3 credit hours
Instructor: Vishnu Mohan MD MBI FACP

Version information: This version of the syllabus updated November 30, 2016

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**Key information about this course**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>BMI 560/660</th>
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<tbody>
<tr>
<td>Course Title</td>
<td>Design and Evaluation in Biomedical Informatics</td>
</tr>
<tr>
<td>Number of Credits</td>
<td>3 (online)</td>
</tr>
<tr>
<td>Quarter</td>
<td>Winter Term 2017</td>
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<tr>
<td>Instructors (with e-mail addresses)</td>
<td>Vishnu Mohan MD MBI FACP <a href="mailto:mohanv@ohsu.edu">mohanv@ohsu.edu</a> 503-494-4469</td>
</tr>
</tbody>
</table>

**Who teaches this course?**

Vishnu Mohan MD MBI FACP

**About me:** I am an internist, clinical educator, and clinical informatician, and an Assistant Professor in Medical Informatics, Medicine, and Management here at OHSU. I am the program director of our ACGME-accredited clinical informatics subspecialty fellowship, and am board certified in internal medicine and in the subspecialty of clinical informatics.

**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) for the OHSU/PSU MBA in Healthcare Management program. As an internist and clinician-educator, I also teach medical students, residents and clinical informatics fellows.
**Research interests:** My primary research interest is in ensuring patient safety in the delivery of healthcare, and in promoting clinical diagnostic reasoning in today’s technology-rich clinical environment. I study how clinicians interact with technology, and how technology affects their decision making. I’m also interested in using high-fidelity simulations to examine how clinicians interact with technology. I have been involved with developing protocols that promote EHR safe use.

**Other interests:** I am also interested in clinical and biomedical informatics education, as well as curriculum development that helps to train the health IT workforce.

**Homepage:** My OHSU web page is at: [http://goo.gl/3C1D](http://goo.gl/3C1D)

**Address:** 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.

**Do I need to complete any prerequisites before I enroll in this course?**  
Yes, there is a prerequisite requirement for this course. You will need to successfully complete a prior course in biostatistics (such as PHPM 524, BSTA 511/611, or equivalent) before enrolling for BMI 560/660.

**Why is there a prerequisite?**  
In the time that I have been teaching this course, I have found that students who do not have a good grasp of the fundamentals of biostatistics are the subset that are most likely not to succeed, and so ensuring that everyone who takes the course has a baseline level of statistical competency maximizes their chances of successfully completing the course.
What is this course about?

This course examines a variety of design and evaluation paradigms and methods in both research as well as clinical informatics domains, and will introduce you to basic concepts associated with informatics project design and evaluation. The breadth of material covered is large, and hence the curriculum for this course is designed at a higher level than a course that examines a single domain of informatics methods in detail.

Is this a required course?

If you are a student in the masters or PhD program, you will be required to take BMI 560 (or BMI 660, the version of this course for PhD students).

How does this course fit into the DMICE curriculum?

The DMICE curriculum includes an Evaluative Science branch that is intended to enable informatics students understand the fundamental aspects of scientific research including statistics, qualitative research methods, epidemiology and health data analysis.

BMI 560/660 is one of two core courses in the Evaluative Sciences branch of the curriculum - the other is an introductory biostatistics course, such as PHPM 524 (Introduction to Biostatistics) or an equivalent learning experience.

This 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). **Please note that some of these in-depth methods courses offered by DMICE may require BMI 560/660 as a prerequisite.**

Also, please note that **if you have already taken several methods-intensive courses, you may not be required to take BMI 560/660.**

The DMICE curriculum also delineates a pathway that will prepare students to successfully complete a capstone or thesis project. This course is the second in a 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.
What makes informatics projects unique?

Informatics projects in the research environment, as well as those in the operational arena, often 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.

Is there a required textbook?

Yes, there is a textbook for this course.

**Title:** Practical Research: Planning and Design (11th Edition)  
**Authors:** Paul D Leedy and Jeanne Ellis Ormrod  
**Paperback:** 408 pages  
**Publisher:** Pearson; 11th edition (January 3, 2015)  
**Language:** English  
**ISBN-10:** 013374132X  
**ISBN-13:** 978-0133741322
What are the primary learning objectives of this course?

This course will:

1. Provide students with an overview and framework for the design and evaluation of biomedical informatics projects, across a 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 four key categories: quantitative evaluation, qualitative evaluation, software development, and business-oriented planning.

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

How is the course structured?

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. 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):

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Overview of the course</th>
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<tbody>
<tr>
<td>Week 2</td>
<td>Introduction, Definitions</td>
</tr>
<tr>
<td>Week 3</td>
<td>Proposals, Frameworks</td>
</tr>
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<td>Week 4</td>
<td>Software methods part 1: Design, Usability</td>
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<tr>
<td>Week 5</td>
<td>Software methods part 2: Evaluation</td>
</tr>
<tr>
<td>Week 6</td>
<td>Quantitative methods part 1: Design</td>
</tr>
<tr>
<td>Week 7</td>
<td>Quantitative methods part 2: Evaluation</td>
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<tr>
<td>Week 8</td>
<td>Qualitative methods</td>
</tr>
<tr>
<td>Week 9</td>
<td>Business methods</td>
</tr>
<tr>
<td>Week 10</td>
<td>Mixed methods, Additional topics</td>
</tr>
<tr>
<td>Week 11</td>
<td>Student projects, Finals week</td>
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</table>
How is this course coordinated?

This class is available to online students.

Students learn through the Sakai learning management software at https://sakai.ohsu.edu. The online component includes lectures, PowerPoint slides and handouts, reading assignments, and project material. If you have any technical questions or if you need help logging in, please contact the Sakai Help Desk, which is open Mon – Fri, 8 am – 9 pm, weekends from 12 pm – 5 pm (closed on official OHSU holidays).

Sakai Help Desk Contact Information:
(Toll-free) 877-972-5249
(Web) http://atech.ohsu.edu/help
(Email) sakai@ohsu.edu

How is the course graded?

The grading framework for this course is:

Assignments and other deliverables, including a end-of-term paper = 40%
Online participation = 40%
Tests and Exams = 20%

Grades are assigned on a curve, but are generally based on the following cutoffs:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93-100</td>
</tr>
<tr>
<td>A-</td>
<td>90-92.99</td>
</tr>
<tr>
<td>B+</td>
<td>87-89.99</td>
</tr>
<tr>
<td>B</td>
<td>83-86.99</td>
</tr>
<tr>
<td>B-</td>
<td>80-82.99</td>
</tr>
<tr>
<td>C+</td>
<td>77-79.99</td>
</tr>
<tr>
<td>C</td>
<td>73-76.99</td>
</tr>
<tr>
<td>C-</td>
<td>70-72.99</td>
</tr>
<tr>
<td>F</td>
<td>&lt;70</td>
</tr>
</tbody>
</table>

This course features an end-of-term final examination, which is taken online. Please note that as per OHSU policy, you may be required to take this exam under the supervision of an online proctoring service.

The exam is a mandatory element of this course, and students are encouraged to contact the Sakai Help Desk before signing up for this course if they have any questions regarding the policy or the online proctoring method that is utilized.
How will online participation be graded?

Each week, students will be required to participate in discussions, held in the Forums section on Sakai. Discussions will typically center on a topic that I will put up at the beginning of each week. We will also discuss group projects, individual student final projects, and other CIS-related topics that you may want to talk about during the term.

Forums participation is graded using the following rubric:

0 = no participation  
1 = minimal participation  
2 = adequate participation in discussion (students posts satisfy the requirements)  
3 = student post demonstrates that they have met learning objectives  
4 and 5 = superior participation that exceeds the required response (participation in a meaningful manner that promotes the learning of others)

You will see that there is a significant weightage towards participation that allows others to learn from your perspectives.

What are students expected to do in order to successfully complete this course?

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.

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

What is your 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.

I believe that 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. Expect to spend a significant proportion of your time engaged in online conversation with other students and with me.

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.

What is the best way to participate 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.

When do I get my grades?

OHSU is committed to providing grades to students in a timely manner. Course instructors will provide students with information in writing at the beginning of each course that describes the grading policies and procedures including but not limited to evaluation criteria, expected time needed to grade individual student examinations and type of feedback they will provide.

Class grades are due to the Registrar by the Friday following the week of finals. However, on those occasions when a grade has not been submitted by the deadline, the following procedure shall be followed:
1) The Department¹ /Program Coordinator² will immediately contact the Instructor requesting the missing grade, with a copy to the Program Director and Registrar.
2) If the grade is still overdue by the end of next week, the Department¹ /Program Coordinator² will email the Department Chair directly, with a copy to the Instructor and Program Director requesting resolution of the missing grade.
3) If, after an additional week the grade is still outstanding, the student or Department¹ /Program Coordinator² may petition the Office of Graduate students for final resolution.

¹ For courses that are run by a specific department.
² For the conjoined courses (course number is preceded by CON_ that are run by Graduate Studies.

What is DMICEs position on academic honesty?

Course participants are expected to maintain academic honesty in their course work. Participants should refrain from seeking published solutions to any assignments. Literature and resources (including Internet resources) employed in fulfilling assignments must be cited. Please note that Turnitin software may be used at the discretion of the course instructor.

See the following websites for details and information on the code of conduct for OHSU, and for more information on citing sources and recognizing plagiarism.

http://ozone.ohsu.edu/som/faculty/docs/graduatecouncil/profconductpolicy.pdf
http://www.ohsu.edu/xd/education/library/research-assistance/plagiarism.cfm?WT_rank=1#
http://www.ohsu.edu/xd/education/teaching-and-learning-center/for-students/index.cfm

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.

To protect student privacy in this process, it will be necessary to remove all personal information, i.e. student name, email address, student u-number, or any other personal information, from documents BEFORE submission.

What is OHSU’s policy regarding Student Access?

OHSU is committed to providing equal access to qualified students who experience a disability in compliance with Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act (ADA) of 1990, and the ADA Amendments Act (ADA-AA) of 2008. If you have a disability or think you may have a disability (physical,
sensory, chronic health, psychological, learning, or other) please contact the Office for Student Access at (503) 494-0082 or studentaccess@ohsu.edu to discuss eligibility for academic accommodations. Information is also available at www.ohsu.edu/student-access. Because accommodations may take time to implement and cannot be applied retroactively, 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.

**What restrictions does DMICE have with respect to course access, and why?**

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 course materials or take screenshots 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 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.

**What is the DMICE policy regarding discrimination?**

Oregon Health & Science University is committed to creating and fostering a learning and working environment based on open communication and mutual respect. If you encounter sexual harassment, sexual misconduct, sexual assault, or discrimination based on race, color, religion, age, national origin or ancestry, veteran or military status, sex, marital status, pregnancy or parenting status, sexual orientation, gender identity, disability or any other protected status please contact the Affirmative Action and Equal Opportunity Department at 503-494-5148 or aaeo@ohsu.edu. Inquiries about Title IX compliance or sex/gender discrimination and harassment may be directed to the OHSU Title IX Coordinator at 503-494-0258 or titleix@ohsu.edu.

**What is the DMICE policy regarding communication?**

1. If the syllabus directs the student to contact the TA before contacting the instructor, the student should do so. Otherwise, the student should contact the instructor and allow 2 business days (not including weekends) for a response.

2. If the student does not receive a response from the instructor within 2 business days, s/he should contact the TA (if there is one). When contacting the TA s/he should cc the instructor and Diane Doctor at doctord@ohsu.edu.
3. If a student does not receive a response from the TA within 1 business day (not including weekends), s/he should contact Diane Doctor at doctord@ohsu.edu and cc the instructor and the TA.

4. If Diane does not reply within 1 business day (not including weekends), the student should contact Andrea Ilg at ilgan@ohsu.edu.

5. Students having difficulties with Sakai should contact the Sakai Help Desk at sakai@ohsu.edu or at (877) 972-5249. Sakai help is available M-F from 8am to 10-pm and weekends from Noon to 5pm. Do not contact the instructor.