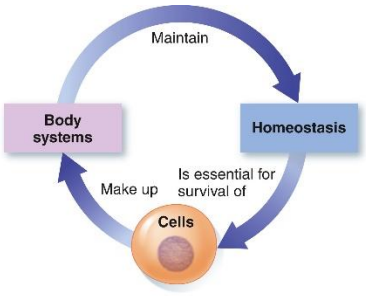
Syllabus for Biology 351: Principles of Anatomy & Physiology I

Overview

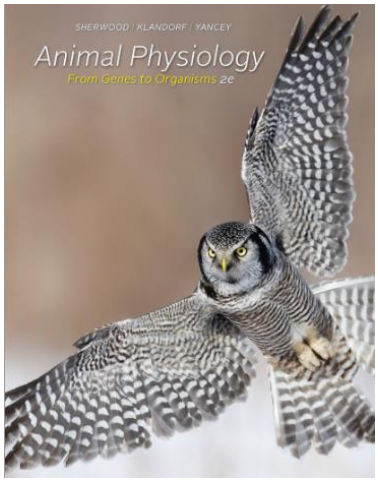
BBio 351 is one half of UW-Bothell's two-quarter series in comparative animal anatomy and physiology. BBio 351 focuses on the nervous, sensory, endocrine, and reproductive systems, while BBio 352 focuses on other organ systems (skeletal, muscular, digestive, urinary, cardiovascular, and respiratory). BBio 351 and 352 are appropriate for students who intend to work in health sciences-related fields and will include some clinical examples; however, these courses have a strong **comparative** theme, meaning that we will examine structures and functions of diverse animals, rather than restricting ourselves to humans. It may seem paradoxical that our understanding of *human* physiology can be deepened by studying other species, but it's true!



Above: Figure 1-6 from your textbook.

Basic requirements

- Prerequisite: Biology 220.
- Lectures: Tuesdays and Thursdays, 8:30-11:00am, UW1 040.
- Labs: Tuesdays or Thursdays 12:00-3:00pm, Discovery Hall 267.
- Textbook: *Animal Physiology: From Genes to Organisms* by Sherwood, Klandorf, and Yancey. You should have access to a hard copy and/or an online version ("e-book"). The 2nd edition (2013) is the current and best version of this textbook. My materials will refer to 2nd-edition figures, page numbers, and questions.
- Consistent access to the Internet and a printer.



Website and contact information

How I will reach you outside of class: I will post ALL important course information (assignments, announcements, grades, etc.) to the course website in Canvas: https://canvas.uw.edu/courses/1563847. I encourage you to check Canvas daily and/or adjust your alerts so that you are notified of all new posts. I will also send messages to individuals via email or Canvas's messaging system.

How you can reach me outside of class: In general, the best ways to reach me are via email (crowther@uw.edu) and/or via Canvas messages/comments.

Learning Outcomes

During this course, your knowledge and skills will progress as follows:

- Develop critical thinking skills and be able to apply physiological concepts and principles at the basic and applied levels.

- Develop a working knowledge of the major physiological systems and be able to associate anatomical areas with their specific function.
- Develop an understanding of the role of evolutionary processes (e.g. natural selection) in driving the organization of physiological systems.
- Understand important physiological challenges animals face, how those challenges vary in relation to the animals' environment, and the processes by which animals deal with these challenges.
- Identify and describe structural differences of major physiological systems that characterize different taxonomic groups of animals.

Schedule

I will do my best to stick to the schedule below, especially regarding test dates. Relevant pages of the textbook (2nd edition) are listed in parentheses.

Week: Dates	**Tuesday lecture**	**Thursday lecture**	**Lab (Tuesday or Thursday)**
1: June 21/23	*Live-stream via zoom:* intro, core concepts, homeostasis (pp.1-23)	*Asynchronous/at-home:* animal evolution (Freeman, 30.1-30.2); cell membranes, cell-cell communication (pp. 70-81, 91-100)	*Asynchronous/at-home:* Lab 1: dinosaur thermoregulation
2: June 28/30	Neuro: neurons, ion channels, potentials (pp. 111-129)	Neuro: synapses, circuits (pp. 129-146)	Lab 2: Neurohistology & *Hydra* Behavior
3: July 5/7	Neuro: evolution (pp. 148-156); article 1	**Test 1**	Lab 3: Invert Neuroanatomy
4: July 12/14	Neuro: autonomic NS, CNS, learning, memory (pp. 156-166, 174-183, 194-203); article 2	Sensory: intro, receptors (pp. 208-233, 239-258)	Lab 4: Vertebrate Neuroanatomy
5: July 19/21	Sensory: pathways, reflexes, blood homeostasis (pp. 180-182, 448-455, 546-553), article 3	**Test 2**	Lab 5: Sensory Systems & Journal Club Check-In
6: July 26/28	Endocrine: intro, hypothalamic-pituitary axis (pp. 268-291)	Endocrine: thyroid gland (pp. 297-304, 717-724, 740-750); **Test 1/2 makeup (optional)**	Lab 6: Vertebrate Endo/Repro Histology
7: Aug. 2/4	Endocrine: adrenal gland, fuel metabolism (pp. 304-323), article 4	**Test 3**	Lab 7: Vertebrate Endo/Repro Dissection
8: Aug. 9/11	Endocrine: BP control; Reproductive: intro, genetics (pp. 628-636, 757-770)	Reproductive: testosterone, sex verification testing, female cycles (pp. 770-799)	Lab 8: Journal Club Presentations; **Test 3 makeup (optional)**
9: Aug. 16/18	Reproductive: fertilization through lactation (pp. 799-815); article 5	**Test 4**	no lab

Articles 1 through 5 will be chosen from the options below according to student voting.

Article # (Week #/Topic)	**Article options**
Article 1 (week 3/neuro)	• GABAergic anxiolytic drug in water increases migration behaviour in salmon (Hellstrom et al. 2016) • Transcriptomic and morphophysiological evidence for a specialized human cortical GABAergic cell type (Boldog et al. 2018)
Article 2 (week 4/neuro)	• Birds have primate-like numbers of neurons in the forebrain (Olkowicz et al. 2016) • Inhibition protects acquired song segments during vocal learning in zebra finches (Vallentin et al. 2016) • A cortex-like canonical circuit in the avian forebrain (Stacho et al. 2020)
Article 3 (week 5/sensory)	• Subretinal electronic chips allow blind patients to read letters and combine them to words (Zrenner et al. 2011) • Parallel Neural Pathways Mediate CO_2 Avoidance Responses in *Drosophila* (Lin et al. 2013) • Evolution of sweet taste perception in hummingbirds by transformation of the ancestral umami receptor (Baldwin et al. 2014)
Article 4 (week 7/endocrine)	• Glucocorticoid-sensitive hippocampal neurons are involved in terminating the adrenocortical stress response (Sapolsky et al. 1984) • Association between mutations in a thyroid hormone transporter and severe X-linked psychomotor retardation (Friesema et al. 2004)
Article 5 (week 9/reproductive)	• Nitric Oxide and the Control of Firefly Flashing (Trimmer et al. 2001) • MiR-200b and miR-429 Function in Mouse Ovulation and Are Essential for Female Fertility (Hasuwa et al. 2013) • Drinking alcohol has sex-dependent effects on pair bond formation in prairie voles (Anacker et al. 2014) • A Critical Period of Sleep for Development of Courtship Circuitry and Behavior in *Drosophila* (Kayser et al. 2014)

Instructor and office hours

I, Greg Crowther, am excited to be your tour guide on this journey through the world of animal anatomy and physiology. I am fascinated by this material both as a biologist and as a former long-distance runner. (My Ph.D. research was on energy metabolism in exercising human leg muscles.) Much more information about me is available via my faculty website, https://faculty.washington.edu/crowther/. You should address me as "Professor Crowther" or "Dr. Crowther" or "Dr. C."

My office hours will be Tuesdays and Thursdays from 11:05am to 12 noon (i.e., between lecture and lab) in or next to the lab room (Discovery 267), and by appointment. I will also hold online group office hours in my zoom room (room ID: 968 469 2123) the night before each exam from 9:00pm to 10:00pm. Come and ask your last-minute questions and/or just listen to others ask theirs!

Disability accommodations

UW-Bothell provides a supportive environment for all students, including students with disabilities. If you have a disability that affects your performance in the class, or if you think you might, please contact Disability Resources for Students.

Inclement weather, emergencies, and suspension of classes

Bad weather or other problems occasionally force the campus to close. Updates on such situations are available via UW-Bothell's home page and its information line (425-352-3333). You may also sign up for text messages via the UW Alert system.

Use of live and preserved animals in the laboratory

For hundreds of years, our understanding of animal anatomy and physiology has advanced from the use of animals in dissections and experiments. Likewise, the laboratory component of this course includes live and preserved animal specimens (crayfish, squid, shark, etc.). All students are expected to participate in all of these exercises. If you have concerns about this, please talk with me as soon as possible.

Assignments and grades

Your final grade in this course will be calculated approximately as follows.

4 exams (125 points each)	500 points
21 pre-lecture/pre-lab/pre-test assignments (3 points each; lowest 2 dropped)	69 points
9 lecture/lab worksheets (10 points each; lowest dropped)	80 points
Journal club presentation	40 points
6 lab check-ins (5 points each; lowest dropped)	25 points
Approximate total	**714 points**

99% → 4.0	89% → 3.4	79% → 2.4	69% → 1.4
98% → 4.0	88% → 3.3	78% → 2.3	68% → 1.3
97% → 4.0	87% → 3.2	77% → 2.2	67% → 1.2
96% → 4.0	86% → 3.1	76% → 2.1	66% → 1.1
95% → 4.0	85% → 3.0	75% → 2.0	65% → 1.0
94% → 3.9	84% → 2.9	74% → 1.9	64% → 0.9
93% → 3.8	83% → 2.8	73% → 1.8	63% → 0.8
92% → 3.7	82% → 2.7	72% → 1.7	62% → 0.7
91% → 3.6	81% → 2.6	71% → 1.6	61% → 0.7
90% → 3.5	80% → 2.5	70% → 1.5	60% → 0.7

In general, assignments will NOT be graded on a curve. If a particular assignment turns out to be unusually hard, I reserve the right to adjust the scores upward. I will never adjust scores downward.

In general, tests can only be made up on designated makeup days after being missed. If you have circumstances that prevent you from taking a test AND prevent you from making it up on the designated day, please get ahold of me as soon as possible.

If you cannot attend your usual lab section for a given week, please let me know that you will be coming to the other lab section that week. If you cannot attend either lab section during a particular week, please contact me as soon as possible to discuss your options.

Late work

Deadlines help keep you moving through this fast-paced course! To help you stay on track, I do enforce assignment deadlines. Late assignments are accepted for half credit (e.g., 2 points for a 4-point assignment) up until the test to which that assignment applies, after which time no credit is available. (Thus, no credit will be given for work submitted after the final exam.) My exceptions to this policy are:

- Assignments due during the first week of class – i.e., while you are learning how to turn in which assignments – will be accepted late without penalty.
- Late penalties will also be waived if you have a reasonable excuse that you post as a comment on the assignment as listed in Canvas (example below). Posting excuses as Canvas comments on the corresponding assignments ensures that I see the excuse when I am grading the assignment. Reasonable excuses include personal and family/close-friend illnesses and emergencies. In general, you do not need to disclose sensitive personal details, but I reserve the right to request documentation of exceptional circumstances.

An assignment you have not turned in may be given a score of 0 shortly after the due date. This should not discourage you from submitting the assignment late for partial credit (or full credit with a valid excuse), but should serve as a reminder that you will get a 0 unless you turn something in.

Collaboration, attribution, and academic honesty

For tests, working with other students is NOT allowed (unless stated otherwise). For all other assignments, working together IS allowed (unless stated otherwise).

If you use a source other than the instructor or textbook – a website, classmate, library book, etc. – you need cite that source. This includes images "borrowed" from the Internet! If you have any questions about appropriate attribution, please ask me.

Religious accommodations and other school-wide policies

UW has a policy for accommodating student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy. Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form.

The UWB School of STEM maintains a file of common course policies.

Tips for success

- *Show up for everything*. While it's possible to learn material without coming to class, it's much harder that way! Give yourself the benefit of multiple passes through the material by studying at home AND coming to all lectures and labs.

- *Actively participate in everything.* Do all homework assignments, not just because you get points for them but because they are good preparation for lectures, quizzes, and tests. Take notes in class. Ask questions when you are confused. Ask questions when you are NOT confused but want to know more. Answer questions, even if you have to guess. Don't let your lab partner do all the fun stuff. Take charge of your education!

- *Read over your notes soon after each session and "clean them up," clarifying any confusing points.* That way, when you return to these notes when studying for a quiz or exam, you won't have to do a lot of last-minute deciphering. (This simple strategy helped me a LOT as an undergraduate.)

- *Get help when you're <u>starting</u> to struggle, not after weeks of confusion.* Let's try to solve small problems before they become big problems. Office hours and lab sessions are especially good times to check in with me.

- *Work together.* This can be done both online (via Canvas Discussion posts and Chats) and in person. Form study groups and help each other out! Just be sure that your submitted work reflects your own understanding and cites sources appropriately (see above).

- *Practice metacognition.* Metacognition means "thinking about how you think." Try to figure out which approaches to the material work best for you. For example, with reading assignments, should you plow straight through the text from beginning to end, look first at subject headers and vocabulary words before going back to fill in the details, focus on the figures, or adopt some other method? In class, should you take tons of notes and sort through them later, or listen more and write less? Different styles may work best for different students!

- *Respect each other and me.* Respectful behavior includes: listening carefully when spoken to; giving others the space to think and to ask and answer questions; refraining from harsh or persistent criticism; avoiding language, attire, or movements that are likely to annoy or distract others; restricting conversations to those relevant to the course material; maintaining control over one's emotions; and giving me adequate time to respond to requests.