



Muscle Physiology

CRN: 80934

4 Credits

Professor:	Courtney Jensen, Ph.D.
Graduate Assistants:	Cameron Williams & Toni Sampson
Class Location:	Main Gym, room 118
Class Days:	Monday, Wednesday, Friday
Class Times:	2:00pm – 3:15pm in MG 118
Lab Location:	Main Gym, rooms 116-118
Lab Days/Times:	Thursday at 7am, 8am, or 9am
Office Location:	Main Gym, office suite upstairs
Office Hours:	<i>TS:</i> Monday: 10:00am to 11:00am <i>CJ:</i> Wednesday: 3:15pm to 5:15pm <i>CW:</i> Thursday: 10:00am to 11:00am



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1. Structure of the Course

This is a unique semester. Full of challenges. That's bad. Horrible, really. But it can also be a great opportunity. If you confront those challenges accordingly. For example, Newton developed calculus while in quarantine from the plague. According to Dorsey Armstrong's "The Black Death" *Great Courses* series, that unprecedented catastrophe is what thrust our ancestors into the Renaissance. Lastly, a more modern (and recently legalized) example: according to Michael Pollan (not a scientist, but a renowned journalist), it was the illegality of cannabis that revolutionized its cultivation. Farmers were forced to manipulate nature in basement experiments, deprived of nourishing sunlight; they explored genetic diversity and novel growth techniques, ultimately providing the world its current abundance of "strains."

Innumerable challenges await you this semester. If you take advantage of them, it may be the most valuable period of your education, the time of greatest personal and professional growth. If you simply succumb to those challenges, however, it is likely to be an unrewarding phase of stagnancy. Your growth as a student is your choice.

Let's move on. **Next topic: the structure of HESP 147.**

You can take this course in one of two ways: **1)** At home, from your kitchen (or sofa or bed), or **2)** In class. Which option you choose is entirely up to you. Neither is better than the other; it's just a matter of preference. And you don't need to stick with your choice once chosen. You can come to some classes live and watch the other lectures from home. I do not grade on attendance or participation; I grade on learning. The learning *environment* is up to you. "I'll go to live class on Mondays, but do digital on Wednesdays and Fridays." Totally fine. But:

Policy on live-class attendance: You must be fully vaccinated. No exceptions. Underlining that two-word sentence was meant to imply a "whatsoever" or "or else" as a silent chaser. You can only attend class if you are fully vaccinated. Let me get personal (and then I'll explain the impersonal reasons): my pulmonologist instructed me not to teach live. And submitted the corresponding paperwork to Human Resources. I have a compromised immune system and pulmonary risk factors, and will likely die if infected with covid. I should not be teaching live. A number of other people (including some of your peers) are at a similar risk. Under no circumstances will I permit our classroom to be the cause of anyone's death. But... I have decided to offer a live opportunity for the most responsible students. Responsibility means full vaccination *and* masks. Distancing and ventilation are not optimal. Safety is up to us. It's up to individuals. Regarding masks, they must be worn at all times. And worn correctly. Wearing a mask that covers a chin and part of a mouth, even briefly, means you can't attend class. If you're in a public space and not wearing pants correctly – even briefly – the police will cite you with indecent exposure. In California, that's a 10-year sex offender registration. Please, please, please: take masks just as seriously. Because spreading infections can kill (approximately 4½ million people have died so far, making it an extremely dangerous form of indecent exposure).

Personal explanation over. Impersonal explanation: Misinformation is the only reason not to take covid seriously (remember: I also teach epidemiology). We're in the health field. For any of us to pretend covid is "just a flu" (or some such dismissal) is equivalent to being a geologist who believes the earth is flat. Blatant distortions of truth abound in every discipline.

We do not have the luxury of subscribing to dangerous misconceptions in our own field. The truth presents challenges. But it's important that we continue to respect sound science and act as ethically as we can (given the information we have). At times, this may be difficult. Definitely inconvenient. And probably depressing. But *make believe* (i.e., "covid isn't that big of a deal") is not a solution. It is, rather, a form of violence. If a confused geologist asserts that the world is flat, the lives of vulnerable round-earthers are not threatened. Hospitals do not fill with victims. We are living in a delicate and divisive time; it is up to us, as individuals, to be citizens of science and morality. It's not easy.

Summary: Live, in-class lectures are available to students who are fully vaccinated and wearing masks as effectively as they wear their pants. And a digital, at-home format is available to everybody.

"What do the at-home digital lectures look like?"

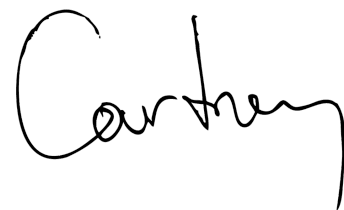
Type this:  courtneyjensen.com/musclephysiology.html 

Or click on this one: <https://courtneyjensen.com/musclephysiology.html>

Either type that address into your browser or simply click the blue link. You'll be taken to a page with 38 pre-recorded lecture videos, multiple sets of student notes corresponding to every one of those lectures, and 14 office hour recordings where previous students have asked questions about the content. It's everything anyone could possibly need (and more) to score 100% on every exam. I will not ask a single question on any exam that isn't fully explained in those files (often, but not always, word-for-word).

Lastly: Take advantage of the resources you have. It's not an easy class. It's definitely not "introductory" in its depth (excepting the first few weeks, in which we polish up the general foundation of exercise physiology). If you rely on the online option, do not wait until the week of the exam to start watching lectures and learning the material. I can't stress that enough. So I won't even try. Just know that, in this class, procrastination is pretty destructive to one's performance. And perendination devastates it completely. The average course grade for all students over the last 6 years is approximately 78%. I say that only to offer information upon which you can set your expectations.

Post-lastly: I shared a small part of my medical difficulties (above) in part to invite openness and honesty. Please know that I am ready to seek solutions (or at least gush empathy in your direction) if covid-related circumstances arise. If you or a family member is currently suffering, and there is something I can do to help, I will try. We cope together. As a class. And as a community. Without honesty, respect, and solidarity, everything is harder.



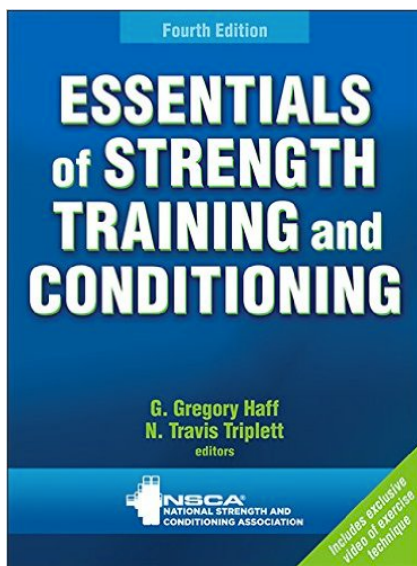
2. Purpose of the Course

Catalog description: HESP 147. Muscle Physiology. 4 Units. This course is focused on skeletal muscle physiology. Topics include the structure and function of muscle tissue, protein synthesis, cell signaling cascades, the specificity of adaptation, enzymes and their roles in metabolism, endocrine function, anabolic steroids, muscle damage, inflammatory physiology, neuromuscular principles (e.g., size principle), and the mechanisms of muscle fatigue. Laboratory assignments focus on skeletal muscle testing and evaluation. Prerequisite: HESP 129 and upper-division class standing. Lab fee required.

HESP 147 is designed for Health, Exercise, and Sport Science majors who have already taken its prerequisite (HESP 129). Coming into this class, all students should have an understanding of the fundamentals of exercise physiology. Throughout this semester, we'll build on that foundation. What was presented in the previous semesters gave you a set of exposures; in this semester we'll cover those topics (and others) in more detail. You should enter this course with a grasp on these phenomena, and you should leave with something close to expertise.

There are labs and laboratory assignments. The purpose of the laboratory assignments is to give you more practical experience with the physiological principles we discuss during the class periods, showing you how they can be applied in real world settings. At the end of the course, you should be able to design a custom workout for anyone (and for any set of goals) that is physiologically sound. And you should be able to explain it.

3. Required Materials



Nothing is required, but if you plan on doing the CSCS cert after graduation, then this is your book.

Haff GG & Triplett NT. (November, 2015). *Essentials of Strength Training and Conditioning*. Human Kinetics, Champaign, IL, USA.

Some portions are available on Google Books:

https://books.google.com/books/about/Essentials_of_Strength_Training_and_Cond.html?id=bfuXCgAAQBAJ

All materials that are actually *required* (including lab content) will be available through the class website on Canvas.



Students are required to use the Canvas website (<https://pacific.instructure.com/>). Most importantly, all exams will be held on Canvas. Second most importantly, announcements will be made there. Third most importantly, some course files will be posted there. So if you're not familiar with Canvas, it's a good idea to do some familiarizing.

5. Exams, Assignments, and Other Points

HESP 147 is divided into 4 blocks. At the end of each block is an exam (3 “midterms”; 1 final). All 4 exams are worth the same number of points. The first 3 cover only material taught during that block; the final is comprehensive. And then there are some laboratory reports.

The breakdown of all points is as follows:

Exams. 4 exams (3 + final exam) at 100 points each. *400 points*

Laboratory Reports. 7 labs, 5 reports at 20 points each. *100 points*

The final exam (100 points) will require the assimilation of material you’ve learned during the entire semester. All questions will ask you to design an appropriate workout for an individual who has specific goals and specific mechanical or physiological requirements.

There are opportunities for extra credit. They will be posted as announcements in Canvas. And every exam has some extra credit questions at the end. Aside from this, there is no way to inflate a grade. For example, if you score poorly on an exam, you can’t retake it or do some sort of make-up assignment to earn back lost points. Nothing like that. You have to score well on the exams if you want to score well in the class. But there will be a few chances at earning extra credit.

6. Grading Scale

Final grades are determined by calculating accumulated points from all tests, quizzes, reports, and assignments and dividing that number by the total points possible (600).

Re “no” opportunity. Every exam has a few extra credit questions at the end. So you can score some bonus points. But there’s no extracurricular extra credit. So you can’t do badly on an exam and then make up for it by writing a paper or attending an event. That’s what I mean by “no” opportunities.

I’m not going to round your grade up when the semester is over no matter how close you are to the cutoff. Your exact points determine your grade (449 is a B+ just as 400 is a B-). Think how absurd it would be the other way around: “Well, technically you got a B-, but you were so close to the C+ cutoff that I’m just going to go ahead and round you down.” I’ll be generous along the way, so you will experience some rounding during the semester. Additional rounding after the semester would just be academic welfare. You don’t need it.

Letter Grade	Points	Percent
Yay!	465+	93%
A-	450–464	90%
B+	435–449	87%
B	415–434	83%
B-	400–414	80%
C+	385–399	77%
C	365–384	73%
C-	350–364	70%
D+	335–349	67%
D	300–334	60%
Sorry.	0–299	<60%

I grade the exams. Your graduate assistant grades your lab reports. “Courtney, I have a complaint about my lab grade!” or whatever. Okay. Take it up with your G.A. Likewise, if you have a complaint about your cell phone bill, I’m unlikely to be your go-to guy.

7. Grade Indicator

- A, A- Quality of work indicates full mastery of the subject; a solid A (no minus) signifies extraordinary distinction (and is difficult to accomplish).
- B+, B, B- Work indicates good comprehension of the course material. You can explain things like mTOR, size principle, and the inflammatory cascade. And you spent the semester demonstrating that ability on assignments, labs, and exams.
- C+, C, C- Earned by work that demonstrates satisfactory comprehension of the course material; student has met the basic requirements for completing assigned work and participating in class activities.
- D+, D, D- Work is not fully satisfactory but the student participated enough in the class activities and has enough of a command of muscle physiology to be (minimally) worthy of course credit toward a degree.
- F Quality of work is not satisfactory and is unworthy of course credit.

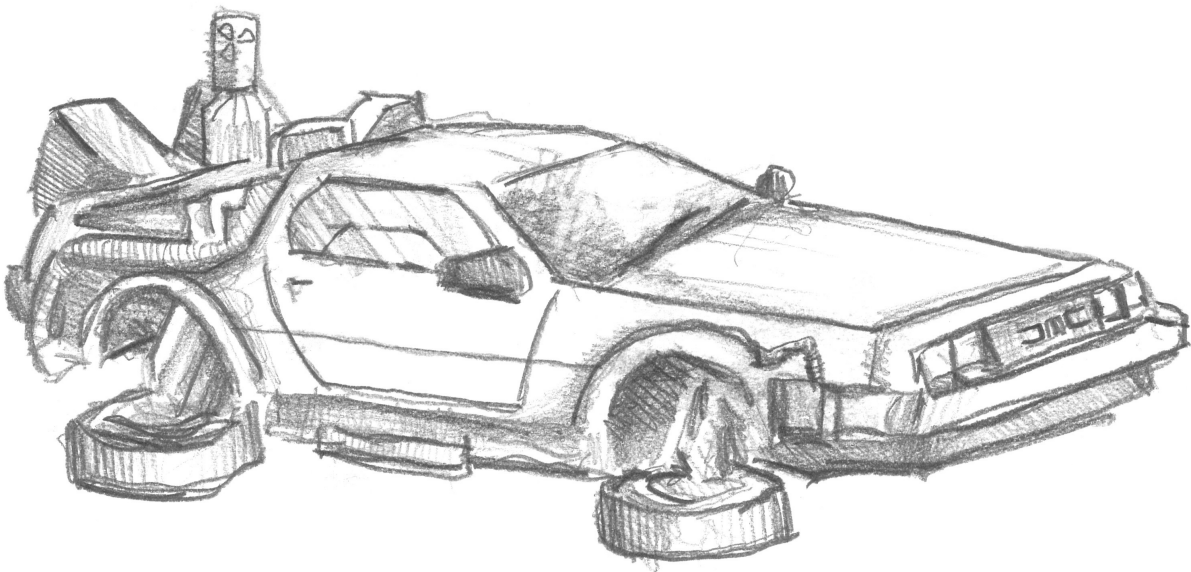
8. End of the Semester Inflation Requests

Student:

“We’ve reached the end of the semester and I seem to have finished in the B+ zone. Is there anything I can do to bump my grade up to an A- or an A?”

Professor:

“You could invent a time machine, go back a few months, study harder, and get better grades on the exams.”



9. Contesting Exam Scores

Sometimes students will take an exam, do poorly, feel appropriately disappointed, and then decide that it's someone else's fault. It's the fault of the writer or the grader of the test. Anyone but themselves. "I *did* study enough; it's the *questions* that were bad!" Or whatever. Once in a while, the student's accusation is correct. And it's important that they receive the score they deserve. It's also important that the writer or grader of the test be made aware of his or her mistake to avoid repeating it in the future. So I *do* want students to feel invited to have this discussion. But I also want students to be aware that, in the thousand or so conversations I've had about "bad questions," there have only been three or four instances in which non-student factors could reasonably be blamed. During the other 990-something instances, the conversation went something like this:

Student: "I think I deserve more points than I got on question 14."

Professor: "Maybe. Let's see what you wrote." [*Reads answer.*] "Okay, you missed the main principle, the thing we discussed most in class. You never mentioned it a single time. And this part over here – this entire page of illegible scribbling – is just false. I'm not sure where you even got that idea; it's six paragraphs of straight fiction. It seems pretty charitable of me to have given you partial credit for something you obviously answered incorrectly. How many points would *you* have assigned to this very incomplete and partially false answer?"

Student: "Maybe an extra point or two?"

Professor: "Really? You'd give an incorrect answer 90%? How many points would you give an NBA player for a missed free throw? 0.8 if it hits the backboard, 0.9 if it hits the rim? If we're being honest, your answer didn't even hit the rim. Do you really think 90% is fair?"

Student: "Well the question was phrased in a confusing way."

Professor: "All right, maybe. Let's take a look." [*Analyzes overall class grade on question 14.*] "Looks like it wasn't confusing; 86% of the students answered it correctly. I'm analyzing the stats right now and this particular question is about 10% less challenging than the *mean* question. So, mathematically, you're incorrect: this was not a matter of professorial trickery."

Student: "But I understood this material. I can explain it to you."

Professor: "That might be true. But you didn't explain it on the test. I'm sure other students could correctly explain incorrect answers to me after the fact as well. What you're asking me to do here is give you special treatment. Let's say there are ten other students who are capable of this. You want me to give extra points to you, but deny the other nine? Let's go back to our basketball analogy: if you can't hit your free throws during the game, nobody cares if you can hit them *after* the game. It's over; your team already lost. In life, you need to produce when it matters, not *after* it matters. If you get used to that now, you'll be much more successful in life. Trust me, I'm on your team; I want you to win. This is how you do it."

I don't say this as an effort to discourage conversation; rather, to *encourage* self-reflection. None of us can improve in anything if we can't appraise ourselves honestly. We must be able to see our own mistakes and shortcomings if we hope to address them in a productive way. Me too. I live in a state of constant self-scrutiny. It's the only way I know how to improve.

10. Student Responsibilities

- Attendance is not mandatory. You can do this class live or online. But, no matter which option you choose, consistency is key. Do not fall behind. Every semester, a student tries to pass without attending (or otherwise viewing) the lectures. Every semester, this student finishes with a lot of regret. 80% of your grade comes from the exams, and more than 80% of the exam content comes from the lectures. And it's *way* too much information to cram. So if you want to do well in this class, *do not fall behind*.
- Timeliness. If you do come to class, show up on time. Only because it annoys everyone when class is underway and a late-waker wanders in with a clunky gait, trying to find a chair. "Can I squeeze in behind you?", after identifying an open spot three seats in. Everyone I've ever met whose presence was a disruptive one didn't make it very far in life. Way better success rate among the punctual folks. If you do the digital option, you can show up and leave whenever you feel like it. Pause it as you please. Be as loud as you want. But if you're coming to the live lecture, be timely about it.
- Due dates. This applies to exams and labs. And they're not negotiable. Anything missed owing to an unexcused absence cannot be made up.
- If you become aware of a scheduling conflict (an *important* conflict) that precludes your presence at a lab or exam, it can be rescheduled if you notify me (or your G.A. if it's a lab) at least 24 hours prior. If I receive an email from you mid-exam ("hey sorry something came up can I take the test tomorrow?"), you will receive a zero.
- Emergencies. I understand these, and experience them myself. In the case of an emergency, you don't need to contact me in advance. Just attend to your situation and notify me when you can. But be prepared to provide documentation. Evidence of some believable variety. We'll figure out a solution and your grade won't be affected; there's no reason to worry. However, if your definition of "emergency" is not compatible with my definition (e.g., "my pet looked so sad this morning; I couldn't leave him home all by his lonesome"), then you probably do have reason to worry.
- All students must abide by the University of the Pacific's policy regarding academic honesty (page 14 of Tiger Lore Student Handbook) and the University Honor Code:

The Honor Code at the University of the Pacific calls upon each student to exhibit a high degree of maturity, responsibility, and personal integrity. Students are expected to:

- 1) Act honestly in all matters
- 2) Actively encourage academic integrity
- 3) Discourage any form of cheating or dishonesty by others
- 4) Inform the instructor and appropriate university administrator if she or he has a reasonable and good faith belief and substantial evidence that a violation of the Academic Honesty Policy has occurred.

Violations will be referred to and investigated by the Office of Student Conduct and Community Standards. If a student is found responsible, it will be documented as part of his or her permanent academic record. A student may receive a range of penalties, including failure of an assignment, failure of the course, suspension, or dismissal from the University. The Academic Honesty Policy is available at: <http://www.pacific.edu/Campus-Life/Safety-and-Conduct/Student-Conduct/Tiger-Lore-Student-Handbook.html>

11. Students with Disabilities

Students with learning disabilities who feel they may benefit from support services and/or accommodations during exams or lectures should contact *The Office of Services for Students with Disabilities*.

- Location: First floor of the McCaffrey Center, rooms 115 and 137
- Phone: (209) 946-3221
- Email: ssd@pacific.edu
- Online: www.pacific.edu/disabilities

The “SSD Office” offers a variety of services for students with disabilities. Accommodations cannot be made unless you have registered with them first. To begin registering, contact the SSD Director for information on how to obtain an Accommodations Request Letter.

3-Step Accommodation Process:

1. Meet with SSD Director, provide documentation, and complete registration forms
2. Request accommodation(s) by completing the Request for Accommodations Form
3. Arrange to meet with professors to discuss accommodation(s) and sign the Accommodation Request Letter

To ensure timeliness of services, initiate this process early. The wait time may be as long as 1–2 weeks or as short as 1–2 days. After the instructor receives the accommodation letter, please schedule a meeting with the instructor during office hours or some other mutually convenient time to arrange the accommodation(s).

12. Professor’s (i.e., My) Responsibilities

1. Online postings: I will maintain a presence on Canvas. There, you will find your syllabus, additional readings, and all announcements. The online lectures (and all corresponding materials) will be available at <https://courtneyjensen.com/musclephysiology.html>

2. Office hours: I will be in my office during the hours stated on the first page. If those hours do not work for you, you can also make appointments to see me at a time that is more convenient. Don’t expect me to be in available 24 hours a day though. Because I’m a person.

3. Phone and email responses: I will be punctual with response times whenever possible. If you have a lot of questions or your questions would require a lot of typing, I may ask that you call or visit me during office hours.

4. Returning student work: The GAs and I will return materials in a timely manner to allow you to benefit from the feedback given, and hopefully improve your subsequent score.

5. Changes to class schedule: I reserve the right to change the class schedule as required. In the event that this happens, I will post all changes on Canvas. I don’t expect this to happen, but should something necessitate it, I’ll do my best to minimize its inconvenience while informing everyone as quickly as possible.

6. Preferred pronouns: I tend to call people by their names. Excepting words like “they” and “somebody” (and those that involve me, e.g., I and mine), I’m not very pronouny in my speech. But if you have a pronoun that would not be obvious to me (or feel like sharing your obvious pronouns), please, please do so. Let me know at any time and I will, of course, respect and honor it. I may not have time to discuss exam grades in detail or respond to administrative questions (or whatever), but being polite and fostering an inclusive learning environment that feels safe and dignified doesn’t take time. I’m not Dolores Umbridge. Every day, I receive about 15 hours of requests beyond what any human is capable of doing, but addressing people as they wish to be addressed takes 5 seconds.



13. Course Objectives and Outcomes

Lecture Objectives:

1. Learn about ATP hydrolysis (the generation/release of energy) and its relationship to muscle fatigue and the “burning” sensation. Learn the cellular mechanisms of fatigue. Review the structure and function of skeletal muscle, and how sliding filament theory works. Understand how ATP hydrolysis relates to cross-bridge activity; what impedes cross-bridge formation and what promotes it? This begins with the neural activation of the muscle and ends with calcium’s *return* to the sarcoplasmic reticulum. Understand each step along the way, and no matter what the biological stress is, be able to identify the likely culprits (both central and cellular).
2. Understand the neural laws governing muscle recruitment. Beyond the mere generation of an action potential, understand orderly recruitment of fiber types and the implications and applications of size principle.
3. Learn the stages of healing, from the initial injury to the remodeling of the tissue’s definitive matrix. Understand the role and the timeline of inflammation in the healing process.
4. Discover how protein synthesis works. What promotes it, what inhibits it, and what are the cellular mechanisms underlying its action? How does signal transduction promote the therapeutic repair and remodeling of tissues (e.g., muscles, tendons, bones)? Understand the similarities and differences between cell signaling for muscle hypertrophy and therapy of tendinopathy. Understand the relationship between healing and inflammation as it relates to cell signaling cascades.
5. Learn the differences between toleration, habituation, and adaptation. Be able to apply principles of specificity to any metabolic or mechanical stress, predicting the physiological responses.
6. Understand the fundamentals of human metabolism and how the balance between catabolism and anabolism is maintained. As a component of this, understand the activity and behavior of enzymes, and the myriad ways in which enzymes control and regulate your metabolic function.

Laboratory Objectives:



Most labs will be conducted on the Proteus device or the Cybex Humac Norm system. These measure muscle force production through isometric, isotonic (concentric, eccentric), and isokinetic (varying degrees per second) motions. Throughout the semester, we’ll evaluate different expressions of strength, making bilateral (dominant vs. non-dominant) comparisons over several body parts. We’ll write reports based on the effects of fatigue, flexor-extensor balances, and history of injury. In conducting the labs, you will come to understand the difference between concentric and eccentric muscle activation, and how muscle function can be disrupted (e.g., mechanical and chemical damage brought about by eccentric stress). You will experience (and explain) delayed onset muscle soreness. You will also understand how the mechanisms of fatigue affect exercise performance in a variety of settings.

Course Objectives:

At the conclusion of this course you should understand how the human body interacts with its environment. You should know the underlying physiology at play when the body merely tolerates a stress, habituates to it, or adapts to it. These should not be memorized lines; you should be able to visualize the phenomena and express them in your own language. And you should be able to *apply* this information to your own life, in your workouts, in discussions with your family about health and disease, and in your daily behaviors.

14. Course Content and Calendar

Optional

CLASS #	DATE	TOPIC	READING
Week 1			
1	MON, Aug 23	Introduction: Syllabus, Expectations, and Certifications	Ch. 9 (176-177)
2	WED, Aug 25	Foundation, Principles, and Goals of an Exercise Prescription	
3	FRI, Aug 27	Structure and Function of the Skeletal Muscle System	Ch. 1 (3-12)
Week 2			
4	MON, Aug 30	Structure and Function of the Neuromuscular System	Ch. 5 (88-93)
5	WED, Sept 1	Excitation-Contraction Coupling and Reflex Arcs	
6	FRI, Sept 3	Orderly Recruitment or Size Principle: An Introduction	Ch. 5 (93-97)
Week 3			
NO CLASS	MON, Sept 6	Labor Day: No Class	
7	WED, Sept 8	History and Biology of Size Principle	
8	FRI, Sept 10	Applications of Size Principle	
Week 4			
9	MON, Sept 13	Specificity of Adaptation: History and Vocabulary	Ch. 17 (440-445)
10	WED, Sept 15	Specificity of Adaptation: Biology and Applications	
EXAM # 1	FRI, Sept 17	EXAM # 1	
Week 5			
11	MON, Sept 20	Introduction to Biomechanics (Beginning at the Foot)	
12	WED, Sept 22	Principles of Biomechanics	Ch. 2 (20-40)
13	FRI, Sept 24	Applications of Biomechanics	
Week 6			
14	MON, Sept 27	Nerves and Neuromuscular Rewiring	
15	WED, Sept 29	CNS Remodeling and Molecular Mechanisms of Nociception	
NO CLASS	FRI, Oct 1	Fall Break: No Class	
Week 7			
16	MON, Oct 4	Finishing Nerves; Introducing Injuries and Rehabilitation	Ch. 22 (606-616)
17	WED, Oct 6	Inflammatory Physiology	
18	FRI, Oct 8	The Role of Inflammation in Tissue Healing Part 1	
Week 8			
19	MON, Oct 11	The Role of Inflammation in Tissue Healing Part 2	
20	WED, Oct 13	Review for Second Exam	
EXAM # 2	FRI, Oct 15	EXAM # 2	

Week 9

21	MON, Oct 18	Halfway-Point Housekeeping, Intro to Endocrine Function	Ch. 4 (66-74)
22	WED, Oct 20	Endocrine System: Hormone Classifications	Ch. 4 (74-86)
23	FRI, Oct 22	Endocrine System: Hormone Actions	Ch. 5 (102-103)

Week 10

24	MON, Oct 25	Introduction to Anabolic Steroids in Sport	Ch. 11 (228-237)
25	WED, Oct 27	Anabolic Steroids: Philosophy, Effects, and Side Effects	
26	FRI, Nov 29	Evaluating the Arguments Against Steroid Use	



2 bonus points if you dress up for Halloween.

Week 11

27	MON, Nov 1	Enzymes: Modes of Regulation and Roles in Metabolism	
28	WED, Nov 3	Cell Signaling 1: The Context and Environment of mTOR	Ch. 17 (465-466)
29	FRI, Nov 5	Cell Signaling 2: mTOR Itself	

Week 12

30	MON, Nov 8	Cell Signaling 3: Navigating the mTOR Map	
31	WED, Nov 10	Cell Signaling 4: How Food and Hormones Influence mTOR	
32	FRI, Nov 12	Cell Signaling 5: Metabolic Regulation by AMPK	Ch. 5 (105-107)

Week 13

33	MON, Nov 15	Cell Signaling 6: Applications and Considerations of mTOR	
34	WED, Nov 17	Cell Signaling 7: Exercise and Supplements on mTOR	Ch. 11 (237-247)
35	FRI, Nov 19	Tryptophan and Fatigue: Indictment and Acquittal of Turkey	

Week 14

EXAM # 3	MON, Nov 22	EXAM # 3
NO CLASS	WED, Nov 24	Happy Thanksgiving: No Class
NO CLASS	FRI, Nov 26	Happy Thanksgiving: No Class



Week 15

36	MON, Nov 29	Exertional Muscle Burning: Lactic Acid vs. Hydrolysis	Ch. 3 (46-50)
37	WED, Dec 1	Cellular Mechanisms of Muscular Fatigue	
38	FRI, Dec 3	Muscular Fatigue: Central vs. Peripheral	
39	FRI, Dec 3	Review for Final Exam: Case Studies	Book (1-735)

Very optional

FINAL EXAM **EXAM WEEK**
December 6-10 WED, Dec 8, Noon-3:00pm

The final exam will be cumulative, but it's not in a standard question-and-answer format. There will be 8 case studies; you select and answer 6 of them. You have 60 minutes to answer the first 3 by yourself. Then you have 60 minutes to answer the last 3 in a group. If you finish the individual part quickly, just wait for everyone else to finish. There will be a buffet to keep you hydrated, fed, and entertained.



15. Additional Content

HESP 147 is a single-semester course. Throughout that semester, we *get* (as opposed to *have*) to spend 39 lectures together (39 wonderful, life-changing class sessions). And then that's it; the semester is over. It's not nearly enough time to learn everything I think you should learn. We'd need at least 50 lectures to cover all of that. So every time I teach this course, I tinker with the content, swapping out one subject for another. The dropped topics aren't pointless; we just don't have time. If you're among that slim slice of the minority demographic of actual *learners* ("I'm in college to *learn*; GPA is merely a byproduct of that learning"), here's a bank of additional lectures for you with material I've covered in previous semesters that. You won't be tested on it; it's an optional bedtime entertainment:

1. A History of Exercise Physiology: The Good Parts Version (HESP 248, Spring 2016, Lecture 2)
2. Kinesiology and the Importance of Movement (Part 1) (HESP 233, Fall 2016, Lecture 3A)
3. Kinesiology and the Importance of Movement (Part 2) (HESP 233, Fall 2016, Lecture 3B)
4. The Brain and Exercise (Part 1) (HESP 233, Fall 2016, Lecture 5A) **Ch. 8** (156-172)
5. The Brain and Exercise (Part 2) (HESP 233, Fall 2016, Lecture 5B)
6. The Brain and Exercise (Part 3) (HESP 233, Fall 2016, Lecture 5C)
7. Barefoot Running, Chiropractors, and Kinesio Tape (HESP 233, Fall 2016, Lecture 8)
8. Age and Exercise (HESP 233, Fall 2016, Lecture 9) **Ch. 18** (478-480), **Ch. 14** (321), **Ch. 6** (129)
9. Influence of Age and Sex on Exercise Outcomes (HESP 147, Fall 2015, Lecture 26) **Ch. 7** (136-153)
10. NSAIDs and an Introduction to Environmental Physiology (HESP 233, Fall 2016, Lecture 15)
11. Heat and Humidity, Cold and Wind Chill (HESP 233, Fall 2016, Lecture 16) **Ch. 6** (124-128)
12. Hyper and Hypobaric Stress (HESP 233, Fall 2016, Lecture 17)
13. The History, Botany, and Physiology of Alcohol (HESP 233, Fall 2016, Lecture 19)
14. Graduate Kinesiology: Semester in Review (HESP 233, Fall 2016, Lecture 20)
15. Stretching, Free Weights vs. Machines (HESP 147, Fall 2016, Lecture 9) **Ch. 14** (318-328), **Ch. 16** (410-421)
16. Speed, Agility, and Plyometrics (HESP 147, Fall 2016, Lecture 10) **Ch. 18 & 19**
17. Periodization, Stretching, Weights, and Plyometrics (HESP 248, Spring 2016, Lecture 13) **Ch. 2** (34-37)
18. Warmups and Stretching (HESP 147, Fall 2015, Lecture 27)
19. Speed, Agility, and Periodization (HESP 147, Fall 2015, Lecture 29) **Ch. 21** (588-595)
20. The Pitfalls of Evidence-Based Exercise Programs (HESP 177, Spring 2015, Lecture 31)
21. Muscular Pathophysiology via HIV (HESP 177, Spring 2015, Lecture 29)
22. IT Band Syndrome: Tradition vs. Science (HESP 147, Fall 2018, Lecture 20)
23. 2016 Case Studies (Part 1) (HESP 147, Fall 2016, Lecture 36)
24. 2016 Case Studies (Part 2) (HESP 147, Fall 2016, Lecture 37)
25. 2015 Case Studies (HESP 147, Fall 2015, Lecture 36)

You can find these lectures here: <https://courtneyjensen.com/extralectures.html>

16. Purpose of Office Hours

A student visits me during office hours: “I missed class. Can you tell me what you covered?”

Me: “I posted the PDF of the slideshow on Canvas and I can give you the audio recording.”

Student: “I don’t want to have to listen to it; can you just tell me what you talked about?”

Me: “You want me to redo the entire lecture for you? Four other people missed class too. Do you really think I’m going to give today’s lecture five times? I record all of my lectures for this *exact* reason.”

17. Course Evaluation

1. Copies of student work may be retained to assess how the learning objectives of the course are being met. And I might scan your work (just the good bits) for future slideshows.
2. If you have suggestions (“it’d be great if we could learn about...”), feel free to speak up. If possible, we will accommodate those suggestions. If not possible, don’t hesitate to visit me during office hours.
3. We’ll do the student evaluations at the very end of the semester. Probably on the last day of class. Probably immediately after the final. That feels like the best way for you to know what it is you’re evaluating. Filling out the forms three weeks before the end of class seems odd to me. It’s like reviewing a movie without watching the last 20 minutes.

18. Letters of Recommendation



I get a lot of requests. See that little picture to the left? That’s the folder that contains all of my letters of recommendation. I came to Pacific spring semester, 2015. On Friday, May 1st, I created that folder and wrote my first letter of recommendation for a Pacific student. Kiran. She got accepted to a couple of M.D. programs and a few D.O. programs. She chose a D.O. school in California. Then more students asked me for letters. And more. On Tuesday, August 10, 2021, I wrote my 501st letter. During my first year, I wrote a letter for every student who asked. During my second year, I came close. And then I never came close again. Today, the difference between the number of requests I receive and the number of letters a human being can write is funny. Why am I telling you this? To warn you of the possibility that you won’t receive a letter from me. Not because you don’t deserve one – you very likely will – but because I’m a person. And just like all other people, I’m not capable of infinity hours of work. I would like to be, but... again: I’m only a person.

So... if you want a letter from me at some point, you need at least a B+ in every class we’ve had together and I need at least a month’s notice (no exceptions here). At whatever moment you ask, my wait list is at least 10 students long. Now, if you want a *good* letter, you have to send me the content you want included (details about your life and details about those details). If I have to sit down and come up with the whole thing from scratch (and then look up awards, grades, dates that you took my classes, etc.), it’s going to take me all day. If I have a list of letter ingredients in front of me, I can cook up a good one in an hour. The more work *you* put in – sending me your résumé, transcript, and everything you want highlighted – the more compelling my letter will be. If all you want is a template, don’t give me much to work with. But if you want a page of sunshiny, glowing praise, then help me out.

19. Important Dates for University of the Pacific, Fall '21

catalog.pacific.edu/stocktongeneral/academiccalendar/#semestertext 🔍 ☆

Fall 2021

Description	Date(s)
Orientation for New Freshmen and Transfer Students (multiple sessions)	June 24 - 26 & August 16
Payment Deadline for Fall 2021	August 1
Classes Begin	August 23
# Last Day to Add Classes	September 3
# Last Day for Pass/No Credit or Letter Grade Option	September 3
# Last Day to Drop Classes (without record of enrollment)	September 3
Labor Day (Holiday - no classes)	September 6
Census Date	October 1
Fall Student Break	October 1
Spring 2022 Schedule of Classes Available	October 4
Homecoming (classes in session)	October 8 - 9
* Advising for Spring 2022 - continuing students	October 11 - 29
Last Day for Pro-Rated Refund	October 15
Last Day to Withdraw	October 28
* Early Registration Appointments Begin Spring 2022 - continuing students	November 1
Thanksgiving Break	November 24 - 26
Classes Resume	November 29
Classes End	December 3
Final Examination Period	December 6 - 10
Deadline to Petition to Walk in May 2022 Commencement (Summer 2022 Graduates)	December 10
Deadline for Faculty to Submit Grades Online (5:00 pm)	December 14

Monday, December 6, 2021 through Friday, December 10, 2021*

Day/Time of Final	Day/Time of Class				
	Monday Dec 6th	Tuesday Dec 7th	Wednesday Dec 8th	Thursday Dec 9th	Friday Dec 10th
8:00-11:00am	MWF 8:00am- 9:30am	TR 8:00am-10:00am	MWF 9:30am-11:00am	TR 10:00am-12:00pm	MWF 11:00am-12:30pm
11:00am-Noon	Break				
12:00-3:00pm	MWF 12:30pm-2:00pm	X	MWF 2:00pm- 3:30pm	TR 1:00pm-3:00pm	X
3:00-6:00pm	X	TR 3:00pm-5:00pm	X	X	MWF 3:30pm-5:00pm
6:00-7:00pm	Break				
7:00-10:00pm	MW 5:00pm-7:00pm 6:00pm-8:00pm	TR 5:00pm-7:00pm 6:00pm-8:00pm	MW 8:00pm-10:00pm	TR 8:00pm-10:00pm	X

Final exam Schedule