



KINE 410: Clinical Exercise Physiology

Term: Fall 2026

Credits: 3.0

Seminar Times & Location: Tuesday & Thursday 9:30–10:45 a.m., Lovell Hall 310

Modality: In-Person Seminar

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Instructor Information

- **Instructor:** Dr. Tyler Harwood (Assistant Teaching Professor of Kinesiology)
- **Email:** tharwood@university.alkimi.ai
- **Office:** Calder Health Sciences Building 322
- **Office Hours:**
 - Tuesday & Thursday: 11:30 a.m.–1:00 p.m. (In person, Calder Health Sciences Building 322)
 - Wednesday: 10:00–11:00 a.m. (Virtual via Zoom; link posted in Canvas)
 - Also available by appointment.

Course Description

Exercise testing and training for people with cardiovascular, pulmonary, metabolic, musculoskeletal, and neuromuscular conditions, with case-based practice. KINE 410 prepares future clinical exercise physiologists to evaluate, test, and prescribe exercise for individuals diagnosed with chronic cardiovascular, pulmonary, metabolic, musculoskeletal, and neuromuscular diseases. Emphasizing clinical decision-making, pathophysiology, and pharmacological interactions, students learn to stratify clinical risk, monitor 12-lead ECG responses during graded exercise testing, and modify exercise prescriptions to optimize functional independence and reduce morbidity. Case-based clinical simulations align with certification standards established by the American College of Sports Medicine (ACSM).

Prerequisites

KINE 301 and KINE 330.

Measurable Student Learning Outcomes

Upon successful completion of KINE 410, students will be able to:

1. **Evaluate Chronic Disease Pathophysiology:** Analyze the etiology, pathophysiology, progression, and clinical manifestations of major cardiovascular, pulmonary, metabolic, musculoskeletal, and neuromuscular conditions.
2. **Interpret Clinical Diagnostic and Exercise Data:** Interpret 12-lead resting and exercise electrocardiograms, spirometry tracings, blood biomarkers, hemodynamic trends, and symptom-limited graded exercise test results.
3. **Formulate Individualized Clinical Exercise Prescriptions:** Design individualized exercise prescriptions using the FITT-VP principle tailored to the limitations, contraindications, and medications of patients with single or multi-morbidities.

4. **Execute Clinical Risk Stratification and Safety Monitoring:** Determine absolute and relative contraindications to exercise testing, stratify patient risk, and apply emergency response protocols for adverse cardiovascular events.
5. **Demonstrate Clinical Competence for ACSM-CEP Credentialing:** Synthesize clinical assessment data and patient interview findings into professional electronic health record progress notes and interprofessional referral summaries.

Required Course Materials & Approximate Costs

1. **Ehrman, Jonathan K., et al. *Clinical Exercise Physiology*. 5th ed., Human Kinetics, 2022.** Approx. \$105 print, \$65 digital rental.
2. **American College of Sports Medicine. *ACSM's Guidelines for Exercise Testing and Prescription*. 11th ed., Wolters Kluwer, 2021.** Approx. \$55 print or digital.
3. **Total estimated cost:** \$120 to \$160.

Generative AI Policy (AI Level 2: AI Permitted with Disclosure for Specified Tasks)

In accordance with Alkimi University Academic Policies (Student Handbook §5.8), KINE 410 operates under **AI Level 2**.

- **What is permitted:** You may use generative AI tools to explore broad differential considerations for chronic disease interactions, generate hypothetical physiological symptom timelines, and review draft clinical exercise prescriptions for typographic clarity.
- **What is prohibited:** You may not use generative AI to interpret clinical electrocardiogram (ECG) rhythm strips, calculate target heart rate intensities for high-risk patients, formulate final clinical exercise prescriptions, or complete examination questions. Clinical safety judgments must originate entirely from your own clinical reasoning.
- **Disclosure:** All submitted clinical case plans and portfolio analyses must feature an explicit AI disclosure statement specifying which tools were consulted and the precise prompts used. If no generative AI tools were used, state: 'No generative AI tools were used in preparing this clinical document.'

Grading Components and Weights

- **Clinical Examination 1 (Cardiovascular & Pulmonary):** 15% (In class, Thursday, October 1)
- **Clinical Examination 2 (Metabolic & Neuromuscular):** 15% (In class, Thursday, November 12)
- **Cardiac Rehabilitation Case Study & Exercise Prescription:** 20% (Due Friday, October 23 at 11:59 p.m.)
- **Multi-Morbidity Grand Rounds Clinical Project:** 15% (Due Friday, November 20 at 11:59 p.m.)
- **Clinical Decision Vignettes & ECG Canvas Quizzes:** 15% (Due Mondays at 11:59 p.m. in Canvas; lowest quiz score dropped)
- **Final Comprehensive Clinical Examination:** 20% (Tuesday, December 15, 2026, 8:00–10:00 a.m.)

Grading Scale (Alkimi University Standard)

- **A:** 93–100% | **A-:** 90–92%
- **B+:** 87–89% | **B:** 83–86% | **B-:** 80–82%
- **C+:** 77–79% | **C:** 73–76% | **C-:** 70–72%
- **D+:** 67–69% | **D:** 60–66% | **F:** Below 60%
- **Extra credit:** No extra credit assignments are offered in KINE 410.

Course Schedule (Fall 2026)

Week	Dates	Topics & Readings	Assignments & Deadlines
Week 1	Aug 27	Scope of Practice and Clinical Pre-Exercise Screening: Role of the clinical exercise physiologist, health history appraisal, risk	<i>First day of classes: Wed Aug 26.</i>

Week	Dates	Topics & Readings	Assignments & Deadlines
		stratification, and informed consent in clinical populations. <i>Reading: Ehrman et al., Ch. 1; ACSM Guidelines, Ch. 1–2</i>	
Week 2	Sep 1, 3	Clinical Electrocardiography and Graded Exercise Testing: 12-lead ECG review, normal and abnormal cardiac rhythms, ST-segment shifts, and indications for terminating exercise testing. <i>Reading: Ehrman et al., Ch. 2; ACSM Guidelines, Ch. 5</i>	<i>Wed Sep 2: Add/section change deadline.</i>
Week 3	Sep 8, 10	Atherosclerotic Cardiovascular Disease and Acute Coronary Syndromes: Pathophysiology of myocardial infarction, stable and unstable angina, revascularization procedures (PCI, CABG), and medication effects. <i>Reading: Ehrman et al., Ch. 12</i>	<i>Mon Sep 7: Labor Day (no classes). Wed Sep 9: Census date (last day to drop without a W).</i>
Week 4	Sep 15, 17	Cardiac Rehabilitation: Phases I through IV: Inpatient mobilization, outpatient telemetry monitoring, exercise progression, risk factor modification, and secondary prevention. <i>Reading: Ehrman et al., Ch. 13</i>	—
Week 5	Sep 22, 24	Heart Failure and Peripheral Artery Disease: Systolic and diastolic heart failure, reduced versus preserved ejection fraction, ventricular assist devices, claudication treadmill protocols. <i>Reading: Ehrman et al., Ch. 14–15</i>	—
Week 6	Sep 29, Oct 1	Hypertension and Cardiac Dysrhythmias: Hemodynamic responses to antihypertensive agents (beta blockers, ACE inhibitors), atrial fibrillation, pacemakers, and ICDs; Clinical Examination 1 in class. <i>Reading: Ehrman et al., Ch. 16</i>	Clinical Examination 1 (Cardiovascular & Pulmonary) (in class).
Week 7	Oct 6, 8	Chronic Obstructive Pulmonary Disease (COPD): Chronic bronchitis, emphysema, flow-volume loops, dyspnea scales, pursed-lip breathing, and pulmonary rehabilitation programming. <i>Reading: Ehrman et al., Ch. 17</i>	—
Week 8	Oct 15	Asthma and Restrictive Lung Diseases: Exercise-induced bronchoconstriction, interstitial lung disease, supplemental oxygen titration, and pulse oximetry monitoring. <i>Reading: Ehrman et al., Ch. 18</i>	<i>Oct 12–Oct 13: Fall break (no classes).</i>
Week 9	Oct 20, 22	Diabetes Mellitus and Metabolic Syndrome: Pathophysiology of Type 1 and Type 2 diabetes, insulin dynamics, hypoglycemia prevention, exercise timing, and glycemic control. <i>Reading: Ehrman et al., Ch. 6</i>	Cardiac Rehabilitation Case Study & Exercise Prescription due Fri Oct 23 at 11:59 p.m.
Week 10	Oct 27, 29	Obesity and Chronic Kidney Disease: Adiposity-driven inflammation, bariatric surgical considerations, end-stage renal disease, hemodialysis scheduling, and exercise safety. <i>Reading: Ehrman et al., Ch. 7, 9</i>	—
Week 11	Nov 3, 5	Cancer and Hematologic Disorders: Exercise oncology guidelines, managing cancer-related fatigue, lymphedema precautions, bone metastases, and chemotherapy cardiotoxicity. <i>Reading: Ehrman et al., Ch. 10</i>	<i>Fri Nov 6: Last day to withdraw (W) or elect Pass/No Pass.</i>
Week 12	Nov 10, 12	Musculoskeletal Conditions: Osteoporosis and Arthritis: Bone remodeling under mechanical loading, fracture risk assessment, osteoarthritis, rheumatoid arthritis; Clinical Examination 2 in class. <i>Reading: Ehrman et al., Ch. 21–22</i>	Clinical Examination 2 (Metabolic & Neuromuscular) (in class).
Week 13	Nov 17, 19	Neuromuscular Disorders: Stroke and Spinal Cord Injury: Hemiparesis rehabilitation, spasticity, autonomic dysreflexia, functional electrical stimulation, and adaptive equipment. <i>Reading: Ehrman et al., Ch. 23</i>	Multi-Morbidity Grand Rounds Clinical Project due Fri Nov 20 at 11:59 p.m.
Week 14	Nov 24	Neurodegenerative Diseases: Parkinson's and Multiple Sclerosis: Tremor, gait freezing, Uhthoff phenomenon in MS, thermoregulatory cooling strategies, and fall prevention balance training. <i>Reading: Ehrman et al., Ch. 24–25</i>	<i>Nov 25–Nov 27: Thanksgiving break (no classes).</i>
Week 15	Dec 1, 3	Pediatric and Geriatric Clinical Exercise Considerations: Congenital heart disease, juvenile idiopathic arthritis, frailty	—

Week	Dates	Topics & Readings	Assignments & Deadlines
		syndromes, cognitive decline, and polypharmacy in older adults. <i>Reading: Ehrman et al., Ch. 26</i>	
Week 16	Dec 8	Clinical Grand Rounds and ACSM-CEP Board Review: Interprofessional grand rounds case presentations, transition to clinical practicum, ACSM-CEP examination blueprint synthesis. <i>Reading: Course review packet</i>	<i>Wed Dec 9: Last day of classes.</i> <i>Thu Dec 10: Reading Day.</i>
Finals	Dec 15	Final Comprehensive Clinical Examination: Tuesday, December 15, 2026, 8:00–10:00 a.m., Lovell Hall 310.	Comprehensive examination aligning with ACSM-CEP clinical competency domains.

Course Policies

Attendance Policy

Class attendance and active participation in clinical case discussions are mandatory. The seminar format requires collaborative risk analysis, mock clinical patient intakes, and ECG interpretation that depend directly on peer interaction. If you anticipate missing a session due to illness or clinical field interview, notify Dr. Harwood prior to class. Students who miss the first two class meetings without notifying the instructor may be dropped. Students may miss class for religious observance without penalty if they notify the instructor in writing within the first two weeks of the semester (by Wednesday, September 9, 2026). Absences for university-sponsored activities (athletics, performances, conferences) are excused with a letter from the sponsoring office at least one week in advance.

Late Work Policy

Clinical case assignments submitted after the deadline will be penalized 10% per calendar day for up to 72 hours. Assignments submitted more than three days late will receive a grade of zero. Weekly clinical vignettes must be submitted by the posted Canvas deadline.

Clinical CPR/AED Prerequisite Requirement

In accordance with Department of Kinesiology clinical safety standards, all students enrolled in KINE 410 must possess current American Heart Association (AHA) or American Red Cross Basic Life Support (BLS) CPR and AED certification.

ACSM-CEP Professional Competencies

Course assessments are structured around the clinical exercise physiology performance domains of the American College of Sports Medicine. Students must earn a grade of C or higher to satisfy requirements for the Kinesiology BS degree.

Final Exam Policy

The final examination (Tuesday, December 15, 2026, 8:00–10:00 a.m.) is scheduled by the University Registrar and can't be moved without the Dean's written approval (Faculty Handbook §5.5). A student with three or more final exams on the same calendar day may reschedule one of them. Requests go to the instructor of the middle exam by the last day of classes. For this term, send the request by Wednesday, December 9, 2026 (Student Handbook §6.4).

Academic Integrity

Alkimi University is an academic community devoted to rigorous scholarship, open intellectual inquiry, and uncompromising ethical conduct. All students are subject to the regulations of the Alkimi University Academic Integrity Policy. Academic dishonesty—including plagiarism, cheating on examinations, unauthorized collaboration, fabrication of empirical data, and unauthorized submission of academic work generated by artificial intelligence—undermines the integrity of the university and carries severe disciplinary sanctions. Sanctions range from a failing grade on an assignment or exam to an administrative course failure recorded as an 'XF' on the official transcript, academic suspension, or expulsion. Suspected

violations are formally investigated and resolved through the Office of Academic Integrity in accordance with Faculty Handbook §6. For detailed information, consult the Office of Academic Integrity, Lovell Hall 315, (555) 555-0163, integrity@university.alkimi.ai.

Accessibility Services

Alkimi University is committed to providing equitable educational access and reasonable accommodations for all students with documented disabilities, including physical, sensory, psychological, learning, and chronic health conditions. Students requesting academic accommodations must formally register with the Office of Accessibility Services, Harlan Hall 204, (555) 555-0155, access@university.alkimi.ai. Once approved, students will receive an official Faculty Accommodation Letter detailing approved accommodations. Students should present this letter to the instructor as early in the semester as possible, and at least one week prior to any exam or assignment requiring accommodation. Accommodations cannot be applied retroactively.

Student Wellness and Mental Health

Your physical health, psychological well-being, and mental health are essential to your academic success. If you experience heightened stress, anxiety, depressive symptoms, personal trauma, or academic burnout, free, confidential counseling and medical care are available through the Hollis Health & Counseling Center, located in the Hollis Center. Routine appointments are available Monday–Friday 8:00 a.m.–6:00 p.m. and Saturday 10:00 a.m.–2:00 p.m. during the semester by calling (555) 555-0190 or emailing health@university.alkimi.ai. Urgent, 24/7 crisis psychological counseling is accessible immediately at (555) 555-0199.

Campus Student Support Services

- **Academic Advising Center:** Lovell Hall 101 | (555) 555-0158 | advising@university.alkimi.ai
- **Writing Center:** Whitcombe Library 3rd Floor | Free consultations on papers, reports, and research projects at any stage.
- **Whitcombe Library:** Whitcombe Library, Main Floor | (555) 555-0170 | askalibrarian@university.alkimi.ai
- **Hollis Health & Counseling Center:** Hollis Center | (555) 555-0190 | 24/7 Counseling Line: (555) 555-0199 | health@university.alkimi.ai
- **Clinical Exercise Physiology Mentoring Hours:** Calder Health Sciences Building 322 | Case debriefing, 12-lead ECG review, and clinical career guidance with Dr. Harwood.