HHD 1042: Physiology of Exercise (Spring 2024)

Course Hours:	Section 1030: T–Th 11:00 am - 12:15 pm Section 1100: T–Th 1:00 pm – 2:15 pm
Course Credits:	3
Course Room:	129 Trees Hall
Instructor:	Christopher E. Kline, PhD
Office:	Oak Hill Research Center (32 Oak Hill Court), Room 210 Pittsburgh, PA 15261
Phone:	412-383-4027
Email:	chriskline@pitt.edu
Office Hours:	By appointment; contact Dr. Kline to schedule a meeting (options include face-to-face/phone/Zoom)

COURSE DESCRIPTION

This lecture course is intended to provide the undergraduate exercise science major with an overview of the principles of exercise physiology. Specifically, we will investigate the effects of exercise upon bodily systems and review the underlying physiological mechanisms that relate to improved physical performance and health.

COURSE GOALS & OBJECTIVES

The course lectures, readings, assignments, quizzes, and exams are intended to provide opportunities for students to accomplish specific competencies related to the basic principles of exercise physiology.

After successful completion of this course, the student should be able to:

- Describe the structure and function of skeletal muscle;
- Discuss the physiology of human metabolism and bioenergetics that fuel human movement during exercise;
- Explain the structure and function of the endocrine and nervous systems at rest and the role they play in controlling and regulating movement during exercise;
- Determine energy expenditure at rest and during exercise;
- Detail the structure and function of the cardiovascular and respiratory systems at rest and their responses to exercise;
- Explain how the cardiorespiratory system responds to acute exercise and adapts to chronic exercise;
- Define and discuss the basic principles of exercise training (e.g., individuality, specificity, overload, detraining);
- Explain the physiological basis for commonly prescribed aerobic, anaerobic power, and muscular strength training regimens;
- Describe the influence of environmental stressors (e.g., heat, cold, altitude) on acute responses to exercise and their impact on exercise performance.

This course reviews numerous areas that are important for ACSM institutional accreditation and preparation for ACSM certification exams. The specific performance domains and associated competencies covered by this course are listed in the Appendix at the end of the syllabus.

COURSE REQUIREMENTS

PREREQUISITES: Prior coursework in undergraduate-level Anatomy (with laboratory; e.g., HHD 1011 and 1012) and Physiology (e.g., HHD 1033) is required for enrollment in this course.

REQUIRED TEXT: Kenney WL, Wilmore JH, Costill DL. *Physiology of Sport and Exercise (8th ed.).* Champaign, IL: Human Kinetics, 2022.

The e-book version of this text is accessible on Canvas through Pitt's Inclusive Access program, with hardcopy versions available upon request. *If you do not want to access the text through this program, you must opt out by the add/drop deadline (01/19/2024) to avoid being charged*. In addition to the University bookstore, this textbook can also be purchased through the publisher (hardcover, loose-leaf, or e-book) or Amazon, among other options.

REQUIRED TECHNOLOGY: This course will use the Canvas learning management system for posting lecture notes, submitting assignments, and completing online quizzes. Because of this, certain technology is required to adequately complete the course. In general, Canvas users will have the best experience with Firefox or Chrome (for Windows or Mac), or Safari for Mac. Please make sure that you have access to a secure cable internet hookup for quizzes. Wireless (Wi-Fi) connections are sometimes unreliable for these crucial tasks.

- Support for Students: There is a Canvas Help Guide available.
- Problems should be directed to the IT Help Desk. Help is available 24 hours a day, 7 days a week, 365 days a year. Use this link to see the different ways to contact them.

COURSE STRUCTURE

This course will include two 75-minute lecture classes per week throughout the semester. All classes will be delivered in person (see **Attendance Policy** below). Modifications to the instructional format may be necessary; we will follow the University's operational posture in the event that a transition to remote or hybrid instruction is necessary.

In addition to the classes, *asynchronous opportunities for enrichment* will be available via Canvas and the textbook's web study guide. These enrichment opportunities will not count against the student in the course grades if not completed; the purpose of these opportunities is to provide students with additional ways to learn more about the field of exercise physiology.

ATTENDANCE POLICY

Attendance is required for all lecture classes. Consistent engagement with the course content is very important for successful completion of the course, and the best way to ensure engagement is attending class.

Students who are more than 5 minutes late will be considered absent. Absences for medical, religious, or athletic reasons must be disclosed to Dr. Kline to be excused. If a student misses a class, it is the student's responsibility to obtain the material that was discussed in class. If a student misses an exam, the student must provide proof that the absence was due to an excused reason (e.g., medical or family emergency, religious holiday, athletic contest).

Each student is allowed one unexcused absence during the semester. Beyond that, each unexcused absence will result in a 5-point deduction from the 100-point attendance grade (see **Methods of Evaluation** below).

METHODS OF EVALUATION

Attendance: 100 points will be awarded for attending all the lecture classes. For each unexcused absence (past the initial absence), 5 points will be deducted from the 100-point total.

Assignments: Each student who completes this class should be a 'consumer' of research. There is an (over)abundance of content online regarding exercise- and fitness-related topics; unfortunately, not all of this information is rooted in scientific evidence. To facilitate the scientific evaluation of this content, each student will be expected to complete 2 of the following tasks:

- Summarize an exercise/fitness podcast episode;
- Critique a movie clip, TikTok video, or Instagram post that features a specific exercise or fitness claim;
- Summarize a recent research paper on a topic relevant to the course content.

Details about these task options will be posted on Canvas and due by *March 8* and *April 19.*

Quizzes: 10 quizzes will be assigned during the semester. Each quiz will become available on Canvas on Friday at 8:00 am and will be due at 10:00 am the following Tuesday. See the **Course Schedule** for specific quiz dates. Quizzes will feature a mix of true/false, multiple choice, and matching questions. The quizzes can be completed using class notes. *The purpose of these quizzes is to encourage the review of course content on a consistent basis.*

Exams: Four exams will be completed in this course. The exams are spread out equally across the semester and are designed to be non-cumulative. Exams will be administered in person.

Extra Credit: There will at least one extra credit opportunity prior to each exam. Examples of opportunities may include 'bonus' quizzes, completing a textbook learning module, and responding to questions after reading research papers or watching brief videos. Detailed instructions will be provided for each opportunity.

Assignments, Quizzes, and Extra Credit Opportunities are to be completed independently and without involvement of fellow classmates. Completing these tasks with the help of classmates is considered cheating; see the 'Academic Policies' section to review the consequences of cheating.

COURSE SCHEDULE

The course schedule is tentative and may change at the discretion of the instructor. Students are responsible for any changes made to the syllabus that are posted.

Week/Dates:	Session:	Topic/Activity:
Week 1 (Jan 9, Jan 11)	Tues lecture:	Course Intro/Structure & Function of Exerc Muscle (Ch 1)
	Thurs lecture:	Structure & Function of Exercising Muscle (Ch 1)
	Quiz:	Quiz #1 available on 01/12; due by 10:00 am on 01/16
Week 2 (Jan 16, Jan 18)	Tues lecture:	Bioenergetics & Muscle Metabolism (Ch 2)
	Thurs lecture:	Bioenergetics & Muscle Metabolism (Ch 2)
	Quiz:	Quiz #2 available on 01/19; due by 10:00 am on 01/23
Week 3 (Jan 23, Jan 25)	Tues lecture:	Bioenergetics & Muscle Metabolism (Ch 2)
	Thurs lecture:	Exam 1 Review & Neural Control of Exercising Muscle (Ch 3)
	Quiz:	No quiz this week
Week 4 (Jan 30, Feb 1)	Tues lecture:	**Exam 1** (covers Chapters 1-2)
	Thurs lecture:	Neural Control of Exercising Muscle (Ch 3)
	Quiz:	Quiz #3 available on 02/02; due by 10:00 am on 02/06

Week 5 (Feb 6, Feb 8)	Tues lecture:	Hormonal Control During Exercise (Ch 4)
	Thurs lecture:	Hormonal Control During Exercise (Ch 4)
	Quiz:	Quiz #4 available on 02/09; due by 10:00 am on 02/13
Week 6 (Feb 13, Feb 15)	Tues lecture:	Energy Expenditure (Ch 5)
	Thurs lecture:	Fatigue, Muscle Soreness, and Muscle Cramps (Ch 6)
	Quiz:	Quiz #5 available on 02/16; due by 10:00 am on 02/20
Week 7 (Feb 20, Feb 22)	Tues lecture:	Fatigue, Soreness, and Cramps (Ch 6) & Exam 2 Review
	Thurs lecture:	**Exam 2** (covers Chapters 3-6)
	Quiz:	No quiz this week
Week 8 (Feb 27, Feb 29)	Tues lecture:	Cardiovascular System & Its Control (Ch 7)
	Thurs lecture:	Cardiovascular System & Its Control (Ch 7) & Respiratory System & Its Regulation (Ch 8)
	Quiz:	Quiz #6 available on 03/01; due by 10:00 am on 03/06
Week 9 (Mar 5, Mar 7)	Tues lecture:	Respiratory System & Its Regulation (Ch 8)
	Thurs lecture:	Cardiorespiratory Responses to Acute Exercise (Ch 9)
	Quiz:	Quiz #7 available on 03/08; due by 10:00 am on 03/19
	Assignment:	Assignment #1 due by 11:59 pm on 03/08
Week 10 (Mar 12, Mar 14)	*No class—Spring Break*	
Week 11 (Mar 19, Mar 21)	Tues lecture:	Cardiorespiratory Responses to Acute Ex (Ch 9) & Exam 3 Review
	Thurs lecture:	**Exam 3** (covers Chapters 7-9)
	Quiz:	No quiz this week
Week 12 (Mar 26, Mar 28)	Tues lecture:	Principles of Exercise Training (Ch 10)
	Thurs lecture:	Adaptations to Resistance Training (Ch 11)
	Quiz:	Quiz #8 available on 03/29; due by 10:00 am on 04/02
Week 13 (Apr 2, Apr 4)	Tues lecture:	Adaptations to Resistance Training (Ch 11)
	Thurs lecture:	Adaptations to Aerobic & Anaerobic Training (Ch 12)
	Quiz:	Quiz #9 available on 04/05; due by 10:00 am on 04/09
Week 14 (Apr 9, Apr 11)	Tues lecture:	Adaptations to Aerobic & Anaerobic Training (Ch 12)
	Thurs lecture:	Exercise in Hot and Cold Environments (Ch 14)
	Quiz:	Quiz #10 available on 04/12; due by 10:00 am on 04/16
Week 15 (Apr 16, Apr 18)	Tues lecture:	Exercise in Hot and Cold Environments (Ch 14) & Altitude, Hyperbaric Environ, & Microgravity (Ch 15)
	Thurs lecture:	Altitude, Hyperbaric Environ, & Microgravity (Ch 15) & Exam 4 Review
	Quiz:	No quiz this week
	Assignment:	Assignment #2 due by 11:59 pm on 04/19
Finals Week		**Exam 4** (covers Chapters 10-12, 14-15) *Dates and times for final exams are TBD*

[Once you finish reading the syllabus, email me a YouTube link to one of your favorite songs to receive 1 bonus point on Exam 1. The deadline is 11:59 pm on January 14, 2024.]

EVALUATION AND GRADING

Evaluation Category:	Proportion of Final Grade:
Attendance	10%
Assignments	20%
Quizzes (10 total; *lowest quiz will be dropped*)	10%
Exam One	15%
Exam Two	15%
Exam Three	15%
Exam Four	15%

The following grading scale will be used to determine final course grades:

Letter grade:	Percentage:		Letter grade:	Percentage:
A	≥ 93.00%		C	73.00 to 76.99%
A-	90.00 to 92.99%		C-	70.00 to 72.99%
B+	87.00 to 89.99%		D+	67.00 to 69.99%
B	83.00 to 86.99%		D	63.00 to 66.99%
B-	80.00 to 82.99%		D-	60.00 to 62.99%
C+	77.00 to 79.99%		F	< 60%

Incomplete (I) or G Grades:
Students must complete all course requirements to receive a grade for this course. In the event of extenuating personal circumstances, such as a medical emergency or a death in the family, an I grade (incomplete course work) or G grade (course work unfinished because of extenuating personal circumstances) may be awarded to signify unfinished course work. *G grades will not be an option for students who fall behind in the course for non-emergency reasons.* Students assigned I or G grades are required to complete course requirements no later than one year after the term in which the course was taken. After the deadline has passed, the I or G grade will remain on the record, and the student will be required to re-register for the course if it is needed to fulfill requirements for graduation.

COURSE COMMUNICATION

- Canvas will be the primary source for all course-related communication and materials, including lecture notes, quizzes, exams, and announcements.
- Announcements may be supplemented by messages sent by the instructor to the students' Pitt e-mail addresses (i.e., xxxx@pitt.edu). As a result, *it is the student's responsibility to check his or her Pitt e-mail address regularly.*
- Dr. Kline can best be reached via e-mail. To ensure a prompt reply, please include 'HHD 1042' in the subject line. Please allow up to 1 full business day for a response.

TEACHING SURVEY

Students will be asked to complete a *Student Opinion of Teaching Survey*. Surveys will be sent via Pitt e-mail and appear on your Canvas page during the last three weeks of class. Your responses are anonymous. Please take time to thoughtfully respond; your feedback is important to me and future offerings of this course. Read more about these surveys here.

ACADEMIC POLICIES

Course Policies:

Any student caught cheating (includes any form of academic dishonesty such as copying answers, taking quizzes with another students, plagiarism, etc.) will result in an automatic "F" in this course. Additionally, the student will be reported to the appropriate university officials, and it will go on file in the student's academic record.

University Policies:

Academic Integrity

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the Academic Integrity Guide for an overview of the topic. For hands-on practice, complete the Understanding and Avoiding Plagiarism tutorial.

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Accessibility

The Canvas LMS platform was built using the most modern HTML and CSS technologies and is committed to W3C's Web Accessibility Initiative and Section 508 guidelines. Specific details regarding individual feature compliance are documented and updated regularly.

Equity, Diversity, and Inclusion

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, visit the Civil Rights & Title IX Compliance web page.

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-7860, or e-mailing titleixcoordinator@pitt.edu. Reports can also be filed online at this link. You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office for Equity, Diversity, and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

Copyright Notice

Course materials may be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials.

See Library of Congress Copyright Office and the University Copyright Policy.

Statement on Classroom Recording

"To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use."

Department of Health and Human Development Student Grievance Policy:

If a student feels that they have been treated unfairly by the instructor with regard to their grade or other aspects of their course participation, there are a series of steps that should be taken in an attempt to resolve this matter. These include the following:

1. The student should first inform the instructor of the course of the issue in an attempt to resolve this matter. If the course is taught by a Teaching Assistant, Graduate Student, or Part-Time instructor, their faculty supervisor should also be informed of this matter. The student should bring this issue to the attention of the instructor in a timely matter and should maintain a record of interactions that occurred with the instructor regarding the matter in question. The course instructor should take necessary steps to address the concern raised by the student in a timely matter and should maintain a record of the interactions that occurred with the student regarding this matter.
2. If, after reasonable attempts to resolve the matter, the matter is not resolved in a manner that is deemed to be acceptable to the student, the student retains the right to file a grievance. This grievance is to be filed with the Department Chair in the form of a written document that can be submitted via email or campus mail. This document should include the following:
    a. Student's name
    b. Student contact information (email, address, telephone number)
    c. Information on the course for which the grievance applies (course title, course number, instructor name)
    d. A copy of the course syllabus that was provided to the student by the instructor
    e. Detailed description of the grievance and additional information the student feels is pertinent to this matter.

    After receiving this information, the Department Chair will inform the student if additional information is needed, as appropriate will discuss this matter with the student and the instructor, and will issue a decision in a timely manner.
3. If the student is not willing to accept the decision of the Department Chair, the student will be informed that they can request an additional review of this matter through the Office of the Dean of the School of Education. If the student decides to pursue this, the student should contact the Associate Dean for Student Affairs & Certification in the School of Education at the University of Pittsburgh.

APPENDIX: ACSM Task Statements: Institutional Competencies

Curriculum for Educational Programs in Exercise Sciences		
Task	**Performance Domains and Associated Job Tasks**	**Lecture/ Lab/Both**
I.B.1.h	Knowledge of risk factors that may be favorably modified by physical activity habits.	Lecture
I.C.1.a	Knowledge of the physiological basis of the components of health-related physical fitness (cardiorespiratory fitness, muscular strength, muscular endurance, flexibility, body composition).	Lecture
I.D.1.a	Knowledge of common submaximal and maximal cardiorespiratory fitness assessment protocols.	Lab
I.D.1.b	Knowledge of blood pressure measurement techniques.	Lab
I.D.1.c	Knowledge of Korotkoff sounds for determining systolic and diastolic blood pressure.	Lab
I.D.1.d	Knowledge of the blood pressure response to exercise.	Lab
I.D.1.e	Knowledge of techniques of measuring heart rate and heart rate response to exercise.	Lab
I.D.1.f	Knowledge of the rating of perceived exertion (RPE).	Lab
I.D.1.h	Knowledge of the anatomy and physiology of the cardiovascular and pulmonary systems.	Lecture
I.D.1.l	Knowledge of oxygen consumption dynamics during exercise (e.g., heart rate, stroke volume, cardiac output, ventilation, ventilatory threshold).	Both
I.D.1.m	Knowledge of methods of calculating VO_{2max}.	Both
I.D.1.n	Knowledge of cardiorespiratory responses to acute graded exercise of conditioned and unconditioned participants.	Lecture
I.D.2.b	Skill in locating anatomic landmarks for palpation of peripheral pulses and blood pressure.	Lab
I.D.2.c	Skill in measuring heart rate, blood pressure, and RPE at rest and during exercise.	Lab
I.D.2.d	Skill in conducting submaximal exercise tests (e.g., cycle ergometer, treadmill, field testing, step test).	Lab
I.D.2.e	Skill in determining cardiorespiratory fitness based on submaximal exercise test results.	Lab
II.A.1.b	Knowledge of the benefits and precautions associated with exercise training in apparently healthy participants and those with controlled disease.	Lecture
II.A.1.e	Knowledge of the physiologic changes associated with an acute bout of exercise.	Both
II.A.1.f	Knowledge of the physiologic adaptations following chronic exercise training.	Lecture
II.A.1.i	Knowledge of the physiological principles related to warm-up and cool-down.	Lecture
II.A.1.j	Knowledge of the principles of reversibility, progressive overload, individual differences and specificity of training, and how they relate to exercise prescription.	Lecture
II.A.1.k	Knowledge the role of aerobic and anaerobic energy systems in the performance of various physical activities.	Lecture
II.B.1.k	Knowledge of the anatomy and physiology of the cardiovascular and pulmonary systems including the basic properties of cardiac muscle.	Lecture
II.B.1.l	Knowledge of the basic principles of gas exchange.	Lecture
II.C.1.h	Knowledge of the types of muscle contractions (e.g., eccentric, concentric, isometric).	Lecture
II.C.1.j	Knowledge of acute and delayed onset muscle soreness (DOMS).	Lecture
II.C.1.k	Knowledge of the anatomy and physiology of skeletal muscle fiber, the characteristics of fast-and slow-twitch muscle fibers, and the sliding filament theory of muscle contraction.	Lecture

II.C.1.l	Knowledge of the stretch reflex, proprioceptors, golgi tendon organ (GTO), muscle spindles, and how they relate to flexibility.	Lecture
II.C.1.m	Knowledge of muscle-related terminology including atrophy, hyperplasia, hypertrophy.	Lecture
II.C.1.o	Knowledge of the physiology underlying plyometric training and common plyometric exercises (e.g., box jumps, leaps, bounds).	Lecture
II.G.1.a	Knowledge of normal maturational changes across the lifespan and their effects (e.g., skeletal muscle, bone, reaction time, coordination, posture, heat and cold tolerance, maximal oxygen consumption, strength, flexibility, body composition, resting and maximal heart rate, resting and maximal blood pressure).	Lecture
II.G.1.g	Knowledge of the effects of the aging process on the musculoskeletal and cardiovascular structures and functions during rest, exercise, and recovery.	Lecture
II.H.1.a	Knowledge of the effects of various environmental conditions on the physiologic response to exercise (e.g., altitude, variable ambient temperatures, humidity, environmental pollution).	Lecture
II.H.1.c	Knowledge of the role of acclimatization when exercising in various environmental conditions (e.g., altitude, variable ambient temperatures, humidity, environmental pollution).	Lecture
Curriculum for Educational Programs in Exercise Sciences with Strength and Conditioning Add-on		
Task	**Performance Domains and Associated Job Tasks**	**Lecture/ Lab/Both**
I.A.1.a	Knowledge of the anatomy and physiology of muscle cells	Lecture
I.A.1.b	Knowledge of the anatomy and function of motor units (i.e., fast and slow twitch characteristics)	Lecture
I.A.1.g	Knowledge of the role of muscle actions in performance development (e.g., eccentric, concentric, isometric).	Lecture
I.A.1.h	Knowledge of the stretch reflex, proprioceptors, Golgi tendon organ (GTO), muscle spindles, and their function.	Lecture
II.A.1.a	Knowledge of acute factors that affect a muscle contraction (e.g., hydrogen, glycogen, fluid, electrolytes)	Lecture
II.A.1.b	Knowledge in muscle contraction response to stress (e.g., work/rest ratio, time under tension, workload)	Lecture
II.A.1.c	Knowledge of energy system employment in response to intensity and duration (i.e., phosphagen system, glycolytic system, aerobic system)	Lecture
II.A.1.d	Knowledge of acute and chronic cellular response to intensity and duration (e.g., energy system interaction, consequential byproducts of the energy system, the effect of rest intervals on substrate replenishment and byproduct removal)	Lecture
II.A.1.e	Knowledge of causes of fatigue (i.e., acute peripheral, peripheral, chronic)	Lecture
II.A.1.g	Knowledge of acute responses and chronic adaptations to exercise and training (e.g., cardiovascular, metabolic, endocrine, neuromuscular, musculoskeletal)	Lecture
II.A.1.h	Knowledge of the force-velocity relationship for adaptational response in sport	Lecture
II.A.1.i	Knowledge of muscle fiber characteristics, recruitment patterns and training adaptations to aerobic and anaerobic training (e.g., structural, neural, metabolic)	Lecture
II.A.1.j	Knowledge of the effects of detraining (e.g., structural, neural, metabolic)	Lecture
V.A.1.b	Knowledge of the principles of training (e.g., overload, specificity, progression, reversibility, individualization, priority, tapering, recovery, concurrent)	Lecture
V.A.1.c	Knowledge of the principles of programming (e.g., mode, frequency, intensity, duration, rest intervals, recovery periods, sets, reps, volume, time under tension)	Lecture
V.A.1.f	Knowledge of aerobic training systems (e.g., steady-state, interval, tempo, LSD, lactate threshold, cross-training)	Lecture

V.A.1.i	Knowledge of the types of resistance training modes (e.g., free weights, variable resistance equipment, pneumatic machines, bands)	Lecture
V.A.1.k	Knowledge of interplay of specific program factors (e.g., mode, frequency, intensity, duration, rest intervals, recovery periods, sets, repetitions, volume, time under tension, exercise selection, order)	Lecture
V.A.1.l	Knowledge of recovery and physiological factors that affect performance, adherence and program decisions (e.g., types of fatigue and delayed onset muscle soreness)	Lecture