Human Physiology

BILD 26

Wi 2024 BILD 26 Syllabus (Access with UCSD email address)

Instructor: Isabella Maita
Email: imaita@ucsd.edu
Student Hours: TBD, 8018 HS&S
TBD, Zoom
Vote Here: https://forms.gle/ACsoJDkWLeVH5Gnn7

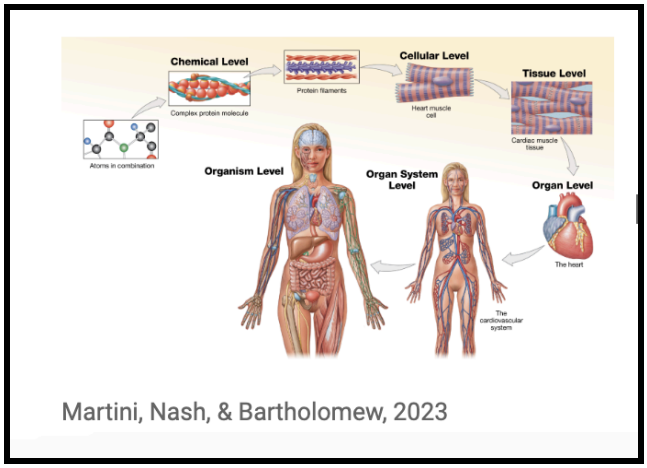
Meeting Times:

Lecture	M/W	6:30 PM - 7:50 PM	HSS 1330
Discussion	M	4:00 PM - 4:50 PM	Zoom

Course Description

Physiology refers to the functions and mechanisms that support life. BILD 26 begins with a brief overview of the fundamentals of biology and physiology. We will then cover the physiology of several organ systems that maintain homeostasis and promote survival and reproduction. Topics will include the human nervous, endocrine, muscular, excretory, and reproductive systems.

This course is an introduction to the fundamentals of physiology, and emphasizes the core physiological principle of homeostasis at several levels of biological organization- from molecular mechanisms to organ systems. Throughout the quarter, we will practice applying concepts in physiology by considering homeostatic dysfunction linked to disease states.



Martini, Nash, & Bartholomew, 2023

Role	Name	Email	Office Hours	Contact Regarding
Instructor	Isabella Maita	imaita@ucsd.edu	TBD	- Exams/Quizzes - Course Content
Graduate IA	Elise Kim	ekkim@ucsd.edu	TBD	- Discussion Assignments - Discussion Section - Course Content
UGIA	Katy Qing-Yi Deonier	kdeonier@ucsd.edu	TBD	- Course Content

Course Materials

Canvas Website: https://canvas.ucsd.edu/courses/53226

Course materials, podcasted class sessions, quizzes, DAs, this syllabus, etc. will be posted on Canvas. Keep an eye out for Canvas announcements and quiz reminders.

Podcast: https://podcast.ucsd.edu/

Video & audio recordings can be found at the link above and in the Media Gallery on Canvas.

Recommended textbook: *Fundamentals of Anatomy and Physiology*, 12th edition by Martini, Nath, and Bartholomew

Highly recommended, NOT required. BILD 26 is participating in the BryteWave/ RedShelf Inclusive Access (IA) program this term, so you have the opportunity to access our textbook at a discount. Please visit the bookstore website if you have questions about IA. To avoid the BryteWave charge, you must opt-out of the program by the add/drop deadline on February 2nd. You can do this using the opt-out link on Canvas.

Recommended readings are listed with the learning outcomes, but exams and quizzes will only contain content covered in lecture and discussion sessions. Some content

covered during lecture is not covered by the textbook, so consistent class attendance is highly recommended. Older versions of the text may be more affordable, though note that chapters may differ.

Recommended Learning Platform: *Mastering A&P*, Pearson

Recommended, NOT required. *Mastering* is an active-learning-based digital tool that guides students through textbook content. I will NOT assign you content on *Mastering*, and have not fully vetted the program. However, *Mastering* guided active-learning activities may be helpful for you.

Evaluation

Learning will be assessed via three types of assignments, DAs, quizzes, and exams.

	Quantity	**Due**	**Weight per assignment**	**Total Weight**
Discussion Activities (DA)	7 (1 incomplete dropped)	Mondays at 11:59 PM	2%	12%
Quizzes	7 (Lowest grade dropped)	Fridays at 11:59 PM	3%	18%
Midterm Exams	2 midterms	E1: January 31th E2: February 28th	20%	40%
Final Exam	1 final	March 20th, 7-10 PM	30%	30%

Grading Scale: I do not grade on a curve.

A+	≥97%	**B+**	87 to <90%	**C+**	73 to <80%	**D**	50 to <60%
A	94 to <97%	**B**	84 to <87%	**C**	66 to <73%	**F**	<50%
A-	90 to <94%	**B-**	80 to <84%	**C-**	60 to <66%		

Exams

Midterm Exams: Two midterm exams will be administered during our normal lecture session, beginning at the start of class. If you are late for an exam, additional time will not be given. Midterm exams will consist of 60 multiple choice questions, to be completed in 80 minutes.

Final Exam: One final exam will be administered during the final exam period on. It will consist of 100 multiple choice questions to be completed in 3 hours. The final is cumulative, with questions on material covered throughout the semester, with a focus on more recent material.

Make-Up Exams: Make-up exams can be administered under the following conditions: (1) scheduled prior to the day of the exam, (2) written proof is provided (e.g. doctor's note, email notice of religious observation, court attendance, intercollegiate athletics) or (3) in an emergency and the instructor is promptly updated. Make-up exams may differ from the original exam.

Online Quizzes

- *Due WEEKLY on Fridays at 11:59 PM, except when a midterm is scheduled.*
- Access & Submission: Quizzes can be accessed starting on Mondays at 7:50 PM (after lecture) under the "Quizzes" tab on Canvas. Students are responsible for accessing quizzes and other online assignments with a stable Internet connection.
- Content: 5 multiple choice questions on material from the previous week of lecture. If taking the quiz on Monday night, you can expect questions on content from the lecture that day and the previous Wednesday. Question and answer pools are randomized, and should be completed independently.
- Grading: Quizzes are graded for accuracy. Your lowest quiz grade will be dropped.

- Purpose: Questions are similar to exam questions, and are used as practice and a predictor for exams. Quiz answers will be released on Saturdays at 12 AM. If you are unhappy with your quiz score, consider bringing your questions to Student Hours or IA office hours.

Discussion Section

Discussion sections will meet weekly on Mondays, 4-4:50 PM over Zoom. These sessions are *highly recommended* and designed to improve your learning of lecture content. During discussion sections, IAs will lead group discussions, presentations, and Discussion Activities (DAs) to facilitate your learning. Log in to discussion sections ready to ask questions, use lecture content, and actively participate. While not mandatory, attending discussion sections will allow you to submit DAs as a group- see below.

Discussion Activities (DAs)

- *Due WEEKLY on Mondays at 11:59 PM.*
- Access & Submission: Released on Monday mornings at 12 AM under the "Assignments" tab on Canvas. DAs are designed as in-class virtual assignments, completed in groups during our organized discussion section.
    - DAs can be submitted as a group if completed at a discussion section.
    - **If you are unable to attend the discussion section, then you can submit the assignment independently by following the instructions on the Canvas assignment.**
- Content: DAs will take a multitude of formats, including problem sets, visual organizers, case studies, and short answer questions about recent lecture content.
- Grading: Graded for completion, not accuracy.
- Purpose: DAs are designed to help you practice using lecture content. Recalling and using information by discussing with classmates, teaching others, and presenting effectively improves learning. You benefit most if you complete DAs

during discussion sections, where you will have opportunities to ask questions, present your work, and request feedback.

Extra Credit Videos

- *Due 5 days prior to exams. The due date is dependent upon the learning outcome your video covers.*
    - *Learning outcomes from lecture 1-5: Due Friday, January 26, 11:59 PM*
    - *Learning outcomes from lecture 6-11: Due Friday, February 23, 11:59 PM*
    - *Learning outcomes from lecture 12-16: Due Friday, March 15, 11:59 PM*
- Access and Submission: A 3-5 minute video on a learning outcome of your choice can be posted to the relevant Discussion tab on Canvas at any time during the quarter, at least 5 days prior to the exam.
- Content: Videos must be about a course learning outcome, and must use a visual organizer to clearly and accurately explain the outcome.
    - Some outcomes are expansive, and do not need to be thoroughly covered in your video, however, clearly low-effort videos will not be accepted.
    - All figures and content presented must be your own. Videos may NOT use images from the textbook, lecture, DA assignments, or other external images.
- Grading: Graded for accuracy, clarity, and effort. No partial credit if any of the above policies are violated.
    - 2% extra credit per video
    - Maximum of 2 videos will be graded
    - Extra credit points will be added to the *final course grade* at the end of the quarter
- Purpose: Creating and presenting visual organizers is a well-established learning method. Videos should help the presenter to practice learning outcomes. Videos will be posted to Canvas, and can be used by fellow students as review/study tools for tricky topics.

Surveys

You may be asked to complete an anonymous survey(s) for additional credit. If you prefer not to participate, an alternate assignment for additional credit will be offered. Additional credit, surveys, and alternate assignments are not guaranteed.

Contacting the Instructor

Email: Email me at imaita@ucsd.edu with "BILD 26" in the subject line and expect a response within 1 business day.

Student Hours: (aka "office hours")

In-person TBD, 8018 HS&S

Virtual TBD Zoom (link on Canvas)

Student hours will be determined by a vote at the start of the quarter, in order to optimize student availability. Student hours are regularly scheduled periods of time for YOU, the student, to come by my office to discuss lecture material, assignments/quizzes/exams, grades, and any other comments or concerns. If you cannot attend the decided upon student hours, please email the instructor to schedule an alternative in-person or virtual meeting time.

VOTE HERE on your Student Hour preferences:
https://forms.gle/ACsoJDkWLeVH5Gnn7

How to Succeed in BILD 26

Other than the obvious (attending lectures, taking notes).

Practice Learning Outcomes: Learning outcomes are achievable goals that can be practiced and assessed. Learning physiology requires more than drilling flashcards. In order to learn mechanisms and complex interactions, I recommend organizing lecture information into comprehensive visual organizers- labeled diagrams, flowcharts, and

tables. Synthesization and visualization facilitate learning! Physiologists are often interested in pathology, so also consider what may go wrong in any given system. For example:

- Create a table CCing endocrine glands and hormones. Then, add a category to your table that predicts the consequences of hyper/hypo secretion of each gland.
- Draw a flowchart SEQing the opening/closing voltage-gated ion channels during an AP. Next, consider if any one step of the AP is blocked by a neurotoxin.

Once you've created your visual organizers using your notes, recreate them! Recall strengthens long-term memory, so practice creating organizers both with *and without* your notes. Creating these organizers requires more cognitive energy *at first*, but results in more complete understanding. Recalling without notes also more closely replicates the exam environment.

Teaching is Learning: Teaching others- or even just pretending to- improves learning outcomes. Once you have created a visual organizer, present it to a classmate, parent, or pet. Make use of discussion sections by talking through mechanisms, asking questions, and quizzing one another with predicted exam questions.

Conduct Gap Analysis: Identifying learning outcomes that you are struggling to achieve is an essential part of learning! Identify gaps in your knowledge and use the resources available to you- discussion sections, student hours, classmates, the textbook. Your instructor/TAs are rooting for your success! Bring up questions and concerns ASAP, so we can do everything in our power to help you succeed.

Course Policies

Plagiarism and Academic Dishonesty: Any violations of academic integrity, according to the UC San Diego policies on academic integrity, will be taken very seriously. Cheating on quizzes and exams will absolutely *not* be tolerated. Violations will be reported to the Academic Integrity (IA) Office.

Disability Services: UC San Diego- including this course and instructor- welcomes students of all abilities. Contact the campus Office for Students with Disabilities (OSD) to be considered for appropriate accommodations. Please provide the instructor with your accommodation letter (AFA) as early in the semester as possible.

OSD Website: https://osd.ucsd.edu/students/registering.html

Inclusivity Statement: I understand and celebrate that students come from a variety of backgrounds and perspectives. I strive to create an inclusive and welcoming classroom environment. To foster this environment, I ask that students maintain a considerate and kind class culture. I encourage students to share their experiences and views, while remaining open and respectful of the experiences and views of others. Disrespectful language and behavior will not be tolerated and may be penalized by reduced grades and/or further intervention.

Health and Well-Being Policy: In accordance with UC San Diego policy at the start of the Fall 2023 semester, masking is optional in the classroom. If you have recently been exposed to COVID or are under the weather, please consider wearing a mask. If you are experiencing COVID symptoms, please do not attend class and take action to prepare alternate learning opportunities (ask a classmate to share their notes, review lectures online, schedule online office hours).

Transfer Students: The Triton Transfer Hub is available to meet transfer students' academic, social, and personal needs. Services include 1:1 involvement and academic success support with professional staff, peer coaching, professional and academic workshops, transfer meetups and more.

Triton Transfer Website: https://transferstudents.ucsd.edu/

Subject to Change Policy: The instructor reserves the right to alter the syllabus (i.e. course schedule) as needed to improve student learning.

Campus Policies

- **UC San Diego Principles of Community**
- **UC San Diego Policy on Integrity of Scholarship**
- **Religious Accommodation**
- **Nondiscrimination and Harassment**
- **UC San Diego Student Conduct Code**

Other Resources:

Learning and Academic Support	
Ask a Librarian: Library Support *Chat or make an appointment with a librarian to focus on your research needs* **Course Reserves, Connecting from Off-Campus and Research Support** *Find supplemental course materials* **First Gen Student Success Coaching Program** *Peer mentor program that provides students with information, resources, and support in meeting their goals* **Office of Academic Support & Instructional Services (OASIS)** *Intellectual and personal development support*	**Writing Hub Services in the Teaching + Learning Commons** *One-on-one online writing tutoring and workshops on key writing topics* **Supplemental Instruction** *Peer-assisted study sessions through the Academic Achievement Hub to improve success in historically challenging courses* **Tutoring - Content** *Drop-in and online tutoring through the Academic Achievement Hub* **Tutoring - Learning Strategies** *Address learning challenges with a metacognitive approach*
Support for Well-being and Inclusion	
Basic Needs at UCSD *Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live is encouraged to contact:* foodpantry@.ucsd.edu | basicneeds@ucsd.edu | (858) 246-2632 **Counseling and Psychological Services** *Confidential counseling and consultations for psychiatric service and mental health programming* **Triton Concern Line** *Report students of concern:* (858) 246-1111 **Office for Students with Disabilities (OSD)** *Supports students with disabilities and accessibility across campus*	**Community and Resource Centers** **Office of Equity, Diversity, and Inclusion** *As part of the Office of Equity, Diversity, and Inclusion the campus community centers provide programs and resources for students and contribute toward the evolution of a socially just campus* (858).822-.3542 | diversity@ucsd.edu **Get Involved** *Student organizations, clubs, service opportunities, and many other ways to connect with others on campus* **Undocumented Student Services** *Programs and services are designed to help students overcome obstacles that arise from their immigration status and support them through personal and academic excellence*

Course Schedule

The class schedule below is subject to change.

Week	Lecture	Day	Topic	Assessment
1	1	Monday, January 8	*Asynchronous Virtual Lecture* Syllabus Biology Basics I: Core Concepts in Physiology and Emergent Properties of Water	**No discussion section** **No DA**
	2	Wednesday, January 10	Biology Basics II: Cells, membranes, and membrane transport	**No quiz**
2		Monday, January 15	*No class- Martin Luther King Jr Day*	**No lecture** **No discussion section** **No DA**
	3	Wednesday, January 17	Neurophysiology I: Membrane potentials and synaptic transmission	**Quiz #1** due Friday, January 19. L1-2: Biology Basics I and II
3	4	Monday, January 22	Neurophysiology II: Central Nervous System	*DA1: APs and Synaptic Transmission* **DAs are due Mondays, 11:59 PM**
	5	Wednesday, January 24	Neurophysiology III: Peripheral Nervous System	**Quiz #2** due Friday, January 26. L3-4: Neurophysiology I and II
4	6	Monday, January 29	Muscle Physiology I: Neuromuscular junction and skeletal muscle	*DA2: Mechanosensation flowchart* **DAs are due Mondays, 11:59 PM**
	EX1	Wednesday, January 31	**Midterm #1**	**No Quiz.**
	Midterm #1 Wednesday, January 31 (in-class): Up to Lecture 5: Peripheral Nervous System			
5	7	Monday, February 5	Muscle Physiology II: Force of skeletal muscle contraction	*DA3: Neuromuscular Junction Diagram* **DAs are due Mondays, 11:59 PM**
	8	Wednesday, February 7	Muscle Physiology III: Smooth and Cardiac Muscle	**Quiz #3** due Friday, February 9. L5-7: Neurophysiology III, Muscle Physiology I and II *Note 3 lectures on this quiz*

Week	Lecture	Day	Topic	Assessment
6	9	Monday, February 12	Cardiac Physiology: The Heart	*DA4: Skeletal Muscle* **DAs are due Mondays, 11:59 PM**
	10	Wednesday, February 14	Endocrine Physiology: Hormones and receptors	**Quiz #4** due Friday, February 16. L8-9: Muscle Physiology III and Cardiac Physiology
7		Monday, February 19	*No class- Presidents' Day*	**No lecture** **No discussion section** **No DA**
	11	Wednesday, February 21	Digestive Physiology I: Digestion	**Quiz #5** due Friday, February 23. L10: Endocrine Physiology
8	12	Monday, February 26	Digestive Physiology II: Nutrition	*DA5: Hormones and Receptors* **DAs are due Mondays, 11:59 PM**
	EX2	Wednesday, February 28	**Midterm #2**	**No quiz**
	Midterm #2 Wednesday, February 28 (in-class): Up to Lecture 11: Digestive Physiology I			
9	13	Monday, March 4	Respiratory Physiology I: The Lungs	*DA6: Nutrition Tables* **DAs are due Mondays, 11:59 PM**
	14	Wednesday, March 6	Renal Physiology: The Kidneys	**Quiz #6** due Friday, March 8. L11-13: Digestive Physiology I and II, Respiratory Physiology I *Note 3 lectures on this quiz*
10	15	Monday, March 11	Reproductive Physiology I: Male Reproductive System	*DA7: Excretion Problem Set* **DAs are due Mondays, 11:59 PM**
	16	Wednesday, March 13	Reproductive Physiology II: Female Reproductive System	**Quiz #7** due Friday, March 15 L14-15: Renal Physiology and Reproductive Physiology I
	Final Exam Friday, March 20, 5-8 PM: Cumulative with emphasis on Lectures 12-16			

BILD 26 Learning Outcomes

See: How to Succeed in BILD 26

APPLY = identify and connect a concept to a real-world example (case study)

CC = compare and contrast components (table)

DESC = describe (short answer/combination of visual organizers)

DIAG = draw, label, and identify components of a graph, diagram, physiological reading (diagram/graph)

SEQ = sequence a series of events that make up a mechanism (flowchart)

Lecture 1. Core Concepts in Physiology

Reading List: Chapters 1 and 2

1. CC, APPLY themes physiology
2. CC, SEQ levels of organization
3. SEQ gene expression
4. CC structure, function, and mechanism
5. SEQ, CC types of feedback loops
6. CC emergent properties of water

Lecture 2. Biology Basics: Cells and Membranes

Reading List: Chapter 3

1. CC cell components
2. CC types of membrane proteins
3. CC, DESC properties of the plasma membrane
4. CC effects of chemical and electrical forces on ion movement across a membrane
5. CC mechanisms of membrane transport

Lecture 3. Nervous System: Action Potential and Synaptic Transmission

Reading List: Chapter 12

1. CC, DIAG neuron structures and functions
2. CC 3 types of neurons
3. CC components of axonal membrane: Na^+/K^+ pump, Na^+ and K^+ voltage-gated ion channels, Na^+ and K^+ leak channels
4. SEQ, DIAG membrane potential, ion channel activity and ion flow during an action potential
5. CC types of conductance
6. SEQ synaptic transmission
7. CC postsynaptic responses

Lecture 4. Nervous System: Central Nervous System

Reading List: Chapters 13 and 14

1. CC CNS and PNS
2. SEQ flow of information in the nervous system
3. CC, DIAG white and gray matter
4. DESC blood brain barrier
5. CC, DIAG structure and functions of forebrain, midbrain, and hindbrain regions
6. CC, DIAG structure and functions of the spinal cord

Lecture 5. Nervous System: Peripheral Nervous System

Reading List: Chapters 15 and 16

1. CC types of sensory receptors
2. SEQ mechanosensation starting with stimulus
3. CC how brain perceives modality, location, intensity, and duration of stimuli
4. CC somatic and autonomic divisions of the PNS
5. CC parasympathetic and sympathetic branches of the ANS
6. CC components of skeletal muscle reflex
7. SEQ withdrawal reflex

Lecture 6. Muscle: Neuromuscular Junction and Skeletal Muscle

Reading List: Chapter 10: 10.1-10.4

1. DIAG, SEQ events at the neuromuscular junction
2. CC thick and thin filaments
3. SEQ excitation-contraction coupling
4. SEQ crossbridge formation and sliding filament theory
5. DESC role of ATP in sliding filament model
6. SEQ muscle contraction starting with somatic motor neuron through the power stroke

Lecture 7. Muscle: Skeletal Muscle Force of Contraction

Reading List: Chapter 10: 10.5-10.8

1. CC relationships between length & tension, summation & contraction, and motor units & contraction force
2. CC slow-twitch muscles and 2 types of fast-twitch muscles
3. CC sources of energy for skeletal muscles

Lecture 8. Endocrine System: Hormones and Receptors

Reading List: Chapter 18

4. CC 3 hormone types
5. SEQ synthesis, storage, transport in blood, cell mechanism of action for steroid and peptide hormones
6. APPLY feedback loops to hormone action
7. CC, SEQ hormone actions
8. CC, SEQ negative feedback in simple and complex endocrine reflexes
9. CC 3 types of hormone interactions

Lecture 9. Muscle: Smooth and Cardiac Muscle

Reading List: Chapter 10.9-10.10,

1. DIAG, SEQ events at the neuroeffector junction
2. CC types of cell-cell communication in smooth and cardiac muscle
3. CC, SEQ contraction in smooth and cardiac muscle
4. CC skeletal, smooth and cardiac muscle anatomy and contraction

Lecture 10. Cardiac Physiology: The Heart

Reading List: Chapter 10.9

1. CC chambers of the heart and valves
2. SEQ, DIAG blood flow through the heart
3. CC components of the intrinsic conduction system
4. SEQ electrical conduction in the heart
5. SEQ cardiac cycle

Lecture 11. Digestive System: Digestion

Reading List: Chapter 24

1. CC compartments of the digestive system
2. SEQ, CC stages of digestion
3. CC digestion of specific nutrients
4. SEQ, CC absorption of specific nutrients

Lecture 12. Digestive System: Nutrition

Reading List: Chapter 24 and 25

1. CC nutrients used by the body
2. DESC metabolic rate
3. SEQ regulation of appetite

Lecture 13. Respiratory System

Reading List: Chapter 23

1. CC, SEQ internal and external respiration
2. DIAG, CC components of the respiratory system

Lecture 14. Urinary System

Reading List: Chapter 26

1. CC components of the urinary system
2. CC types of nitrogenous wastes
3. CC, DIAG functional components of the nephron

4. CC functions, process, location of filtration, reabsorption, secretion, excretion
5. CC, APPLY effects of renal handling on clearance
6. SEQ integrated regulation of osmolarity and ion concentration
7. SEQ control of urination

Lecture 15. Reproductive System: Male

Reading: Chapter 28.1-28.3

1. CC, DIAG components of male reproductive system
2. SEQ mitosis and meiosis
3. SEQ spermatogenesis

Lecture 16. Reproductive System: Female

Reading: Chapter 28.1-28.3

4. CC, DIAG components of female reproductive system
5. SEQ oogenesis
6. SEQ menstrual cycle