

University of Oregon  
Department of Biology

Course: BI 358 Investigations in Medical Physiology, CRN 21749, 04 cr, Lecture: 8:30-9:50 TR, 110 WIL + Discussion-Lab: CRN 21750, 10:00-11:50 T or CRN 21751, 12:00-13:50 T or CRN 21572, 14:00-15:50 T, Remote Zoom or 129 HUE (see specific Discussion-Lab & dates + subject to change based on U of O campus restrictions), Winter 2022.

Canvas Website: <https://canvas.uoregon.edu/courses/193215>

Instructor: V. Pat Lombardi, 65A KLA, 541-346-6055, [lombardi@uoregon.edu](mailto:lombardi@uoregon.edu)

Office Hr: M, 11:00 – 12:00, R 10:00 – 11:00 and by appointment.

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Texts: John E. Hall & Michael E. Hall (G&H). *Guyton & Hall Textbook of Medical Physiology*, 14<sup>th</sup> ed. Elsevier, 2021. [Required] Digital version included. Digital-only version available.

V. Pat Lombardi, Eugene Evonuk & Mary Ann Carmack. *BI 358, Investigations in Medical Physiology Discussion-Lecture Notebook (DLN)*, 2022.[Required] Available weekly online, free on Canvas website.

John E. Hall & Michael E. Hall. *Pocket Companion to Guyton & Hall Textbook of Medical Physiology*, 14<sup>th</sup> ed. Elsevier Saunders, 2021. [Optional]

Lauralee Sherwood (LS1). *Human Physiology: From Cells to Systems*, 9<sup>th</sup>/8<sup>th</sup>/7<sup>th</sup>/6<sup>th</sup> ed. Cengage Learning, 2016, 2013, 2010, 2007. [Optional/Supplemental reading.]

Lauralee Sherwood (LS2). *Fundamentals of Physiology: A Human Perspective*, 4<sup>th</sup>/3<sup>rd</sup> ed. Brooks/Cole, Cengage Learning, 2012, 2006. [Optional/Supplemental reading.]

Frances S Sizer & Eleanor N. Whitney (S&W). *Nutrition: Concepts & Controversies*, 15<sup>th</sup>, 14<sup>th</sup>, 13<sup>th</sup> or 12<sup>th</sup> ed. Boston, MA: Cengage Learning, 2020, 2017, 2013 or 2010 or other peer-reviewed nutrition textbook. See also:

<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.heart.org/en/healthy-living/healthy-eating/eat-smart/nutrition-basics>, <https://www.nhlbi.nih.gov/health/educational/wecan/tools-resources/nutrition.htm>, <https://health.gov/our-work/food-nutrition>, <https://mynutrition.wsu.edu/nutrition-basics>

Tentative Outline:

Jan 4 (T) **Lecture 1:** Anatomy vs. Physiology, Body Levels of Organization, Homeostatic Balances (Water, Temperature, pH, Ionic, Gas, Metabolic), Simplified Homeostatic Model, Negative (-) vs. Positive (+) Feedback, Feedback Gain (Remote Zoom). **Readings:** G&H Preface pp vii-viii, ch 1 pp 3-11, ch 46 fig 46-4 p 572; LS1/LS2 ch 1 (Homeostasis); DLN pp A-1, A-2. **Assignment:** Active Learning Questions Lecture 1. Submit on Canvas by 11:59:59 pm, US PST.

Jan 4 (T) **Discussion 1:** I. Introduction & Resources: Personal Information Cards. II. Guidelines for Research Paper & Presentation (Remote Zoom). **Discussion 2:** Addiction Medicine Primer: I. Discussion: *Opioid Addiction*. II. Breakout Groups & Mini-Presentations on Common Drugs of Addiction: Alcohol, Cocaine, Heroin, Kratom, Marijuana, Methamphetamine, Opioids, Tobacco, E-Cigarettes. **Readings:** DLN pp iv-x, 1-1, 1-2, 2-1 thru 2-74. **Assignments:** Submit Personal Information Card on Canvas by 11:59:59 pm. Begin personal computer search (*PubMed* +) on topic/s of interest. Submit title and rough paper outline on Canvas by 5:00 pm on Jan 10 (M).

- Jan 6 (R) **Lecture 2:** Synapses & Introduction to Addiction Medicine, Autonomic Nervous System: Sympathetic vs. Parasympathetic: Neurotransmitters, Receptors, Actions; Fight-or-Flight. Limbic System & Hypothalamus (Remote Zoom). **Readings:** G&H ch 46 pp 569-83; ch 59 pp 741-52; ch 61 pp 763-75. **Assignment:** Active Learning Questions Lecture 2. Submit on Canvas by 11:59:59 pm, US PST.
- Jan 10 (M) **Assignments:** Topic title with simple outline in .docx or .doc format due. Submit on Canvas and e-mail copy to [lombardi@uoregon.edu](mailto:lombardi@uoregon.edu) by 5:00 pm, US PST.
- Jan 11 (T) **Lecture 3: Guest Lecture Series-Clinical:** Douglas Bovee, MD, Addiction & Internal Medicine, Eugene, OR. *Drugs of Addiction: A Survey of their Pharmacology & Pathophysiology* (110 WIL). **Readings:** DLN pp B-1 thru B-9 + <http://learn.genetics.utah.edu/content/addiction/mouse/>. **Assignments:** Active Learning Questions Lecture 3 + Comments on Guest Lecturer. Submit on Canvas by 11:59:59 pm, US PST.
- Jan 11 (T) **Discussion 3:** Peer Review of Outlines. Brief topic explanations within breakout groups. Peer review of outlines + feedback by e-mail (Remote Zoom). **Readings:** DLN pp 3-1, 3-2. **Assignments:** E-mail outlines in .docx or .doc format to all members in your topic group. Provide e-mail feedback to all group members within 48-hr and submit on Canvas by Jan 13 (Thurs), 11:59:59 pm, US PST.
- Jan 13 (R) **Lecture 4:** Gastrointestinal Anatomy & Physiology (110 WIL). **Readings:** G&H ch 63, 64 & 65, pp 787-822. **Assignment:** Active Learning Questions Lecture 4. Submit on Canvas by 11:59:59 pm, US PST.
- Jan 14 (F) **Quiz 1**-covers **Lectures 1, 2, 3 & Discussion 2**. Available on Canvas 12 n – 11:59:59 pm, US PST.
- Jan 18 (T) **Lecture 5:** I. Digestion & Absorption. II. Nutrition & Disease Prevention (110 WIL). **Readings:** G&H ch 66 pp 823-32; + highlights of ch 72 pp 877-92; DLN pp C-1 thru C-10. **Assignment:** Active Learning Questions Lecture 5. Submit on Canvas by 11:59:59 pm, US PST.
- Jan 18 (T) **Discussion-Lab 4: Nutrition & Disease Prevention** (129 HUE). **NB: Prior to lab, please record your diet for at least two full days** so that you can 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:** DLN pp 4-1 thru 4-22 + see websites on the p 1 of this outline. **Assignment:** Discussion 4 Worksheet with nutrition report attachments. Submit on Canvas by Jan 23 (Sun), 11:59:59 pm, US PST.
- Jan 20 (R) **Lecture 6:** Blood + Immunology I & II: Blood Cells & Immunity, Overview of Innate vs. Acquired/Adaptive (Nonspecific vs. Specific) Immunity. Resistance of the Body to Infection; Immunity & Allergy. Evolution of the Immune System, How Breast Milk Protects Newborns (110 WIL). **Readings:** G&H ch 33, 34 & 35 pp 439-70; ch 36 pp 471-6 + posted article links. **Assignment:** Active Learning Questions Lecture 6. Submit on Canvas by 11:59:59 pm, US PST.
- Jan 21 (F) **Quiz 2**-covers **Lectures 4, 5 & Discussion 4**. Available on Canvas 12 n – 11:59:59 pm, US PST.
- Jan 25 (T) **Lecture 7: Guest Lecture Series-Clinical:** Kraig W. Jacobson, MD, Oregon Allergy Associates, Eugene, OR. *Allergy & Immunology* (110 WIL). **Readings:** DLN pp D-1 thru D-14. **Assignments:** Active Learning Questions Lecture 7 + Comments on Guest Lecturer. Submit on Canvas by 11:59:59 pm, US PST.
- Jan 25 (T) **Discussion-Lab 5:** I. Evolution, Immunity & the Invertebrates. Sharks & Origins of Vertebrate Immunity. Allergies? II. White Blood Cell Differential Count Lab (129 HUE). **Readings:** DLN pp 5-1 thru 5-9 + article links posted on Canvas. **Assignment:** Lab 5 Blood Chemistry Worksheet. Submit on Canvas by Jan 30 (Sun), 11:59:59 pm, US PST.

- Jan 27 (R) **Lecture 8:** Cardiovascular Physiology: Heart & Vessels Anatomy & Physiology, General Circulation, Coronary Circulation, Heart Sounds, Atherosclerosis, CABG & PTCA, Hypertension (110 WIL). **Readings:** G&H ch 9 pp 113-21; ch 14 pp 171-4; ch 15 pp 186-92; ch 16 pp 193-7, 201-4; ch 21 pp 262-9; ch 23 pp 283-8; ch 69 pp 861-4. **Assignment:** Active Learning Questions Lecture 8. Submit on Canvas by 11:59:59 pm, US PST.
- Feb 1 (T) **Lecture 9: Guest Lecture Series-Clinical:** Richard C. Padgett, MD, Cardiology, Oregon Heart & Vascular Institute, Eugene, OR. *Clinical Cardiology, Case Studies & Recent Advances* (110 WIL). **Readings:** DLN pp E-1 thru E-8. **Assignments:** Active Learning Questions Lecture 9 + Comments on Guest Lecturer. Submit on Canvas by 11:59:59 pm, US PST.
- Feb 1 (T) **Discussion-Lab 6:** Heart Model Anatomy & Heart Dissection Lab. Blood Pressure, Hypertension & International & National Guidelines (129 HUE). **Readings:** DLN p 6-1 and 6-2; G&H pp 173-8, 234, 863.
- Feb 3 (R) **Lecture 10:** I. Introduction to Endocrinology, Pituitary Hormones & Control by the Hypothalamus. II. Peripheral Endocrine Organs (110 WIL). **Readings:** G&H ch 75 & 76 pp 915-40; ch 77 & 78 highlights pp 941-72. **Assignment:** Active Learning Questions Lecture 10. Submit on Canvas by 11:59:59 pm, US PST.
- Feb 4 (F) **Quiz 3** – Covers **Lectures 6, 7, 8, 9 & Discussions-Labs 5 & 6** (Blood, Immunology, Cardiovascular Physiology & Cardiology). Available on Canvas 12 n – 11:59:59 pm, US PST.
- Feb 7 (M) **Assignments:** Submit Paper Draft on Canvas and e-mail copy in .docx or .doc format by 5:00 pm US PST to [rpenick@uoregon.edu](mailto:rpenick@uoregon.edu) or [rhopton@uoregon.edu](mailto:rhopton@uoregon.edu) based on your specific lab section. Also, e-mail members in your group, so that you can review in discussion.
- Feb 8 (T) **Lecture 11:** Reproductive Physiology: I. Female Reproductive Anatomy & Physiology: Ovarian & Menstrual Cycle, Birth Control Techniques. II. Male Reproductive Anatomy & Physiology (110 WIL). **Readings:** G&H ch 82 pp 1027-44; ch 83 pp 1045-51; highlights of ch 81 pp 1011-25. **Assignment:** Active Learning Questions Lecture 11. Submit on Canvas by 11:59:59 pm, US PST.
- Feb 8 (T) **Discussion 7:** Peer Review of Papers (Remote Zoom). **Readings:** DLN pp 7-1 thru 7-3. **Assignment:** Case histories to prepare for Dr. Garrett. Submit on Canvas by 11:59:59 pm, US PST.
- Feb 10 (R) **Lecture 12: Guest Lecture Series-Clinical:** Audrey P. Garrett, MD, MPH, Willamette Valley Cancer Institute & Research Center, Eugene, OR & Oregon Health & Science University, Portland, OR. *Human Papillomavirus (HPV), Cancer & Gynecologic Care* (110 WIL). **Readings:** DLN pp F-1 thru F-16. **Assignments:** Active Learning Questions Lecture 12 + Comments on Guest Lecturer. Submit on Canvas by 11:59:59 pm, US PST.
- Feb 14 (M) **Assignments:** Presentations Group I due on Canvas and to [lombardi@uoregon.edu](mailto:lombardi@uoregon.edu) and specific lab instructor either [rpenick@uoregon.edu](mailto:rpenick@uoregon.edu) or [rhopton@uoregon.edu](mailto:rhopton@uoregon.edu) by 5 pm, US PST. Group II Presenters submit Paper Draft on Canvas and e-mail copy in .docx or .doc format to lab instructors.
- Feb 15 (T) **Lecture 13: Guest Lecture Series-Clinical:** Paul F. Kaplan, MD, Oregon Health & Science University, Portland, OR & University Health Center & Department of Human Physiology, Eugene, OR. *Assisted Reproductive Technologies (ART) & Polycystic Ovary Disease: A Common Endocrine Disorder in Women* (110 WIL). **Readings:** DLN pp G-1 thru G-10. **Assignments:** Active Learning Questions Lecture 13 + Comments on Guest Lecturer. Submit on Canvas by 11:59:59 pm, US PST.
- Feb 15 (T) **Discussion 8: Class Presentations I** (Remote Zoom).
- Feb 17 (R) **Lecture 14:** Fetal & Neonatal Physiology, Fetal Blood Flow, Pediatrics, Children & Bone Development (110 WIL). **Readings:** G&H ch 84 pp 1061-70; ch 23 pp 288-91; ch 80 pp 993-9. **Assignment:** Active Learning Questions Lecture 14. Submit on Canvas by 11:59:59 pm, US PST.

- Feb 18 (F) **Quiz 4** – covers **Lectures 10, 11, 12, 13 & Discussion 7 Case Histories** (Endocrinology, Reproduction, HPV & Cancer). Available on Canvas 12 n – 11:59:59 pm, US PST.
- Feb 21 (M) **Assignments:** Presentations Group II due on Canvas and to [lombardi@uoregon.edu](mailto:lombardi@uoregon.edu) and specific lab instructor either [rpenick@uoregon.edu](mailto:rpenick@uoregon.edu) or [rhorton@uoregon.edu](mailto:rhorton@uoregon.edu) by 5 pm, US PST. Group III Presenters submit Paper Draft on Canvas and e-mail copy in .docx or .doc format to lab instructors.
- Feb 22 (T) **Lecture 15: Guest Lecture Series-Clinical:** Pilar Bradshaw, MD, Eugene Pediatric Associates, Eugene, OR. *Pediatrics & Case Studies* (110 WIL). **Readings:** DLN pp H-1 thru H-4. **Assignments:** Active Learning Questions Lecture 15 + Comments on Guest Lecturer. Submit on Canvas by 11:59:59 pm, US PST.
- Feb 22 (T) **Discussion 9: Class Presentations II** (Remote Zoom).
- Feb 24 (R) **Lecture 16:** No formal lecture. Work on research papers.
- Feb 28 (M) **Assignments:** Presentations Group III due on Canvas and to [lombardi@uoregon.edu](mailto:lombardi@uoregon.edu) and specific lab instructor either [rpenick@uoregon.edu](mailto:rpenick@uoregon.edu) or [rhorton@uoregon.edu](mailto:rhorton@uoregon.edu) by 5 pm, US PST.
- Mar 1 (T) **Lecture 17: Guest Lecture Series - Clinical:** Jenna M. Godfrey, MD, MSPH, Slocum Center for Orthopedics & Sports Medicine, Eugene, OR. *Congenital Hand Differences in the Media* (Remote Zoom). **Readings:** DLN pp H-5 thru H-12. **Assignments:** Active Learning Questions Lecture 17 + Comments on Guest Lecturer. Submit on Canvas by 11:59:59 pm, US PST.
- Mar 1 (T) **Discussion 10: Class Presentations III** (Remote Zoom).
- Mar 3 (R) **Lecture 18:** Eye Anatomy & Physiology. I: Anatomy & Optics of Vision. II: Retinal Receptor & Neural Function. III: Central Neurophysiology of Vision (110 WIL). **Readings:** G&H ch 50, 51 pp 627-51; ch 52 pp 653-6. **Assignment:** Active Learning Questions Lecture 18. Submit on Canvas by 11:59:59 pm, US PST.
- Mar 4 (F) **Quiz 5** –covers **Lectures 14, 15 & 17** (Fetal Physiology & Development, Pediatrics & Orthopedics). Available on Canvas 12 n – 11:59:59 pm.
- Mar 8 (T) **Lecture 19: Guest Lecture Series-Clinical:** Annette Chang Sims, MD, Oregon Eye Specialists, Drs. Fine, Hoffman & Sims, Ophthalmologists, Eugene, Springfield & Florence, OR. *Ophthalmology: The Medical & Surgical Treatment of Eye Diseases* (110 WIL). **Readings:** I-1 thru I-6. **Assignments:** Active Learning Questions Lecture 19 + Comments on Guest Lecturer. Submit on Canvas by 11:59:59 pm, US PST.
- Mar 8 (T) **Discussion-Lab 11: Vision Lab with Eye Dissections** (129 HUE). **Readings:** DLN pp 11-1 thru 11-3.
- Mar 10 (R) **Lecture 20:** Thoughts on applying to graduate schools in medicine & allied health. Final comments by Pat (110 WIL).
- Mar 11 (F) **Quiz 6** -covers **Lectures 18, 19 & Discussion-Lab 11**. Available on Canvas 12 n – 11:59:59 pm, US PST.
- Mar 14 (M) **Final Research Paper Due by 5:00 pm, US PDT. Assignment:** Submit .docx or .doc format on Canvas by 5:00 pm and by e-mail to [lombardi@uoregon.edu](mailto:lombardi@uoregon.edu)

**Grading:**

- Attendance & Participation (25%)
- Feedback on Guest Lecturers & Peers (5%)
- Paper & Presentation (10%)
- Quizzes (60%)

BI 358 Investigations in Medical Physiology Syllabus  
University of Oregon, Department of Biology  
V. Pat Lombardi

Introduction: *BI 358 Investigations in Medical Physiology* is an upper division lecture, discussion/laboratory course that is ideal for seniors and juniors with aspirations for careers in medicine. It is designed to bridge the gap between textbook knowledge from Guyton & Hall *Textbook of Medical Physiology* and practical applications in clinical medicine and research. Basic and applied physiology lectures are followed by presentations by experts in medicine and research. The primary approaches we will use to explore medical physiology are descriptive (what and where), correlational (relationship between two or more variables) and mechanistic (how, sequence of cause-and-effect steps). Occasionally, we will use a purpose-driven (why or teleological) approach to help us remember or associate key concepts. Topic coverage includes homeostasis and homeostatic models; the nervous system, neurotransmitters and addiction medicine; immunology, allergies and asthma; cardiovascular physiology and clinical cardiology; digestive physiology and nutrition; endocrinology, reproductive physiology and infertility; gynecologic oncology; neonatology and development, pediatrics and pediatric orthopedics; and visual physiology and clinical ophthalmology.

*Physiology*, the study or science of function in living matter, 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, medicine, molecular biology, nutrition, pathophysiology (the study of diseases), physics, and systems physiology! The specific focus of study varies based on the adjective placed 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. *Medical* physiology focuses on the study of function with specific applications to medicine. Certainly, there is much overlap among subdisciplines. Though we will discuss examples from many areas of medical physiology, our primary focus will be to study humans at a variety of levels of organization – 1<sup>st</sup> under normal and healthy baseline conditions prior to examining pathology, that is, how diseases disrupt homeostatic balances. Whatever your plans in medicine or allied health, ultimately, my hope is that you enhance your appreciation and understanding of the intricate and miraculous nature of the human body and that you apply what you have learned in this course throughout the rest of your life!

Prerequisites & Applications: The prerequisites for BI 358 are General Biology IV: *BI 214 Mechanisms* or Honors Biology III: *BI 283H Evolution, Diversity & Ecology* or *HPHY 324 Human Physiology II*. These prerequisites imply that you have completed a lower division Biology sequence required for the Biology, Human Physiology or General Science major. A background in Human Anatomy & Physiology is preferred because this will ensure that previously you have studied at the descriptive level (what and where) and have established the vocabulary of the

structures needed to study specific functions. BI 358 is an *Area II Systems/Organisms* course and can be applied toward the 44-cr of upper division courses required for the Biology major and may be applied toward the 16-cr of upper division electives required for the Human Physiology major.

Learning outcomes: By the end of the course, you should be able to:

- construct homeostatic models to solve problems at multiple levels of organization in applied physiology, medicine and research and demonstrate this ability on weekly quizzes.
- engage in peer-review of outlines, paper drafts and presentations, and provide feedback on guest speakers.
- examine, analyze and summarize research in a personal area of interest in medical physiology.
- develop and formalize an outline, review paper and class presentation and assist in grading these with instructors and peers.
- enhance scientific writing and presentation skills based on extensive evaluation and instructor and peer feedback.

Learning Objectives: By the end of the course, you should be able to:

- 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 concept of feedback gain and provide examples of negative and positive feedback.
- identify the specific components of a simplified homeostatic model that are disrupted in common human pathologies like cardiovascular diseases and diabetes mellitus.
- compare and contrast parasympathetic and sympathetic neurotransmitters, receptors, actions, and rest-and-digest vs. fight-or-flight states.
- discuss how common drugs of addiction impact primary neurotransmitters, synapses, body organs and systems.
- describe the physiology and inherent multi-organ risks of cigarette smoking and vaping.
- identify structures and functions of the gastrointestinal system and describe steps involved in digestion and absorption.
- describe the role nutrition plays in disease prevention and compare and contrast plant- vs. animal-based diets.
- identify the common characteristics of the world's longest lived people in *Blue Zones*.
- describe the relationship of trimethyl amine oxide (TMAO) and N-glycolylneuraminic acid (neu5Gc) in the development of inflammation and chronic human diseases.
- analyze the nutrient content of your personal diet relative to national guidelines and make recommendations for self-improvement.
- identify components of blood and the function of red blood cells, white blood cells and platelets; compare and contrast plasma vs. serum.
- define and calculate hematocrit, evaluate blood glucose and classify normal and abnormal ranges.

- describe the steps involved in a white blood cell differential count and identify the general structure, function and % of individual white blood cells.
- compare and contrast innate vs. adaptive immunity.
- provide an overview of clinical immunology and treatments involved in allergies.
- identify components of the cardiovascular and lymphatic systems and describe fluid flow and structural and functional relationships between these systems.
- illustrate the coronary circulation, describe phases of the cardiac cycle and normal and abnormal heart sounds.
- define blood pressure, hypertension and new national and international guidelines for assessment.
- explain theories involved in the development of atherosclerosis, general atherosclerotic risk factors, the treatment triad and guidelines for prevention.
- discuss the cardiology surgical procedures percutaneous transluminal coronary angioplasty (PTCA) and transaortic valve replacement (TAVR).
- identify the structure and function of organs in the endocrine system
- illustrate the vascular connection between the hypothalamus and anterior pituitary and the nervous connection between the hypothalamus and posterior pituitary.
- identify hypothalamic release- and release-inhibiting hormones and anterior pituitary hormones together with normal and abnormal feedback mechanisms.
- describe female and male reproductive anatomy and physiology along with hormonal feedback mechanisms.
- define reproduction number  $R_0$ , discuss the spike protein and mRNA vaccines and implications relative to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).
- explain the relationship between human papilloma viruses (HPV) and cancer development.
- discuss assisted reproductive technologies (ART) and the identification and treatment of couples with infertility.
- describe the features of polycystic ovary disease.
- explain basic fetal and neonatal physiology, fetal blood flow, vital signs and development.
- identify common pediatric diseases and a general systems plan for diagnoses and treatments.
- classify congenital hand differences and potential orthopedic treatments.
- describe the structure and function of the eye and the general physics of myopia, hyperopia and presbyopia.
- discuss cataracts and glaucoma and ophthalmology treatments including phacoemulsification and shunt surgeries used to reduce intra-ocular pressure.

### Texts & References:

#### Lecture:

John E Hall & Michael E Hall (G&H). *Guyton & Hall Textbook of Medical Physiology, 14<sup>th</sup> ed.* Elsevier, 2021. [Required] Digital version included. Digital-only version available.

## Lab:

V. Pat Lombardi, Eugene Evonuk & Mary Ann Carmack (DLN). *BI 358, Investigations in Medical Physiology, Discussion/Laboratory-Lecture Notebook, Winter 2022*. Provided free on Canvas.

The *Discussion/Laboratory-Lecture Notebook* contains all of the background for discussions and labs and slides from prior guest lectures. It is usually for sale at the U of O Duck Store (Bookstore) for ~10 US dollars, but for this term, it is free because I am posting this for you directly on Canvas.

## Additional Lecture & Lab Resources:

Lauralee Sherwood (LS1). *Fundamentals of Human Physiology, 4<sup>th</sup> ed.* Belmont, CA: Brooks/Cole, Cengage Learning, 2012, ISBN-13:0840062253. Digital rental or purchase, used or new textbook.

Lauralee Sherwood (LS2). *Fundamentals of Physiology: A Human Perspective, 4<sup>th</sup>/3<sup>rd</sup> ed.* Brooks/Cole, Cengage Learning, 2012, 2006. [Optional/Supplemental reading.]

Sizer, Frances S. & Whitney, Eleanor N. (S&W). *Nutrition: Concepts & Controversies, 15<sup>th</sup>, 14<sup>th</sup>, 13<sup>th</sup> or 12<sup>th</sup> ed.* Boston, MA: Cengage Learning, 2020, 2017, 2013 or 2010 or other peer-reviewed nutrition textbook. 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.heart.org/en/healthy-living/healthy-eating/eat-smart/nutrition-basics>, <https://www.nhlbi.nih.gov/health/educational/wecan/tools-resources/nutrition.htm>, <https://health.gov/our-work/food-nutrition>, <https://mynutrition.wsu.edu/nutrition-basics>

## Requirements:

- **Review the Active Learning Questions and Lecture .pdfs prior to attending online Lecture Discussions.** These will be posted by the weekend prior to lectures. For some lectures, but likely not guest lectures, .mp4s also may be available. So that we are able to engage at least partly in a reverse classroom configuration, it is crucial that you review Active Learning Questions and .pdfs prior to attending our online lecture-discussions. The answers to the Active Learning Questions are within the .pdfs and .mp4s and in most cases are not found by cruising the internet. Examine Guyton & Hall *Textbook of Medical Physiology* and other course materials 1<sup>st</sup> prior to doing internet searches reflexively. If you do conduct internet searches as a follow-up, rely upon more accurate and reliable sites with .edu, .org or .gov extensions. There are a few exceptions to this rule, for example, UC Berkeley Wellness is financially separate from UC Berkeley and thus is a .com rather than an .edu. In contrast, the Westin A. Price Foundation is an .org, yet is not peer-reviewed, but these are two rare exceptions to the .edu, .org, .gov guideline used to ensure accuracy.
- **Review the Discussion/Lab Background material and .pdfs and any Lab Worksheets prior to attending online Lab Discussions.** Again, so that we are able to take at least partial advantage of a reverse classroom design, it is crucial that you review at least background material and .pdfs prior to coming to our online lab discussions. The Blood



Chemistry Lab requires a moderately extensive write-up, while the Nutrition Lab involves the most analyses and question responses with guidelines posted for both labs on Canvas. Again, as with the lecture, seek course materials 1<sup>st</sup> prior to conducting internet searches reflexively. Our live, in-person discussions/labs are scheduled for 100 min, but if online they may be reduced to 90 min.

- **Read, take notes and study** the pages listed from your textbook and other resources listed on your course outline prior to the Lecture-Discussions and Lab-Discussions. Again, this will help foster discussion and facilitate a reverse classroom framework.
- Complete **Active Learning Questions** using the template provided and submit by way of Canvas by 11:59:59 pm the night of each Lecture-Discussion. To make it easier for the reviewer to make comments, .docx or .doc format is preferred. Hand-written, .jpg and .pages documents will not be accepted.
- Complete **Lab Reports** using the template provided for required labs and submit by way of Canvas by 11:59:59 pm as indicated on the course outline. For the Nutrition and Blood Chemistry Labs you will have until the weekend to submit, due to the more extensive nature of these write-ups.
- Provide **Feedback on Guest Lectures** using the template provided and submit by way of Canvas by 11:59:59 pm on the same day as the guest lecture. To make it easier to collate for guests, please use .docx/.doc, single-paragraph format, and do not identify yourself.
- Provide **Feedback on Outlines & Paper Drafts for Peers** within your assigned presentation group. Post these on Canvas when requested to do so.
- Create a **Research Paper** of 6 double-sided pages with 1 page of references (so a total of 7 pages) using distinct headers (Introduction...Directions for Future Research, Summary & Conclusions, References) and a variable-by-variable approach. Submit your research paper in .docx or .doc format both on Canvas and to [lombardi@uoregon.edu](mailto:lombardi@uoregon.edu) by Monday at 5:00 pm during final exam week. More details will be posted on Canvas under *Paper and Presentation Guidelines* and described in your Lab/Discussion section.
- Create a **Presentation** of 5-7 slides maximum (.pptx) on a medical physiology research topic of your choice and submit .pdf on Canvas by Monday at 5:00 pm on the night before your scheduled presentation. Also, submit by way of e-mail a .pptx or .pdf (depending on the software you use) to [lombardi@uoregon.edu](mailto:lombardi@uoregon.edu) and to your lab/discussion instructor by Monday at 5:00 pm on the night before your scheduled presentation. More details about the presentation will be posted on Canvas under *Paper and Presentation Guidelines* and described during your Lab/Discussion section.
- Provide **Comments & Score** all presentations except for your own by using a score sheet and scale provided. More details about the scoring will be posted on Canvas and described during your Lab/Discussion section.
- Complete six online **Canvas Quizzes** covering all Active Learning Q, Lectures, Discussions/Labs for the specific modules indicated on the *Course Outline*. Each Quiz will contain 10 Q (multi-modal, multiple choice...) and have a 20- to 30-min window to complete, sometime between 12 N and 11:59:59 pm US PDT on Fridays.

Accessible Education: If you have documented additional needs through our Accessible Education Center (AEC) <https://aec.uoregon.edu/using-aec-connect>, more time will be allotted for you to complete quizzes.

**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 shots or snipping tools to capture quiz questions. You will pledge to ensure 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 1<sup>st</sup> 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 other materials, 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 20 (or perhaps 30) 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:

- 25% Attendance & Participation**
- 5% Feedback on Guest Lecturers & Peers**
- 10% Paper & Presentation**
- 60% Quizzes** (10% for each of the 6 Quizzes)
- 100% Total**

The individual breakdown is below and detailed directions will be provided on Canvas and in lecture & lab. Please ask if you have any questions.

| BI 358 2021e Grading      |    |             |       |   |                         |   |                               |  |
|---------------------------|----|-------------|-------|---|-------------------------|---|-------------------------------|--|
| Assignment                | #  | Pt value ea | Total |   |                         |   |                               |  |
| Introduction Card         | 1  | 0.25        | 0.25  | } | 24.25                   | } | 25 Attendance & Participation |  |
| Active Learning Q-Lecture | 18 | 0.5         | 9     |   |                         |   |                               |  |
| Attendance-Lecture        | 19 | 0.5         | 9.5   |   |                         |   |                               |  |
| Attendance-Lab            | 10 | 0.5         | 5     |   |                         |   |                               |  |
| Blood Chemistry Write-up  | 1  | 0.25        | 0.25  | } | 5 Feedback              | } | 25 Attendance & Participation |  |
| Case Histories            | 1  | 0.25        | 0.25  |   |                         |   |                               |  |
| Feedback-Guest Lecturers  | 8  | 0.5         | 4     | } | 0.75                    | } | 25 Attendance & Participation |  |
| Feedback-Peers            | 2  | 0.5         | 1     |   |                         |   |                               |  |
| Nutritional Analyses      | 1  | 0.5         | 0.5   | } | 10 Paper & Presentation | } | 10 Paper & Presentation       |  |
| Outline                   | 1  | 0.25        | 0.25  |   |                         |   |                               |  |
| Paper                     | 1  | 5           | 5     | } | 60 Quizzes              | } | 60 Quizzes                    |  |
| Presentation              | 1  | 5           | 5     |   |                         |   |                               |  |
| Quizzes                   | 6  | 10          | 60    |   |                         |   |                               |  |
|                           |    | Σ =         | 100   |   | 100 Total               |   |                               |  |

Absences & Make-ups: It is difficult based on the pace and organization of the course with guest lecturers to facilitate make-ups. Although we may post some Zoom recordings of (past?) lectures and discussions online, there is simply nothing like being there. View it like a job that you get paid for when you show up! Also, think about the money you and/or your parents/sponsors have paid and the time we have invested to organize and develop the course and schedule guest lecturers and labs. Reflect on a host devoting much time and care to creating hors d'oeuvres, entrees and drinks and then not having people show up. You can sense why the host might be upset if asked "Did I miss anything important?" The best we may be able to do with a make-up is to provide you with ½ credit if you have a legitimate excuse related to University-sponsored travel, childcare, interview, illness, birth, death or gastrulation! ☺ Please send an e-mail to [lombardi@uoregon.edu](mailto:lombardi@uoregon.edu) and cc: lab instructors that may be impacted by any absences. The further in advance we have notice, the more likely we may be able to accommodate your desires for a make-up.

Late Assignments: Assignments posted or received past the listed deadline may be docked 10% per day or simply not accepted. Do your very best to get all assignments in on time. Remember, we have the highest of possible expectations. We should all strive to be the best possible versions of ourselves. This translates to doing the best we can to prepare, being on time and respectful and working and supporting others to the very best of our capabilities.

Organization: As mentioned previously, I would like to implement at least partly, a reverse classroom plan, where you review each Lecture *.pdf* online and attempt to complete the Active Learning Questions on your own time, and then attend the Lecture-Discussion. This will enable you to fill in details on the Active Learning Questions. It's probably best not to submit them until after you have attended the lecture. Also, you review each Background for the Discussion/Lab *.pdf* at your leisure then attend the Lab-Discussion. For Lab write-ups, again, it is best not to submit until after you have participated in the lab. Your efforts outside of the Lecture and Lab Discussions will make you well-prepared and enable all of us to engage in each topic at a deeper level and more fully interact and learn together. Please let me know if you have any questions or need additional information or resources. I am looking forward to learning together and having fun this term! :)