Course Number: 667

Course Title: Advanced biostatistics for clinical research

Course Credit: 3 credits

Prerequisite: BIOMED 642 and 643 or equivalent and permission of instructor

Placement in Curriculum: Winter Semester (second semester)

Course Description: The course will cover through lectures, discussions, and a group analysis current methods for analyzing longitudinal and clustered, clinical data. Topic areas covered will include multi-level, multi-state, multi-process, and structural equation models.

Course Objectives: In this course, students will:

- Learn statistical methods for analyzing longitudinal and clustered data
- Present journal articles that have used the methods
- Propose studies that might apply the methods within their clinical specialties
- Conduct an analysis as a group of a clinical dataset

Learning Outcomes

At the conclusion of the course students will be able to:

Understand the clinical literature using longitudinal or clustered designs
Include these designs within their own research studies
Know how to participate in the analysis of a clinical dataset
Learn how to write up the results of longitudinal analyses

Topical Outline:

General Sessions

Discrete time logistic regression
Modeling time dependent explanatory variables
Competing risk models
Repeated measures analysis
Multi-state transition models
Introduction to multi-level models
Multi-level models for normally distributed data
Multi-level models for binary data
Multi-level models for multinomial and ordinal data
Multiple membership models
Overview of multi-process models
Modeling possibilities using multi-process models
Introduction to structural equation models
Growth modeling with continuous outcomes
Growth modeling with categorical outcomes
Cross-sectional mixture modeling
Longitudinal mixture modeling
Multi-level latent variable models

**Teaching Methods**

Lectures on statistical methods
Student presentations of journal articles
Student presentations of study designs within their specialty areas
Analysis with group discussions of a clinical dataset
Write-up of the results of the statistical analysis

**Required Reading:**

Students will be given one or two articles per class session to read and discuss in class.

**Learning Experiences:**

Lecture, group discussions, individual presentations, data analysis, manuscript preparation

**Evaluation:**

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Journal article presentations</td>
<td>25%</td>
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<td>Proposed study designs</td>
<td>25%</td>
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<tr>
<td>Data analysis and write-up</td>
<td>50%</td>
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