Queen's University
School of Kinesiology and Health Studies

Course Name: **KNPE 153/3.0** Introductory Biomechanics	**Course Instructor:** Dr. Patrick Costigan	**Contact Hours:** Fall 2020 – Remote Delivery
		Prerequisite: Reserved for BPHEH and BSCH KINE students only
		Exclusion: PHED 153/3.0

Course Description:

This course presents the fundamentals of biomechanics, which includes ideas such as forces and moments, techniques used to capture and analyze human motion as well as the major concepts used in skill analysis.

Course Texts:

Biomechanics: A Case-Based Approach, second edition, by Sean P. Flanagan. The textbook is recommended not required. It is an excellent resource for additional details on the material presented in class.

MATLAB: The MATLAB software package must be downloaded and installed before the first tutorial. Queen's has site license for MATLAB and it is free for all students. Go to mMy.Queensu.ca and sign in with your NetID and password, scroll down the page until you find the MATLAB section, and then log into Mathworks (the makers of MATLAB) to find the download. See the download directions for tutorial #1 on the onQ page for additional details.

MATLAB will be used in the tutorials to gain an understanding of how biomechanical data is processed and presented. You will use several custom programs written in MATLAB to process your tutorial data. MATLAB is a powerful computation package that might be useful in your other physical science courses.

All course notes will be available on the onQ page in PowerPoint format.

Intended Student Learning Outcomes: At the end of this course you will, 1. be able to qualitatively assess motion; 2. be familiar with and able to use the kinematic and kinetic equations; 3. be able to use these equations to analyze motion; 4. understand and be able to use methods to take measurements in biomechanics; 5. be able to present analyzed data in a clear, organized format; 6. understand, to a limited extent, the hardware and software tools used in biomechanics.	**Course Evaluation:** Solo Assignments 30% Group Assignment 15% Quizzes 15% Project 40%

Course Outline

Introduction to Course	Centre of Gravity
What is Biomechanics?	Stability
Force and Vectors	Angular Kinematics
Anatomy: the Anatomical System, Planes	Push Throw Movement Pattern
Anatomy: Skeletal System	Movement Pattern Analysis
Anatomy: Muscular System	Skill Analysis Methods
Adding Forces – Free Body Diagram	Fluid Mechanics
Linear Kinematics – Projectiles	Stress and Strain – Materials
Linear Kinetics – Newton	Biomechanics and Injury
Work, Power, Energy	Ergonomics
Torque/Moments; Digitizing & Calibration	Research Tool and Applications
Levers	Selected Topics: Electromyography

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