George Mason University
College of Education and Human Development
PhD in Education – Exercise, Fitness and Health Promotion Specialization
EFHP 825 (001) – Data Analytics in Exercise, Fitness, and Health Promotion
3 Credits, Spring 2018
[Fridays/10:30AM – 1:10PM] [Bull Run Hall Room 252 – Science & Technology Campus]

Faculty
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Prerequisites/Corequisites
Graduate Standing or Permission of Instructor

University Catalog Course Description
Examines data processing, analysis and interpretation using software applications common in Exercise, Fitness and Health Promotion.

Course Overview
Not Applicable

Course Delivery Method
This course is delivered using classroom instruction (face-to-face) and laboratory experiences.

Learner Outcomes or Objectives
This course is designed to enable students to do the following:
1. Critique the appropriate analytic methodology to process data in Exercise, Fitness and Health Promotion.
2. Select and design data processing procedures to analyze data from measurement techniques and instrumentation.
3. Synthesize literature in data analytics in Exercise, Fitness and Health Promotion.
4. Interpret data processing results from various equipment commonly used.

Optional Texts
Payton C, Bartlett R. *Biomechanical evaluation of movement in sport and exercise: the British Association of Sport and Exercise Sciences guide*. Routledge; 2007.

Article Reading List
VO2
Howley ET, Bassett DR, Welch HG. Criteria for maximal oxygen uptake: review and commentary. *Med Sci Sports Exerc*. 1995;27(9):1292-1301.

Robergs RA, Dwyer D, Astorino T. Recommendations for improved data processing from expired gas analysis indirect calorimetry. *Sports Med*. 2010;40(2):95-111. doi:10.2165/11319670-000000000-00000.

ECG
Evolving interpretation of the athlete's electrocardiogram: from European Society of Cardiology and Stanford criteria, to Seattle criteria and beyond. *J Electrocardiol*. 2015;48(3):283-291. doi:10.1016/j.jelectrocard.2015.01.007.

International criteria for electrocardiographic interpretation in athletes: Consensus statement | British Journal of Sports Medicine. http://bjsm.bmj.com/content/51/9/704. Accessed December 27, 2017.

Data Processing
Pezzack JC, Norman RW, Winter DA. An assessment of derivative determining techniques used for motion analysis. *Journal of Biomechanics*. 1977;10(5):377-382. doi:10.1016/0021-9290(77)90010-0.

Wood GA. DATA SMOOTHING AND DIFFERENTIATION PROCEDURES IN BIOMECHANICS. *Exercise and Sport Sciences Reviews*. 1982;10(1):308.

Challis JH. A Procedure for the Automatic Determination of Filter Cutoff Frequency for the Processing of Biomechanical Data. *Journal of Applied Biomechanics*. 1999;15(3):303-317. doi:10.1123/jab.15.3.303.

Kinematic Data
Hreljac A, Marshall RN. Algorithms to determine event timing during normal walking using kinematic data. *Journal of Biomechanics*. 2000;33(6):783-786. doi:10.1016/S0021-9290(00)00014-2.

Wu G, Siegler S, Allard P, et al. ISB recommendation on definitions of joint coordinate system of various joints for the reporting of human joint motion--part I: ankle, hip, and spine. International Society of Biomechanics. *J Biomech*. 2002;35(4):543-548.

EMG
Soderberg GL, Knutson LM. A guide for use and interpretation of kinesiologic electromyographic data. *Phys Ther*. 2000;80(5):485-498.

Data Reporting
Madkour M, Benhaddou D, Tao C. Temporal data representation, normalization, extraction, and reasoning: A review from clinical domain. *Comput Methods Programs Biomed*. 2016;128:52-68. doi:10.1016/j.cmpb.2016.02.007.

Wijndaele K, Westgate K, Stephens SK, et al. Utilization and Harmonization of Adult Accelerometry Data: Review and Expert Consensus. *Med Sci Sports Exerc*. 2015;47(10):2129-2139.

doi:10.1249/MSS.0000000000000661.

Other important resources:
During this course, we will primarily use MATLAB software. You can have access to this software using Virtual Computing Lab (VCL), https://doit.gmu.edu/faculty-and-staff/computer-labs/virtual-computing-lab/. You can also access it remotely. For that you just need to be connected to the Virtual Private Network (VPN), https://itservices.gmu.edu/services/view-service.cfm?customel_dataPageID_4609=6169, and then connect to VCL. The classroom for this class is a computer lab, and every computer has MATLAB.

Course Performance Evaluation
Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, Tk20, hard copy).

Assignments and Examinations

Data Analysis Assignments & Portfolio – The intent of the portfolio is to apply the theory learned in EFHP 815 class as well as this class to a variety of data analysis applications. During the class meetings, students will conduct data analyses and interpretation of data collected previously. Assignments can be finished off class, and turned in at the beginning of next class. The portfolio will be submitted at the end of the semester and include all materials developed during the semester. Detailed instructions will be provided to students at the start of the semester. A total of 8 assignments and one portfolio will be required.

Final Project & Presentation – Each student will be required to complete a final project data analyses where the student will write a matlab script, to call/import/read data, process data, compute descriptive & inferential analysis and plot graph(s). The student will have to write a brief report on the process and respective data interpretation, as well as submit the respective matlab script with the report. American Medical Association Manual (AMA) of Style (10th edition) format must be used for all written work in this class (e.g., citations, references, creation of tables, and formatting headers for paper sections). Topics will be initially discussed during the first week of class. *Students must notify both instructors by email no later than 5 pm on February 23 of their final project topic and scope of data analysis.*

Course Performance Evaluation Weighting

This course will be graded on a point system, with a total of 100 possible points.

ASSESSMENT METHOD	POINTS
Assignment #1	10
Assignment #2	10
Assignment #3	10
Assignment #4	10
Assignment #5	10
Assignment #6	10
Assignment #7	10
Portfolio	10
Final Project Presentation	10
Final Project	10
TOTAL	**100**

Grading Policies

The student's final letter grade will be earned based on the following scale:

Grade	Percentage
A	94 – 100%
A-	90 – 93%
B+	88 – 89%
B	84 – 87%
B-	80 – 83%
C	70 – 79%
F	0 – 69%

Note: Although a B- is a satisfactory grade for a course, students must maintain a 3.00 average in their degree program.

Professional Dispositions

See https://cehd.gmu.edu/students/polices-procedures/

Class Schedule

Week	Topic	Assignment Due Date
1 – 1/26	Introduction to course Discussion of projects ICC based on demographics and anthropometrics data. ICCs, types of ICCs and why it is important to establish rater or testing reliability	
2 – 2/2	Introduction to Matlab 1 – The Basics	
3 – 2/9	VO2 & ECG analysis (Dr. Robison) Introduction to Matlab 2 – Applications to Human Movement Data Assignment #1	
4 – 2/16	*No Class – extended EFHP 811 meeting* **Students can meet with instructors for advice on research project OR extra help with Matlab*	**Final Project Proposal Email due to instructors by 5 pm**
5 – 2/23	Basics of Smoothing and Filtering Data Introduction to Matlab 3 – Function and Algorithm Development Assignment #2	**Assignment #1 Due**
6 – 3/2	Biomedical Imaging Processing (Dr. Sikdar)	
7 – 3/9	Processing EMG (Dr. Ambegaonkar) Assignment #3	**Assignment #2 Due**
8 – 3/16	***Spring Break***	
9 – 3/23	Kinematics: Residual Analysis – Determine optimum filtering Assignment #4 Processing & Filtering in Matlab – EMG	**Assignment #3 Due**
10 – 3/30	Kinetics: Processing & Filtering Force Plate Data Determining 'events' from the data Assignment #5	**Assignment #4 Due**
11 – 4/6	Balance & Stability: Center of Pressure Data Analysis Assignment #6	**Assignment #5 Due**

12 – 4/13	Topic TBD based on student projects/interests	**Assignment #6 Due**
	Assignment #7	
13 – 4/20	Final Project Workday	**Assignment #7 Due**
14 – 4/27	Final Project Workday	
15 – 5/4	Final Project Presentations	**Presentation Slides Due by 9 am**
		Final Project Due by Midnight on Sunday, May 6

Core Values Commitment

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: http://cehd.gmu.edu/values/.

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see https://catalog.gmu.edu/policies/honor-code-system/ http://oai.gmu.edu/the-mason-honor-code/).

- Students must follow the university policy for Responsible Use of Computing (see http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/).

- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students **solely** through their Mason email account.

- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see http://ods.gmu.edu/).

- Students must follow the university policy stating that all sound emitting devices shall be silenced during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or https://cehd.gmu.edu/aero/tk20. Questions or concerns regarding use of Blackboard should be directed to http://coursessupport.gmu.edu/.

- For information on student support resources on campus, see https://ctfe.gmu.edu/teaching/student-support-resources-on-campus

For additional information on the College of Education and Human Development, please visit our website https://cehd.gmu.edu/students/ .