MS in Medical Physiology
Required Course Descriptions
Total of 20 Credit Hours
(30 Credit Hours Required for the Degree)

Medical Physiology I and II (PHOL 481 and 482, 6 credit hours each, a total of 12 credit hours required):

1. All MS in Medical Physiology students are required to register for these two courses their first two semesters in the program (PHOL 481 fall semester and PHOL 482 spring semester).
2. These courses are held from 10:00 AM – 12:00 noon Monday, Tuesday, and Thursday in E-501.
3. We use the CWRU Canvas course management system to communicate the course syllabus, Learning Objectives, reading assignments, notetaker's notes, and links to streaming video of all lectures to all students for all required courses in the program. Students will be oriented to this system at the department orientation session on the week before classes begin.
4. Students are expected to read the Learning Objectives and look over the assigned chapter(s) in *Medical Physiology* by Boron and Boulpaep (B&B) BEFORE class so that they are prepared to discuss the content with the faculty and other students. Please NOTE that Dr. Boron is Chair of our department, coordinator of the Respiratory Physiology block of this course, and co-course director of the Translational Physiology courses.
    a. The 9 sections of B&B (corresponding to the 7 organ systems, Physiology of Cells and Molecules, and the Physiology of Everyday Life) will be covered over the two semesters.
    b. The first 4 sections will be covered during the first semester and the last 5 sections during the second semester.
5. We have chosen CWRU faculty who are expert in each topic that is taught in this program. In this way, students will be exposed to more than 50 physiologists over the course of the program.
6. Faculty will prepare a set of Learning Objectives (LO's) for each class session. LO's are statements of what the students are expected to be able to do after each class. All test questions will be linked to these LO's.
7. Faculty have the academic freedom to present the material on a particular topic in the way they think best. It is expected that most class sessions will be primarily in a lecture format using PowerPoint to present graphical material.

8. A traditional white board, an overhead projector, and a computer with Internet connectivity are available to faculty for their presentations in E-501. The Panopto Deployed Solution for Lecture Capture will be used to capture both the video and audio of the faculty presentations as well as anything they project on the screen. Each lecture will be archived and made available to the students for playback on the Internet through Canvas.

9. The TurningPoint Audience Response system is available in E-501. Faculty will stop once or twice during each hour of lecture to ask the students a multiple choice/true-false question. Students will answer the questions using the audience response system. Faculty will lead a discussion of the students' responses. The purpose of these questions is to help the students keep up with the material, to actively engage the material during the course of a lecture, and to help the faculty realize whether or not the important concepts are being understood by the students. These questions are formative and are not graded.

10. Each Monday (except for the first Monday of a block) at the beginning of class, a computer-based, formative, multiple choice/true-false quiz will be administered over the material covered during the previous week.

    a. The faculty member coordinating the block will be responsible for creating these quizzes in consultation with the faculty giving the lectures.
    b. The grades on these quizzes will constitute 10% of the final grade for the course.
    c. These quizzes are NOT secure and should be used to study for the block exams.

11. The teaching assistants for the courses will hold review sessions at various times during the week.

12. The last Friday of each block is reserved for a two-hour examination over the content of the block.

    a. These exams are computer-based, multiple choice/true false in nature.
    b. All exam questions are secure.
    c. The faculty organizing the block will be responsible for creating this examination with the help of the faculty teaching in the block.
    d. The student's average score on these block exams (each block weighed by the number of weeks devoted to that block) will constitute 90% of their semester grade.
    e. For each block, the teaching faculty design the exams to have a median grade of at least 85%. If the median on any exam is less than 85%, the faculty have the option to add points (referred to as a Difficulty Factor) to all students' grades to bring the class median to 85%.
    f. Final block exam percentage grades will be uploaded to Canvas by the end of the Friday when the exam is administered.

13. Final grades in the course are based on the block exam averages (90%, weighted by the number of weeks dedicated to each block) and the quiz averages (10%). The final grades are: A, 85% - 100%; B, 70% - 84%; C, < 70%.

Translational Physiology I and II (PHOL 483 and 484; 3 credit hours each, a total of 6 credit hours required):

1. All MS in Medical Physiology students are required to register for these two courses their first two semesters in the program (PHOL 483 fall semester and PHOL 484 spring semester).
2. These sessions are held on Wednesdays from 12:00 noon – 1:00 PM and on Fridays from 10:00 AM – 12:00 PM in E-501. On the last week of the block, the Friday class will meet on Wednesday from 10:00 AM – 12:00 PM in order to give students a study day between the last class of the block and the block exam.
3. The Medical Physiology courses are prerequisites for the Translational Physiology courses. It is expected that they will be taken concurrently, although students may take the Translational Physiology courses independently with the permission of the director of the program.
4. The faculty coordinating a Medical Physiology block will choose clinical cases that they think will best complement the material taught in the Medical Physiology course.
   a. Either a basic scientist or a clinical faculty member will give a 2 hour presentation on this topic on Friday.
   b. On Wednesdays, one of the primary faculty of the Department of Physiology and Biophysics will give a one hour presentation on their translational research that correlates with the clinical topic under discussion.
5. On the last Friday of a block, a computer-based one-hour examination on the Translational Physiology block content will be administered immediately after the Medical Physiology exam.
   a. The faculty design the exams to have a median grade of at least 85%. If the median on any exam is less than 85%, the faculty have the option to add points (referred to as a Difficulty Factor) to all students' grades to bring the class median to 85%.
6. The final grade in the Translational Physiology course is determined by the average of the block exams, weighted by the number of weeks dedicated to each block. A, 85% - 100%; B, 70% - 84%; C, < 70%.

Physiology Seminar I and II (PHOL 498 C and D; 1 credit hour each, a total of 2 credit hours required):

1. All MS in Medical Physiology students must register for Physiology Seminar PHOL 498C fall semester and PHOL 498D spring semesters of their first year in the program.
2. Students are required to attend at least 75% of the weekly seminars sponsored by the Department of Physiology and Biophysics on Mondays from 4:00 PM – 5:00 PM and any other special seminars sponsored by the department (a sign-in sheet is provided just outside the auditorium). Students are expected to attend all of the Ph.D. dissertation seminars presented by Ph.D. candidates in the Department of Physiology and Biophysics.

3. Two papers that will be distributed to all students via Canvas the week before the seminar.
    a. One paper will be a review of the topic to be covered by the seminar.
    b. The second paper will be a recent research paper published by the lab of the seminar speaker.
    c. Students will take a computer-based quiz in Canvas over the content of these papers and the seminar presentation.
4. The final grade in this course is determined by attendance in class and performance on the quizzes
    a. A=100%-85%, B=84%-70%, and C<70%.

Electives (total of 10 credit hours):

1. The required core physiology courses in the Department of Physiology and Biophysics total 20 credit hours. A total of 30 credit hours are required for the MS degree.
2. The remaining 10 credit hours can be obtained by taking any graduate level courses offered at the university at the 400 or higher level either inside or outside the Department of Physiology and Biophysics.
3. Students may only register for elective courses AFTER consultation with their Academic Advisor.

Requirements for successful completion of the MS in Medical Physiology Program:

1. Approximately two weeks after the last block exam in the Medical Physiology II (PHOL 482) and Translational Physiology II (PHOL 484) courses, all MS in Medical Physiology students will take the basic science subject exam in Physiology and Neurophysiology from the National Board of Medical Examiners (NBME).
    a. To prepare for this exam, computer-based NBME-type quizzes will be administered the week after each Block exam.
    b. The department will pay the registration fee for this examination.
    c. In order for a student to progress in the program (a condition for the degree), s(he) must pass this examination (the passing mark is at the 50th percentile of all students nationwide (typically > 4,000) taking this exam.
    d. If a student does not pass the exam, they can retake the exam once more (at their expense - ~$55.00) before the beginning of the subsequent fall semester and pass it at the same percentile established for the original exam.
2. Students must maintain a grade point average (GPA) **better than** 3.0 to graduate from the program. Two C's in any courses will constitute grounds for dismissal from the program.
3. If a student fails 2 pass/fail courses, this will constitute grounds for dismissal from the program.