

CALIFORNIA STATE UNIVERSITY, NORTHRIDGE
Department of Kinesiology

Kinesiology 445
QUANTITATIVE BIOMECHANICS
Spring, 2008

Instructor: William C. Whiting, Ph.D.
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Office Hours: Tuesday, 10:00-11:00 a.m. and by appointment

Class Schedule: Tuesday & Thursday 11:00 a.m. – 12:15 p.m. Room: RE 157

Required Text: S. J. Hall. *Basic Biomechanics* (5th ed.) McGraw Hill.

Course Prerequisites: KIN 345; and Math 104, 105 or equivalent background

Course Description: The evaluation and interpretation of human performance on the basis of applied mechanics, with quantitative emphasis

Departmental Learning Outcomes:

The Department of Kinesiology has six Student Learning Outcomes (SLO):

1. Demonstrate an understanding of the multi-disciplinary and integrated nature of kinesiology.
2. Apply, integrate and communicate kinesiological principles and movement-related knowledge across diverse settings and populations to enhance quality of life and encourage adoption of healthy lifestyles.
3. Apply innovative technology to understand and enhance human movement.
4. Demonstrate commitment to professional growth.
5. Demonstrate reasoning, problem solving, critical thinking, and reflective strategies in the pursuit and application of movement related knowledge.
6. Develop and apply assessment tools to measure and evaluate movement program efficacy.

SLOs are aligned with the following Course Objectives as indicated in brackets [SLO #].

Course Objectives: To provide students with the knowledge and skills to be able to:

- (1) Construct free body diagrams defining the operative mechanical factors in human movement situations [SLO 5].
- (2) Utilize vector algebra, the equations of uniform acceleration, and the principles of static and dynamic equilibrium to solve problems relating to human movement [SLO 2, 5].
- (3) Analyze the influences of selected kinetic quantities on human motion, including friction, impulse and momentum, mechanical work, power, energy, torque, moment of inertia, and center of gravity location [SLO 2, 5].
- (4) Apply biomechanical principles to the daily activities of normal and special populations, including individuals with disabilities, throughout the lifespan [SLO 2, 3, 5].
- (5) Write a paper reviewing current biomechanics literature on a selected topic [SLO 1,2, 5].
- (6) Make a class presentation on a topic of current interest in biomechanics [SLO 1, 2, 5].

Evaluation: Course grades will be based on the following point distribution.

Problem Sets	200 pts	(20%)	Assignment of grades will be based on the ranges:	A = 900-1000 pts
Midterm Exams	400 pts	(40%)		B = 800-899 pts
Term Paper	200 pts	(20%)		C = 700-799 pts
Presentation	100 pts	(10%)		D = 600-699 pts
Final Exam	100 pts	(10%)		F = < 600 pts
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Course Total	1000 pts	(100%)	[plus/minus grade adjustments will be determined by final class distribution]	

Examination Policies

1. Students will **not** be allowed to leave the room during exams. Please attend to any personal needs before the exam.
2. Make-up exams will be considered only under exceptional circumstances. (Note: "I overslept", "I'm tired", "I'm not prepared", etc. are **not** exceptional circumstances!) Any student who fails to contact the instructor *prior* to any missed exam may **not** be allowed to makeup the exam.
3. Absence for medical reasons requires *written* verification by a physician.
4. Exams will **not** be rescheduled based on a student's personal work/school schedule. Please plan ahead.
5. Questions/concerns regarding grading of any exam must be resolved with the instructor within **one (1) week** of the date graded exams are returned to the student.
6. All exams are non-circulating.

Students with Disabilities: This instructor, in conjunction with California State University Northridge, is committed to upholding and maintaining all aspects of the federal Americans with Disabilities Act (ADA) of 1990 and Section 504 of the Rehabilitation Act of 1973. If you are a student with a disability and wish to request accommodations, please contact office of Students with Disabilities Resources located in SB 110, or call (818) 677-2684 for an appointment. Any information regarding your disability will remain confidential. Because many accommodations require early planning, requests for accommodation should be made as early as possible. Any requests for accommodations will be reviewed in a timely manner to determine their appropriateness for this class.

Each student is expected to be familiar with, and abide by, the conditions of student conduct, as presented in the CSUN Catalog (Appendix C), with emphasis on sections: Student Conduct Code, Academic Dishonesty, Faculty Policy on Academic Dishonesty, and Penalties.

Any student engaging in academic dishonesty (e.g., cheating, fabrication, facilitating academic dishonesty, plagiarism) is subject to discipline, which may include a failing grade in the course, and may also be subject to more severe discipline by the University.

Reading Assignments

Please Note: The reading assignments listed below are intended to *supplement* the lecture materials. Some of the material in the text will **not** be covered in lecture but may be included on the exams. By the same token, all of the information given in lecture will **not** be found in the text, but may also be included on the exams. Students are expected to have read the assigned sections in the text *before* the scheduled lectures to which they apply.

Basic Biomechanics – Susan J. Hall, Ph.D.

	(4 th edition)	(5 th edition)
Weeks 0-1:	Ch. 1: 1-17 Appendices A & B	Ch. 1: 1-19 Appendices A & B
Week 2:	Ch. 2: 28-51 Ch. 10: 318-329	Ch. 2: 29-53 Ch. 10: 321-333
Weeks 3-4:	Ch. 11: 356-376	Ch. 11: 359-380
Week 4:	Ch. 10: 329-345	Ch. 10: 333-349
Week 5:	Ch. 3: 62-76 Ch. 12: 384-388 Ch. 14: 468-470	Ch. 3: 62-76 Ch. 12: 388-392 Ch. 14: 474-476
Week 6:	Ch. 12: 389-395 Ch. 12: 395-399	Ch. 12: 393-398 Ch. 12: 398-403
Week 7:	Ch. 12: 399-402	Ch. 12: 403-406
Week 8:	Ch. 12: 403-410 Ch. 13: 420-434	Ch. 12: 407-414 Ch. 13: 424-436
Week 9:	Ch. 13: 436-445	Ch. 13: 436-449
Week 10:	none	none
Week 11:	Ch. 14: 454-458 Ch. 14: 458-468	Ch. 14: 460-464 Ch. 14: 464-474
Week 12:	Ch. 14: 470-471 Ch. 15: 480-503	Ch. 14: 476-477 Ch. 15: 485-505
Weeks 13-15:	none	none

LECTURE SCHEDULE

<u>Week</u>	<u>Day</u>	<u>Date</u>	<u>Lecture Topic</u>
1	Tue	Jan 22	Introduction
	Thu	Jan 24	Mechanical Foundations
2	Tue	Jan 29	Linear Kinematics
	Thu	Jan 31	Kinematic Relations
3	Tue	Feb 5	Angular Kinematics
	Thu	Feb 7	Kinematic Problem Solving
4	Tue	Feb 12	Kinematic Problem Solving
	Thu	Feb 14	EXAM #1
5	Tue	Feb 19	Projectile Motion
	Thu	Feb 21	Basic Kinetic Concepts
6	Tue	Feb 26	Newton's Laws of Motion
	Thu	Feb 28	Friction
7	Tue	Mar 4	Linear Impulse & Momentum
	Thu	Mar 6	EXAM #2
8	Tue	Mar 11	Mechanics of Impact
	Thu	Mar 13	Work, Energy, and Power
[March 17-21 – Spring Break – No class meetings]			
9	Tue	Mar 25	Torque
	Thu	Mar 27	Static Equilibrium
10	Tue	Apr 1	Center of Gravity Concepts
	Thu	Apr 3	EXAM #3
11	Tue	Apr 8	Dynamic Equilibrium
	Thu	Apr 10	Moment of Inertia Concepts
12	Tue	Apr 15	Angular Impulse & Momentum
	Thu	Apr 17	Centripetal/Centrifugal Force
13	Tue	Apr 22	Fluid Mechanics
	Thu	Apr 24	EXAM #4
14	Tue	Apr 29	Student Presentations
	Thu	May 1	Student Presentations
15	Tue	May 6	Student Presentations
	Thu	May 8	Student Presentations

FINAL EXAM - May 13 (Tuesday) 10:15 am – 12:15 pm
 (Note: Schedule subject to change, with appropriate notice, as circumstances and opportunities may dictate)