KNES-103 – Introduction to Biomechanics

Health and Human Services

Effective Term & Year: Fall 2025
Course Outline Review Date: 2030-03-01

Program Area: Health

Description:

In this course, students acquire knowledge of the mechanical, anatomical, and physiological aspects of human movement and performance, including the application of basic principles of physics and math to a quantitative analysis of human movement. Analysis will focus on the development of forces within the body and their effect on initiating and controlling movement.

Program Information:

This is a required course in the Kinesiology Diploma Program and may be used as an elective for students in other disciplines.

Delivery Methods: On-campus (Face-to-Face)

Credit Type: College of the Rockies Credits

Credits: 3

Course type/s: Sciences, Social Sciences

Instructional Activity and Hours:

Activity	Hours
Classroom, Directed Studies or Online Instruction	45
Seminar/Tutorials	
Laboratory/Studio	
Practicum/Field Experience	
Co-op/Work Experience	

Other	
Total	45

Course Requisites:

- Complete all of the following
  - Completed at least 1 of the following:
    - FOM 11 – Foundations of Mathematics 11
    - FOM 12 – Foundations of Mathematics 12
    - PREC 11 – Pre-Calculus 11
    - PREC 12 – Pre-Calculus 12
    - CALC 12 – Calculus 12
    - MATH080 – Mathematics – Advanced Level
  - Earned a minimum grade of D (50%) in at least 1 of the following:
    - KNES163 – Physical Literacy for Life (3)
    - KNES190 – Human Anatomy (3)

Prior Learning and Recognition: Yes

Students are able to request formal recognition of their prior learning or experience outside the classroom. Challenge examination, portfolio-assisted assessment, work-based assessment or a combination of assessments that is appropriate to identify, assess, and recognize prior skills, competencies, and knowledge to achieve course credit. Tuition fees apply, refer to Policy 2.5.5 Prior Learning Assessment and Recognition (PLAR) or contact an education advisor for more information.

Course Transfer Credit:

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see https://www.bctransferguide.ca/ or https://transferalberta.alberta.ca . For more transfer credit information, please visit https://www.cotr.bc.ca/Transfer

All requests for course transfer credit from institutions in British Columba or elsewhere should go to the College of the Rockies Enrolment Services office.

Textbook Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

McGinnis, P. M. (2020). *Biomechanics of sport and exercise (4th ed).* Human Kinetics.

Please see the instructor's syllabus or check COTR's online text calculator https://textbook.cotr.bc.ca/ *for a complete list of the currently required textbooks.*

Learning Outcomes:

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

- describe the scope of exercise and sport biomechanics;
- apply knowledge of body segments, large bones, joints and major muscles of the body to create and analyze free body diagrams;
- identify and use anatomical terminology to describe movement;
- identify the organization of and basic dimensions used in mechanics, and apply each of Newton's laws of motion to various exercises and sport skills;
- describe and classify "force" and how it applies to linear, angular and general motion;
- describe work, power and energy and how motion is caused using Newton's laws;
- describe torques and movements of force and apply to exercise and sport;
- describe fluid mechanics and how they apply to water sports;
- describe the mechanical forces of the human body during sport and exercise;
- describe the structure and basic functions of the skeletal, muscular and nervous systems, and how they adapt to the various forces placed upon them; and
- analyze and apply qualitative and quantitative analysis to a specific sport or exercise skill.

Course Topics:

Unit I: Introduction to Biomechanics/External Forces and Effects on Human Motion

- Why study biomechanics?
- Terminology in exercise and sport biomechanics
- Fundamental concepts and principles of mechanics
- Forces: maintaining equilibrium or changing motion
- Linear kinematics: describing objects in linear motion
- Linear kinetics: explaining the causes of linear motion
- Work, power and energy

Unit II: Angular Kinematics and Fluid Mechanics

- Angular kinematics: describing objects in angular motion
- Angular kinetics: explaining the causes of angular motion
- Fluid mechanics

Unit III: Internal Biomechanics and Biomechanical Principles

- Mechanics of stress and strain on human motion
- The skeletal system
- The muscular system
- The nervous system
- Applying biomechanical principles in sport and exercise

See instructor's syllabus for the detailed outline of weekly readings, activities and assignments.

Evaluation and Assessments

Assessment Type: On-Campus (face-to-face)

Assessment Type	% of Total Grade
Assignments & Presentation	30%
Unit Exams (20% x 2)	40%
Final Exam	30%
Total	100%

Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	<50

Evaluation Notes: A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses.

Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior approval will receive a "0" on the exam.

Academic Policies:

College of the Rockies policies related to courses can be found at https://cotr.bc.ca/about-us/college-policies/ and include the following:

- Policy 2.1.4 Course Audit
- Policy 2.4.1 Credential Framework
- Policy 2.4.3 Students with Documented Disabilities
- Policy 2.4.4 Student Rights, Responsibilities and Conduct
- Policy 2.4.8 Academic Performance

- Policy 2.4.9 Student Feedback and Concerns
- Policy 2.4.11 Storage of Academic Works
- Policy 2.5.3 Student Appeal
- Policy 2.5.5 Prior Learning Assessment and Recognition (PLAR)

Equivalent Course(s) and Course Code Changes

Prior Course Code: HKIN 103 >> KNES 103

Date changed: September 2012

Course Changes:

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.