

# Department of Kinesiology San Jose State University

## Kin 155 - Exercise Physiology Spring, 2015

### Contact Information

<b>Instructor:</b>	Craig J. Cisar, Ph.D.
<b>Office Location:</b>	YuH 242
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<b>Office Hours:</b>	W 1100-1400 (Posted Outside of YuH 242)
<b>Class Days/Time:</b>	Lecture MW 0930-1020; Lab MTWTR 0730-0920
<b>Classroom:</b>	Lecture YuH 124; Lab YuH 233
<b>Prerequisites:</b>	KIN 70 - Introduction to Kinesiology, BIOL 66 - Human Physiology, CHEM 30A - Introductory Chemistry or higher level chemistry course, and a general education mathematics course (Area B4), or equivalents.

### Faculty Web Page and MYSJSU Messaging (Optional)

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on my faculty web page at <http://www.sjsu.edu/people/craig.cisar/courses/kin155/>. You are responsible for regularly checking with the messaging system through MySJSU (or other communication system as indicated by the instructor) to learn any updates.

### Course Description

Exercise physiology examines the physiological responses and adaptations of the human organism to physical activity. Considerable emphasis is given toward understanding how the body functions during exercise and adapts to long-term training. Topics related to neuromuscular physiology, bioenergetics, cardiorespiratory physiology, circulation, neuroendocrinology, and cellular developmental traits will be presented and interrelated. In addition, the physiological effects of factors such as age, gender, body composition, and the environment on human performance will be discussed. Lectures and discussions will focus on applying the information from these topics into a framework for conditioning programs designed to improve performance and promote health enhancement.

## **Undergraduate Degree Program Learning Objectives (PLO)**

At the end of a Bachelor of Science degree program in the Department of Kinesiology students should be able to:

1. obtain a critical understanding and the ability to apply theoretical and scientific knowledge from the subdisciplines in kinesiology for personal fitness, healthy lifestyles, sport, and/or therapeutic rehabilitation.
2. effectively communicate the essential theories, scientific applications, and ethical considerations related to kinesiology.
3. apply scholarship and practice of different movement forms to enhance movement competence in kinesiology.
4. recognize and apply sustainable approaches as they relate to kinesiology.
5. identify social justice and equity issues related to kinesiology for various populations.

### **Course Learning Outcomes**

Following successful completion of this course, students will be able to:

1. identify and explain the basic physiological responses and training adaptations to physical activity (PLO #1 and #3).
2. analyze and identify the physiological requirements of sports and physical activities (PLO #1 and #3).
3. identify and explain various physiological factors limiting performance of various sports and physical activities (PLO #1 and #3).
4. sensitively identify and explain age, gender, cultural, and other individual differences that may exist in physiological responses, training adaptations, and performance capabilities in various sports and physical activities (PLO #1 and #5).
5. identify and explain the basic components of conditioning programs designed to improve performance and promote health enhancement (PLO #1 and #3).
6. identify and describe equipment used to measure and evaluate various physiological aspects of human performance (PLO #1 and #3).
7. collect, analyze, and interpret physiological data collected from various laboratory tests and procedures (PLO #1, #2, and #4).

### **Required Course Reader and Calculator**

1. Cisar, C.J., Thorland, W.J., & Christensen, C.L. (2015). Physiology of exercise notebook. San Jose, CA: Maple Press (available at Maple Press, 481 East San Carlos Street).
2. Battery operated hand calculator (**no cell phones**).

### **Course Requirements and Assignments**

1. SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found at <http://www.sjsu.edu/senate/docs/S12-3pdf>.

2. Students are responsible for information presented in lecture and laboratory sessions, whether present or not, as students are expected to attend the laboratory and lecture sections in which they are enrolled. In addition, students are responsible for material presented in the assigned readings.
3. Active participation in the laboratory sessions is expected. Laboratory sessions are designed to supplement the lecture material. Laboratory sessions will consist of data collection, data analysis, and discussion of the results obtained during the laboratory sessions. Students are expected to study the data collected and answer questions during and at the end of each lab. This material will then be covered on lab exams.
4. Lecture examinations will cover lecture materials and related assigned readings. Laboratory examinations will cover the conceptual and technical aspects of the material presented in the laboratory sessions and related laboratory materials. All examinations will be conducted as closed textbook and notebook. Both the lecture and laboratory examinations will be objective examinations consisting of multiple choice, matching, and/or true-false questions; the examinations may involve calculations. **EXAMINATIONS WILL BE GIVEN AT THE SCHEDULED TIME ONLY AND NO MAKE-UP EXAMINATIONS WILL BE GIVEN**, except for dire and serious illnesses. If this should occur, the instructor must be notified personally PRIOR to the examination. Students should be aware that more than a superficial understanding of concepts will be necessary in order to apply the information given in class and related readings to situations presented in examination questions.
5. Students will have the opportunity to earn additional points through participation in laboratory activities and completion of laboratory assignments. The maximum additional points that can be earned are 5 points. Laboratory assignments will not be accepted late.

## Grading Policy

Grades will be based solely on accumulated points from the examinations and application paper with total points allocated in the following manner.

	<u>Points</u>
Two Lecture Examinations - 30 Points Each (PLO #1, #3, #4, and #5)	60
Two Lab Examinations - 20 Points Each (PLO #1, #3, #4, and #5)	<u>40</u>
Subtotal	100
Laboratory Participation and Assignments (PLO #1, #2, #4, and #5)	<u>5</u>
Total	105

Final grades will be assigned according to the following allocation of total points.

A+	98-105	B+	88-89	C+	78-79	D+	68-69	F	≤ 59
A	92-97	B	82-87	C	72-77	D	62-67		
A-	90-91	B-	80-81	C-	70-71	D-	60-61		

## Classroom Protocol

As previously stated students are expected to attend and participate the laboratory and lecture sections in which they are enrolled. The lecture and laboratory sessions will begin promptly at the scheduled time. Please limit cell phone use to class activities and emergency use only during class time. Cell phone use will not be allowed during exams and calculators cannot be shared during exams.

## University Policies

### Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](http://www.sjsu.edu/provost/services/academic_calendars/) at [http://www.sjsu.edu/provost/services/academic\\_calendars/](http://www.sjsu.edu/provost/services/academic_calendars/). The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

### Consent for Recording of Class and Public Sharing of Instructor Material

[University Policy S12-7](http://www.sjsu.edu/senate/docs/S12-7.pdf), <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor's permission to record the course.

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”
  - Students have the permission of the instructor to make audio or video recordings of the lecture and laboratory presentations during the course.
  - During active participation in the laboratory sessions, permission from those students participating in the activity should be obtained from the participating students before they are video recorded.
- “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.”

### Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](http://www.sjsu.edu/senate/docs/S07-2.pdf) at <http://www.sjsu.edu/senate/docs/S07-2.pdf> requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of

Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.

### **Campus Policy in Compliance with the American Disabilities Act**

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at [http://www.sjsu.edu/president/docs/directives/PD\\_1997-03.pdf](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.

In 2013, the Disability Resource Center changed its name to be known as the Accessible Education Center, to incorporate a philosophy of accessible education for students with disabilities. The new name change reflects the broad scope of attention and support to SJSU students with disabilities and the University's continued advocacy and commitment to increasing accessibility and inclusivity on campus.

### **Tentative Schedule of Lecture Topics and Examinations**

Introduction

Central and Peripheral Nervous System Control of Movement

Contractile Model

Muscle Fiber Type Variations and Properties

Three Basic Principles of Exercise Physiology

Motor Unit Response Characteristics

Determinants of Force Production

Influences on Speed of Movement

Effects of Muscular Fatigue on Force Production and Training Influences on Contractile-Related Factors

Phosphagen Metabolism and Glycolytic Metabolism

Oxidative Metabolism - Krebs Cycle and Electron Transport System

Energy System Characteristics and Energy Yield from Carbohydrate and Fat Metabolism

Beta Oxidation of Fatty Acids

Metabolic Response to Exercise

Free Fatty Acid Mobilization

Carbohydrate Loading and Replenishment Fluids and Other Ergogenic Aids

Muscle Histological and Biochemical Adaptations from Training

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First Lecture Examination – Monday, March 16th

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Pulmonary, Metabolic, Cardiac, and Motor Unit Recruitment Responses to Exercise  
Effects of Respiratory Rate and Depth on Alveolar Ventilation Rate  
Gas Exchange and Pulmonary Diffusion  
Plasma and Hemoglobin Transport of Oxygen  
Hemoglobin-Oxygen Dissociation Curve  
Circulatory and Cardiac Responses to Exercise  
Submaximal and Maximal Oxygen Uptake Rate  
Influences on Cardiorespiratory Responses to Exercise  
Carbon Dioxide Transport  
Lactic Production and Buffering During Exercise  
Anaerobic Threshold  
Cardiorespiratory and Metabolic Training Adaptations  
Review of Oxygen Uptake Rate Responses to Exercise  
Influence of Exercise on Growth, Aging, Coronary Heart Disease, and Other Causes of Death  
Fundamental Concepts Underlying Training Programs  
Metabolic Contributions to Energy Requirements  
Review of Oxygen Deficit and Debt Concepts  
Effects of Different Pacing Strategies on Oxygen Uptake Rate and Oxygen Deficit  
Factors Affecting Oxygen Debt and Rate of Recovery from Exercise  
Performance and Training Implications  
Interval Training Guidelines and Endurance Training Guidelines  
Concepts Related to Strength Training, Strength Training Guidelines, and Muscle Soreness  
Muscle Mass and Strength Development Trends  
Review of Gender Differences in Age Trends of Body Composition  
Review of Training Adaptations

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Second Lecture Examination – Friday, May 15th, 0715-0930

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Tentative Laboratory Topics and Examinations

Week	Dates	Lab #	Topics/Examinations
1	1-22		No Lab
2	1-26/27/28/29	1	Characteristics of Muscular Strength and Contractile Responses: Electromyography Responses

Week	Dates	Lab #	Topics/Examination
3	2-2/3/4/5	2	Characteristics of Muscular Strength and Contractile Responses: Isokinetic Responses
4	2-9/10/11/12	3	Anaerobic Work Indices
5	2-16/17/18/19	4	Determination of Resting Metabolic Rate by Open Circuit Calorimetry and Energy Expenditure
		6	Cardiorespiratory and Metabolic Responses During Submaximal
6	2-23/24/25/26	5	Determination of Heart Rate and Blood Pressure Basic Interpretation of Electrocardiograms
7	3-2/3/4/5		First Lab Examination
8	3-9/10/11/12	7	Determination of Maximal Oxygen Uptake Rate and Anaerobic Threshold
9	3-16/17/18/19	8	Astrand-Rhyming Bicycle Ergometer Test and Other Field Tests for Determination of Maximal Oxygen Uptake Rate
10	3-23/24/25/26		Spring Break
11	3-30/31 & 4-1/2		No Lab
12	4-6/7/8/9	9	Pulmonary Function Testing
13	4-13/14/15/16	10	Body Composition - Underwater Weighing
15	4-20/21/22/23	11	Anthropometric Determination of Body Composition
15	4-27/28/29/30	12	Anthropometric Determination of Body Build Characteristics
16	5-4/5/6/7		Second Lab Examination
17	5-11/12/13		No Lab

