



**KINE 3343 W02  
Biomechanics  
Summer 2023**

**Dr. Billy Jack Ray**  
Assistant Professor - Kinesiology

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**Office Hours:** **By appointment (email to set an appointment)**  
**Meeting:** On-line via Blackboard and Connect  
**Required Text:** Basic Biomechanics 9<sup>th</sup> Edition – Susan Hall  
ISBN: 978-1-260-83698-1

### **COURSE DESCRIPTION**

This course will equip participants with knowledge of the essential mechanical concepts and principles that govern human movement within a context of physical education and sports science. Through lecture, laboratory experience, problem-solving activities, and other forms of learning in and outside the classroom, students will acquire practical biomechanical knowledge through the integration between the mechanical principles and the efficiency of human movement and interrelationships of biomechanics, musculoskeletal anatomy, and neuromuscular physiology. Recommended Prerequisite: BIOL 2401 and/or BIOL 2402.

### **EXPECTATION OF STUDENTS**

Students are responsible for keeping up with the reading and are expected to read the assigned chapters and/or other posted readings prior to class in order to contribute to online discussion. Handouts distributed through Blackboard should be kept in a notebook in order to be referred to as necessary.

### **MARKETABLE SKILLS – The following marketable skills are met in this course:**

- **Collaboration** – students will interact with one another through a multitude of class discussions and activities
- **Communication** –
- **Critical Thinking** – students will be asked to critically decipher a multitude of real-world scenarios
- **Career Management** – students will develop the skills necessary to train athletes by understanding proper motor learning and motor development

### **STUDENT LEARNING OUTCOMES**

Upon successful completion of this course, students should be able to:

- Describe the terms biomechanics, statics, dynamics, kinematics, and kinetics and the scope of scientific inquiry addressed by biomechanists.
- Explain kinematics and kinetics for analyzing human motion
- Describe biomechanics concepts in musculoskeletal system
- Apply biomechanics concepts for analyzing human motion using 2D video analysis

**COURSE OBJECTIVES:** Students will be able to:

- Demonstrate knowledge of the history of biomechanics and its implementation in our world.
- Lists and defines directional terms and cardinal planes used to describe the body and the relationship of its parts.
- Defines the principles and concepts of body movement including functional classification of joints, joint biomechanics, and normal ranges of joint motion, joint action terminology, muscular structures responsible for joint actions (prime movers, synergists), skeletal muscle contraction, and kinesthesia/proprioception.
- Describes the mechanical principles applied to the analysis of movement.
- Describe Newton's laws of motion and how they apply to exercise and sport.
- Detail the factors that affect technique improvement and injury development in human movement.
- Compare and contrast qualitative and quantitative techniques for analyzing human movement.
- Apply the biomechanical principles that are essential to improving performance and reducing injury.
- Describe how improper technique limits the ability of the human body to produce effective movement.
- Demonstrate knowledge of various equipment utilized to make a biomechanical analysis.
- Perform an analysis of human movement including all principles learned in class.

**PROGRAM LEARNING OUTCOMES:**

- The student will demonstrate understanding of structural and mechanical properties of the musculoskeletal system, functional and movement characteristics, and analysis of movement by synthesizing principles acquired in the coursework as demonstrated in projects defining sport and exercise science skills.
- The student will demonstrate knowledge of treatment planning for athletic injuries and illnesses by recommending appropriate treatment and rehabilitative plans to include administering appropriate emergency care, applying suitable therapeutic modalities, implementing comprehensive rehabilitation programs, acknowledging the effective use of pharmacological agents, developing sound nutritional practices, and providing for appropriate medical referral.
- The student will demonstrate the ability to combine personal fitness and corresponding exercise adoptions for lifetime wellness. This includes the ability to assess a person's health and fitness status utilizing skill and fitness test administration, subsequent data collection, and corresponding evaluation and decision making.
- The student will demonstrate understanding of physiological adaptations made by the human body in adjusting to various sport and exercise activities by measuring and analyzing human response during various aerobic and anaerobic challenges.
- The student will demonstrate the ability to assess individual and community sport and health/fitness status by obtaining physiological data about current health and fitness state and developing a program/prescription to improve an individual's health and fitness status according to American College of Sports Medicine (ACSM) guidelines.
- The student will demonstrate the ability to combine personal fitness and corresponding exercise adoptions for lifetime wellness. This includes the ability to assess a person's health and fitness status utilizing skill and fitness test administration, subsequent data collection, and corresponding evaluation and decision making.
- The student will demonstrate the ability to develop and deliver fitness, wellness, strength training programming to individuals with differing levels of fitness, skill, and health or physical needs.

## Course Format

The format for this course will include, but is not limited to – face to face delivery and on-line components.

## Attendance

Attendance for class is mandatory. Every class day is a grade. You will receive 100% credit for being on time, 75% credit for being tardy. **One letter grade will be deducted for every absence after four (4). Students with zero (0) absences (not including athletic related absences) and with no missing assignments will be exempt from the final exam.**

## GRADING POLICIES/TESTING/ASSIGNMENTS/ATTENDANCE/EXPECTATIONS

Grade calculation	% of Grade	Grading Scale
Connect SmartBook Assignments (5)	5 @ 50 = 250 points (25%)	900 or more A
Test (5)	5 @ 100 = 500 points (50%)	800-899 B
Final Project	150 points (15%)	700-799 C
Final Exam	100 points (10%)	600-699 D
		Less than 599 F
		<b>Total Points = 1000</b>

**No Late Assignments Will Be Accepted. Also, No Credit Will Be Given For Any Late Assignments**



**Course**

**Schedule**

		<b><u>Connect / BlackBoard</u></b> <b><u>Assignment</u></b>
<b><u>Week 1</u></b>	CHAPTER 1: What is Biomechanics? CHAPTER 2: Kinematic Concepts for Analyzing Human Motion CHAPTER 3: Kinetic Concepts for Analyzing Human Motion	SmartBook 1 <b>Due Friday, July 14 @ noon</b> <b>Test 1</b> <b>Due Friday, July 14 @ noon</b>
<b><u>Week 2</u></b>	CHAPTER 4: The Biomechanics of Human Bone Growth and Development CHAPTER 5: The Biomechanics of Human Skeletal Articulations CHAPTER 6: The Biomechanics of Human Skeletal Muscle	SmartBook 2 <b>Due Friday, July 21 @ noon</b> <b>Test 2</b> <b>Due Friday, July 21 @ noon</b>
<b><u>Week 3</u></b>	CHAPTER 7: The Biomechanics of the Human Upper Extremity CHAPTER 8: The Biomechanics of the Human Lower Extremity CHAPTER 9: The Biomechanics of the Human Spine	SmartBook 3 <b>Due Friday, July 28 @ noon</b> <b>Test 3</b> <b>Due Friday, July 28 @ noon</b>
<b><u>Week 4</u></b>	CHAPTER 10: Linear Kinematics of Human Movement CHAPTER 11: Angular Kinematics of Human Movement CHAPTER 12: Linear Kinetics of Human Movement	SmartBook 4 <b>Due Friday, August 4 @ noon</b> <b>Test 4</b> <b>Due Friday, August 4 @ noon</b>
<b><u>Week 5</u></b>	CHAPTER 13: Equilibrium and Human Movement CHAPTER 14: Angular Kinetics of Human Movement CHAPTER 15: Human Movement in a Fluid Medium	SmartBook 5 <b>Due Friday, August 11 @ noon</b> <b>Test 5</b> <b>Due Friday, August 11 @ noon</b>
<b><u>Week 5.5</u></b>		<b>Final Project</b> <b>Due Monday, August 14 @ noon</b> <b>Final Exam</b> <b>Due Monday, August 14 @ noon</b>

## **ALL COURSE REQUIREMENTS DEADLINE**

**All test and assignments will be due on the date shown by 11:59 pm. The final exam will be due by the date and time shown.**

### **Distance Education Statement**

Students enrolled in distance education courses have equal access to the university's academic support services, such as Smarthinking, library resources, online databases, and instructional technology support. For more information about accessing these resources, visit the SRSU website. Students should correspond using Sul Ross email accounts and submit online assignments through Blackboard, which requires secure login information to verify students' identities and to protect students' information. The procedures for filing a student complaint are included in the student handbook. Students enrolled in distance education courses at Sul Ross are expected to adhere to all policies pertaining to academic honesty and appropriate student conduct, as described in the student handbook. Students in web-based courses must maintain appropriate equipment and software, according to the needs and requirements of the course, as outlined on the SRSU website.

### **Accidents & Injuries**

In the case of bodily or personal property damage, the Kinesiology Department will not be held responsible. The student must report any field experience related injury or illness to the Instructor immediately. Any expense incurred due to injury or illness will be the student's responsibility.

### **Academic Integrity Statement**

Students in this class are expected to demonstrate scholarly behavior and academic honesty in the use of intellectual property. A scholar is expected to be punctual, prepared, and focused; meaningful and pertinent participation is appreciated. Examples of academic dishonesty include but are not limited to: Turning in work as original that was used in whole or part for another course and/or professor; turning in another person's work as one's own; copying from professional works or internet sites without citation; collaborating on a course assignment, examination, or quiz when collaboration is forbidden. The Student Handbook can be found at: <https://www.sulross.edu/catalog/undergraduate-academic-regulations-2/#1605412215143-c8b265dc-3e01> In addition, please note that plagiarism detection software will be used in this class for written assignments.

### **Academic Civility Statement**

Students are expected to interact with professors and peers in a respectful manner that enhances the learning environment. Professors may require a student who deviates from this expectation to leave the face-to-face (or virtual) classroom learning environment for that particular class session (and potentially subsequent class sessions) for a specific amount of time. In addition, the professor might consider the university disciplinary process (for Academic Affairs/Student Life) for egregious or continued disruptive behavior.

### **Academic Affairs Service Statement**

Sul Ross faculty, staff, and students are expected to model responsible citizenship through service activities that promote personal and academic growth while enhancing the university, local, regional, national, and global communities. These activities will foster a culture of academic/public engagement that contributes to the achievement of the university's mission and core values.

### **Libraries**

The Bryan Wildenthal Memorial Library in Alpine.

Offers FREE resources and services to the entire SRSU community. Access and borrow books, articles, and more by visiting the library's website, [library.sulross.edu](http://library.sulross.edu). Off-campus access requires logging in with your LoboID and password. Librarians are a tremendous resource for your coursework and can be reached in person, by email ([srsulibrary@sulross.edu](mailto:srsulibrary@sulross.edu)), or phone (432-837-8123).

### **Academic Excellence Statement**

Sul Ross holds high expectations for students to assume responsibility for their own individual learning. Students are also expected to achieve academic excellence by:

- Honoring the core values of Sul Ross.
- Upholding high standards of habit and behavior.
- Maintaining excellence through class attendance and punctuality.
- Preparing for active participation in all learning experiences.
- Putting forth their best individual effort.
- Continually improving as independent learners.
- Engaging in extracurricular opportunities that encourage personal and academic growth.
- Reflecting critically upon feedback and applying these lessons to meet future challenges.

## **ADA Statement**

SRSU Disability Services. Sul Ross State University (SRSU) is committed to equal access in compliance with Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student's responsibility to initiate a request each semester for each class. Students seeking accessibility/accommodations services must contact Rebecca Greathouse Wren, LPC-S, SRSU's Accessibility Services Coordinator at 432-837-8203 (please leave a message and we'll get back to you as soon as we can during working hours), or email [rebecca.wren@sulross.edu](mailto:rebecca.wren@sulross.edu). Our office is located on the first floor of Ferguson Hall (Suite 112), and our mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas, 79832.