

**Department of Kinesiology
San José State University**

**KIN 147
Biomechanical Assessment of Movement
Fall 2015**

Instructor:	Dr. James Kao Office: Spartan Complex 173H Phone: 408-924-3026 email: james.kao@sjsu.edu Office hours: <ul style="list-style-type: none">• Thursday: 1:30 – 3:30 pm by appointment<ul style="list-style-type: none">○ Send email to reserve an appointment time• Other times available<ul style="list-style-type: none">○ Send email to request a non-office hour appointment time
Class Days, Times, and Rooms:	Lecture: M 08:30 – 09:20; Spartan Complex 160 Lab: MW 0930 – 1120; Spartan Complex 172 Lab: MW 1330 – 1520; Spartan Complex 172
Prerequisites:	KIN 70 (Introduction to Kinesiology) with grade of C- or better KIN 158 (Biomechanics) with grade of C- or better

Faculty Web Page and MYSJSU Messaging

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on Dr. Kao's faculty web page at <http://www.kin.sjsu.edu/faculty/jkao/>.

You are responsible for regularly checking your email address listed on MYSJSU for updated course information.

Course Description

This class is designed to assist the student in becoming familiar and proficient with the Biomechanical methods and equipment for assessing human movement performance characteristics with the following goals: improving movement effectiveness, preventing injuries, and assessing rehabilitation progress.

Kinesiology Undergraduate Major Program Learning Objectives (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.

Course-Specific Student Learning Objectives (SLOs)

Upon successful completion of the course, students will:

- (1) Demonstrate knowledge and use of equipment and procedures utilized to collect acceleration data.
- (2) Demonstrate proficiency in analyzing and interpreting acceleration data.
- (3) Demonstrate knowledge and use of equipment and procedures utilized to collect video/kinematic data.
- (4) Demonstrate proficiency in analyzing and interpreting video/kinematic data.
- (5) Demonstrate knowledge and use of equipment and procedures utilized to collect electromyographic (EMG) data.
- (6) Demonstrate proficiency in analyzing and interpreting electromyographic (EMG) data.
- (7) Utilize accelerometers, video cameras, and EMG equipment to analyze real-world movements (jumping, walking, running, stair climbing & descending, etc.) for effectiveness and efficiency.

Required Materials

Textbook

- Robertson, D. G., et al. (2004). *Research Methods in Biomechanics, Champagne, IL: Human Kinetics.*

Course Handouts

- Chapter and Lecture Handouts: Available on my website
- Laboratory Handouts: Available on my website
- Required Additional Readings: To be distributed by email prior to use in lecture and lab.

Definition of a Credit Hour

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

As an example, the expectation of work for a 3-credit course is 150-minutes of direct faculty instruction and six hours of out-of-class student work each week.

Classroom Protocol

Instructional Methods

- Lecture/discussion
- Demonstration
- Observation
- Assigned readings
- Laboratory experiences - emphasis is on hands-on activities to develop the skills required to utilize biomechanical data collection instruments for real-world (applied) applications.

Recording of Class Lectures

Common courtesy and professional behavior dictates 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. This 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.

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.

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 calendar](http://www.sjsu.edu/provost/Academic_Calendars/) web page at http://www.sjsu.edu/provost/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/>.

Course Content and Grading Policy

Course Content

1. Accelerometers (PLO 1)
 - a. Characteristics (SLO 1)
 - b. Operating Requirements (SLO 1)
 - c. Data Collection Procedures (SLO 1)
 - d. Data Analysis Methods (SLO 2)
 - e. Interpretation of Data (SLO 2)
2. Video Cameras (PLO 1)
 - a. Characteristics (SLO 3)
 - b. Operating Requirements (SLO 3)
 - c. Data Collection Procedures (SLO 3)
 - d. Data Analysis Methods (SLO 4)
 - e. Interpretation of Data (SLO 4)
3. Electromyographic (EMG) Recording Devices (PLO 1)
 - a. Characteristics (SLO 5)
 - b. Operating Requirements (SLO 5)
 - c. Data Collection Procedures (SLO 5)
 - d. Data Analysis Methods (SLO 5)
 - e. Interpretation of Data (SLO 5)
4. Real-World Applications - The use of Biomechanical data collection equipment in real-world settings (PLO 1; PLO 2; PLO 3)
 - a. Performance enhancement (SLO 6)
 - b. Injury prevention (SLO 5)
 - c. Rehabilitation assessment (SLO 6)

Evaluation

- Three Course Content Knowledge Examinations (60% total)
 - Exam 1 (10%)
 - Exam 2 (20%)
 - Exam 3 (30%)
- Lab Practical Exam (15%)
- Quizzes (15% total)
- Laboratory Grade (10% total)

Course Content Knowledge Examinations (PLO 1; PLO 2; PLO 3; SLO 1; SLO 3; SLO 5)

- 1) Lecture Portion – Multiple Choice questions related to course content knowledge (50%)
- 2) Real-World Application Portion – Written assessment of your ability to use course content knowledge, data collection methods, and data analysis methods in real-world settings (50%) to enhance movement performance, prevent injuries, and assess rehabilitation progress.
- 3) All course content exams are cumulative
- 4) No Scantrons or Blue Books are required
- 5) Make-up exams are permitted ONLY for serious and compelling reasons.

Lab Practical Examination (PLO 2; PLO 3; SLO 1; SLO 2; SLO 3; SLO 4; SLO 5; SLO 6; SLO 7)

You will be assessed on your ability to perform the following:

- 1) Collect and analyze acceleration data
- 2) Collect and analyze video/kinematic data
- 3) Collect and analyze EMG data
- 4) Interpret acceleration data
- 5) Interpret video/kinematic data
- 6) Interpret EMG data

Quizzes (PLO 1)

- 1) Given at beginning of every lecture.
- 2) **CLOSED** book, notes, and neighbor.
- 3) elnstruction Response Pads will be used to take the quizzes
- 4) Make-up quizzes **WILL NOT** be given under any circumstances.

Laboratory Work (SLO 1; SLO 2; SLO 3; SLO 4; SLO 5; SLO 6; SLO 7)

- 1) Students are expected to attend and participate regularly in laboratories
- 2) Lab assignments must be turned in by the due date assigned for each
- 3) Late lab assignments will not be accepted

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 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.

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.

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 are responsible for obtaining material from another student BEFORE seeing the instructor about content missed.

Grading Rubric

Course Content and Lab Practical Examination Grading

For each exam, you will receive a letter grade based on percentages of the **highest score on the exam**

Percentage of the Highest Score on each Exam	Grade
93 – 100%	A
90 – 92.99%	A-
87 – 89.99%	B+
83 – 86.99%	B
80 – 82.99%	B-
77 – 79.99%	C+
73 – 76.99%	C
70 – 72.99%	C-
67 – 69.99%	D+
63 – 66.99%	D
60 – 62.99%	D-
less than 59.99%	F

Quiz Grading

You will receive a letter grade based on percentages of the **highest cumulative quiz points achieved by a student**.

Percentage of the Highest Cumulative Quiz Points	Grade
93 – 100%	A
90 – 92.99%	A-
87 – 89.99%	B+
83 – 86.99%	B
80 – 82.99%	B-
77 – 79.99%	C+
73 – 76.99%	C
70 – 72.99%	C-
67 – 69.99%	D+
63 – 66.99%	D
60 – 62.99%	D-
less than 59.99%	F

Lab Grading

You will receive a letter grade based on percentages of the **highest cumulative lab points achieved by a student**.

Percentage of the Highest Cumulative Lab Points	Grade
93 – 100%	A
90 – 92.99%	A-
87 – 89.99%	B+
83 – 86.99%	B
80 – 82.99%	B-
77 – 79.99%	C+
73 – 76.99%	C
70 – 72.99%	C-
67 – 69.99%	D+
63 – 66.99%	D
60 – 62.99%	D-
less than 59.99%	F

Letter Grade Values

A	11
A-	10
B+	9
B	8
B-	7
C+	6
C	5
C-	4
D+	3
D	2
D-	1
F	0

Course Grading Example

Exam 1 Grade: B (8 points)

Exam 2 Grade: B (8 points)

Exam 3 Grade: C+ (6 points)

Lab Practical Grade: A (11 points)

Quiz Grade: C (5 points)

Lab Grade: A- (10 points)

Exam 1 is worth 10% of your final grade: $(8 \text{ points}) \times (0.10) = 0.80 \text{ points}$

Exam 2 is worth 20% of your final grade: $(8 \text{ points}) \times (0.20) = 1.60 \text{ points}$

Exam 3 is worth 30% of your final grade: $(6 \text{ points}) \times (0.30) = 1.80 \text{ points}$

Lab Practical Exam is worth 15% of your final grade: $(11 \text{ points}) \times (0.15) = 1.65 \text{ points}$

Quizzes are worth 15% of your final grade: $(5 \text{ points}) \times (0.15) = 0.75 \text{ points}$

Labs are worth 10% of your final grade: $(10 \text{ points}) \times (0.10) = 1.00 \text{ points}$

Your final point total for the class = $0.80 + 1.60 + 1.80 + 1.65 + 0.75 + 1.00 = 7.60 \text{ points}$

Round your final point total to the nearest integer: 8 points

Your final letter grade: B

University Policies

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University's Academic Integrity policy](http://www.sjsu.edu/senate/S07-2.htm), located at <http://www.sjsu.edu/senate/S07-2.htm>, 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 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.

Student Technology Resources (Optional)

Computer labs for student use are available in the [Academic Success Center](http://www.at.sjsu.edu/asc/) at <http://www.at.sjsu.edu/asc/> located on the 1st floor of Clark Hall and in the Associated Students Lab on the 2nd floor of the Student Union. Additional computer labs may be available in your department/college. Computers are also available in the Martin Luther King Library.

A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include DV and HD digital camcorders; digital still cameras; video, slide and overhead projectors; DVD, CD, and audiotape players; sound systems, wireless microphones, projection screens and monitors.

SJSU Peer Connections

The Learning Assistance Resource Center (LARC) and the Peer Mentor Program have merged to become Peer Connections. Peer Connections is the new campus-wide resource for mentoring and tutoring. Our staff is here to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. Students are encouraged to take advantage of our services which include course-content based tutoring, enhanced study and time management skills, more effective critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory, alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space are also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10th and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in Campus Village Housing Building B. Visit [Peer Connections website](http://peerconnections.sjsu.edu) at <http://peerconnections.sjsu.edu> for more information.

SJSU Writing Center

The SJSU Writing Center is located in Suite 126 in Clark Hall. It is staffed by professional instructors and upper-division or graduate-level writing specialists from each of the seven SJSU colleges. Our writing specialists have met a rigorous GPA requirement, and they are well trained to assist all students at all levels within all disciplines to become better writers. The [Writing Center staff](http://www.sjsu.edu/writingcenter/about/staff/) can be found at <http://www.sjsu.edu/writingcenter/about/staff/>.

Tentative Course Outline

Dates	Topic(s)	Reading Assignments	Lab
8/24 – 8/26	<ul style="list-style-type: none"> Course Syllabus Static Acceleration Data Dynamic Acceleration Data 	Chapter 1 Article #1	Lab 1: Static and Dynamic Acceleration
8/31 – 9/2	<ul style="list-style-type: none"> Using Acceleration Data <ul style="list-style-type: none"> Maximizing Push-Off Forces Minimizing Landing Forces 	Chapter 11 Article #2 Article #3	Lab 2: Jumping Acceleration Data Collection and Analysis
9/7	Labor Day		
9/9	<ul style="list-style-type: none"> Using Acceleration Data (cont.) <ul style="list-style-type: none"> Maximizing Push-Off Forces Minimizing Landing Forces 	Chapter 11 Article #2 Article #3	Lab 2: Jumping Acceleration Data Collection and Analysis (cont.)
9/14	Exam 1		Lab 3: Video Camera Basics
9/16			
9/21 – 9/23	<ul style="list-style-type: none"> Jumping Performance Improvement - Video and Acceleration Analysis <ul style="list-style-type: none"> Increasing Jump Height <ul style="list-style-type: none"> Projection Angle Optimal Joint Angles Maximizing Push-Off Forces Minimizing Landing Forces 	Chapter 1 Article #4	Lab 4: Jumping Acceleration and Video Data Collection and Analysis #1
9/28 – 9/30			Lab 5: Jumping Acceleration and Video Data Collection and Analysis #2
10/5 – 10/7			
10/12 – 10/14			
10/19	Exam 2		Electromyography Basics
10/21			
10/26 – 10-28	<ul style="list-style-type: none"> Movement Technique Retraining for Running and Walking: <ul style="list-style-type: none"> Foot Angles Joint Angles Foot Contact Location Propulsive Acceleration Landing/Braking Acceleration Muscle activation/utilization 	Article #5 Article #6 Article #7 Article #8	Running Acceleration and Video Collection and Analysis #1
11/2 – 11/4			Running Acceleration, and EMG Data Collection #1
11/9 – 11/11			Running Acceleration and Video Data Collection and Analysis #2
11/16 – 11/18			Running Acceleration, and EMG Data Collection #2
11/23 – 11/25	<ul style="list-style-type: none"> Movement Technique Retraining for Cycling: <ul style="list-style-type: none"> Joint Angles Propulsive Push Acceleration Propulsive Pull Acceleration Muscle activation/utilization 		Running Acceleration and Video Data Collection and Analysis #3
11/30			Cycling Acceleration, and EMG Data Collection #1
12/2			Lab Practical Data Collection Exam
12/7	General Discussion of Lab Results		Lab Practical Analysis Exam
12/13	Exam 3 (7:15 – 9:30)		