Introduction: Human Physiology is the study and science of function in humans—how processes work at cell, organ, tissue and body system levels of organization or as Lauralee Sherwood says, what makes us tick! It is a wonderfully broad and demanding field that encompasses many disciplines including anatomy, animal physiology, biochemistry, cell biology, environmental and exercise physiology, histology, immunology, mathematics, medical physiology, molecular biology, nutrition, pathophysiology (the study of diseases), physics, and systems physiology! The focus varies based on the adjective used in front of the word physiology. For example, the goal of comparative physiology is to contrast functions across the animal kingdom. Exercise physiology studies adaptations to unique modes of exercise, primarily in humans. Environmental physiology investigates specific adaptations due to environmental stressors like high vs. low altitudes and cold vs. hot climates. Viral physiology or virology examines mechanisms in viruses, infectious, microscopic, genetic material in a protein coat, found in almost all ecosystems on earth. Certainly, there is much overlap among subdisciplines. Though we will discuss examples from many areas of physiology, our primary focus will be to study humans under normal, healthy conditions at the body systems level. Topic coverage includes homeostasis, basic cell physiology and genetics, and physiology of the gut, heart, vessels, blood, glands, brain, nerves, muscles and lungs. Nutrition and exercise physiology are included to make the material more applicable to daily activities and to promote optimal choices and enhance body awareness and health for a lifetime! My ultimate hopes are that you enhance your appreciation and understanding of the intricate and miraculous nature of the human body!

Prerequisites: BI 121 has no prerequisites and those who are new students, exploring or with any major are encouraged to enroll. BI 121 helps U of O students satisfy their Natural Science Area of Inquiry requirement. However, because no assumptions are made about backgrounds in science or math and the course is taught largely to beginning, non-science majors at the 100-level, our approach will be more descriptive (what and where), correlational (demonstrating how two or more variables are related) and purpose-driven (why) rather than mechanistic (how).

Organization: I would like to implement a reverse classroom plan, whereby you read materials, review Lecture and Lab .pdfs and .mp4s and attempt to answer Active Learning Questions and Worksheets prior to attending optional Discussions each day. Your efforts outside of these optional discussions will make you well prepared and enable us all of us to engage in each topic at a deeper level and more fully interact and learn together. Discussions Monday thru Thursday are optional, but strongly encouraged, assuming you can make them based on your time zone and personal schedule. They are extremely helpful in completing Active Learning Questions and Lab Worksheets and particularly for reviewing and preparing for all Quizzes. Please let me know if you have any questions or need additional information or resources. I would be delighted to help you further!

Objectives: By the end of the course, you should be able to complete these dozen learning objectives:
describe the concept of homeostasis and identify key categories of variables balanced within the extracellular fluid compartment.

apply a simplified homeostatic model to the regulation of unique input variables that ensure that body systems maintain homeostasis leading to cell survival.

explain the basic structure and function of cells and cell organelles.

compare and contrast anaerobic and aerobic metabolism and assign specific exercises to unique areas of the energy continuum.

distinguish structures and functions of deoxyribonucleic and ribonucleic acids (DNA & RNA).

discuss the flow of information from the nucleus to cytoplasm, from DNA to RNA to protein.

paraphrase nutrition and exercise guidelines established by the US Government, the American Institute for Cancer Research, the American Heart Association and the American College of Sports Medicine.

identify the common characteristics of the world’s longest-lived people in Blue Zones.

analyze the nutrient content of your personal diet relative to national guidelines and make recommendations for self-improvement.

articulate and debunk common myths about nutrition and exercise.

summarize the basic structure and function of the gastrointestinal, cardiovascular, endocrine, nervous, skeletal muscular and respiratory systems.

describe the physiology and inherent multi-organ risks of cigarette smoking and vaping.

Texts & References: BI 121 is designated as a low-cost course because all materials required cost less than 50 US dollars.

Lecture: You have a choice of textbooks for the lecture-discussion component of the course based on personal finances and your reading and studying styles. Below are the two choices:


OR


Sherwood’s Fundamentals (called the little book because Dr. Sherwood wrote a more advanced physiology text at a higher level) is over 600 pages, while Chiras’ book is more like a packet containing 170 pages. Sherwood’s text also contains cell physiology and genetics sections whereas Chiras’ book does not, as it is entirely at the body systems level. However, Chiras’ book contains a short nutrition chapter, whereas Sherwood’s does not. For nutrition, I will rely upon Sizer and Whitney’s (S&W) Nutrition Concepts & Controversies and many other sources (see below nutrition links and course outline), but it is not necessary that you purchase any additional references beyond books by Sherwood and/or Chiras. Sherwood & Chiras options are in a semi-reasonable price range ($25 - $40) for the 120- or 180-d digital version access. Sherwood’s hard copy is far more expensive than Chiras’. Our lectures are in the middle between the lighter nature of Chiras and the more expanded details of Sherwood. Both are excellent writers.
For our section on Nutrition, I will rely upon a textbook by Sizer and Whitney and many other resources. I will provide you with the information you need in recorded lectures, labs and discussions, so you certainly do not have to purchase a nutrition text. If you are interested in the exact resource listing, I have printed it below. Please contact me directly if you have questions about resources.


See also outstanding nutrition resources below:

- https://nutritionfacts.org/
- https://www.cspinet.org/eating-healthy
- https://www.aicr.org/cancer-prevention/
- https://www.hsph.harvard.edu/nutritionsource/
- https://www.nutrition.gov/
- https://www.eatright.org
- https://www.nutritionletter.tufts.edu/
- https://www.nhlbi.nih.gov/health/educational/wecan/tools-resources/nutrition.htm
- https://health.gov/our-work/food-nutrition

**Lab:** The Lab Manual contains all of the background and the worksheets for our 6 labs. It is usually for sale at the U of O Duckstore (Bookstore) for ~ $10 – $15, but it is free this term because I am posting the Lab Worksheets and Lab Backgrounds for you online on Canvas.


**Canvas Site:**
The Canvas link for our course is https://canvas.uoregon.edu/courses/203707. We will be building our Canvas site as we proceed throughout the term to ensure that we are as up to date as possible. I will post on Canvas all Active Learning Questions, Lectures, Lab Worksheets and Labs for the following week at least by the preceding Friday on Canvas. All Lecture Active Learning Questions and Lab Worksheets should submitted by way of Canvas.

**Assignment Submissions:**
Please submit your assignments using Word *.docx/*doc or Adobe *.pdf* formats, as these are easiest to make comments and grade. Formats like *.pages* are inaccessible by Canvas and *.jpeg* formats have issues with size and orientation making them difficult to decipher especially when images are made from hand-written documents. Rely on course resources and use as few words as possible. Be sure to see *Guide for Active Learning Questions + Worksheets* on Canvas.

**Resources:**
Please, please, rely 1st and foremost upon our course resources, rather than search reflexively on the internet for answers. Most of the answers to all assignment questions can be found easily simply by looking through the posted *.pdfs* for lectures and labs. Of course, you can glean far more details and gain a more complete grasp of concepts, by listening to the *.mp4s* designed to be 30 minutes or less for lectures and 50 min or less for labs.
Intensity:
Keep in mind that a 4-wk summer course is 2.5 times more (10 divided by 4) intense than the regular academic year, 10-wk term, so compressed substantially. The condensed timeframe makes it tough to have that all-important incubation period, so several repetitions and rest periods between study sessions are crucial. You can help ensure that you will do well if you are as consistent as the sun in studying and are proactive about scheduling and keeping up with the material. Active Learning Questions and Lab Worksheets are due in most cases on the same night of the scheduled earlier session and Quizzes are at the end of the work week. So, it is important to do your best to focus and to keep up consistently with the work! Remember, the benefits you gain will be directly proportional to the efforts you invest! By the end of the term, we will have learned much practical, life-long information together and had fun, too!

Discussions & Timing:
The course is listed as entirely web-based, so the Discussions from 11 am – 12 n Monday thru Thursday are optional, though strongly encouraged. Throughout the term, it is so crucial to make live connections for guidance, verbal feedback and explanations. We can stay beyond 12 n, if any of you desire additional help. If you cannot make that timeframe, I will do my best to accommodate you at another time based your unique work schedule and other obligations. Send me an e-mail by way of lombardi@uoregon.edu to let me know which times might work. Several of you may be in Europe, the Far East or scattered throughout the US, so in unique time zones https://www.timeanddate.com/worldclock/. [Eugene + 8 hr = London and London + 8 hr = Tokyo! So, Eugene + 16 hr = Tokyo!] I will be able to accommodate most of you in the US and Europe, but will have to do extra odd hours to help those in other parts of the world. I promise to do my very best and expect the same from you, too!

Late Assignments & Makeup Quizzes:
Without Accessible Education Center (AEC) accommodations, late assignments & makeups will not be permitted except in extreme circumstances (e.g., birth, death or severe illness). The maximum extension is 48-hr and without documentation, 20% will be deducted for each 24-hr increment. For example, the maximum score for an on-time submission is 100%, 24-hr late submission is 80%, 48-hr late submission is 60%, while no credit will be given for assignments 48 hr beyond the due date.

Requirements & Estimated Time* per Session:
* All estimated times may differ based on Accessible Education Center (AEC) accommodations. Please visit https://aec.uoregon.edu/using-aec-connect to contact the outstanding AEC staff.

- Read, take notes and study the pages listed on your course outline in your textbooks (LS, Lauralee Sherwood and/or DC, Daniel Chiras) and your Lab Manual (LM) prior to attending optional Discussions. You must do so daily to provide the foundation needed to keep up with the pace and do well in the course, especially during the summer.
  Estimated time = 30 – 60 min.
- Participate in all Lectures by viewing .pdfs and .mp4 videos online on Canvas.
  Estimated time = 45 – 60 min.
Complete Active Learning Questions and submit by due date before 11:59:59 pm on Canvas. To prime yourself for what to look for, glance at the questions before viewing the lecture .pdfs and .mp4s. Rely on course resources and use as few words as possible when completing your answers. Short words or phrases with arrows or flow charts are fine. Do not repeat the stem of the question. Be sure to see Guide for Active Learning Questions + Worksheets. Estimated time = 15 – 45 min.

Participate in all Labs by viewing .pdfs and .mp4 videos online on Canvas. Estimated time = 45 – 60 min.

Complete Lab Worksheets and submit by way of Canvas by 11:59:59 pm the night of lab (except when noted otherwise). Again, to prime yourself for what to look for, glance at the questions before viewing the lab .pdfs and .mp4s. Rely on course resources and use as few words as possible. Be sure to see Guide for Active Learning Questions + Worksheets. Estimated time = 15 – 90 min.

Discussions Monday thru Thursday are optional, but strongly encouraged, assuming you can make them based on your time zone and personal schedule. They are extremely helpful in completing assignments and particularly for reviewing and preparing for all quizzes. Quiz preparation is designed to be fun and interactive, as we will participate in Jeopardy Games. Estimate optional time = 45 – 60 min.

Complete 4 weekly online Canvas Quizzes covering Active Learning Q, Lectures, Worksheets and Labs for the week. Quizzes will be open only on Fridays, from 12 n until 12 midnight, US PDT. [There is one exception, based on summer session scheduling, the last Quiz 4 is on a Thursday during the final week of the term.] Grades will be tabulated in Canvas. Estimated time = 30 – 40 min.

Quiz Directions: The quizzes are open book, but not open communication or conversation. You may use your textbook/s and lecture and lab notes, however, once you begin a quiz, you are not allowed to communicate with others, including classmates, family members or any humans (or telepathic animals!) by any communication means including by cell phone, texting, instant messaging, Zoom, e-mail or Morse code! You may not take pictures or use screen capture tools to capture quiz questions. Prior to beginning a quiz, you confirm that your work is yours alone independently, and that you have not engaged in any communication, conversation or any dishonesty, plagiarism, preconceived scams, copying or revealing of quiz questions. I want you to know that 1st and foremost, I was raised to value and respect the utmost of integrity and that I hold you to the highest of possible standards! Even though you can use your notes, text/s and Lab Manual, you should be able to answer questions without referring to these and the time allotment will not enable you to search and discover answers while you are taking a quiz. Once you start a quiz, you will have 40 minutes to complete it, unless you have received additional time for AEC accommodations. Best of luck!

Grading:
The grading for the course is as follows:

**10% Lecture Attendance & Participation** (determined by online Lecture viewing and completion and submission of Active Learning Questions on Canvas)

**10% Lab Attendance & Participation** (determined by online Lab viewing and completion and submission of Lab Worksheets on Canvas)

**80% Quizzes** (20% for each of the 4 weekly Quizzes tabulated online by Canvas)
Course: Introduction to Human Physiology, BI 121, 04 cr (CRN 41064) MTWRFSU (SYNC WEB) + strongly encouraged, but optional Zoom Discussions for Lecture & Lab MTWR (11 am – 12 n or later if desired, US Pacific Daylight Time/PDT), Summer, 2022.

Website: Canvas - https://canvas.uoregon.edu/courses/203707

Instructor & Contact information: Instructor: V. Pat Lombardi; Office: Web/65A Klamath Hall; Office Hours: 12 n or after Discussions MTWR + Zoom appointments by e-mail; E-mail: lombardi@uoregon.edu; Office Phone: 541-346-6055.

Lab Preparator & Contact Information: Emily Gustin; egustin@uoregon.edu

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1st Supplemental Text: Readings listed in [] below:


+ See many supplemental reserved texts/resources in Science Library or web listing: http://libweb.uoregon.edu

Click on the Course Reserves tab, then sign in with U of O ID and password & type in BI 121.

Tentative Outline:

Week 1


Jul 18 (M) Optional Discussion (Zoom). 11 am - 12 n +, US PDT.


Jul 19 (T) Optional Discussion (Zoom). 11 am - 12 n +, US PDT.
Jul 20 (W) **Lecture 3. Anaerobic vs Aerobic Metabolism** I. Metabolism: Anaerobic (ATP-PC, Glycolytic) vs Aerobic; Subcategory Location & ATP Production. II. Cytoskeleton. **Readings:** ch 2, pp 26-41 (LS). **Assignment:** Active Learning Questions Lecture 3. Submit on Canvas by 11:59:59 pm, US PDT.

Jul 20 (W) **Optional Discussion** (Zoom). 11 am - 12 n +, US PDT.


Jul 21 (R) **Lab 2. Histology: Microscopic Study of Tissues.** **Readings:** pp i-iii, 1-1 to 1-4 (LM). **Assignment:** Lab 2 Worksheet. Submit on Canvas by 11:59:59 pm, US PDT.

Jul 21 (R) **Discussion & Review for Quiz 1** (Zoom). **Activity:** Jeopardy Game 1. 11 am – 12 n +, US PDT.

Jul 22 (F) **Quiz 1 on Canvas.** Covers Lectures 1 – 4 and Labs 1 & 2. Open 12 n until 11:59:59 pm, US PDT.

**Week 2**


Jul 25 (M) **Optional Discussion** (Zoom). 11 am - 12 n +, US PDT.


Jul 26 (T) **Lab 3. Nutrition Analyses.** Record your diet for at least one day on p 3-7 and analyze it using the Diet Controller/Diet Organizer or ASA 24 National Cancer Institute Calorie Counter & Food Diary/Cronometer Nutrition Tracker, HealthyOut, My Fitness Pal or Other Smart Phone Software. **Readings:** pp 3-1 to 3-20 (LM). **Assignment:** Lab 3 Worksheet. Submit on Canvas by 11:59:59 pm, US PDT, by Saturday, July 30th, 2022.

Jul 26 (T) **Optional Discussion** (Zoom). 11 am - 12 n +, US PDT.

Jul 27 (W) **Lecture 7. Cardiovascular System (100 WIL).** I. Circulatory: Cardiovascular & Lymphatic. II. Cardiac Physiology: Anatomy, Adult Heart & Fetal Blood Flow. **Readings:** ch 9, pp 228-234; ch 10, pp 281-7 (LS); Module 4, pp 25-29; 33-34 (DC). **Assignment:** Active Learning Questions Lecture 7. Submit on Canvas by 11:59:59 pm, US PDT.

Jul 27 (W) **Optional Discussion** (Zoom). 11 am - 12 n +, US PDT.


Jul 28 (R) **Lab 4. Heart Rate, Blood Pressure & Cardiovascular Disease Risk.** **Readings:** pp 4-1 to 4-8 (LM). **Assignment:** Lab 4 Worksheet. Submit on Canvas by 11:59:59 pm, US PDT.

Jul 28 (R) **Discussion & Review for Quiz 2** (Zoom). **Activity:** Jeopardy Game 2. 11 am – 12 n +, US PDT.

Jul 29 (F) **Quiz 2 on Canvas.** Covers Lectures 5 – 8 and Labs 3 & 4. Open 12 n until 11:59:59 pm, US PDT.
Week 3


Aug 1 (M) **Optional Discussion** (Zoom). 11 am - 12 n +, US PDT.


Aug 2 (T) **Lab 5. Blood Chemistry: Blood Glucose & Blood Typing** **Readings:** pp 5-1 to 5-6 (LM). **Assignment:** Lab 5 Worksheet. Submit on Canvas by 11:59:59 pm, US PDT.

Aug 2 (T) **Optional Discussion** (Zoom). 11 am - 12 n +, US PDT.


Aug 3 (W) **Optional Discussion** (Zoom). 11 am - 12 n +, US PDT.


Aug 4 (R) No Lab. Study for Quiz 3!

Aug 4 (R) **Discussion & Review for Quiz 3** (Zoom). **Activity:** Jeopardy Game 3. 11 am – 12 n +, US PDT.

Aug 5 (F) **Quiz 3 on Canvas.** Covers Lectures 9 – 12 and Lab 5. Open 12 n until 11:59:59 pm, US PDT.

Week 4


Aug 8 (M) **Optional Discussion** (Zoom). 11 am - 12 n +, US PDT.


Aug 9 (T) **Lab 6. Pulmonary Function Tests.** **Readings:** pp 6-1 to 6-8 (LM). **Assignment:** Lab 6 Worksheet. Submit on Canvas by 11:59:59 pm, US PDT.

Aug 9 (T) **Optional Discussion** (Zoom). 11 am - 12 n +, US PDT.


BI 121 Syllabus

Grading:

- 10% Lecture Attendance & Active Learning Questions submitted on Canvas
- 10% Lab Attendance & Worksheets submitted on Canvas
- 20% Quiz 1 on Canvas
- 20% Quiz 2 on Canvas
- 20% Quiz 3 on Canvas
- 20% Quiz 4 on Canvas

We ❤️ Human Physiology!!! 😊