Oregon Health & Science University  
Department of Medical Informatics and Clinical Epidemiology

BMI 560/660 - Design and Evaluation in Biomedical Informatics

OFFERED ON-CAMPUS (Winter) and ONLINE (Summer)

3 credit hours  
Winter Term 2013  
Instructor: Vishnu Mohan MD MBI FACP

Version information: This version of the syllabus updated November 9th, 2012

KEY INFORMATION FOR THIS COURSE

<table>
<thead>
<tr>
<th>Course Number</th>
<th>BMI 560/660</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Title</td>
<td>Design and Evaluation in Biomedical Informatics</td>
</tr>
<tr>
<td>Number of Credits</td>
<td>3 (on-campus)</td>
</tr>
<tr>
<td>Quarter</td>
<td>Winter Term 2013</td>
</tr>
<tr>
<td>Instructors</td>
<td>Vishnu Mohan MD MBI FACP</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:mohanv@ohsu.edu">mohanv@ohsu.edu</a></td>
</tr>
<tr>
<td></td>
<td>503-494-4469</td>
</tr>
<tr>
<td>Term Dates</td>
<td>Registration Begins 11/26</td>
</tr>
<tr>
<td></td>
<td>Classes Begin 1/7, Term Ends 3/22</td>
</tr>
<tr>
<td></td>
<td>Holidays:</td>
</tr>
<tr>
<td></td>
<td>Martin Luther King Holiday 1/21</td>
</tr>
<tr>
<td></td>
<td>Presidents Day Holiday 2/18</td>
</tr>
</tbody>
</table>

PREREQUISITES

A prior course in biostatistics (such as PHPM 524, BSTA 511/611, or equivalent).
COURSE OVERVIEW

What does BMI 560/660 fit into the DMICE curriculum?

BMI 560/660 is one of two core courses in the Evaluative Sciences branch of the curriculum, which also includes PHPM 524 (Introduction to Biostatistics) or an equivalent course. The Evaluative Sciences curriculum was developed to enable students to understand the fundamental aspects of scientific research including statistics, qualitative research methods, epidemiology and health data analysis.

The Evaluation Sciences branch also includes a third elective course in evaluation methods that is chosen by the student according to their individual interests and needs (examples include Qualitative Research Methods, Quantitative Research Methods, Software Engineering, or other evaluation courses approved by the student’s advisor). If you have already taken several of these, you may not be required to take BMI 560/660. Please note that some of these methods courses may require BMI 560/660 as a prerequisite.

This course is also the second in the three-course series, which also includes BMI 515 (Ethical, Legal and Social Issues in Biomedical Informatics) and BMI 570 (Scientific Writing and Communication for Informatics Students) that prepare first-year masters students to conduct a capstone or thesis project in year two. This course is also an excellent introductory course if you are planning the direction of your research for your PhD.

COURSE DESCRIPTION

What makes informatics projects unique?

Informatics projects in the research environment, as well as those in the operational arena can display a wide spectrum of disparity. Examples of informatics projects are quite varied; from field studies that improve the understanding of tasks and information needs of users, to development projects that design, build, and deploy clinical information systems, to studies that assess the impact of information systems on health care processes and outcomes.
Why is the process of designing an informatics project challenging?

Informaticians are often asked to help design and implement projects in diverse settings that require frameworks to be drawn from different disciplines. Additionally, for their capstone or thesis, informatics students often design projects that traverse several traditional branches of learning.

How will this course help informaticians?

At the most fundamental level, this course provides you with a "toolkit" of design and evaluation concepts that will allow you to build your own projects, both in research as well as the clinical informatics realms.

This course is intended to provide a high-level overview of the concepts, terminology, and strategies needed to design and evaluate projects in biomedical informatics, including methodologies drawn from software engineering, qualitative research, quantitative research, and business administration.

FACULTY INFORMATION

Vishnu Mohan MD MBI FACP
BICC 409, Department of Medical Informatics and Clinical Epidemiology,
Oregon Health & Science University,
3181 Sam Jackson Park Rd,
Portland, OR 97239
Email: mohanv@ohsu.edu
Telephone: 503 494 4469

How to reach me: Email is always the best way to communicate with me. My office hours are by appointment – email for a time to meet virtually or face-to-face, or leave a message at 503 494 4469.

Teaching: I teach three core clinical informatics courses at DMICE - BMI 560/660 (Design and Evaluation in Health Informatics), BMI 512/612 (Clinical Information Systems), and BMI 513 (Electronic Health Record Lab). I also teach ISQA 551 (Healthcare Information Technology for Managers), and co-teach ISQA 511 (Managerial Decision Making) for the PHSU/PSU MBA in Healthcare Management program. As an internist and clinician-educator, I also teach residents and medical students.
Research interests: My primary research interest is in clinical diagnostic reasoning, and how clinicians interact with technology such as clinical decision support and computerized physician order entry (CPOE), and how technology affects their decision making. We study this interaction in a unique way, using a qualitative, interdisciplinary approach. I’m also interested in using high-fidelity simulation to look at how clinicians interact with technology. Other interests include clinical and biomedical informatics education, and curriculum development to help train the health IT workforce.

Homepage: My OHSU web page is at: http://goo.gl/3C1D

PRIMARY LEARNING OBJECTIVES

This course will:

1. Provide students with an overview and framework for the design and evaluation of biomedical informatics projects, across the spectrum of system types, developmental stages, user perspectives, and evaluation methods.

2. Examine in detail a variety of design and evaluation methods, and apply them to specific projects in three key categories: quantitative evaluation, qualitative evaluation, and software development.

3. Prepare students to design and conduct thesis or capstone research/development projects in biomedical informatics.

REQUIRED TEXTBOOK

Practical Research: Planning and Design (10th Edition)

Authors: Paul D Leedy and Jeanne Ellis Ormrod
Paperback: 384 pages
Publisher: Addison Wesley; 10 edition (January 16, 2012)
Language: English
ISBN-10: 0132693240

COURSE COORDINATION

This class is available to on-campus students during Winter Term 2013. An online instance of the course will be offered during Summer Term 2013.
The online component to this course is available through the Sakai learning management software at [http://sakai.ohsu.edu](http://sakai.ohsu.edu). The online component includes lectures, PowerPoint slides and handouts, reading assignments, and project material.

The in-class section meets once a week at BICC. For these students, the online component is augmented by their in-class experience, which include large-group as well as small-group sessions.

**COURSE STRUCTURE AND CONTENT**

The course is structured in a modular fashion as a series of weekly components. Each weekly module includes a lecture, additional reading material, and assignments. Tests may also be held online, at the discretion of the instructor. Lectures may be delivered by guest lecturers with experience in research or in the operational informatics universe. Guest lecturers may also participate in in-class sessions (for in-class instances of the course).

**Example of the course schedule and topics covered (note that the actual schedule for this course may vary from the example):**

- **Week 1**  Overview of the course
- **Week 2**  Projects and proposals
- **Week 3**  Definitions and frameworks
- **Week 4**  Software design and usability methods
- **Week 5**  Software evaluation methods
- **Week 6**  Quantitative methods: design
- **Week 7**  Quantitative methods: evaluation
- **Week 8**  Qualitative methods
- **Week 9**  Business methods
- **Week 10**  Mixed methods
- **Week 11**  Student projects

**EXPECTATIONS**

To succeed in this course, students are expected to:

1. Review reading assignments; including lectures, chapters from the required textbook, articles or handouts, and engage in independent reading for projects and questions.
Students are responsible for learning all content in the assigned readings, whether discussed in the lectures or not.

2. Participate in discussions; this class actively encourages collaboration, engagement and participation by all students. The student’s participation grade is based on their level of contribution to the learning of others.

3. Complete assignments and other deliverables in a timely fashion. It is anticipated that students will substantiate their assertions with appropriate attribution, and demonstrate that they possess the ability to critically retrieve and analyze information that is available in the informatics literature. Some assignments and projects may involve teamwork for preparation, presentation, and grading. As is common in real life, there are penalties for late submissions and bonuses for those who turn their work in early.

4. Complete quizzes and other evaluative tools during the course in a timely fashion.

Please note that this course features a final exam that will be a closed-book, timed effort, with questions will be in a multiple-choice format.

**EVALUATION AND GRADING**

Assignments and Projects = 40%
Participation = 30%
Tests and Exams = 30%

**HOW TO SUCCEED IN THIS COURSE**

This section describes one approach that may be helpful in allowing you to be successful in this course.

**My philosophy on learning and the role of the instructor**

At this level of education, I anticipate that students will be adult learners and already have significant insight into the way they learn best.

The best learning occurs when we learn from each other. All of you bring your unique experiences and prior learning to this course. I encourage you to share your expertise during this course. My classes emphasize a culture where participation and sharing information results in the dissemination of knowledge and wisdom.
When I teach a course at the graduate level, I often find that I learn as much from you as you do from your instructors. I see my role as primarily that of a facilitator, helping you reach your learning goals for the course.

**Participation in Forums**

Participation scores are graded weekly, so read and post on the Forum regularly! The weekly score is based on your level of contribution to the learning of others. I’m looking for quality, not quantity! It’s not how much you post, but *what* you say and *how* you say it.

Remember that a Forum format is just that – a place for meaningful discussion. Responses to posts often are as useful to enhance learning as the original post itself. The Forum is a great format to help us learn from each other.

**Lectures and course material**

This course offers an intensive amount of information and it is highly recommended that students develop their own routine schedule to keep up with course materials; it is likely that students will not be able to catch up if they miss a substantial number of lectures and assignments over the duration of the course.

**Grading**

This is a graduate level offering, and though I wish every one of you could score a perfect "A" for this course, in all likelihood that particular scenario will remain a fantasy.

You will see that each evaluation aspect of this course has approximately equal weightage. This is to ensure that no one specific element can drag down your grade. However students who show an equal level of engagement in all aspects (assignments and other deliverables, class participation, and tests) tend to have the highest grades in the course. Of course, this also implies that students who choose not to actively participate in one or more aspects of this course will find it difficult to earn a high grade.

You will note that there is a multiple choice test that is part of the evaluation matrix for this course. I need to know that you have understood the key elements of the course content, and the test allows me to quantitatively evaluate if specific objectives have been met. In addition to giving you feedback of your own learning, it also helps me improve the course for future offerings by targeting areas that need a greater focus.
ACADEMIC HONESTY

Course participants are expected to maintain academic honesty in their course work. Participants should refrain from seeking past published solutions to any assignments. Literature and resources (including Internet resources) employed in fulfilling assignments must be cited.

In an effort to uphold the principles and practice of academic honesty, faculty members at OHSU may use originality checking systems such as Turnitin to compare a student’s submitted work against multiple sources.

See http://ozone.ohsu.edu/som/faculty/docs/graduatecouncil/profconductpolicy.pdf for details.

SPECIAL NEEDS

Our program is committed to all students achieving their potential. If you have a disability or think you may have a disability (physical, learning, hearing, vision, psychological) which may need a reasonable accommodation please contact Student Access at (503) 494-0082 or e-mail at orchards@ohsu.edu to discuss your needs. You can also find more information at http://www.ohsu.edu/student-access. Because accommodations can take time to implement, it is important to have this discussion as soon as possible. All information regarding a student’s disability is kept in accordance with relevant state and federal laws.

COURSE ACCESS

Every reasonable effort has been made to protect the copyright requirements of materials used in this course. Class participants are warned not to copy, audio, or videotape in violation of copyright laws. Journal articles will be kept on reserve at the library or online for student access. Copyright law does allow for making one personal copy of each article from the original article. This limit also applies to electronic sources.

To comply with the fair use fair use doctrine of the US copyright law, Sakai course sites close three weeks after grades are posted with the Registrar. Please be sure to download all course material you wish to keep before this time as you will have no further access to your courses.