CAMOSUN COLLEGE	***School of Arts & Science*** ***PHYSICS DEPARTMENT*** **PHYS 160-ALL** **Biomechanics of Sport** **Winter 2009**

COURSE OUTLINE

The Approved Course Description is available on the web @ _____

Ω *Please note: this outline will be electronically stored for five (5) years only.*
It is strongly recommended students keep this outline for your records.

1. Instructor Information

(a)	Instructor:			
(b)	Office Hours:			
(c)	Location:			
(d)	Phone:		Alternative Phone:	
(e)	Email:			
(f)	Website:			

Upon completion of this course the student will be able to:

1. Answer, in written form, brief conceptual questions on the scope of biomechanics.
2. Solve technical problems:
   - involving units of scientific measurement, derived S.I. units, unit conversions.
   - involving forces in one dimension.
   - of force and linear kinematics with constant acceleration.
   - of momentum and impulse in one dimension.
   - of mechanical work, energy and power.
   - involving rotational quantities and kinematic relationships.
   - of torque, rotational kinematics, and angular momentum.
   - involving centre of mass.
   - of fluid buoyancy, lift and drag.
   - demonstrate proficiency in qualitative and quantitative biomechanical analysis of a sport activity.
3. Assemble simple experimental apparatus using written instructions.
4. Observe, record, organize and display data in tables, graphs or charts.
5. Analyze linear graphs (determine area, slope, intercept, etc.).
6. Interpret meaning of experimental results in the context of the experimental objectives.

3. Required Materials

(a) Texts Biomechanics of Sport and Exercise, *2nd edition*, McGinnis, P.M.

(b) Other Physics 160 Laboratory Manual

Scientific calculator
Graph paper (must be either 10 lines/inch or millimeter graph paper)

4. Course Content and Schedule

(Can include: class hours, lab hours, out of class requirements and/or dates for quizzes, exams, lectures, labs, seminars, practicums, etc.)

5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

The standard mark distribution for this course is as follows:

Quizzes and Other Work	50%
Final Exam (3 hours)	50%
Lab Reports	must be completed

DEPARTMENT POLICIES REGARDING TESTING:

1. Students must write quizzes, tests, midterm tests, etc., on the date and time assigned by the instructor. Missed exams normally receive a zero grade. In exceptional circumstances such as medical issues or a documented illness, a make-up exam may be given or the test may be waived at the discretion of the instructor. The instructor should be notified prior to the exam.

2. The final exam will cover the entire course and will be 3 hours long. As stated in the current college calendar (p. 39) “students are expected to write all term tests and final exams at the scheduled time and place.” Exceptions will only be considered for emergency circumstances as outlined in the calendar. Excursions, holidays, or scheduled travel flights are not accepted.

DEPARTMENT POLICIES REGARDING LABS:

1. Lab exercises will be done on a bi-weekly basis during the scheduled lab period. Attendance is mandatory and you will be required to “sign in” at the beginning of each one. As you complete the exercise your instructor will discuss your results with you and mark your work.

2. All assigned laboratory exercises and reports must be completed with an overall grade of 60% in order to obtain credit for this course. Attendance is required for all lab exercises at the scheduled times. A lab may be made up at a later time only in the case of documented illness or other extenuating circumstances.

3. At the discretion of the instructor, a student who is repeating this Physics course may not be required to complete the laboratory exercises a second time if an average lab grade of 70% or better was obtained.

STUDY TIME:

It is recommended that between 5 and 10 hours per week be spent studying for this course outside of class time.

6. Grading System

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D	Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite.	1
0-49	F	Minimum level has not been achieved.	0

Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy E-1.5 at **camosun.ca** for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	*Incomplete*: A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	*In progress*: A temporary grade assigned for courses that, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. *(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of course completion.)*
CW	*Compulsory Withdrawal:* A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.

7. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College calendar, at Student Services or the College web site at camosun.ca.

STUDENT CONDUCT POLICY

There is a Student Conduct Policy **which includes plagiarism**.
It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, at Student Services and on the College web site in the Policy Section.

OUTLINE

Part I Introduction, Forces and Human Motion

1. **Introduction to Biomechanics**
   - 1.1 The study of Biomechanics
   - 1.2 Definitions and history

2. **Terminology for Biomechanics in Sport and Exercise**
   - 2.1 The skeletal system and body segments
   - 2.2 Bones and joints
   - 2.3 Muscles
   - 2.4 Anatomical system for describing limb movements- direction, planes, and axes of motion.
   - 2.5 Joint actions

3. **Fundamentals for Studying Mechanics**
   - 3.1 Measurement, units, basic dimensions and fundamental quantities
   - 3.2 Accuracy and calculation
   - 3.3 Graphical analysis – plotting graphs, fitting curves to the data, analysis and interpretation

4. **Forces**
   - 4.1 The organization of mechanics
   - 4.2 Newton's laws of motion
   - 4.3 Defining forces – magnitude and direction
   - 4.4 Types of forces
   - 4.5 Addition of forces – resultant force
   - 4.6 Resolution of forces
   - 4.7 Equilibrium

5. **Linear Kinematics – Describing Objects in Linear Motion**
   - 5.1 Motion and definitions
   - 5.2 Linear kinematics
   - 5.3 Uniform acceleration and projectile motion

6. **Linear Kinetics – The Causes of Linear Motion**
   - 6.1 Newton's First Law and inertia
   - 6.2 Newton's Second Law and acceleration
   - 6.3 The concepts of impulse and momentum
   - 6.4 Newton's Third Law – Action and reaction forces
   - 6.5 Newton's Law of Universal Gravitation

7. **Work, Energy and Power**
   - 7.1 Definition of Work
   - 7.2 Energy - Kinetic and Potential

7.3 Work and energy - The Work-Energy Theorem, Conservation of Energy
7.4 Power

Part II Angular Motion and Fluid Mechanics

8. **Torques – Maintaining Equilibrium or Changing Rotational Motion**
   8.1 Defining torques – Forces and lever arms
   8.2 Equilibrium
   8.3 Center of Gravity

9. **Angular Kinematics – Describing Angular Motion**
   9.1 Angular position, displacement, velocity, and acceleration
   9.2 Linear and angular quantities
   9.3 Planes and axes for describing body and limb movements

10. **Angular Kinetics - Causing or Changing Angular Motion**
    10.1 Angular inertia
    10.2 Angular momentum, angular impulse
    10.3 Newton's 3 laws applied to angular motion

11. **Fluids - Motion in Water and Air**
    11.1 Buoyant force
    11.2 Dynamic fluid forces
    11.3 Drag

Part III Internal Biomechanics - Body Structure and Movement

12. **Mechanical Properties of Biological Materials**
    12.1 Stress
    12.2 Strain
    12.3 Stress-strain relation
    12.4 Mechanical properties of the musculoskeletal system

13. **The Skeletal System**
    13.1 Bones and joints

14. **The Muscular System**
    14.1 Muscle structure
    14.2 Muscle action – the contraction force

15. **The Nervous System**
    15.1 Neuron
    15.2 Motor unit
    15.3 Receptors and reflexes

16. **Applications of Biomechanical Principles in Technique and Training**