

**University of Hawaii at Manoa  
John A. Burns School of Medicine  
Course Overview  
Dr. James W. Davis**

**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:**

Journal article presentations	25%
Proposed study designs	25%
Data analysis and write-up	50%