Course Code	Course Title	ECTS Credits
SPSC-310	Biomechanics & Kinesiology of Sports	6
Department	**Semester**	**Prerequisites**
Sports Science	Spring or Fall	SPSC-105, SPSC-106
Type of Course	**Field**	**Language of Instruction**
Required	Science of Sports	Greek
Level of Course	**Year of Study**	**Lecturer**
1st Cycle	3rd	Dr Parpa Koulla
Mode of Delivery	**Work Placement**	**Co-requisites**
face-to-face	N/A	None
Recommended Optional Programme Components: N/A		

Objectives of the Course:

The first part of the course will introduce students to the study of biomechanics. Students will develop a secure understanding of under-pinning mechanical principles and an understanding of the mechanics of sports movements using kinetic analyses of linear and angular motions. A wide variety of sport and exercise situations will be used to demonstrate the application of these principles. The second part of the course will be concerned with the biomechanics of complex movements and equipment design. Laboratory experimentation will provide the opportunity for students to develop practical skills in the use of a range of analysis equipment such as a force plate and computer-based motion analysis.

The aims of the course are to:

1. Enable students to become familiar with biomechanical terms and formulae.
2. Provide grounding in mechanical principles and their application to sport and exercise performance.
3. Introduce students to some of the basic techniques used for data collection and analysis.

Learning Outcomes:

On completion of this course, students should be able to:

1. Describe the type, structure and motion of joints (conferring, name of the movement, anatomical planes in which the movement occurs, and the degrees of freedom of the joint).
2. Undertake a kinesiological analysis: describe planes, axis, joint and muscle actions using anatomical terminology in a sporting context.
3. Identify key biomechanical terms, abbreviations, units and formulae.
4. Demonstrate basic knowledge and understanding of linear kinematics, linear kinetics, aerodynamics, buoyancy, gravity and friction.
5. Demonstrate the application of knowledge to simple movements in sport and exercise.

6. Develop an understanding of the mechanical principles governing human movement and of the mathematical modelling of sports movements.
7. Describe in depth the sequence and timing of events during activities (such as walking and pulls-ups).
8. Observe a human movement pattern (force of gravity, work, energy, Newton's laws of motion, etc.).
9. Perform a basic biomechanical analysis of a movement.

Course Contents:

1. The mechanics of sports movements using kinematic and kinetic analyses of linear and angular motions.
2. Techniques of motion capture and force plate.
3. Data collection and their use in the mechanical analysis of sports movements.
4. The relationship between the structure of the musculoskeletal system and its function in human movement, sport and exercise.
5. An introduction to 2-D/3D video analysis.
6. Static and dynamic equilibrium.
7. Calculation of centre of mass.
8. Determination of joint torques using inverse dynamics.

Learning Activities and Teaching Methods:

Lectures and practical demonstration

Assessment Methods:

Midterm examination, Final examination, Coursework/essays, Attendance/participation

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
McGinnis, P.	Biomechanics of sport and exercise science (2nd revised Edition)	Human Kinetics Europe Ltd	2004	0736051015

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Bartlett, R.M.	Introduction to sport biomechanics (2nd edition)	Routledge: Taylor & Francis	2007	978-0-415-33994-0
Roger Eston, Thomas Reilly	Kinanthropometry and Exercise Physiology Anthropometry, measurement and data analysis	Routledge: Taylor & Francis Group	2001	978-0-415-23613-3
Gerry Carr, Gerald A. Carr	Mechanics of sport: a practitioner's guide	Human Kinetics, Champaign, IL	1996	0873229746
Hamill, J. & Knutzen, K.M.	Biomechanical basis of human movement	Lippincott Williams &	2007	0781763061

	(2Rev Ed edition)	Wilkins,US		