**Advanced Statistical Analysis of Biomechanical Time Series: PCA, FDA & SPM**

7 July 2018, 13:30 – 16:30

**Schedule**

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|  | **Time** | **Topic** | **Speakers** |
| **1** | 13:30 – 13:40 | Introduction | Laura-Anne Furlong |
| **2** | 13:40 – 14:00 | Time Series Analysis Basics | Jos Vanrenterghem |
| **3** | 14:00 – 14:30 | Advanced Techniques: PCA & FDA | John Warmenhoven, Drew Harrison |
| **4** | 14:30 – 15:00 | Advanced Techniques: SPM & SnPM | Mark Robinson, Jos Vanrenterghem, Todd Pataky |
| **5** | 15:00 – 15:30 | Example Dataset Analysis | John Warmenhoven, Todd Pataky |
| **6** | 15:30 – 15:55 | Considerations for Choosing Techniques | Drew Harrison, Mark Robinson |
| **7** | 15:55 – 16:10 | Panel Discussion | Chair: Laura-Anne Furlong |
| **8** | 16:10 – 16:30 | Open Audience Discussion | Chair: Laura-Anne Furlong |

**Introduction**

* Historical background in relation to curve analysis in biomechanics and the high dimensional nature of biomechanical data sets
* Identification of some key publications
* The knowledge/ skill gap in our field
* Aims of the workshop

**Time Series Analysis Basics**

* Smoothing
* Normalization / Registration
* Discrete point techniques (and issues with them)

**Advanced Techniques: PCA & FDA**

* Overview of FDA and fPCA as a technique within PCA
* Description of the range of tools available

**Advanced Techniques: SPM & SnPM**

* Historical and literature contexts of SPM
* Theory overview
* Example: t test (parametric and non-parametric)
* Generalizability: regression, ANOVA, Hotelling’s T2 test

**Example Dataset Analysis**

* Dataset overview (refer to paper comparing SPM and Functional t-tests)
* GitHub document overview
* Code overview: PCA, FDA, SPM and SnPM
* Results summary: PCA, FDA, SPM and SnPM

**Considerations for Choosing Techniques**

* Objectives of studies
* Strengths and weaknesses

**Panel Discussion**

* Possible topics:
  + Statistical techniques as scientific tools
  + Important strengths / weaknesses of the techniques
  + Software availability / usability
  + The future of Statistics in Biomechanics

**Open Audience Discussion**