San José State University
College of Applied Sciences and Arts
Kinesiology Department
KIN158, Biomechanics, Section 1, Fall, 2018

Course and Contact Information

Lead Instructor:	Tamar Brand-Perez, PT, DPT
Office Location:	Spartan Complex Central, room 234, Biomechanics Lab
Telephone:	Biomechanics lab: (408) 924-4669
Email:	tamar.brand-perez@sjsu.edu
Office Hours:	Tuesday 9am to 10am and Wednesday 1:00pm to 2:00pm. Please contact instructor prior to meeting by email or text.
Lab instructor:	Adriane Cris Tomimbang
Telephone:	Kinesiology Office: (408) 924-3010
Email:	adrianecris.tomimbang@sjsu.edu
Class Days/Time:	Lecture twice a week: 8:00am - 8:50am Tuesday and Thursday Lab once a week: Tuesday10am - 11:50am, or 12pm - 1:50pm, or 2pm - 3:50pm or Thursday 10am - 11:50am, or 12pm - 1:50pm, or 2pm - 3:50pm
Classroom:	Lecture: Yoshihiro Uchida, Hall 124 Lab: Spartan Complex Central, room 234, Biomechanics Lab
Prerequisites:	KIN070; BIOL 065 (min C-); Math Area B4 (min C-)

Course Format

Required Technology

For successful completion of this course, a computer is recommended. During lab time, there are computers in the biomechanics lab with the necessary software installed on them. Additional open lab time will be offered to facilitate completion of class projects. In addition, there are 5 laptops available as loaners from the biomechanics lab, those can be signed out for use at home. Contact the instructor for more details.

Kinovea motion analysis software – Kinovea is a free software. Kinovea will be used throughout the course.

Kinovea is for PC only. If you have an Apple computer you can use Bootcamp to download Kinovea on your Apple computer or use the lab computers.

Download this software from https://www.kinovea.org/ There are two versions for this software. A stable version and an experimental version. You can choose which version you want to download. The experimental version has more tools but may also have more bugs. To download the stable version 0.8.15 press on the large green button in the link above. To download the experimental version, in the same website, go to the link right below the large green download button. The experimental version is 0.8.26.

MYSJSU Messaging

Course materials such as syllabus, schedule, lecture slides, lab guides etc can be found on Canvas Learning Management System, course login website at http://sjsu.instructure.com. You are responsible for regularly checking your SJSU email and Canvas at http://my.sjsu.edu for class updates.

Course Description

Relationship of structural and mechanical principles of the musculoskeletal system to the analysis of human performance. Biomechanics is the science concerned with the effect of forces acting on living objects, and in this course, the effect of forces acting on the human body. Rigid-body mechanics will be used to explain gross movement of humans, within rigid-body mechanics, dynamics, or the mechanics of objects in accelerated motion will be explored. Both kinetics and kinematics will be studied. Tissue mechanics and fluid mechanics will be discussed as well.
This course will consist of lectures and small group activities as well as labs designed to apply the knowledge of biomechanics to activities such as exercise, sports and locomotion.

Course Goals

The students will understand and will successfully apply basic biomechanical principles to the analysis of normal movement such as gait and to the design of physical activities.

Course Learning Outcomes:

Based on the guidelines for undergraduate biomechanics provided by the National association for sport and physical education: "At the conclusion of the course, students should demonstrate basic competence in a systematic approach to the observation, analysis, and evaluation of human movements in athletic, clinical, educational, and work environments. The following outcomes are stated to be consistent with the phrase "The student is able to".

1. Observe and describe a movement technique accurately.
2. Determine the anatomical and mechanical factors basic to the performance of an observed movement.
3. Evaluate the suitability of a performer's technique with reference to the task at Hand.
4. Identify those factors that limit performance and establish a priority for change in those factors most likely to lead to improvement in performance."

Details of the NASPE standards are included throughout the course in lecture and lab specific objectives.
More course objectives:

1. Use professional terminology learned in the course such as displacement, velocity, acceleration, force, torque, vector, to all assignments in the course including: video portfolio, lab reports, quiz and exams. Terminology should be used accurately.
2. Demonstrate the ability to conduct qualitative and quantitative biomechanical analysis using Kinovea software as detailed in the video portfolio rubric.

3. Clearly present the video portfolio and lab reports demonstrating an improved understanding of how to prevent injury, maximize performance, and assess new products and training programs, based on the biomechanical concepts learned in class.
4. Demonstrate active learning of class content as detailed in the syllabus such as kinetic, and kinematic principles, fluid mechanics, and how they are applied to the human body.
5. Recall planes of motion, structure and function of bone and muscle including muscle architecture, force velocity and length tension curves, and how they relate to performance and injury prevention.
6. Assess with good accuracy posture and lifting techniques as well as analyze gait from a biomechanical perspective.
7. Discuss current trends relevant to class content using judgement in appraising evidence used.
8. Practice critical thinking and analysis skills in the context of biomechanical analysis of human motion.

Department Learning Outcomes:

Department of Kinesiology SJSU: http://www.sjsu.edu/kinesiology/learning_outcomes/

Teaching Methods and Learning Experiences:

Didactic lectures and demonstrations accompanied by slides, videos, models, handouts, and relevant published research will be utilized in the lecture portion of the class. In addition, small group activities will enable refinement of concepts learned. Lab time will be devoted to application of the material using tools such as Kinovea motion analysis software, Vicon 3D motion capture system, force plates and EMG, as well as practice of skills such as observation and analysis of posture and movement. Lab content will guide students through the process of critical inquiry in the context of biomechanics.

Required Texts/Readings

Textbook

1. Flanagan S (2019) Biomechanics A Case Based Approach, 2nd ed. Burlington MA, Jones and Bartlett Learning. ISBN 9781284102338

Other Readings

1. Neumann DA (2017) Kinesiology of the Musculoskeletal System: Foundations for Rehabilitation, 3rd ed. St Louis, MO, Elsevier. ISBN: 978-0-323-28753-1
2. Atlas of anatomy: Any atlas will be helpful. It does not have to be the latest edition. Some examples include: Netter, Moore, Rohen, Thieme etc.

Other Technology Requirements

As mentioned above, for successful completion of this course, a computer is recommended. During lab time, there are computers in the biomechanics lab with the necessary software installed on them. Additional open lab time will be offered to facilitate completion of class projects. In addition, there are 5 laptops available as loaners from the biomechanics lab those can be signed out for use at home. Contact the instructor for more details.

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Subject Librarian

Kinesiology

Poo, Adriana
Phone: (408) 808-2019
Email: adriana.poo@sjsu.edu

Course Requirements and Assignments

1. Attendance and participation in all lectures and labs.
2. 1 quiz
3. 4 lab mini experiments with presentations
4. One-on-one presentations of a video portfolio of biomechanical concepts (4 videos)
5. Three exams

Course grades:

1 Quiz	40 points = 4%
4 lab mini experiments	160 points=16%
Video portfolio (4 videos)	240 points = 24%
Exam 1	150 points = 15%
Exam 2	150 points = 15%
Exam 3 (cumulative)	260 points = 26%
Total:	1000 points = 100%

Quiz:
There will be 1 quiz in the beginning of the course. It will be based on class content and will be available on Canvas as specified on the class schedule. It will be open from Saturday to Monday at 11:59pm. The quiz will only be available during the specified time frame. It will not be possible to take the quiz late. The purpose of the quiz is to provide an opportunity to review class content.

4 Lab Mini Experiments:
There will be four lab mini experiments. These will be done in lab in small groups. At the end of each mini experiment cycle (2 weeks) each group will present their work to the rest of their lab group. For more details please see mini experiment requirements on Canvas.

Video Portfolio of Biomechanical Concepts:
Over the course you will create 4 videos of Biomechanical concepts on Kinovea. In the middle and at the end of the course, you will present these videos in a 10-20 minute one-on-one session with the instructor. See instructions on Canvas – "Video portfolio guidelines"

Examinations:
There will be 3 exams taken during lab hours in lab (see schedule for dates). To get credit for the exams, you will have to take the exams in lab. Exams are comprised of multiple choice, fill-in the blanks, drawing and short answer questions. The third exam is the final Examination: A **cumulative exam** covering all content in the course.

Grading Scale:
The grading scale for KIN 158 will be in accordance with San Jose State University. The following list of assigned letter grades and their corresponding percentages accrued over the entire semester will be used to determine student performance on graded material.
http://info.sjsu.edu/web-dbgen/narr/catalog/rec-16334.16407.16438.16439.html

A = 100 – 92.5	B- = 82 – 79.5	D+ = 69 – 66.5
A- = 92 – 89.5	C+ = 79 – 76.5	D = 66 - 62.5
B+ = 89 – 86.5	C = 76 – 72.5	D- = 62 – 59.5
B = 86 – 82.5	C- = 72 - 69.5	F = 59 and below

Feedback:
Grades for students will be posted via Canvas after each exam. Students are encouraged to come to the instructor's office to review exams, and other assessments.

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

Classroom Protocol

1. Use of calculators: You may ONLY use a simple non-programmable calculator during lecture, lab and exams. Using an improper calculator or CELL PHONE is a form of cheating and will be punished by a zero grade for the first offense and course failure and referral to the University Disciplinary Committee for any subsequent offense.
2. Late assignments: Points will be deducted for every late assignment at the discretion of the course instructor. At a minimum, 5% will be deducted per week (Max 2 weeks, assignments will NOT be accepted after 2 weeks).
3. Requests for consideration of point corrections on written examinations must be made within one (1) week after the exam has been returned. These requests must be in writing and can be turned in at the Kinesiology office. Requests made after the one-week time limit will not be considered.
4. Students cannot pass the course if less than 62% average was earned on the two exams, less than 62% average on the mini experiments and less than 62% average on the videos.
5. Any make-up exams are at the discretion of the instructor. NO Make-up Exams will be given without PRIOR (48 hours) approval of the Instructor.

6. Lecture and lab participation are expected. The student is expected to be punctual, prepared and interactive for ALL course sessions. In addition, it is NOT the responsibility of the instructor to get the materials to the student OR reteach any materials missed during a course session unless previous arrangements have been made. If the student is NOT able to attend a scheduled course session, then the student is expected to notify the COURSE INSTRUCTOR before the scheduled class session in order to receive an EXCUSED absence. Unexcused absences or consistent tardiness are unacceptable and ***not consistent with professional behavior***.
   For this class: following two (2) unexcused absences or two episodes of tardiness, the student will be given a verbal warning that this pattern of behavior needs to change. Continued unexcused absences or tardiness will result in a loss of points for each unexcused absence or late arrival that follows the warning, as well as meetings with the course director and your advisor.
6. Academic honesty: SJSU Academic honesty info can be found at: http://info.sjsu.edu/static/schedules/integrity.html
7. Professional behavior is expected at all times with instructors and classmates. This includes commitment to learning, efficient use of time, effective communication, effective interpersonal skills, appropriate use of constructive feedback, stress management, compliance with dress and personal appearance, professional conduct and respect for students, and faculty. For more information regarding university and department expectations please refer to the following link: http://www.sjsu.edu/aars/slo/
8. For more information on the department of Kinesiology policies please refer to the department of kinesiology undergraduate program website: http://www.sjsu.edu/kinesiology/programs/undergradutes/

USE OF LAPTOPS AND PHONES:

APPROPRIATE use of laptops during lectures or labs is encouraged in order to access prior class material and online resources for the purpose of small group activities. Use of laptops, iPads, or other notebook devices during lectures or labs for checking email or purposes other than learning the course material currently being taught is distracting to fellow students and unprofessional. Please use breaks and lunch time for other uses of your electronic devices.

Use of phones during class is NOT APPROPRIATE for any reason except in an emergency. Please be courteous to those around you and silence your phones during class. Even phones set on vibrate can be loud and distracting.

Accessible Education Center

Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. Accessibility Services is available to facilitate the reasonable accommodations process. They can be reached by phone at 408-924-6000 or by email: aec-info@sjsu.edu

For more information about the University's program supporting the rights of our students with disabilities see: http://www.sjsu.edu/aec/

Campus Emergency Information

California San Jose State University is committed to being a safe and caring community. Your appropriate response in the event of an emergency can help save lives. Emergency procedures may be found at: http://www.sjsu.edu/emergency/ Please be familiar with these procedures. Information on this page is updated as required. Please review the information on a regular basis.

In the event of an earthquake

Duck and Cover

1. Duck and Cover until the shaking stops. Use desks, tables and protect your head and neck.

2. Only after the shaking stops should you attempt to leave the building.
NOTE: FIRE- EXIT building rapidly, but calmly ALWAYS- Remain calm- DO NOT USE ELEVATORS
CAMPUS EMERGENCY PHONE IS 911
PREPARE AHEAD Carry a Survival Kit in your car at all times. Minimally, be sure you have 1 gallon of water, a blanket, warm clothing, flashlight, and a portable radio. Ideally have a first aid kit and some food, too.
http://www.sjsu.edu/police/prepare/earthquake/

KIN158 / Biomechanics, Fall, Course Schedule

Week	Date	Activity	Topic	Resources: Flanagan=F Mansfield/ Neumann= M/N	Assignments:
Week 1	8/21	Lecture	**Introduction**; review of syllabus and schedule; Joint motions	M/N - ch. 1	
	8/23	Lecture	Joint motions cont'd; Motion analysis		
	8/21 or 8/23	Lab	Anatomy review, joint motions; Linear kinematics		
	Open 8/25 to 8/27 at 11:59pm	Quiz	On Canvas – to be completed outside of class		
Week 2	8/28	Lecture	Linear kinematics	F - ch. 2,3,4	
	8/30	Lecture	Linear kinematics (cont'd)		
	8/28 or 8/30	Lab	Introduction to Kinovea; Mini experiment 1 – linear kinematics		
Week 3	9/4	Lecture	Projectile motion		

	9/6	Lecture	Projectile motion (cont'd)		
	9/4 or 9/6	Lab	Mini experiment 1 – linear kinematics (cont'd), Video portfolio – video 1		Presentation of mini experiment 1 linear kinematics
Week 4	9/11	Lecture	Angular kinematics	F - ch. 5	
	9/13	Lecture	Angular kinematics (cont'd)		
	9/11 or 9/13	Lab	mini experiment 2 – angular kinematics; Video portfolio – video 2		
Week 5	9/18	Lecture	Force		
	9/20	Lecture	Force (cont'd); resolution of forces		
	9/18 or 9/20	Lab	Mini experiment 2 – angular kinematics (cont'd) Vicon demonstration – squat/ jump		Presentation of mini experiment 2 angular kinematics
Week 6	9/25	Lecture	Torque and Levers		
	9/27	Lecture	Torque and Levers (cont'd)		
	9/25 or 9/27	Lab	Video portfolio one-on-one presentations – video 1, and video 2		
Week 7	10/2	Lecture	Exam 1 Review		
	10/4	Lecture	Linear kinetics	F - Ch. 7	
	10/2 or 10/4	Lab	Exam 1 – on Canvas in lab during lab time		
Week 8	10/9	Lecture	Linear kinetics (cont'd)		
	10/11	Lecture	Angular kinetics	F - Ch. 8, 11	
	10/9 or 10/11	Lab	Mini experiment 3 – kinetics		

			Video portfolio – video 3		
Week 9	10/16	Lecture	Angular kinetics (cont'd)		
	10/18	Lecture	Tissue mechanics		
	10/16 or 10/18	Lab	Tissue mechanics lab Mini experiment 3 cont'd		
Week 10	10/23	Lecture	Tissue mechanics (cont'd)		
	10/25	Lecture	Bone	F – ch. 11,12	
	10/23 or 10/25	Lab	Bones lab; Mini experiment 3 cont'd; video portfolio – video 3, video 4		Presentation of mini experiment 3 linear and angular kinetics
Week 11	10/30	Lecture	Exam 2 review		
	11/1	Lecture	Muscle	F – ch. 12,18	
	10/30 or 11/1	Lab	Exam 2 - on Canvas in Lab during lab time		
Week 12	11/6	Lecture	Muscle (cont'd)		
	11/8	Lecture	Muscle (cont'd)		
	11/6 or 11/8	Lab	EMG demonstration Mini experiment 4 – EMG Posture and lifting techniques		
Week 13	11/13	Lecture	Muscle (cont'd)		
	11/15	Lecture	Muscle (cont'd)		
	11/13 or 11/15	Lab	Mini experiment 4 – EMG (cont'd) Video portfolio – video 4		Presentation of mini experiment 4 Muscle, EMG
Week 14	11/20	Lecture	Gait analysis	F – ch. 18	
	11/22	Thanksgiving Holiday	No Lecture		
	11/20 or 11/22	Thanksgiving Holiday	No Lab		
Week 15	11/27	Lecture	Walking running continuum		

	11/29	Lecture	Fluid mechanics		
	11/27 or 11/29	Lab	Gait analysis; Fluid mechanics		
Week 16	12/4	Lecture	Fluid mechanics (cont'd)		
	12/6	Lecture	Final exam review		
	12/4 or 12/6	Lab	Video portfolio one-on-one presentations – video 3, and video 4		
Week 17	12/11 or 12/13	Final Exams week	Final exam - on Canvas in lab during your regular lab time		
	12/21	End of Semester	Happy Holidays!		