

# APA 2315

## Introduction to the Biomechanics of Human Movement

Fall 2010

**Instructor:** Prof. D. Gordon E. Robertson, Montpetit 343, 562-5800 x4253 (office)  
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### Course Objectives:

- to introduce the scientific principles and laws underlying the field of biomechanics
  - to describe how biomechanical principles can be applied to understanding and analyzing the causes of human movements and their affects on the body
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<b>Course Evaluation:</b>	Midterm exam:	30%
	Labs and assignments:	30%
	Final exam:	40%

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### Course Text:

Robertson DGE. *Introduction to Biomechanics for Human Motion Analysis, Second Edition*. Waterloo: Waterloo Biomechanics, 2004.

### Reference:

Bartlett, R. *Introduction to Sports Biomechanics*, London: Spon Press, 1999.

Dyson GHG. *The Mechanics of Athletics*, Seventh edition. Toronto: Hodder & Stoughton, 1977.

Gowitzke BA & Milner M. *Understanding the Scientific Bases of Human Movement*, Third edition. Baltimore: Williams & Wilkins, 1988.

Hall SJ. *Basic Biomechanics*, Third edition. Toronto: Mosby-Year Book, 1999.

Hamill J & Knutsen KM. *Biomechanical Basis of Human Movement*, Second edition. Baltimore: Williams & Wilkins, 2003.

Hay JG. *Biomechanics of Sports Techniques*, Fourth edition. Englewood Cliffs: Prentice-Hall, 1993.

Kreighbaum E & Barthels KM. *A Qualitative Approach for Studying Human Movement*, Fourth edition. Boston: Allyn & Bacon, 1996.

Luttgens K; Deutsch H & Hamilton N. *Kinesiology: Scientific Basis of Human Motion*. Eighth edition. Dubuque, IA: Wm. C. Brown, 1992.

Ozkaya N & Nordin M. *Fundamentals of Biomechanics: Equilibrium, Motion and Deformation*, New York: Van Nostrand Reinhold, 1991.

**Course Content:**

<b>Date</b>	<b>Topics</b>	<b>Reading</b>
Sep. 9	Introduction Fundamental principles	chapter 1 chapter 2
Sep. 16	Statics: gravitation and weight, resolution of forces Statics: equilibrium, moment of a force, levers	sect. 3.1, 3.2 sect. 3.3, 3.4, 3.5
Sep. 23	Friction	chapter 4
Sep. 30	Kinematics: linear	sect. 5.1
Oct. 7	Kinematics: projectile motion	sect. 5.2
Oct. 14	Kinematics: angular, relationship between linear & ang. motion Review	sect. 5.3, 5.4 chapters 1-5
<b>Oct. 21</b>	<b>Midterm Examination (chapters 1 to 5 inclusive)</b>	
<b>Oct. 25-29</b>	<b>Study break</b>	
Nov. 4	Kinetics: forces Kinetics: moments of force	sect. 6.1 sect. 6.2
Nov. 11	Kinetics: moment of inertia Kinetics: law of reaction	sect. 6.3 sect. 6.4
Nov. 18	Kinetics: linear impulse and momentum Kinetics: angular impulse and momentum, conservation	sect. 7.1 sect. 7.2, 7.3
Nov. 25	Kinetics: work, energy and power	chapter 8
Dec. 2	Fluid Mechanics	chapter 9

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**Labs and Assignments:** Ten labs and assignments will be given. Assignments will consist of questions from the textbook that will be included with the lab. They **MUST** be handed in on the following week from your scheduled lab. Late assignments will be penalized. **Although, students will work in groups during the lab, exact copying of labs and assignments from another student is considered plagiarism. It is academic misconduct and can be severely penalized.**

**Don't do it!**