recorded as a P* grade in the permanent record of the student, overwriting the F grade. It is the policy of the SSOM that no student will be permitted to graduate into the second-year medical studies until all failed courses are remediated. Graduate students will be graded separately and there is no opportunity for remediation for graduate students.

EXCUSED ABSENCES: Students who are very ill or have other extenuating circumstances (i.e. death in the family) must contact the Dean of Student Affairs and the Course Director, Dr. Pak, prior to missing an exam to obtain an excused absence (**see excerpt from Academic Policy Handbook below**). Excused absences are granted according to University policy, proper documentation will be required, and no exceptions will be made. You must also notify Maureen Locklund, Course Coordinator, so that alternative arrangements can be made.

Non-Emergent Absences from Required Activities

Petitions for approved absences for serious but non-emergent reasons from activities in which attendance is mandatory (i.e., examinations) must be submitted prior to the start of the course, if possible, but in no case less than one month before the date in question. Such petitions are reviewed by the Course Director, Course Coordinator, and Associate Dean for Student Affairs or designate. A student must have a serious reason for an excused absence or request for a change in an exam date. The petition should detail the nature of the conflict and available supporting documentation should be attached (e.g., copy of a jury summons or invitation to present a poster). **A petition for permission to be absent is a request, requires review, and is not automatically approved simply by submission.** In granting permission, the logistics and feasibility of rescheduling the missed academic activity are weighed and the student is notified of the decision. Approval to reschedule an examination specifies a date later than the original test date on which the test must be taken. An examination cannot be rescheduled to a date earlier than the original exam date.

EXAM REVIEWS: After the grading of each sectional exam has been finalized, students will have the opportunity to review the questions that they answered incorrectly during an Exam Review. The Course Coordinator will notify the students of the exact day/time/location for the Exam Review. The Exam Review will be 30 minutes and notes may not be taken during that time. Students may also review the questions they answered incorrectly under supervision in the Academic Center for Excellence (ACE). The same limits will also apply in ACE (30 minutes, no note taking). Students may not review an exam in ACE until after the regularly scheduled exam review takes place. Students having difficulties with the exams should seek advice on how to improve their performance from Dr. Pak, Course Director, Dr. DonCarlos, Assistant Course Director and/or Dr. Joshua Hopps, ACE Director.

COMMUNICATION: Students will receive up-to-date information about the FHB course from the Course Director and/or Course Coordinator by direct emails to the entire class. Students should check their Loyola email accounts on a daily basis. Please be aware that emails sent from other email servers (i.e. gmail, yahoo, hotmail) might not be received by the intended faculty member due to Loyola spam filters. Clear and effective communications between faculty and students are not only necessary, but mandatory for fostering a positive learning experience.

COURSE COORDINATOR: The FHB course is supported by Maureen Locklund, Course Coordinator. Maureen is responsible for production and on-line posting of all course materials, examinations, evaluation forms, and scheduling.

Maureen Locklund, Medical Education Coordinator

Location: Education Office, SSOM Building 120, Room 320

Telephone (voice mail): (708) 216-7989

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Email: mlocklund@luc.edu

COURSE DIRECTOR: The Course Director is Dr. Toni Pak. Dr. Pak should be contacted regarding any issues pertaining to FHB organization, attendance, grading, and other student concerns. She can be reached at her office, by email or telephone. All deliberations with students are held in strict confidence.

Toni Pak, Ph.D., Course Director

Location: Department of Cell and Molecular Physiology, CTRE, Room 516

Telephone (voice mail): (708) 216-5183

Email: tpak@luc.edu

ASSISTANT COURSE DIRECTOR: The Assistant Course Director may be contacted for all matters relating to the course if the Course Director is not available.

Lydia L. DonCarlos, Ph.D., Assistant Course Director

Location: Department of Cell and Molecular Physiology, CTRE, Room 437

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