



KINE 3401 Biomechanics of Human Movement Spring 2019

Instructor: Dr. Mark Ricard
E-Mail: ricard@uta.edu

Office: MAC 230
Office Phone: (817) 272-0764
Lab Phone: (817) 272-9185

Office Hours: By appointment

Location & Time: Lecture SH 100, Tue & Thur 12:30 – 1:50 PM

Labs

MAC 132,	Tue	2:00 – 2:50,	Instructor: Xian Liu	xian.liu@mavs.uta.edu
MAC 132,	Tue	3:00 – 3:50,	Instructor: Xian Liu	xian.liu@mavs.uta.edu
MAC 132,	Tue	4:00 – 4:50,	Instructor: Xian Liu	xian.liu@mavs.uta.edu
MAC 154,	Thr	11:00 – 11:50,	Instructor: Xian Liu	xian.liu@mavs.uta.edu
MAC 154,	Thr	2:00 – 2:50,	Instructor: Sung Gi Noh	sunggi.noh@mavs.uta.edu
MAC 154,	Thr	3:00 – 3:50,	Instructor: Sung Gi Noh	sunggi.noh@mavs.uta.edu
MAC 154,	Thr	4:00 – 4:50,	Instructor: Sung Gi Noh	sunggi.noh@mavs.uta.edu

Faculty Profile: <https://www.uta.edu/mentis/profile/?445>

Prerequisites: KINE 1400, 3300, BIOL 2457 and MATH 1302, or permission of instructor.

Required Textbook: Mark D. Ricard, [\(2018\) Applied Biomechanics 3rd ed.](#) 978-1725912236, Biomech Publications, 347 pages.

Other Requirements:

1. Smart phone, tablet, or laptop for daily Echo360 active learning activities.
2. Scientific calculator with \tan , \tan^{-1} , \sin , \cos , x^2 , \sqrt{x}

Course Description: **KINE 3401 BIOMECHANICS OF HUMAN MOVEMENT** (3-1) Quantitative and qualitative analyses of human movement. Emphasis on the application of the principles of human movement, with consideration of functional anatomy, kinesiology and mechanical concepts to exercise, sport, and activities of daily living.

Student Learning Outcomes:

The student should be able to:

1. Solve basic mechanics problems related to human movement.
2. Systematically analyze sports skills and common exercises used in conditioning programs and rehabilitation.
3. Write mechanical principles and give examples of their application to several different sports and human movement situations.
4. Write a detailed descriptive and mechanical analysis of a sport skill, including the major muscle groups used in executing the skill.
5. Identify, analyze and evaluate the mechanics of fundamental motor skills such as kicking, throwing, walking, running and jumping.
6. Identify the biomechanical factors that discriminate between mature and immature movement patterns.
7. Identify how the bone, muscle, ligament and tendons respond to mechanical stress.
8. Demonstrate knowledge of how the muscular and nervous systems relate to the mechanics of movement.

9. Demonstrate the ability to analyze the mechanics of fundamental movement patterns and sport movement patterns.

Grading

Grades in this course will be based on the following percentages:

Exams (3):	60%
Echo 360 Quizzes, Reading Quizzes	10%
Homework	5%
Lab	5%
Comprehensive Final Exam	20%

Grading Scale:

90 - 100%	A
80 - 89 %	B
70 - 79 %	C
60 - 69 %	D
0 - 59 %	F

Date	Chapter	Lecture Homework & Quizzes in Blackboard	Lab Topic & Assignment
Jan 15	1: Introduction to Biomechanics		No lab
Jan 17	2: Vectors and Scalars 3: Linear Kinematics	2: Vector quiz	2: Vectors 3: Position – Velocity – Acceleration Curves
Jan 22	3: Linear Kinematics 4: Linear Kinematics Applications	3: Position, velocity, acceleration quiz HW #1: Excel compute velocity & acceleration from position HW #2: Excel compute position & velocity from acceleration	2: Vectors 3: Position – Velocity – Acceleration Curves
Jan 24	5: Projectiles	5: Reading Quiz on Projectiles due before class	5: Projectile problems
Jan 29	5: Projectiles		5: Projectile problems
Jan 31	6: Angular Kinematics	6: Reading Quiz on Angular kinematics due before class	6: Angular kinematics problems Review for test
Feb 5	Review for Test 1		6: Angular kinematics problems Review for test
Feb 7	Test 1		
Feb 12	7: Linear Kinetics	7: Reading Quiz on Linear kinetics due before class	7 & 8: Kinetics & Impulse – Momentum problems
Feb 14	8: Linear Momentum	8: Reading Quiz on Linear momentum due before class	7 & 8: Kinetics & Impulse – Momentum problems
Feb 19	9: Linear Impulse – Momentum	9: Reading Quiz on impulse - momentum due before class	9: Collect force plate walk and run data on each student.
Feb 21	10: Work, Power and Energy	10: Reading Quiz on work, power, energy due before class HW #3: Computing energy in Excel	9: Collect force plate walk and run data on each student.
Feb 26	11: Torque	11: Reading Quiz on torque due before class HW # 4 & 5: submit your force plate walk & run data. Use sample from Blackboard for analysis	10: Work, energy, and power problems. 11 & 12: Torque and center of mass problems

Feb 28	12: Center of Mass 13: Angular Impulse & Angular Momentum	13: Reading Quiz on angular impulse & angular momentum due before class HW #6: Submit center of mass assignment to Blackboard	10: Work, energy, and power problems. 11 & 12: Torque and center of mass problems
Mar 5	13: Angular Impulse & Angular Momentum	HW #7: Submit Back Flip assignment to Blackboard HW #8: Submit Rigid Bar angular impulse assignment to Blackboard	13: Angular impulse problems and Test 2 review
Mar 7		Review for Test 2	13: Angular impulse problems and Test 2 review
Mar 19		Test 2	
Mar 21	14: Mechanical Responses of Biological Materials	14: Reading Quiz on mechanical responses of biological tissues due before class	Collect vertical jump force plate data on each student.
Mar 26	15: Exercise Adaptations to Biological Materials	15: Reading Quiz on exercise adaptations to biological materials due before class	Collect vertical jump force plate data on each student.
Apr 2	15: Exercise Adaptations to Biological Materials	HW #9: Submit vertical jump analysis to Blackboard	Biodex demonstration lab on muscle force-length and force-velocity.
Apr 4	16: Muscle Excitation – Contraction Coupling	16: Reading Quiz on muscle excitation-contraction coupling due before class	Biodex demonstration lab on muscle force-length and force-velocity.
Apr 9	17: Muscle Force-Velocity, Force-Length, & Stretch-Shorten	17: Reading Quiz on force-velocity, force-length, stretch-shorten due before class	EMG isometric and force-velocity lab Submit Biodex analysis to Lab Blackboard
Apr 11	18: Motor Neurons and Electromyography	18: Reading Quiz on motor neurons and EMG due before class	EMG isometric and force-velocity lab
Apr 16	19: Sensory Receptors and Reflexes	19: Reading Quiz on sensory receptors and reflexes due before class	NeuroCom postural control and reflex lab Submit EMG analysis to Lab Blackboard
Apr 18	19: Sensory Receptors and Reflexes		NeuroCom postural control and reflex lab
Apr 23	20: Postural Control and Balance	20: Reading Quiz on postural control and balance due before class	Test 3 Review Submit Postural control and reflex analysis to Lab Blackboard
Apr 25		Review for Test 3	Test 3 Review
Apr 30		Test 3	
May 2		Review for Final Exam	
Dec 15		Final Exam Thursday, May 9 8:00 AM – 10:30 PM	

Attendance Policy: At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. **As the instructor of this section, I have established the following attendance policy: attendance is MANDATORY. I will use Echo360 to take attendance students will receive a zero for all missed Echo360 quizzes.** However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

It is important that students understand that any attendance rules applied in your course are your own and not a matter of institutional policy. Doing so will keep the University in compliance with Federal regulations as they apply to Title IV funding. (For a summary, see <http://www.tgslc.org/pdf/Program-integrity-R2T4-Taking-Attendance.pdf>.) If you are teaching a course in which attendance / hours must be tracked to meet other non-institutional requirements (e.g., to earn an academically-grounded professional credential), be sure to clearly indicate the agency that has established the requirement.

Make-up Exams: If you miss an exam due to illness or a planned trip it is your responsibility to arrange a make-up exam.

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 9 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will

not be tolerated. For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

Academic Integrity: Students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

Campus Carry

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit <http://www.uta.edu/news/info/campus-carry/>

Student Feedback Survey: At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit <http://www.uta.edu/sfs>.

Final Review Week: for semester-long courses, a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located at the rear of the classroom and at the front right & left of classroom. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

http://www.uta.edu/campus-ops/ehs/fire/Evac_Maps_Buildings.php

<http://www.uta.edu/police/EvacuationProcedures.pdf>)

Students should also be encouraged to subscribe to the MavAlert system that will send information in case of an emergency to their cell phones or email accounts. Anyone can subscribe at <https://mavalert.uta.edu/> or <https://mavalert.uta.edu/register.php>

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include [tutoring](#), [major-based learning centers](#), developmental education, [advising and mentoring](#), personal counseling, and [federally funded programs](#). For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at <http://www.uta.edu/universitycollege/resources/index.php>.

The IDEAS Center (2nd Floor of Central Library) offers **free** tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. To schedule an appointment with a peer tutor or mentor email IDEAS@uta.edu or call (817) 272-6593.

<p>Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-3003 (campus phone). You may also dial 911. Non-emergency number 817-272-3381</p>

Library Home Page library.uta.edu

Resources for Students

Academic Help

Academic Plaza Consultation Services library.uta.edu/academic-plaza

Ask Us ask.uta.edu/

Library Tutorials library.uta.edu/how-to

Subject and Course Research Guides libguides.uta.edu

Subject Librarians library.uta.edu/subject-librarians

Resources

A to Z List of Library Databases libguides.uta.edu/az.php

Course Reserves pulse.uta.edu/vwebv/enterCourseReserve.do

FabLab fablab.uta.edu/

Special Collections library.uta.edu/special-collections

Study Room Reservations openroom.uta.edu/

Teaching & Learning Services for Faculty

Copyright Consultation library-sc@listserv.uta.edu

Course Research Guide Development, Andy Herzog amherzog@uta.edu or your subject librarian

Data Visualization Instruction, Peace Ossom-Williamson peace@uta.edu

Digital Humanities Instruction, Rafia Mirza rafia@uta.edu

Graduate Student Research Skills Instruction, Andy Herzog amherzog@uta.edu or your subject librarian

Project or Problem-Based Instruction, Gretchen Trkay gtrkay@uta.edu

Undergraduate Research Skills Instruction, Gretchen Trkay gtrkay@uta.edu or your subject librarian.