

**Bio 2800-Physiology for Biomedical Engineering
Fall Semester 2018**

Lecture: MW 4:30 PM – 5:45 PM; SH 243A
Lecture Instructor: Katrina Yamazaki, Ph.D.
ASC La Kretz Hall 215

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Office Hours: Monday 3:30-4:30 (by appointment)

Course Website: moodle.calstatela.edu and McGrawHill Connect

Number of units: 3

COURSE DESCRIPTION: Pre-requisites: CHEM 1040. Basic human physiology and its connection to engineering design. A focus on the nervous, cardiovascular, and musculoskeletal systems. Pathophysiology of some major diseases and disorders that are currently treated and/or monitored by biomedical devices and technology.

COURSE TEXTBOOK:

Lecture: Widmaier, E. Vander's Human Physiology. McGraw Hill.

http://connect.mheducation.com/class/k-yamazaki-smartstart-course_3

COURSE ALIGNMENT WITH DEPARTMENT OF BIOLOGICAL SCIENCES UNDERGRADUATE STUDENT LEARNING

OUTCOMES: Biology 4330 is designed to help students meet the following undergraduate degree learning outcomes:

- 1 The student will acquire the following attitudes:
 - 1.1 Learning about both living micro and macro systems is relevant and essential for understanding life.
- 2 The student will be able to demonstrate that he/she is skilled at:
 - 2.1 Applying the processes and methods of scientific inquiry, including the search and retrieval of scientific information, the formulation of scientific hypotheses, the design and conduct of experiments, and the analysis and interpretation of data;
 - 2.2 Understanding and critically evaluating the scientific work of others;
 - 2.3 Communicating scientific information effectively using oral presentations and written reports;
 - 2.4 Performing laboratory techniques that are appropriate to the major, with an understanding of the principles of laboratory safety;
 - 2.5 Working collaboratively on group projects.
- 3 The biology student will be able to demonstrate knowledge of the following:
 - 3.1 Molecular and cellular structure and function;
 - 3.3 Basic principles of anatomy, physiology, and development;

OFFICE HOURS: For questions and assistance regarding class materials, please make an appointment with me in person or e-mail for one of my office hour slots. The times have been set aside for this class. Please make an appointment to see me during those times.

GRADING: Final course grades will be based on the following assessments worth:

Lecture

664 points

- 13 homework assignments (pre-lecture assignments – 20 points each): 260 points
- 12 Lecture Quizzes (post-lecture assessments – 25 points each): 300 points
- 4 lecture exams (100 points each): 400 points
- 1 Group Term Paper: 75 points
- 1 Group Presentation: 25 points

Homework Assignments = 260 points: There will be homework every week assigned on McGraw Hill Connect. These assignments are designed to have you come to class the following week prepared. Each assignment will open Friday morning and close on Sunday @ 11:59 PM (see lecture schedule for chapter reading assignments).

Lecture Quizzes = 300 points: There will be a lecture quiz every week assigned on McGraw Hill Connect. These quizzes give me the ability to assess your understanding of the material presented the week before class. These quizzes will open on Thursday and close on Friday @ 11:59 each week.

Lecture Exams: Each exam can be a combination of multiple-choice, matching, true/false, fill-in-the-blank, and short answer/short essay questions over lecture, laboratory, and reading materials. Laboratory reports will be graded according to the rubric handed out in class (also posted online).

Term Paper = 100 points: The term paper should be 10-12 typed, double spaced pages, reviewing the *most current literature* on a biomedical engineering topic. You may use books, but not as primary sources, and only to clarify concepts in your mind. Papers are due 11/30/2018 @ 11:59 PM SHARP. Late papers will be penalized 10 points per weekday it is late. I do not accept hard copies. The paper must be submitted 11:59 PM SHARP on 11/30/2018 through Turnitin on Moodle. Any submissions at 12:00 AM or later will be considered late and points deducted. SEE GUIDELINES BELOW.

Presentation: Students will be required to create a poster of their term paper subject. The rubric of what will be graded will be posted on Moodle. The presentation should be **10 minutes long** (will be cut off at 10 minutes) and highlight the key concepts of the paper. Students will be graded on content, presentation design, and presentation. Peer evaluations will be done and will count towards 25% of the presentation grade. Posters must be submitted to me via Turnitin on Moodle by MONDAY, DECEMBER 3rd at 11:59 PM.

The grading distribution based on the total points earned in Lecture is as follows:

"A" = 90-100% of possible points	"C" = 70-79%	"F" <59% of possible points
"B" = 80-89%	"D" = 60-69%	

Within each grade range, the top 3% and the bottom 3% will receive "+" and "-" grades.

MAKE-UPS: Make-up exams or late lab reports will be allowed on a case-by-case basis at my discretion and are given in the event of an emergency, or other excused absence, that conflicts with a scheduled exam. Written documentation of the reason you missed the exam is a MUST. NO MAKE UP LABS ARE AVAILABLE.

DISABILITY STATEMENT: Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation.

ACADEMIC HONESTY: Students are expected to read and abide by the University's Academic Honesty Policy, which can be found at

<http://www.calstatela.edu/academic/senate/handbook/ch5a.htm>. Students who violate this policy will be subject to disciplinary action and may receive a failing grade in the course for a single violation.

SYLLABUS DISCLAIMER STATEMENT: Serious effort and consideration were used in formulating the course syllabus. While viewed as an educational contract between Dr. Yamazaki and student, unforeseen events may cause changes to the scheduling of lectures, exercises, examinations, etc. Every effort will be made NOT to change scheduled items. Nonetheless, Dr. Yamazaki reserves the right to make any changes deemed necessary to best fulfill the course objectives. Students registered for this course will be made aware of any changes in a timely fashion using reasonable means (i.e. through campus email or course website). This disclaimer does not abrogate any student rights as described by University rules and regulations.

General term paper guide and topics that should be covered.

Biomedical engineering can be viewed from two angles, from the medical applications side and from the engineering side. A biomedical engineer must have some view of both sides. You will use this approach when constructing your term paper. Your term paper needs to be about a disease within one of the organ systems we covered and then how biomedical engineering has helped with the treatment of that disease. Potential topics as it pertains to biomedical engineering include:

1. Cardiovascular technology – which includes all drugs, biologics and devices related with diagnostics and therapeutics of the cardiovascular systems
2. Neural technology - which includes all drugs, biologics and devices related with diagnostics and therapeutics of the brain and nervous systems
3. Orthopedic technology - which includes all drugs, biologics and devices related with diagnostics and therapeutics of the skeletal systems
4. Bioelectrical – BME, based on Electrical engineering and Computer Science – associated with bioelectrical and neural engineering, bioinstrumentation, biomedical imaging and medical devices. This also tends to encompass optics and optical engineering – biomedical optics, bioinformatics, imaging and related medical devices.
5. Bioelectrical – BME, based on Mechanical Engineering – associated with biomechanics, biotransport, medical devices and modeling of biological systems, like soft tissue mechanics.

Your term paper should address the following topics pertaining to your chosen topic. To give adequate coverage to a topic, usually no fewer than 10-12 references should be used, with the majority of the references (8-10) being from peer-reviewed journal articles. *Wikipedia* text is not acceptable, whereas figures found on *Wikipedia* may be.

Please organize your paper in the following order, using the following headings, then subheadings (in bold).

1. Introduction - Short introductory paragraph about what the paper is about.
2. Anatomy and normal physiology of the organ system (preferably with figures)
3. What condition or disease involves this organ system? How does the disease arise, etc? (preferably with figures)
4. Biomedical Approach to treatment
 - a. Need to clearly explain the how the treatment aids the disease using the concepts learned in class (preferably with figures)
5. Conclusion – a short paragraph of closing remarks.
6. References List and corresponding in-text citations - Be sure you make the appropriate citations (e.g. experimental findings from the literature) in the text of your paper. Each reference **MUST** be cited **SOMEWHERE** in the text/figures/tables of the term paper. Vice versa: each reference cited in the paper itself **MUST** appear in your references list.

Be sure to include page numbers in your paper.

BIOL 1054 Schedule:

Date	Lecture Topic	Chapters
Aug 20	Course Introduction-Lecture Course Syllabus	
Aug 22	Homeostasis: A Framework for Human Physiology	1
Aug 27	Cellular Structure, Proteins and Metabolic Pathways	3
Aug 29	Cellular Structure, Proteins and Metabolic Pathways	3
Sept 3	<i>NO CLASS – LABOR DAY HOLIDAY</i>	
Sept 5	Movement of Molecules Across Cell Membranes	4
Sept 10	Cell Signaling in Physiology	5
Sept 12	EXAM 1	
Sept 17	Neuronal Signaling and the Structure of the Nervous System	6
Sept 19	Neuronal Signaling and the Structure of the Nervous System	6
Sept 24	Sensory Physiology	7
Sept 26	Sensory Physiology	7
Oct 1	Consciousness, the Brain and Behavior	8
Oct 3	Consciousness, the Brain and Behavior	8
Oct 8	EXAM 2	
Oct 10	Muscle	9
Oct 15	Muscle	9
Oct 17	Control of Body Movement	10
Oct 22	Control of Body Movement	10
Oct 24	The Endocrine System	11
Oct 29	The Endocrine System	11
Oct 31	Respiratory Physiology	13
Nov 5	Respiratory Physiology	13
Nov 7	EXAM 3	
Nov 12	<i>NO CLASS – Labor Day Holiday</i>	

Date	Lecture Topic	Chapters
Nov 14	Cardiovascular Physiology	12
Nov 19	NO CLASS – FALL RECESS	
Nov 21	NO CLASS – FALL RECESS	
Nov 26	Cardiovascular Physiology	12
Nov 28	The Kidneys and Regulation of Water and Inorganic Ions	14
Dec 3	The Kidneys and Regulation of Water and Inorganic Ions	14
Dec 5	Final Presentations	
Dec 12	EXAM 4 2:30 – 4:30	