



HESP 248

Applied & Clinical Physiology

Fall, 2021

CRN: 82482

Syllabus

Instructor: Courtney Jensen, Ph.D.

Class Location: Main Gym, Room 118

Class Days: Monday, Wednesday, Friday

Class Times: 12:30pm – 1:45pm

Lab Location: Rooms 113, 117, 118, or the Snake Bunker

Lab Days/Times: No specific days, no specific times; we'll chat

Office Location: Main Gym, upstairs, the door with my name on it

Office Hours: Wednesday: 3:15pm – 5:15pm (2 hours)
These M/W/F: 1:45pm – 1:56pm (0.1833 hours)



(209) 946-3133



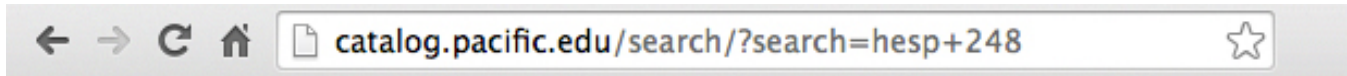
cjensen1@pacific.edu

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1. Purpose of the Course



Search Results

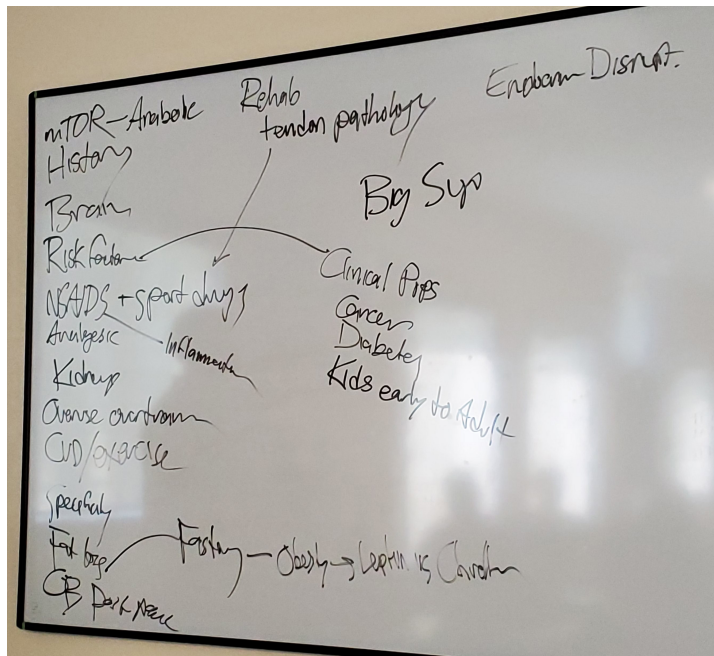
HESP 248

HESP 248. Applied and Clinical Physiology. 4 Units.

This course is designed to study the fundamental principles of exercise testing and interpretation for high risk, healthy, and athletic populations. The course is structured to focus on the cardiovascular, metabolic, and pulmonary responses to aerobic exercise and implications for designing training programs to enhance health, fitness, and performance. This course serves as a foundation for clinical exercise science and the use of exercise testing in the study of cardiac, metabolic and respiratory pathology.



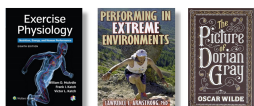
That's the online description, and it's not a good one. We won't address cardiovascular and pulmonary responses to aerobic exercise; that material is covered in HESP 247 (where you also learn how to perform comprehensive exercise testing and learn about corresponding pathologies). Just ignore the official course description. It is difficult to create an accurate characterization of a course that covers different material every time it's taught. What we will be learning about *this* semester is what all'a'y'all suggested on the first day.



In an undergraduate program, physiology courses focus on the breadth of exposures rather than the depth of content. In this class, we will explore (nay, plumb) the depths of these areas. You already have a background in much of this. The fundamentals are not foreign to you. That's the foundation we'll build on. There will be some review here and there. Those lectures (e.g., endocrine system, glycolysis, ATP hydrolysis) will function as warm-up sets, preparing us for heavier lifting. But the academic heaving (e.g., cell signaling) will be balanced with practical applications (e.g., exercise techniques and supplements).

2. Required Reading:

Nothing. But there are useful books in life.



McArdle, Katch, and Katch (2014) is expensive, but it's a 30-year staple (currently in 8th edition). Armstrong's PiEE (2000) is more of a niche staple; only the 1st edition exists (and only in used condition; it's OOP). Everything that's actually required reading will be posted on Canvas. A bunch of PDFs.

3. Exams and Their Points

HESP 248 is divided into two blocks. At the end of each block, there will be an exam. That's it for *normal* points: exams. You're graded on nothing else. Thus, this:

The breakdown of points: **Exams: 2 (200 points each)**

Total points possible: 400 points



I'm a bad test-taker.

Okay. You're going to have to become a good test-taker. Life insists. Every performance that matters is one in which you're on the spot (i.e., being tested). I could be the best basketball player in the world, but if I can't get the ball into the hoop when it counts, nobody cares. If every time I put my skills to the test, I toss up air balls, not even the Sacramento Kings 'gon draft me.



What is the format of the tests?

It's mostly Scantron. And then some very objectively right-or-wrong fill-in-the-blanks. It'd be difficult for me to do any rounding. I'll be generous in the questions I write, but generosity in *grading* isn't really feasible; Scantron machines struggle with things like subjectivity. Just study hard, ace the tests, and you'll be happy you did those things.



4. Grading Scale

Final grades are determined by calculating accumulated points from all exams and labs, and then dividing that number by the total points possible (400). The exams are hard. But there's some extra credit along the way. You'll all be fine. You're smart.

Letter Grade	Points	Percentage
A	372-400	93%
A-	360-371	90%
B+	348-359	87%
B	332-347	83%
B-	320-331	80%
C+	308-319	77%
C	292-307	73%
C-	280-291	70%
Please Avoid	None-279	<70%



All students are required to use Canvas (it's accessible in *InsidePacific*). I'll post lecture materials there on occasion. And I'll make announcements there on more frequent occasions. Maybe some discussions. Stuff like that. If you're not familiar with Canvas, it's a good idea to do some familiarizing

6. Student Responsibilities

- Attendance is not mandatory, but encouraged. Grad classes involve more discussion and you-participation than undergrad classes.
- “Due dates” are not negotiable. The only thing that’s really “due” is exams. So try not to miss them. If you miss one and your absence is not a crisis (or otherwise excused in advance), I’m going to be unsympathetic. What does “unsympathetic” mean for your grade? That depends on the situation. Please try to avoid any such situation though.
- If you become aware of a scheduling conflict that falls on an exam date, we can reschedule it if you notify me at least 24 hours prior to the date of the quiz or exam. If I receive an email from you mid-class (“sorry, something came up”), you will receive a zero, obviously.
- If there is an emergency, you don’t need to contact me in advance. Just attend to your emergency and notify me when you can. 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 really sad; I couldn’t leave him all by his lonesome”), then you *do* have reason to worry. And I will share that concern, because every creature in the history of the universe who has prioritized life in that way has spent his or her adult years unfulfilled and in poverty. And then they died sad and alone because pets (excepting turtles) don’t live very long. So make sure you prioritize your life like a successful person. You’ll accomplish more that way. Whether you’re *happy*, I don’t know.
- 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>

7. Students with Disabilities

Students with learning disabilities who feel they may need 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 the accommodation(s) and to 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).

8. Instructor Responsibilities

1. Canvas postings: I will maintain a presence on Canvas. Not a particularly sophisticated one, but you’ll be able to find your syllabus, readings, and announcements there.

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 does. But realize that I’m a person. And I work about 14 hours a day, every day of the year. So attempting to schedule non-office-hour meetings with me can be frustrating (for students). I’d like to be more available, but on an average day, I receive 30-ish hours of requests for my time. If I slept 0 hours forever and spent every waking minute working, I’d still fail to address everyone’s requests. That said, I always prioritize graduate students. Let me rephrase: I always prioritize graduate students whose questions or needs are real.

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 visit me during office hours.

4. Returning exams: I will return these within three days.

5. Lecture materials: I’m not going to post the PowerPoints themselves, but I’ll definitely post every lecture video (me talking with the slides in the background) within 24 hours.

6. Changes to class schedule: I reserve the right to change the class schedule as necessary. In the likely event that this happens, I will notify everyone via Canvas group messages.

9. Course Objectives and Outcomes

This was what we covered last time. It was a four-block course, rather than two. If you see stuff here that you want to talk about this semester, we can. Just let me know.

Block One:

1. Understand a little bit about the history of exercise physiology (how we know what we know) in order to appreciate just how *little* we know.
2. Learn about the relationship between the body and its stressors. Inappropriately applied stress induces deterioration of body systems; appropriately applied stress enhances health and athleticism. Recognize how all of this works.
3. Homeostasis and thermal regulation: Appreciate the difference between our *assumed* set point and our *actual* set point. And learn how our bodies defend that point when exposed to climatic stressors.

Block Two:

4. *Refresh* the fundamentals of anaerobic metabolism: ATP hydrolysis, glycolysis, and lactate accumulation.
5. What is exercise-induced fatigue? What are the cellular mechanisms that cause you to stop exercising? What else (e.g., central function) causes you to stop exercising? You will be able to answer those questions in detail, from several perspectives, and with a good amount of style.
6. Carbohydrate and fat metabolism are well covered in nearly every ex. phys. class; protein metabolism is seldom acknowledged. We'll acknowledge it. And then we'll explain the ups (synthesis) and downs (degradation) of protein turnover.
7. Translation is the linking together of amino acids; linked-together amino acids are proteins. Before talking about hypertrophy in any detail, it's important to know the underlying biochemistry.
8. Become serious experts in the laws and principles of skeletal muscle recruitment. "Orderly recruitment" and "Henneman's size principle" will be more than just terms.
9. Neuromuscular recruitment patterns can be affected in the presence of pain. You will learn how this happens, where it happens, and the downstream consequences.
10. Be able to describe the different stages of inflammation.

Block Three:

11. Understand the endocrine system (as it applies to protein synthesis) in detail. What is a hormone, what kinds of hormones exist, and how do they exert their actions?
12. Steroids: exploring the most biased arguments in health and exercise science.
13. Develop a comprehensive understanding of (and affection for) enzymes.
14. Know about cellular signaling cascades for protein synthesis (muscle hypertrophy); not just what's involved, memorizing steps and enzymes, but be able to discuss its importance in a variety of contexts and apply these principles to exercise program design. Part of this is knowledge of enzymes (e.g., AMPK), what they are and how they work. But you should also know about the roles of other proteins, fatty acids, and other compounds.

Block Four:

15. Physiological ergogenic aids: learn the principles, the substances that actually work, the substances that don't, and how they do or do not work.
16. and compare/contrast the inflammatory responses of different tissues (muscles vs. tendons, for example).

When the Semester is Over:

17. Remember the stuff that matters to you; be able to apply it to your career.

10. Course Content and Calendar

CLASS #	DATE	TOPIC
<i>Week 1</i>		
1	MON, Aug 23	Introduction: what do we want to learn this semester?
2	WED, Aug 25	Exercise physiology and how it got that way: history, part 1.
3	FRI, Aug 27	Our field is ridiculous and ridiculously young: history, part 2.
<i>Week 2</i>		
4	MON, Aug 30	The responsibility of the clinician: risk factor assessment.
5	WED, Sept 1	Working with clinical populations: CVD, cancer, and diabetes.
6	FRI, Sept 3	Team competition: case studies.
<i>Week 3</i>		
NO CLASS	MON, Sept 6	Labor Day. No class.
7	WED, Sept 8	Kids and exercise: state of the evidence.
8	FRI, Sept 10	Fat: why we have it and how to lose it (and keep it lost).
<i>Week 4</i>		
9	MON, Sept 13	Intermittent fasting: physiology and practical applications.
10	WED, Sept 15	Exercise prescription: consider stress and our specific reactions to it.
11	FRI, Sept 17	Exercise is not just for bodily stuff: how movement benefits the brain.
<i>Week 5</i>		
12	MON, Sept 20	The brain and exercise, part 2.
13	WED, Sept 22	I guess we'll talk about the brain and exercise this one last time.
14	FRI, Sept 24	Inflammatory physiology: pros and cons and stuff.
<i>Week 6</i>		
15	MON, Sept 27	NSAIDs and other analgesics: questioning their abundance in sport.
16	WED, Sept 29	Tendon pathology and rehabilitation.
NO CLASS	FRI, Oct 1	Fall break. No class does us today! (And happiness becomes you.)
<i>Week 7</i>		
EXAM # 1	MON, Oct 4	EXAM # 1
17	WED, Oct 6	Midsemester housekeeping: reviewing exam 1, chatting, whatevering.
18	FRI, Oct 8	Skeletal muscle function: a huge crammy refresher.
<i>Week 8</i>		
19	MON, Oct 11	Genetics, part 1: the language and alphabet of hypertrophy.
20	WED, Oct 13	Genetics, part 2: disease states and epigenetic changes.
21	FRI, Oct 15	Protein metabolism (starting with catabolism).

Week 9

22	MON, Oct 18	Protein metabolism (getting into anabolism).
23	WED, Oct 20	mTOR: how muscle cells regulate their growth.
24	FRI, Oct 22	More mTOR.

Week 10

25	MON, Oct 25	We're still mTORing.
26	WED, Oct 27	We can see mTOR's finish line, but we haven't crossed it yet.
27	FRI, Nov 29	At this point, we're probably wrapping up anabolic metabolism.



Week 11

28	MON, Nov 1	Team competition: mTOR.
29	WED, Nov 3	Endocrine system: the history and state of evidence.
30	FRI, Nov 5	Hormone actions and consequences of disruption.

Week 12

31	MON, Nov 8	Overuse injuries (local) and overtraining syndrome (systemic).
32	WED, Nov 10	Follow the proton: characterizing pH changes during exercise.
33	FRI, Nov 12	Team competition: pH steps in glycolysis.

Week 13

34	MON, Nov 15	Big sups: how the supplement industry became so good and terrible.
35	WED, Nov 17	Supplements, part 2.
36	FRI, Nov 19	Supplements, part 3. And drugs. Supplements and drugs both.

Week 14

37	MON, Nov 22	Thanksgiving dinner: tryptophan and the postprandial nap.
NO CLASS	WED, Nov 24	Thanksgiving. Happy it. No class.
NO CLASS	FRI, Nov 26	Thanksgiving. Happy it. No class.



Week 15

38	MON, Nov 29	Kidneys: a hub of tons-of-stuff regulation.
39	WED, Dec 1	Health, obstetrics, and postpartum changes.
40	FRI, Dec 3	Review for final exam.

FINAL

EXAM WEEK

EXAM **December 6–10** Monday, Dec 6, 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.



11. Grade Indicator

- A, A- Quality of work indicates full mastery of the subject; a solid A (no minus) tells me that you're a serious champ. Nobody gets an A for mere "good work"; yours is the product of real discipline (and superior cognitive genetics).
- B+, B, B- Work indicates good comprehension of the course material. You've demonstrated a sufficient (sometimes thorough) understanding of muscle physiology and its applications.
- C+, C, C- Earned by work that demonstrates satisfactory comprehension of the course material; you've met the basic requirements for completing the labs, participating in class, and intelligently half-assing the exams.
- ≤ D+ If you get anything less than a C in grad school, we have a larger problem than anything I can address in a syllabus. Work hard; don't disappoint me.

12. 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.

13. Letters of Recommendation

At the end of the semester, if you want a letter of recommendation, you need to get at least a B in the class. If you get a D, it's difficult for me to conceal that with paragraphs of praise. There's only so much talking *around* a bad grade I can do before it begins to feel suspicious. If you get a B or better, and you want a letter, I'll be happy to write one, but you have to give me at least two weeks' notice before it's due. I'm a busy guy. "Can you write a letter for me by tomorrow?" is nearly impossible.

Also, realize that it takes an awfully long time to write one from scratch. And those letters (the scratch-written ones) are always boring and short. Especially if I've only known you for one semester; I won't have much to say and that will likely be obvious to the recipient. Your letter will be far better – much more thorough – if you give me a sample letter first. Two rules for the sample letter. 1) Address it to whomever I'll be writing so I don't have to do a bunch of searching; you don't want people to feel burdened at the exact moment they're attempting to write positive things about you. 2) After addressing it, write out what you'd like me to say. I'll obviously change it a great deal, but this will give me the resources to discuss your strengths and merits at length as opposed to whatever brief and incomplete thoughts come to mind during the hour that I dedicate to your letter. Don't be shy. It's an exercise in selling yourself (something you'll have to do a lot of as a professional anything).

14. 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