BMIF 370 Evaluation Methods in Biomedical Informatics  
Instructors: Cindy Gadd and Josh Peterson  
Fall

Students are introduced to evaluation and experimentation, with exposure to study design, including sampling, appropriate use of controls; data collection, including human subjects research considerations; analysis, including testing for statistical significance, definitions of sensitivity and specificity, ROC plots; and reporting of results. Quantitative and qualitative methods will be covered, as well as methods and issues specific to healthcare settings. The course is not a substitute for in-depth methodology courses, e.g., biostatistics, epidemiology, or qualitative methods, but rather focuses on the basics of using these methods in biomedical informatics evaluation studies; therefore our treatment of some of these methods will be brief/superficial and subsequent coursework will be necessary for thorough understanding and/or application in your own research.

Notes:
1. One 3-hour class per week
2. Prerequisites: BMIF 300 and Biostatistics
3. Other Readings for Class Discussion drawn from publications and examples from current research of students, faculty, others
4. Course will be taught using a team approach: CG, JP, and guest lecturers, including Laurie Novak (LN) and Josh Denny (JD).

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<th>Week</th>
<th>Topic</th>
<th>Subtopics</th>
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<th>Other Readings for Class Discussion</th>
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<th>Homework Assignments</th>
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| 1    | Overview of Evaluation Methods in Biomedical Informatics and this Course | 1. Evaluation in Biomedical Informatics  
2. Evaluation as a field  
3. Course objectives and mechanics | 1 | Campbell et al. GJIM 2008  
Dexter et al. NEJM 2001 | CG/JP | 
| 2    | Approaches to Evaluation and Study Design Overview | 1. Measurement  
2. Demonstration | 2 & 3 | Stead et al. JAMIA 1994  
Friedman JAMIA 1995  
Friedman JMLA 2005 | CG | Self-tests 2.1, 2.2, 3.1 Due |
<p>| 3    | Measurement Study Methods | 1. Reliability and validity in measurement | 4 &amp; 5 | | CG | Self-tests 4.1, 4.4, 4.4, 5.1, 5.4, 5.5 Due |</p>
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| 4    | Proposals                                      | 1. Guide to writing proposals  
2. Overview of course project requirements | 12, pp. 338-346 | PHS 398 and sample proposals  
CG/JP                                               | Survey Exercise Assigned                     |
| 4    | Surveys – Development and Use                  | 1. Improving measurement capabilities  
CG                                                   | Survey Exercise Due                           |
| 5    | Introduction to Demonstration Study Design     | 1. Overview  
2. Error                                                                 | 7               | “AMIA Informatics 2009 Year in Review”  
http://dbmichair.mc.vanderbilt.edu/amia2009/  
JP                                                   | Project: Abstract Due                        |
| 5    | Design Issues in Comparative Informatics Trials| Randomized and nonrandomized trials  
2. Adjudication  
3. Diagnostic testing |                             | CONSORT:  
http://www.consort-statement.org/consort-statement/  
TREND:  
http://www.cdc.gov/trendstatement/  
JP                                                   | Study Design Exercise 1 Due                  |
| 6    | Demonstration Study Methods – Design           | 1. Reference standards  
2. Adjudication  
3. Diagnostic testing | 6               | Hripcsak et al. JAMIA 2002  
JP                                                   | Project: Abstract Due                        |
http://mcapps01.mc.vanderbilt.edu/IRB/policy&procedures.nsf  
JP/CG                                               | Study Design Exercise 2 Due                  |
| 7    | Demonstration Study Methods – Analysis         | 1. Power  
2. Measures of association  
3. Statistical significance | 8               | Readings TBA  
JP                                                   | Study Design Exercise 1 Due                  |
| 8    | Demonstration Study Methods – Introduction to Multivariate Analysis | -                                                                 | -               | Readings TBA  
JP                                                   | Study Design Exercise 2 Due                  |
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<th>Comparative Effectiveness Research</th>
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<th>Readings TBA</th>
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<td>Project Overviews</td>
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<td>Project: Discuss Proposals in Class</td>
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<td>11</td>
<td>Subjectivist Approaches</td>
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<td>Forsythe. Medical Anthropology Quarterly 1996.</td>
<td>CG</td>
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<tr>
<td>12</td>
<td>Performing Subjectivist Studies</td>
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<td>Jordan, Nemeth, and Patterson</td>
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<td>Multi-Method Approaches &amp; Economic Aspects of Evaluation</td>
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<td>Kaplan &amp; Duchon</td>
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<td>Special Topics in Evaluation Methods</td>
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<td>Readings TBA</td>
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<td>Project: Presentations in Class; Proposal Due</td>
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**Graded Assignments:**
1. Term Project: Students will develop individual evaluation study proposals for a real project (e.g., MS thesis) – break it down into components/milestones w/ due dates for feedback (from instructors, peers) over the term and final proposal due at end of term – more information will be provided.
2. Homework Assignments: a) Self-tests (in text) and problem sets will be used to exercise mastery of concepts and methods throughout the course; b) Critiquing one or more published evaluation studies will demonstrate understanding of study design, methods, analysis of results, and reporting.
3. Class Participation: a) Each class will have 1-2 featured publications, from which one student will be responsible for presenting the key points to the class – students will not know in advance who will be presenting each class so all will be prepared to discuss; b) Understanding of topics and willingness to explore/challenge concepts, as demonstrated by class participation throughout the course.