

Department of Kinesiology

San José State University

KIN 154A Instrumentation in Exercise Physiology & Biomechanics Spring 2013

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Office Hours:	MW 10:00 - 11:30 am Other times available by appointment	Office Hours:

Class Days/Time	Sec 1,3 (Lecture) M 4:30-5:20 pm Sec 2,4 (Lab) MW 5:30-7:20 pm
Classroom:	SPX 208 (sec 1,2); SPX 82 (sec 3,4); switch rooms mid-semester
Prerequisites:	KIN 70, 155, 158 with grades of C- or better; Human Anatomy, Human Physiology, Introductory Chemistry, GE Math

Course Description

This class is designed to assist the student in becoming familiar and proficient with the methods and instruments of assessing physiological and biomechanical characteristics of human performance.

Kinesiology Undergraduate Major Program Learning Outcomes (KIN PLOs)

At the end of a Bachelor of Science degree program in the Department of Kinesiology, students should expect:

- (1) to 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) to effectively communicate the essential theories, scientific applications, and ethical considerations related to kinesiology.
- (3) to apply scholarship and practice of different movement forms to enhance movement competence in kinesiology.
- (4) to recognize and apply sustainable approaches as they relate to kinesiology.
- (5) to identify social justice and equity issues related to kinesiology for various populations.

Course-Specific Student Learning Outcomes (SLOs)

Upon successful completion of the course, students will:

Exercise Physiology

- (1) demonstrate knowledge of instruments and procedures used in physiological testing. (PLO 1, 2)
- (2) demonstrate proficiency in administering selected physiological tests. (PLO 1, 2)
- (3) interpret and explain test results. (PLO 1, 2)
- (4) demonstrate knowledge of the underlying principles, benefits, and limitations of selected physiological tests. (PLO 1, 2)
- (5) demonstrate sensitivity to age, gender, cultural, and other individual differences as they relate to the physiological assessment of human performance. (PLO 1, 5)
- (6) demonstrate critical thinking and problem solving skills. (PLO 1)

Biomechanics

- (7) demonstrate knowledge and use of equipment and procedures to collect biomechanical video data. (PLO 1, 2)
- (8) demonstrate proficiency in analyzing and interpreting biomechanical video data. (PLO 1, 2)
- (9) demonstrate knowledge and use of equipment and procedures to collect biomechanical acceleration data. (PLO 1, 2)
- (10) demonstrate proficiency in analyzing and interpreting biomechanical acceleration data. (PLO 1, 2)

Methods

- (1) Lecture/discussion
- (2) Demonstration
- (3) Observation
- (4) Assigned readings
- (5) Laboratory experience - emphasis on hands-on practice to develop competence

Course Content

- (1) Anthropometry & body composition
 - (a) Height, weight, circumferences, and diameters
 - (b) Bioelectrical impedance analysis (BIA)
 - (c) Skinfold measurements
 - (d) Hydrostatic weighing
 - (e) Air displacement plethysmography (Bod Pod)
 - (f) Dual-energy X-ray absorptiometry (DXA)
- (2) Pulmonary function
 - (a) Spirometry: static and dynamic lung volumes
 - (b) Environmental conditions
 - (c) Residual volume: measuring and estimating
- (3) Fitness & health assessments - Trifit, Cholestech
- (4) Qualitative and quantitative movement analysis – video & acceleration data
- (5) Miscellaneous topics
 - (a) Equipment calibration and operation
 - (b) Selection of tests
 - (c) Equipment specifications
 - (d) Analysis and interpretation of results

Evaluation

The final course grade will be determined 50% from the exercise physiology unit and 50% from the biomechanics unit.

Calculating Grades

A+	97-100%	C+	77-79%
A	93-96%	C	73-76%
A-	90-92%	C-	70-72%
B+	87-89%	D+	67-69%
B	83-86%	D	63-66%
B-	80-82%	D-	60-62%
		F	<60%

Requirements

- ! Heyward, V. H., & Wagner, D. R. (2004). *Applied body composition assessment* (2nd ed.). Champaign, IL: Human Kinetics.
- ! Course reader for exercise physiology — available at first class. After the first class, available at Maple Press (481 E. San Carlos, 408-297-1000)
- ! Battery-operated calculator
- ! Biomechanics chapter and laboratory handouts: Available on Dr. Kao's website
- ! Recommended textbooks for biomechanics half of course:
 - McGinnis, P. M. (2005). *Biomechanics of sport and exercise* (2nd ed.). Champaign, IL: Human Kinetics.
 - Muscolino, J. E. (2010). *The muscular system manual: The skeletal muscles of the human body* (3rd ed.). St. Louis, MO: Elsevier-Mosby.

University Policies

Academic Integrity

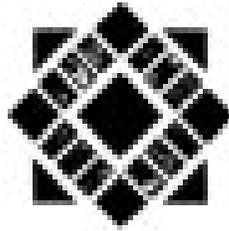
The University's [Academic Integrity Policy](http://sa.sjsu.edu/judicial_affairs/faculty_and_staff/academic_integrity/index.html) is available at http://sa.sjsu.edu/judicial_affairs/faculty_and_staff/academic_integrity/index.html. Your own commitment to learning, as evidenced by your enrollment at San José State University and the University's integrity policy, 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](http://www.sa.sjsu.edu/judicial_affairs/index.html), located at http://www.sa.sjsu.edu/judicial_affairs/index.html. Plagiarism and cheating are serious offenses. Students should carefully read the attached information on academic integrity and plagiarism.

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 requires that students with disabilities requesting accommodations must register with the [Disability Resource Center](http://www.drc.sjsu.edu/) (DRC) at <http://www.drc.sjsu.edu/> to establish a record of their disability. The DRC is located in ADM 110 (408-924-6000 [voice] or 408-924-5990 [TDD]).

Adding, Dropping, Late Withdrawals, and Incompletes

February 4 is the last day to drop this course without a “W” being assigned. According to University policy, dropping this course after Feb. 4 is permissible only for serious and compelling reasons, and requires written documentation. Unsatisfactory performance in course work is not a serious and compelling reason. The last day to add the course is Feb. 11. However, students who receive add codes should use them within 1 day, or the class space and add code may be given to another student. The university policies on late withdrawals and incompletes will be strictly followed.



San José State **UNIVERSITY**

The following information on academic integrity has been excerpted from the San José State University Academic Integrity Policy (policy S04-12). The complete policy is available at <http://www2.sjsu.edu/senate/S04-12.pdf>.

SAN JOSE STATE UNIVERSITY

ACADEMIC INTEGRITY POLICY

The University emphasizes responsible citizenship and an understanding of ethical choices inherent in human development. Academic honesty and fairness foster ethical standards for all those who depend upon the integrity of the university, its courses, and its degrees. This policy sets the standards for such integrity and shall be used to inform students, faculty and staff of the university's Academic Integrity Policy. The public is defrauded if faculty and/or students knowingly or unwittingly allow dishonest acts to be rewarded academically and the university's degrees are compromised.

Student Role

It is the role and obligation of each student to:

1. Know the rules that preserve academic integrity and abide by them at all times. This includes learning and following the particular rules associated with specific classes, exams and/or course assignments. Ignorance of these rules is not a defense to the charge of violating the Academic Integrity Policy.
2. Know what the consequences of violating the Academic Integrity Policy will be, students' appeal rights, and the procedures to be followed in the appeal.
3. Foster academic integrity among peers.

1.0 Definitions of Academic Dishonesty

1.1 Cheating

At SJSU, cheating is the act of obtaining or attempting to obtain credit for academic work through the use of any dishonest, deceptive, or fraudulent means. Cheating at SJSU includes but is not limited to:

- 1.1.1 Copying, in part or in whole, from another's test or other evaluation instrument including homework assignments, worksheets, lab reports, essays, summaries, quizzes, etc.;
- 1.1.2 Submitting work previously graded in another course unless this has been approved by the course instructor or by departmental policy;
- 1.1.3 Submitting work simultaneously presented in two courses, unless this has been approved by both course instructors or by the department policies of both departments;
- 1.1.4 Using or consulting, prior to, or during an examination, sources or materials not authorized by the instructor;
- 1.1.5 Altering or interfering with the grading process;
- 1.1.6 Sitting for an examination by a surrogate, or as a surrogate;
- 1.1.7 Any other act committed by a student in the course of their academic work which defrauds or misrepresents, including aiding or abetting in any of the actions defined above.

1.2 Plagiarism

At SJSU plagiarism is the act of representing the work of another as one's own without giving appropriate credit, regardless of how that work was obtained, and/or submitting it to fulfill academic requirements. Plagiarism at SJSU includes but is not limited to:

- 1.2.1 The act of incorporating the ideas, words, sentences, paragraphs, or parts of, and/or the specific substance of another's work, without giving appropriate credit, and/or representing the product as one's own work;
- 1.2.2 Representing another's artistic/scholarly works such as musical compositions, computer programs, photographs, paintings, drawings, sculptures, or similar works as one's own.

2.0 Notification of Standards of Detecting Plagiarism

- 2.1 SJSU or its faculty may subscribe to and/or use plagiarism detection services.

Exercise Physiology Instrumentation

Evaluation	Weighting	SLO
Competency Tests (2% each)	10%	1, 2
Professionalism, Care of Equipment	3%	1, 2, 5, 6
Anthropometric Lab	5%	1, 3
BIA Lab	5%	1, 3
Skinfold Lab	5%	1, 3
Hydrostatic Weighing Lab	5%	1, 3
Bod Pod Lab	5%	1, 3
Spirometry Lab	5%	1, 3
Trifit & Cholestech Lab	5%	1, 3
Body Composition Project	12%	1, 3, 5, 6
Quizzes (6 of 7 counted)	15%	1, 3, 4, 6
Lab Practical Exam	10%	1, 2, 6
Written Midterm or Final Exam	15%	1, 3, 4, 5, 6

Competency Tests

Students will demonstrate competency on ALL of the following:

- Measuring height
- Measuring weight
- Measuring skinfolds
- Performing hydrostatic weighing
- Measuring barometric pressure

Grading on competency tests:

A (95%) = excellent technique (performed smoothly & with confidence, accurate results)
 B (85%) = good technique (minor corrections needed)
 F (50%) = poor or weak technique (significant errors, questionable data)
 0 pts = did not attempt competency

Students receiving less than an A grade will receive feedback and may, after further practice, retake the competency on another day. If a student does not attempt a competency by the first deadline date, the score may be lowered one letter grade for each week, or part of a week, that the deadline is missed. During labs, students are responsible for signing up on the white board when they are READY for a competency test. If you are not ready when called for your competency test, you must sign up again at

the bottom of the list. To reduce stress, practice and attempt your competencies BEFORE the first deadline date. The last day to complete competencies is during the practical examination (if time allows, maximum of one competency tested.)

Professionalism, Care of Equipment

This is a professional preparation course. Students are expected to:

- **Be fully prepared;** actively and enthusiastically participate in all laboratory sessions and class discussions.
- **Read assigned material and lab instructions BEFORE class.** (Lecture and lab time will be used to present material, help students master techniques, and check competencies. Students are directed to the green sheet and course reader for answers to many of their procedural questions.)
- Bring textbook, calculator, course reader, and other necessary supplies to class.
- Dress appropriately for scheduled activities.
- Participate in demonstrations and data collection.
- Enthusiastically serve as a client for others.
- PRACTICE, PRACTICE, PRACTICE techniques. **Use your class time effectively!** Ask for guidance from instructor if having difficulty mastering a technique.
- Complete competencies and assignments on time.
- Use equipment properly; clean and put away all equipment before leaving lab area.
- Keep lab clean. No food or drinks are allowed in the lab, except water.
- Maintain lab security (confidentiality of omnilock code; lock lab if leaving for even 1 min).

Students who consistently demonstrate professionalism, as described above, WILL be able to complete all lab assignments and competencies in a timely manner. Students who choose not to use laboratory time effectively may not complete all assignments, and should not expect the instructor to ensure that they do. **In an 8-week, lab-intensive class, if you fall behind it may be impossible to catch up.**

The most effective class results when EACH class member makes an INDIVIDUAL COMMITMENT to be an active participant in the teaching/learning process. Individual contributions and differing viewpoints will be appreciated and respected. Students are responsible for material presented and announcements made in each class. Students who miss class (a rare occurrence!) are responsible for obtaining material from another student BEFORE seeing the instructor about content missed.

Labs and Body Composition Project

Guidelines and forms are in the course reader. Refer to the class schedule for due dates. Written work must be typed or neatly hand-written. Remember to proofread and check for completeness before turning in.

Due Date	Received	Grade Lowered
Monday	After class Mon. through Wed.	1 grade step (eg, B+ $\hat{=}$ B)
	Thurs. or Fri.	2 grade steps (eg, B+ $\hat{=}$ B-)
	Sat. through following Mon.	1 full grade (eg, B+ $\hat{=}$ C+)
Wednesday	After class Wed. through Fri.	1 grade step
	Sat. through Mon.	2 grade steps
	Tues. or following Wed.	1 full grade

Students must speak with the instructor regarding assignments that are over 1 week late.

Laboratory Practical Exam

- ! Students will demonstrate skill on two assessments:
 - Two sites covered in class for girths OR bone diameters (circumferences or diameters and sites will be randomly determined, AND
 - Spirometry (Collins spirometer)
- ! A 25 minute test session will be scheduled; all assessments must be completed in this time period.
- ! After a student is tested, he/she will serve as the client for the next individual and should be dressed appropriately. If there is no test immediately before, the student being tested must bring a client. The client may NOT be a class member unless he/she has been tested.
- ! Grades will be based on ability to: (a) give accurate and complete instructions to participant, (b) administer test correctly and obtain accurate data. **Calculations are not required during the laboratory practical.**
- ! During the practical exam, students who realize they have made an error should correct the error. (It's better to correct an error than to hope/think it will be undetected. Proficiency in testing includes recognizing your errors.)
- ! When administering a test, collect only the measurements necessary to obtain accurate data. You do not need to fill in every blank on the data sheet.
- ! Grading:

A (+,-)	=	No errors or very minor errors, technique & data are good
B (+,-)	=	Minor errors, needs some additional practice
C (+,-)	=	Significant errors
D (+,-)	=	Poor technique, accuracy of data is highly questionable
F	=	Unable to obtain data without significant help, or data are invalid

Converting Letter Grades to Percentages

A+ = 98%	A = 95%	A- = 91%
B+ = 88%	B = 85%	B- = 81%
C+ = 78%	C = 75%	C- = 71%
D+ = 68%	D = 65%	D- = 61%
F = ≤ 50%		

Quizzes & Written Midterm or Final Exam

- ! In-class quizzes (Quizzes 1-5) and the midterm (sec. 1) or final exam (sec. 3) will cover theoretical background, use of equipment, data collection and interpretation. You will need a scantron 815E and #2 pencil for each quiz. For the midterm (sec. 1) or the final exam, you will need a scantron 882E and #2 pencil.
- ! Questions may include true-false, multiple choice, short answer, problems, and calculations.
- Pre-lab questions (completed online – Desire2Learn) **MUST** be completed before 11:00 am on the lab day. There is **no** make-up or second chance to complete the pre-lab questions, so **plan accordingly!** If you start early enough, you will have options if there are technological problems (e.g., on-campus computers if your computer breaks or you have internet connection problems). If you wait until the last minute and there are technological problems, accept the consequences without complaint. The total points on the pre-lab questions will be equivalent to two quiz scores. Quiz 6 = pre-lab questions on skinfolds, hydrostatic weighing, and ADP. Quiz 7 = pre-lab questions on environmental conditions/pulmonary and health/fitness assessments. Pre-lab questions are to be completed independently, NOT in a group. Carefully read the information on

the University's Academic Integrity Policy; violations will be reported with appropriate sanctions taken. Earning your college degree is important – think carefully before jeopardizing this process!

! Six of seven quiz scores will be counted; the lowest quiz score will be dropped.

Make-ups for in-class quizzes and exams are permitted only for illness and emergency (TRULY EXTRAORDINARY CIRCUMSTANCES). The student is responsible for notifying the instructor and making arrangements at the earliest possible time. In most cases, the quiz/exam must be completed before the next class meeting. All requests for make-up exams will be evaluated on an individual basis. Again, there is **NO MAKE-UP** for missed pre-lab questions.

Example

Component	% Earned	X	Points Possible	Points
Competency Tests	B, 85%, A, 95%, A, 95%, A, 95%, A, 95%, A, 95% Avg = 93%	X	10	9.3
Professionalism	90%	X	3	2.7
Anthropometric Lab	85%	X	5	4.25
BIA Lab	94%	X	5	4.7
Skinfold Lab	82%	X	5	4.1
Hydrostatic Lab	85%	X	5	4.25
Bod Pod Lab	100%	X	5	5.0
Pulmonary Lab	75%	X	5	3.75
Trifit Lab	100%	X	5	5.0
Body Comp. Project	92%	X	12	11.04
Quizzes	Avg = 77%	X	15	11.55
Lab Practical Exam	A- 91%, B, 85% Avg = 88%	X	10	8.8
Midterm or Final Exam	81%	X	15	12.15
Total for exercise physiology half of course				86.59
86.59 out of 100 pts converted to 43.3 out of 50 pts for exercise physiology half of course				B+
50 pts possible in exercise physiology half; 50 pts possible in biomechanics half of course				

PROPOSED SCHEDULE (Sec. 1)

(Subject to change with fair notice –any changes will be announced in class)

*Readings from Heyward & Wagner text. In addition to the text assignments, students should read the appropriate sections of the exercise physiology course reader BEFORE class.

CT: Date for completion of first attempt at competency test

DATE	TOPIC	*TEXT ASSIGNMENT	DUE
Wed., Jan. 23	Introduction & Course Overview, Body Composition Assessment Lab: Anthropometric Measurements (Height & Weight)		
Mon., Jan. 28	Lec: Anthropometric Measurements Lab: Anthropometric Measurements (Height, Weight, Circumferences, Diameters)	Chaps. 1, 5, 6	
Wed., Jan. 30	(Lecture on Bioelectrical Impedance Analysis, BIA) Lab: Anthropometric Measurements & BIA	Chap. 10	
Mon., Feb. 4	Lec: Skinfold Measurements Lab: Anthropometric Measurements, BIA, Skinfolds QUIZ 1 (Anthropometric Measurements)	Chaps. 2, 4	Pre-lab on Skinfolds CT: Height & Weight
Wed., Feb. 6	Lab: BIA & Skinfolds		Anthropometric Lab
Mon., Feb. 11	Lec: Hydrostatic Weighing QUIZ 2 (BIA & Skinfolds) Lab: Skinfolds & Hydrostatic Weighing	pp. 27-33, 37-40 Chap. 15	Pre-lab on Hydrostatic Weighing
Wed., Feb. 13	Lab: Skinfolds & Hydrostatic Weighing		BIA & Skinfold Labs CT: Skinfolds
Mon., Feb. 18	Lec: Air Displacement Plethysmography (ADP or Bod Pod) & DXA QUIZ 3 (Hydrostatic Weighing) Lab: Hydrostatic Weighing & Bod Pod	pp. 33-37 Chap. 11	Pre-lab on ADP & DXA
Wed., Feb. 20	Lab: Bod Pod & DXA Demonstration	pp. 40-47	Hydrostatic Weighing Lab

DATE	TOPIC	*TEXT ASSIGNMENT	DUE
Mon., Feb. 25	Lec: Environmental Conditions & Pulmonary Function QUIZ 4 (Bod Pod & DXA) Lab: Bod Pod & Spirometry		Pre-lab on Environ. Conditions & Pulmonary
Wed., Feb. 27	Lab: Spirometry		Bod Pod Lab Body Comp Project CT: Hydro. Weigh
Mon., Mar. 4	Lec: Health & Fitness Assessments QUIZ 5 (Environmental Conditions & Pulmonary) Lab: Spirometry, Trifit & Cholestech		Pre-lab on Health & Fitness Assmts. CT: P_{bar}
Wed., Mar. 6	Lab: Trifit & Cholestech		Spirometry Lab
Mon., Mar. 11	4:30-5:20: Trifit & Cholestech 5:30-7:20: MIDTERM EXAM		Trifit Lab
Wed., Mar. 13	Lab: Lab Practicals		

PROPOSED SCHEDULE (Sec. 3)

(Subject to change with fair notice –any changes will be announced in class)

*Readings from Heyward & Wagner text. In addition to the text assignments, students should read the appropriate sections of the exercise physiology course reader BEFORE class.

CT: Date for completion of first attempt at competency test

DATE	TOPIC	*TEXT ASSIGNMENT	DUE
Mon., Mar. 18	Lec: Body Composition Assessment Anthropometric Measurements Lab: Anthropometric Measurements (Height, Weight, Circumferences, Diameters)	Chaps. 1, 5, 6	
Wed., Mar. 20	Lab: Anthropometric Measurements		
Mon., Mar. 25	SPRING BREAK		
Wed., Mar. 27	SPRING BREAK		
Mon., Apr. 1	CAMPUS CLOSED		
Wed., Apr. 3	(Bioelectrical Impedance Analysis, BIA, Lecture) Lab: Anthropometric Measurements & BIA	Chap. 10	Pre-lab on Skinfolds CT: Height & Weight
Mon., Apr. 8	Lec: Skinfold Measurements QUIZ 1 (Anthropometric Measurements) Lab: Anthropometric Measurements, BIA, Skinfolds	Chaps. 2, 4,	Pre-lab on Skinfolds
Wed., Apr. 10	Lab: BIA & Skinfolds		Anthropometric Lab
Mon., Apr. 15	Lec: Hydrostatic Weighing QUIZ 2 (BIA & Skinfolds) Lab: Hydrostatic Weighing, BIA, & Skinfolds	pp. 27-33, 37- 40 Chap. 15	Pre-lab on Hydrostatic Weighing CT: Skinfolds
Wed., Apr. 17	Lab: Hydrostatic Weighing		BIA & Skinfold Labs

DATE	TOPIC	*TEXT ASSIGNMENT	DUE
Mon., Apr. 22	Lec: Air Displacement Plethysmography (ADP or Bod Pod), DXA QUIZ 3 (Hydrostatic Weighing) Lab: Bod Pod & Hydrostatic Weighing	pp. 33-37, 40-47 Chap. 11	Pre-lab on ADP & DXA
Wed., Apr. 24	Lab: Spirometry		Hydrostatic Weighing Lab
Mon., Apr. 29	Lec: Environmental Conditions & Pulmonary Function QUIZ 4 (ADP & DXA) Lab: Bod Pod & Spirometry		Pre-lab on Environ. Conditions & Pulmonary
Wed., May 1	Lab: Spirometry		Bod Pod Lab Body Comp Project CT: Hydro. Weigh
Mon., May 6	Lec: Health & Fitness Assessments QUIZ 5 (Envir. Conditions & Pulmonary Function) Lab: Spirometry, Trifit & Cholestech		Pre-lab on Health & Fitness Assmts. CT: P_{bar}
Wed., May 8	Lab: Trifit & Cholestech		Spirometry Lab
Mon., May 13	4:30-5:20 Trifit & Cholestech 5:30-7:20 Lab Practicals		Trifit Lab
Wed., May 15 2:45-5:00 pm	FINAL EXAM		