

Physiology of Human Systems- Zool. 4280 001 Fall 2011

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Prerequisite: Biol 3310, Chem 3010/3012 **Corequisite:** Zool 4282

Satisfies the physiology elective for the biology major

Text: HUMAN ANATOMY AND PHYSIOLOGY, Eighth Edition by Elaine Marieb and Katja Hoehn

Website: <http://biology.csustan.edu/~watson/watson-moodle/>

Brief course description

The human body, its function and mechanisms, is the focus of this class- Physiology of Human Systems (Zool. 4280). This course provides the scientific foundation for the field of medicine and all other technologies related to human health and physical performance. The scope of topics included in this course is therefore wide-ranging. Subject matters included are: membrane transport, nerve excitation, muscle contraction, cardiovascular, respiratory, and renal physiology, neuro-endocrine functions, reproduction, and digestion. Each topic is covered in sufficient detail to provide a firm basis for future expansion and application.

To keep pace with today's rapid advances in the health sciences, students must be able to draw on their conceptual understanding of physiology. The course is designed to promote understanding of the basic principles and concepts of physiology instead of rote memorization. This course focuses on seven recurring general models that are used to explain most physiological systems. The verbiage may vary from organ system to organ system; however, the underlying mechanisms utilized by the organ systems are very similar. These general models are control systems, conservation of mass and heat flow, elastic properties of tissues, transport across membranes, inter- and intracellular communication and the law of mass action.

The mechanisms of body functions from cells to systems are organized around the central theme of homeostasis- how the body meets changing demands while maintaining the internal constancy necessary for all cells and organs to function. Furthermore, because anatomy is not a prerequisite course, enough relevant anatomy is integrated within the material to make meaningful the inseparable relation between structure and function. At the end of the course the students will be able to integrate related physiological concepts using the recurring general models, and understand the relationships between anatomical structures and their functions.

In addition to learning about the basic principles and concepts of physiology, the course will also provide students with opportunities to collaborate and cooperate in designing their own laboratory research. Research, writing and speaking skills will also be included in this course. Each student is required to present to the class in power point one lab reports in the format of the scientific method and one library research presentation, topic of his/her choice.

Course objectives

The students will:

1. Describe how the body works, from the molecular level to organ systems and to the whole body. **Cause-and-effect sequences** are emphasized in studying how the human body works.
2. Explain the importance of physiology in modern medicine.
3. Examine the role of the scientific method in the study of physiology as it relates to evaluating evidences and drawing logical conclusions.
4. Examine the tissue level of organization and interpret the role of tissues in human systems. Compare and contrast the location, organization and function of the four basic classifications of human tissues.
5. Define homeostasis and explain how this concept is used in physiology and medicine.
6. Describe the nature of negative and positive feedback loops and explain how these mechanisms act to maintain homeostasis.
7. Distinguish between intrinsic and extrinsic regulation and the roles of nervous and endocrine systems.
8. Examine and describe the major features and functions of the cardiovascular, respiratory, muscular, digestive, immune, reproductive, and renal systems and their contributions to homeostasis.
9. Describe the relationship between homeostatic imbalance and diseases in each of the organ systems.

Method of Instruction

This course will involve lectures, class discussions and lab. Reading assignments are required for discussion during class. Active learning and problem solving skills will be developed during class discussion. Students are expected to develop important skills of applying physiological information and integrating the facts of physiology into conceptual models of physiological phenomena. Each phenomenon/problem is presented in stages. Students are expected to complete each section and discuss the solution to the part **before** proceeding to the next component of the problem. Two main tools for solving these physiological problems are the use of prediction tables and drawing of concept maps/flowcharts.

The prediction table is a simple way to make qualitative predictions (increase, decrease, no change) about the responses of specified components that result from a situation described in the problem. The construction of concept maps or flowcharts of physiological events requires utilization of information and concepts acquired from lecture or the text to explain the described phenomenon.

In this course you will be using Mastering A&P, an online tutorial and homework program that accompanies your textbook. You will need a (CSUS) email address, a student access code which comes in the Student Access Code Card/Kit that is packaged with your new text book, and a course ID – [F11Z00L4280](https://www.masteringAandP.com). To register, go to www.masteringAandP.com and click **Students** under **Register**, using the student access code inside the student access code kit. To log in, enter your Login Name and Password that you specify during registration and click Log In. This Mastering section is worth approximately 10+ % of your grade.

Evaluation and Grades

Due to the quantity and complexity of this subject, students need to attend class and lab on a regular basis. **Unannounced** quizzes, approximately 15% of the grade, will be given in class. Bonus points may be given during these quizzes. These quizzes are to encourage students to be present and prepared for class. No other extra credit will be available in this class.

Exams will be combinations of multiple-choice questions, fill in the blanks, and essays. You need Scantron Form No. 882-E for each exam and a number-2 pencil and a good eraser. It is the students' responsibility to transfer the correct answers from the exam to the scantron; **only the answers from the scantron will be accepted**. Both lecture materials and information assigned from the textbook will be included in the exams. The given schedule is a **tentative outline and is subject to change**. The final exam will be comprehensive. Information presented from students' Power Point will also be included in the final lecture exam.

You may not leave the room during an exam without the instructor's permission. You **must turn off cell phones and remove baseball caps during exams**. Taking out a cell phone during an exam is considered as cheating. You will receive a grade of F for that exam.

There will be a mandatory oral power point presentation (40 points) focused on physiological homeostatic imbalances (disease) of a specific organ system. Research your topic using www and library resources. Your choice of topic is due on **Wednesday, 9-7-2011**. A brief description of the disease, including the symptoms, who is affected, and how this disease is related to physiological homeostatic imbalance is due on **Wednesday, 9-21-2011** (2 page limit). Sources or reference, at least three, must be included. This assignment is worth 10 points. The oral power point presentation will be graded according to information and discussion of chosen topic(s). Three questions pertaining to your presentation and their appropriate answers must be included with the power point presentation. These questions with answers should be entered in a file on the desk computer in lab. Failure to complete the power point presentation will result in a deduction of 50 points from your final grade.

Grading is based on unannounced quizzes, a library research Power Point presentation, three exams, lab report/abstracts, and lab exams. **NO make-up exams, quizzes or class activities will be given**. Please let me know ahead of time (preferably a week in advance) if you cannot take the exams as scheduled. If you are sick or have family emergency, please let me know before the exam. You need to provide official documentation and a make-up exam may be scheduled.

Grading for lab report: Please include the following table with your lab report

		Your grade
Abstract	5 points	
Introduction	5 points	
Methods	5 points	
Results-text	5 points	
Results- figures/tables	5 points	
Discussion	8 points	
Conclusion	3 points	

Clarity, general grammar and mechanics	5 points	
References	4 points	
Power Point	20 points	
Peer reviewer – 2 lab reports	20 points	
TOTAL	85 POINTS	

Grading for power point presentation:

Statement of research topic/hypothesis	4 points
Information from recent journal(s)**	12 points
In depth discussion of topic. Clear explanation of physiological mechanisms	16 points
Overall oral presentation--organization/clarity Overall understanding of his/her materials	8 points
** More information will be given in class	Total = 40 points

Tentative grading- subject to change!

MasteringA&P	100-150 pts
6-7 quizzes (lab and lecture) @ 15-20 points each	100-120 pts
Two exams @ approximately 100 (+/-) points each	200 pts
One final exam @ approximately 180 (+/- 20) points	180 pts
Student presentation questions given at final exam	48 pts
Library research topic and outline by September 21	10 pts
1 research Power Point presentation	40 pts
1 lab reports with power point + 2 reviews (10 points each)**	85 pts
Lab (3) abstracts/reports <u>from three labs**</u>	30 pts
Lab exams (3)	200 pts
** More information will be given in class	Total (+/- 20) = ~1000+/- pts

Grading scale:

100-94% =	A	93-90% =	A-	89-87% =	B+
86-84% =	B	83-80% =	B-	79-77% =	C+
76-74% =	C	73-70% =	C-	69-67% =	D+
66-64% =	D	63-60% =	D-	Below 60% =	F

Physiology of Human Systems (Zool 4280) Tentative Lecture Schedule

Text: HUMAN ANATOMY AND PHYSIOLOGY, Eighth Edition by Elaine Marieb and Katja Hoehn

<http://biology.csustan.edu/~watson/watson-moodle/>

Tentative lecture schedule

DATE	TOPIC	CHAPTER
8-22	Introduction: The Meaning of Physiology The Human Body-Levels of Organization Homeostasis	1
8-24	The Plasma Membrane: Functions Interaction between cells and the extracellular environment	3
8-26	Body fluid, electrolytes, and acid base balance	26
8-29, 31	Acid base balance	
9-2	Tissues: The Living Fabric	4
9- 5, 7, 9	Fundamentals of the Nervous System Collect research topic 9-7-2011	11
9-12	Central Nervous System Research paper outline due this week	12
9-14	The Autonomic Nervous System	14
9-16	<u>EXAM 1</u> <i>(September 19, 2010 -last day to drop a course)</i>	
9-19, 21, 23	Collect assignment 9-21-11 The Endocrine System	16
9-26, 28	The Reproductive System	27
9-30, 10-3, 5	The Cardiovascular System- Blood	17
10-7, 10, 12	The Heart	18
10-14, 17, 19	Blood vessels	19
10-24	Exam 2	
10-26, 28, 31	The Lymphatic and Immune System	20, 21

11-2, 4, 7	The Respiratory System	22
11-9, 14, 16	The Muscular System	9
11-18, 21, 23	The Urinary System	25
11-28, 30 12-2	The Digestive System	23
12-5	Nutrition, Metabolism, and Body Temperature	24
12-14	<u>Final exam (8:30A - 10:30A)</u>	

There is zero tolerance for academic dishonesty. Any form of academic dishonesty will result in an F grade for the course.

Physiology of Human Systems Zool 4282 Tentative lab schedule

Objectives: To analyze physiological systems using the seven recurring general conceptual models.

In addition, exercises and experiments will be conducted to study the principals of physiology with special reference to the human body.

Biopac Student Laboratory Guide -- Biopac Systems Inc. Manual

PhysioEX 9.0 Laboratory Simulations in Physiology P. Zao, T. Stabler, G. Peterson

<u>DATE</u>	<u>TOPIC</u>	Lab	PhysioEx
8-22,24	Getting Started - Laboratory safety guidelines Introduction of general conceptual models Homeostasis/negative feedback	Video- Human Body Designing an experiment Metric system Homeostasis	
8-29, 31	Dissection/tissues	Organ system/tissues	
9-5, 7	No Lab		

9-12, 14	Tissues Transport- Osmosis, diffusion, and tonicity	Tissues Transport lab	PhysioEx 1, #2, 4, and 5 (facilitated diffusion, filtration, active transport)
9-19, 21	Nervous system: Eye and ear Exam 1- Tissues only	Vision Ear	PhysioEx 3, #2, 5, and 6 (receptor potential, refractory periods, and coding for stimulus)
9-26, 28	Endocrine system Plasma glucose determination	Plasma glucose lab	PhysioEx 4, #1 (metabolism and thyroid hormone)
10-3, 5	Cardiovascular system/ECG	Biopac (5+7) 7 **	
10-10, 12	Cardiovascular physiology Cardiovascular system and physical fitness Student Research and Presentations		PhysioEx 6, # 1, 2, and 4 (refractory period, vagus nerve stimulation, chemical modifiers on HR)
10-17, 19	Student Research and Presentations		-----
10-24, 26	Exam 2 Immune System Student Research and Presentations	worksheet and video	
10-31, 11-2	Student Research and Presentations Acid/base balance- renal system compensation	Respiratory acidosis and alkalosis	PhysioEx 10, # 3 and 4 (renal responses to respiratory acidosis and alkalosis)
11-7, 9	Respiratory system Student Research and Presentations	Biopac 12 and 13	
11-14, 16	Muscular system Student Research and Presentations	Biopac 1 and 2	PhysioEx 2, #6 and 7 (isometric and isotonic contraction)
11-21, 23	Renal regulation of fluid and electrolyte balance Student Research and Presentation	Renal lab	

11-28, 30	Final exam		
	Student Presentations		

There will be a total of 3 **abstracts/reports per group of three students and one lab report (PI system) per student**. The **abstracts and report must be typed** and are due two weeks after the experiment is finished. This lab report should include an oral (Power Point) presentation and a written report, which **must be typed and presented in the format of the scientific method, which includes an abstract, background research, hypothesis, methods, materials, data presentation, discussion, conclusion, and references.** Oral presentations should not exceed 15 minutes (if necessary, a timer will be used to limit the presentation to 15 minutes). Late lab reports are **penalized 10 points a day**. Lab report that is not received by the end of the semester will be penalized by 100 points.

Be sure to read and download your lab assignment before coming to lab. At the beginning of each lab, organize your lab space and get all necessary instruments and reagents. Be aware of what you and your lab partner(s) are doing. You **may not** use the lab computer to download your lab or lab report. At the end of each lab, clean and dry your glassware, place them in the proper drawers, and return all supplies to their proper locations. Clean your lab area with soap and water. You are responsible for any missing and broken items in lab. **You will NOT receive a grade** until you pay your bill for any missing/broken items.

NO FOOD OR DRINK is allowed in lab. Attendance is required in this class. Due to the complexity of the experiments, no make-up labs are available. **Ten points per lab will be deducted from your grade if you miss more than one lab.**

Library research Power Point presentation assignment

This presentation should focus on physiological homeostatic imbalance (disease) of a specific organ system. The literature should be from scientific refereed journals within the last five years. Encyclopedias and our text book do not count as references. The research presentation (40 points) will be presented to the class on assigned dates in lab (sign up sheets will be circulated in class).

You need to familiarize yourself with the subject matter. Power-point presentation should **include a recent article from the journals you used in your paper.** The method, results and discussion of the paper should be summarized and presented to the class. This serves to inform the class and me the latest research in the specific physiological mechanism. The presentation should be about 10 minutes in length and 3-5 minutes to answer questions from the audience. Information from your presentation will be included in the final examination, so be sure to make your presentation simple, precise, and understandable by your colleagues. Please encourage the class to discuss the physiological mechanisms involved in your topic of research (use one of the seven general conceptual models discussed in lab). Handout of your outline would be helpful to your classmates. The goal of this assignment is to give you an opportunity to research in a specific area of your choice, improve verbal communication, and critical thinking skills. Failure to complete the presentation will result in a deduction of 50 points from your final grade.

Steps for carrying out the assignment:

Scientific Article Selection:

Spend some time in choosing an organ system that you are interested in, then decide on a specific topic you would like to study. Go to the library and research the topic you have chosen.

Collect and read a few (at least three) articles that emphasize the topic of your interest from three different scientific journals available from the library at CSUSTAN or other libraries. Only select journal issues published since 2005. By using current journals the students are exposed to the most current research that is not found in the textbook. Your 'topic of interest' is due in class Wednesday 9-7-11.

The next assignment is to describe the homeostatic imbalance (disease), and how the imbalance relates to physiological mechanisms. Page limit is 2 pages. List the references you have chosen for this research paper. You may add more references as you finish your presentation. ***Due date is September 21, 2011.***

If you failed to turn in your assignment, 10 points will be deducted from your final grade. You may be requested to provide copies of your sources. Failure to provide copies of your references upon request will result in an "F" for the assignment. For materials that were published on the world wide web (www), please report the complete URL address of the site, the date of publication, and the author or organization that produce the page. Be sure to site all of your sources of information.

How to document literature cited?

When quoting journals, do not use abbreviations in the Literature Cited section. Pay close attention to the use of punctuation and capital letters. There are periods that follow name(s), year, and title. The title is followed by two blank spaces after the year. In all book citations include the total number of pages. A few examples are given below:

Bold, H. C. and J. W. La Claire. 1987. The plant kingdom. Fifth edition. Prentice-Hall, Englewood Cliffs, New Jersey, 309 pages.

Carlisle, D. B. and F. Knowles. 1959. Color change. (Chapter 3). Pages 40-69, in Endocrine control in crustaceans. Cambridge University Press, 119 pages.

Slatis, H. M., M. B. Katznelson, and B. BonneTamir. 1976. The inheritance of fingerprint patterns. American Journal of Human Genetics, 28:280-289.

Sunderland, N. and M. Roberts. 1997. New approach to pollen culture. Nature 270:236-238.

Final touches on your presentation:

To days after you finished your presentation, reread and revise your Power Point. You may have more questions on your topic and may want to do more research at this point. Proof read your final draft. Let your colleague or lab partner proofread it as well. **Email (flora@biology.csustan.edu) your final Power Point** to me at the assigned date of your presentation. Each student will have his/her own date. **Any postponement will be penalized 5 points per day.**

Evaluation criteria (PowerPoint presentation)

The presentation will be evaluated according to the following questions.

- Did the student clearly state the purpose and subject of the presentation?
- Did the student know the subject matter he/she is presenting?
- Is the physiological mechanism adequately explained?
- Did the student explain clearly (easy to understand) the physiological mechanisms that affect the homeostatic imbalance of the organ system?

- Did the student finish within 15 minutes?
- Did the student present/evaluate a recent article from a referred journal?
- Did the student answer questions confidently and adequately?
- In the presentation, are all data sources carefully documented?
- Is the presentation scientifically correct, logical, coherent, and well organized? (For example: Is there a distinct introduction, body, and conclusion? Is the material organized for best emphasis?)
- Is the Power Point carefully proofread and edited so that errors of grammar, spelling, and punctuation are minimal?

Abstract writing style:

Write your abstract as a comprehensive, objective summary of the scientific study. This should include-- who did the study, the purpose of the study, and the method of the study, details about the results (graphs and tables), statistical results (if any), and the researcher's conclusions. The abstract should be written in the past tense using the third person (**do not use "I" or make references to yourself or your beliefs**). Quotations should be limited and even avoided. Use careful attention to keep mechanical errors (spelling, grammatical and punctuation) to a minimum. These errors will be considered in the overall grade. An abstract will NOT be accepted if ANY portion of the content is found to be plagiarized. Each abstract must be presented on a separate sheet of paper. The length of each abstract is limited to **one page**, and it **must be typed**. Examples of abstract are posted on the side cabinet doors in N229.

Oral Lab Presentation with PowerPoint-- 10 minutes with 3 minutes for questions

1. Title should express the major conclusion from the work and include the name of the organism.
2. Your presentation should provide background for your audience
3. Presentation should have a clearly stated hypothesis
4. A brief description of methods and materials
5. Well organized results (graphs, tables, photos, etc)
6. Discussion of how your results relate to your hypothesis
7. Include a summary slide
8. Acknowledgment slide to recognize funding sources, collaborations, etc.

Lab Policies

Infractions of any of these policies will result in the docking of 5% of your total lab points for each incident.

You are required to stay until your lab group has finished the exercise and your workspace and glassware has been cleaned and returned to its appropriate place.

You are required to stay during student presentations, leaving early will result in an absence for the day.

The printer in the lab is for recording data from BioPac and PhysioEx exercises only, you will not be allowed to keep other materials printed using the laser printer.

Broken glass belongs in the labeled glass disposal containers and paper and plastic in the regular trash.

You are responsible for the equipment checked out to you for each lab. Lost or broken equipment will be charged to the group and must be paid for before grades will be released.

No Food or Drinks will be consumed in the lab.

Cell phones must be turned off and put away during lab, leaving lab to talk on the phone is considered an absence.

Computers are to be used for laboratory exercises, Biopac and PhysioEx, not checking email or surfing the net. No programs, files, or pictures may be downloaded to the computers in lab. You need to bring a flash drive if you want to save your data. Once the computer is turned off, whatever you saved prior to shut down will be gone.

Bare feet are not allowed, and shoes with tops (vs. thongs or sandals) are recommended.

Microscopes, regardless of the condition they were previously put away in, must be put away properly and have clean optics.

Attendance is mandatory; you may miss one laboratory period without affecting your grade. Most labs will last three hours. All further missed labs and/or partially missed lab-- including lab periods when you leave while your partners are still working, or when students are presenting (Power Point), or when you are working/studying on courses other than physiology, will result in a loss of 10 lab points per lab.

LABORATORY SAFETY

Be safe! It is extremely important for you to establish good safety practices when working in the lab. Safety is a combination of common sense and familiarity with existing hazards and potential dangers. Accidents in the lab are most often the result of careless or improper handling of materials.

STUDENT RESPONSIBILITY AND LABORATORY SAFETY RULES

1. At the beginning of the first lab, know the location and proper use of the fire extinguishers, first aid kit, and eye wash station.
2. Wear goggles or safety glasses and gloves while you are working with solutions that are toxic, acidic or caustic, and may splash into your or your partner's eyes.
3. No smoking, eating or drinking is allowed in lab. Chemicals may enter your mouth and/or lungs. Your hands may also be contaminated with toxic chemicals. Never taste or sniff a chemical.
4. No bare foot is allowed in the laboratory. Long hair should be tied back when a Bunsen burner, alcohol lamp, mixers, stirrers, etc. is used. When working in lab, remove neckties and scarves.
5. It is the responsibility of the student to read labels and properly handle all equipment and reagents. If you are unsure, please ask your instructor.
6. Receptacles for proper disposing of materials are provided in the lab. Dispose glassware, plasticware, needles, urine samples, and animals, in their **proper containers**. Do not discard hazardous materials, flammable, toxic, or water-insoluble liquids in the sink. Water insoluble liquids, solids, hazardous/toxic wastes, volatile liquids and reactive chemicals should be discarded in separate waste jars. Paper products should be discarded into wastebaskets.
7. Acidic or basic chemicals should be diluted before flushing down the sink. No solvent should be flushed down the sink.
8. Report all accidents, even minor ones to the instructor.
9. Unauthorized experiments and/or variations of the lab experiments are not allowed.
10. Lab coats are not required but are recommended.
11. Always read the labels on the reagent bottles very carefully. Avoid contaminating the stock solution- do not return the excess chemicals to the reagent bottle. Transfer the stock solution to a clean beaker using the pipette (with mechanical pipettor) from the stock beaker. Always add more concentrated solution into water or into less concentrated solution. This is especially true with concentrated acids.
12. Clean your work area. The workbench should be clean at the end of each lab period. Wash your hands before you leave the lab.

13. For all emergencies call 911 (9-911 from my office).

Failure to comply with these policies will result in expulsion from the laboratory and therefore the course.

Name (Print) _____ Signature _____ Date _____

Course # _____ Semester: _____ Fall Winter Spring