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| <p>Course Name: KNPE 353/3.0</p> <p>Experiments in Neuromechanical Kinesiology</p> | <p>Course Instructor:</p> <p>Dr. Jessica Selinger</p> | <p>Contact Hours:</p> <p>Lecture: 1 x 3.0 x hrs/wk / 12 weeks 120 (36Lab;84P)</p> | | | | | | | | | | | | |
| <p>Course Description:</p> <p>This laboratory course will focus on advanced principles and techniques used in experiments in Neuromechanical Kinesiology, including applications in biomechanics, motor control, and neurophysiology. The objective of the course is to provide students with hands on experience in scientific study design, human instrumentation and data collection, signal processing and data analysis, and scientific report writing. These skills are intended to prepare students interested in pursuing careers involving the collection and/or interpretation of human data, be it research, clinical, or industry settings.</p> | | <p>Prerequisite:</p> <p>KNPE 153/3.0, KNPE 254/3.0 and KNPE 261/3.0 Restricted to students in a KIN Program level 3 or above.</p> <p>Exclusion:</p> <p>None</p> | | | | | | | | | | | | |
| <p>Learning Outcomes:</p> <ul style="list-style-type: none"> • Describe the technologies used to investigate human neuromechanics during movement • Collect, process, analyze and interpret human neuromechanical data • Develop problem solving and critical thinking skills through coding and data analysis • Develop teamwork skills through group laboratory work • Communicate scientific findings through written lab reports | <p>Course Texts:</p> <p>MATLAB & Simulink: This course makes use of MATLAB & Simulink, which is freely available to all Queen's students.</p> <p>Course Evaluation:</p> <table border="0"> <tr> <td>Lab 1 (Finger Pulse)</td> <td>9%</td> </tr> <tr> <td>Lab 2 (EMG)</td> <td>16%</td> </tr> <tr> <td>Lab 3 (Force Plates)</td> <td>16%</td> </tr> <tr> <td>Lab 4 (Motion Capture)</td> <td>19%</td> </tr> <tr> <td>Lab 5 (Wearables)</td> <td>20%</td> </tr> <tr> <td>Student's Choice</td> <td>20%</td> </tr> </table> | | Lab 1 (Finger Pulse) | 9% | Lab 2 (EMG) | 16% | Lab 3 (Force Plates) | 16% | Lab 4 (Motion Capture) | 19% | Lab 5 (Wearables) | 20% | Student's Choice | 20% |
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| <p>Course Outline</p> | | | | | | | | | | | | | | |
| <p>Data Acquisition and Signal Processing</p> | <p>Standing Stability and Force Plates</p> | | | | | | | | | | | | | |
| <p>Electromyography and Muscle Force</p> | <p>Gait Mechanics and Motion Capture</p> | | | | | | | | | | | | | |
| <p>Reflexes and Nerve Conduction Velocity</p> | <p>Activity Monitoring and Wearable Sensors</p> | | | | | | | | | | | | | |
| <p>Motion Capture and Inverse Dynamics</p> | <p>Processing Motion Capture Data</p> | | | | | | | | | | | | | |
| <p>Predicting physical activities using accelerometry</p> | <p>Investigating walking and running mechanics</p> | | | | | | | | | | | | | |
| <p>Investigating center of pressure dynamics during standing</p> | <p>Investigating the relationship between muscle force, fatigue, and EMG</p> | | | | | | | | | | | | | |
| <p>Acquiring finger pulse data</p> | | | | | | | | | | | | | | |