INFO B513
The Design, Implementation, and Evaluation of Electronic Health Record Systems
(Short title: EHR Systems)

Department of BioHealth Informatics
Indiana University School of Informatics and Computing, Indianapolis
Spring 2015

Section No.: Credit Hours:
Time:
Location: IT ###, Informatics & Communications Technology Complex
535 West Michigan Street, Indianapolis, IN 46202 [map]
First Class: January ##, 2015
Website: https://canvas.iu.edu/…
Instructor: Saptarshi Purkayastha, PhD, Visiting Assistant Professor
Office Hours: TBD
Office: WK 118 Walker Plaza Building
719 Indiana Avenue, Indianapolis, IN 46202 [map]
Phone: 317-274-0439 (Office)
Email: saptpurk@iupui.edu
Prerequisites: None (Not an extension of any undergraduate or graduate course)

COURSE DESCRIPTION
Students learn how to design, implement, and evaluate electronic health record (EHR) system and how to use technology to support their data acquisition, storage, reuse, interoperability, exchange, and analysis. They also evaluate their legal, ethical, and regulatory implications and learn how to build teams to manage their implementation in healthcare organizations.

EXTENDED COURSE DESCRIPTION
In this practical course, students analyze the design of existing EHR systems through the example of an open-source platform, OpenMRS. They implement this platform according to international conceptual and markup standards, such as the Health Level 7 Reference Information Model (HL7 RIM) and the Continuity of Care Document (CCD). Students evaluate gaps in the system by comparing it with other Computerized Physician Order Entry (CPOE) systems and create designs for modules. Students evaluate legal, ethical, and regulatory implications of current EHR systems.

INFO B642 Clinical Decision Support Systems is recommended as a corequisite.
Required Text(s):
Title: Electronic Health Records: Understanding and Using Computerized Medical Records
Author: Richard Gartee
Edition: 2nd edition (February 3, 2011)
Publisher: Prentice Hall
ISBN: 978-0132499767

Title: Electronic Health Records
Author: Jerome H. Carter
Edition: 2nd edition (March 15, 2008)
Publisher: American College of Physicians
ISBN: 978-1930513976

Additional Readings:
Title: Electronic Health Records: A Practical Guide for Professionals and Organizations
Author(s): Margret K. Amatayakul
Publisher: AHIMA
ISBN: 978-1584262916

- OpenMRS data model https://wiki.openmrs.org/x/BQAJ
- http://www.healthit.gov/providers-professionals/ehr-incentive-programs
- http://www.healthit.gov/providers-professionals/meaningful-use-definition-objectives
- http://www.healthit.gov/providers-professionals/certification-process-ehr-technologies
- Electronic Health Records Overview
- http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3065078/
**Student Learning Outcomes:**
Upon completion of this course, the student will

1. Design and implement an EHR system. (6 in Bloom’s taxonomy, new version)  
2. Evaluate gaps in the EHR system. (5)  
3. Describe the role of EHRs, their components, and how they are used in a healthcare system. (2)  
4. Apply the laws governing the use of data and technical approaches to ensuring quality and protection of data within EHRs (3); evaluate their legal, ethical, and regulatory implications (5).  
5. Identify the range of clinical decision support (CDS) tools within the EHR (1); determine which tool is appropriate for specific situations (5); analyze how to develop and implement CDS tools to adhere to meaningful use criteria. (4)  
6. Describe the processes of developing or selecting an EHR system, preparing and supporting clinicians for system implementation, and evaluating system effectiveness. (2)  
7. Identify the key types of EHR systems and describe how to achieve system interoperability. (1, 2)  
8. Weigh the nontechnical factors that influence the adoption of EHR systems by clinicians and strategies for promoting effective use of EHR systems. (4)

**Principles of Graduate and Professional Learning (PGPL)**
Learning outcomes are assessed in the following areas:

1. Knowledge and skills mastery (K&S)  
   Moderate emphasis  
2. Critical thinking and good judgment (CT)  
   Major emphasis  
3. Effective communication (EC)  
4. Ethical behavior (EB)  
   Some emphasis

**Software used:**
During this course, students will use the following applications:

- OpenMRS cloud installation  
- Practice Fusion cloud EMR  
- Microsoft Excel 2013

**Course Schedule**

1. Module 1. Background and support for EHRs – 1 week  
   a. History and current state of EHRs  
   b. Legal issues, privacy, and security of health information
2. Module 2. The Design of EHRs – 4 weeks
   a. Processes in clinical practice
   b. Clinical workflow analysis
   c. Quality improvement using EHRs
   d. Human-computer interaction in point-of-care (CPOE) systems

3. Module 3. The Implementation of EHRs – 5 weeks
   a. Data acquisition, storage, and retrieval techniques in EHRs
   b. Selection and implementation of software and hardware for EHRs
   c. Representing flowsheets, charts, anatomical drawing in EHRs
   d. Electronic ordering and requisition systems
   e. Messaging and interoperability between various systems

4. Module 4. The Evaluation of EHRs – 4 weeks
   a. Healthcare data reuse: evidence-based medicine and real-world use
   b. Meaningful use definition, incentives, and EHR certifications
   c. Evaluation of EHR systems in situ
   d. From process analysis to goal evaluation
   e. Implementation planning and change management

Expectations/Guidelines/Policies:
- Attendance and discussion participation
- Two midterms
- Final project
- Final essay

Date for each class meeting:
- Specific pre-class readings
- Specific subject matter/topics covered
- Goals and objectives of each class period

Grading Information:

<table>
<thead>
<tr>
<th>Date</th>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>All weeks</td>
<td>Class participation</td>
<td>10%</td>
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<tr>
<td>September (end)</td>
<td>Midterm 1 (Module 1 and 2)</td>
<td>20%</td>
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<tr>
<td>February (early)</td>
<td></td>
<td></td>
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<tr>
<td>October (end)</td>
<td>Midterm 2 (Module 3)</td>
<td>20%</td>
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<tr>
<td>March (early)</td>
<td></td>
<td></td>
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<tr>
<td>November (end)</td>
<td>Final Project on EHR Design &amp; Implementation (Module 1–3)</td>
<td>40%</td>
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<tr>
<td>April (early)</td>
<td></td>
<td></td>
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<tr>
<td>December (early)</td>
<td>Final Essay on EHR Evaluation Model (Module 4)</td>
<td>10%</td>
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<tr>
<td>April (end)</td>
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<td></td>
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Grading Scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score Range</th>
<th>Description</th>
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<tbody>
<tr>
<td>A+</td>
<td>97 – 100</td>
<td>Outstanding achievement, given at the instructor’s discretion</td>
</tr>
<tr>
<td>A</td>
<td>93 – 100</td>
<td>Excellent achievement</td>
</tr>
<tr>
<td>A–</td>
<td>90 – 92.99</td>
<td>Very good performance and quality of work</td>
</tr>
<tr>
<td>B+</td>
<td>87 – 89.99</td>
<td>Good performance and quality of work</td>
</tr>
<tr>
<td>B</td>
<td>83 – 86.99</td>
<td>Modestly acceptable performance and quality of work</td>
</tr>
<tr>
<td>B–</td>
<td>80 – 82.99</td>
<td>Marginal acceptable performance and quality of work</td>
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<tr>
<td>C+</td>
<td>77 – 79.99</td>
<td>Unacceptable work (Core course must be repeated for credit)</td>
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<tr>
<td>C</td>
<td>73 – 76.99</td>
<td>Unacceptable work (Core course must be repeated for credit)</td>
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<tr>
<td>C–</td>
<td>70 – 72.99</td>
<td>Unacceptable work (Course must be repeated for credit)</td>
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<tr>
<td>D+</td>
<td>67 – 69.99</td>
<td>Unacceptable work (Course must be repeated for credit)</td>
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<td>D</td>
<td>63 – 66.99</td>
<td>Unacceptable work (Course must be repeated for credit)</td>
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<tr>
<td>D–</td>
<td>60 – 62.99</td>
<td>Unacceptable work (Course must be repeated for credit)</td>
</tr>
<tr>
<td>F</td>
<td>Below 60</td>
<td>Unacceptable work (Course must be repeated for credit)</td>
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EXPECTATIONS, GUIDELINES, AND POLICIES

Attendance:
A basic requirement of this course is that you will participate in all class meetings, whether online or face-to-face, and conscientiously complete all required course activities and assignments. Class attendance is required for classroom-based courses. It entails being present and attentive for the entire class period. Attendance shall be taken in every class. If you do not sign the attendance sheet while in class, you shall be marked absent. Signing the attendance sheet for another student is prohibited. The instructor is required to submit to the Registrar a record of student attendance, and action shall be taken if the record conveys a trend of absenteeism.

Only the following are acceptable excuses for absences: death in the immediate family (e.g. mother, father, spouse, child, or sibling), hospitalization or serious illness; jury duty; court ordered summons; religious holiday; university/school coordinated athletic or scholastic activities; an unanticipated event that would cause attendance to result in substantial hardship to one’s self or immediate family. Absences must be explained with the submission of appropriate documentation to the satisfaction of the instructor, who will decide whether missed work may be made up. Absences that do not satisfy the above criteria are considered unexcused. To protect your privacy, doctor’s excuses should exclude the nature of the condition and focus instead on how the condition impacts your attendance and academic performance.

Missing class reduces your grade through the following grade reduction policy: You are allowed two excused or unexcused absences. Each additional absence, unless excused, results in a 5% reduction in your final course grade. More than four absences result in an F in the course. Missing class may also reduce your grade by eliminating opportunities for class participation. For all absences, the student is responsible for all covered materials and assignments.
Incomplete:
The instructor may assign an Incomplete (I) grade only if at least 75% of the required coursework has been completed at passing quality and holding you to previously established time limits would result in unjust hardship to you. All unfinished work must be completed by the date set by the instructor. Left unchanged, an Incomplete automatically becomes an F after one year. http://registrar.iupui.edu/incomp.html

Deliverables:
You are responsible for completing each deliverable (e.g., assignment, quiz) by its deadline and submitting it by the specified method. Deadlines are outlined in the syllabus or in supplementary documents accessible through OnCourse. Should you miss a class, you are still responsible for completing the deliverable and for finding out what was covered in class, including any new or modified deliverable. In fairness to the instructor and students who completed their work on time, a grade on a deliverable shall be reduced 10%, if it is submitted late and a further 10% for each 24-hour period it is submitted after the deadline.

CODE OF CONDUCT
All students should aspire to the highest standards of academic integrity. Using another student’s work on an assignment, cheating on a test, not quoting or citing references correctly, or any other form of dishonesty or plagiarism shall result in a grade of zero on the item and possibly an F in the course. Incidences of academic misconduct shall be referred to the Department Chair and repeated violations shall result in dismissal from the program.

All students are responsible for reading, understanding, and applying the Code of Student Rights, Responsibilities and Conduct and in particular the section on academic misconduct. Refer to The Code > Responsibilities > Academic Misconduct at http://www.indiana.edu/~code/. All students must also successfully complete the Indiana University Department of Education “How to Recognize Plagiarism” Tutorial and Test. https://www.indiana.edu/~istd You must document the difference between your writing and that of others. Use quotation marks in addition to a citation, page number, and reference whenever writing someone else’s words (e.g., following the Publication Manual of the American Psychological Association). To detect plagiarism instructors apply a range of methods, including Turnitin.com. http://www.ulib.iupui.edu/libinfo/turnitin

Academic Misconduct:
1. Cheating: Cheating is considered to be an attempt to use or provide unauthorized assistance, materials, information, or study aids in any form and in any academic exercise or environment.
   a. A student must not use external assistance on any “in-class” or “take-home” examination, unless the instructor specifically has authorized external assistance. This prohibition includes, but is not limited to, the use of tutors, books, notes, calculators, computers, and wireless communication devices.
   b. A student must not use another person as a substitute in the taking of an examination or quiz, nor allow other persons to conduct research or to prepare
work, without advanced authorization from the instructor to whom the work is being submitted.

c. A student must not use materials from a commercial term paper company, files of papers prepared by other persons, or submit documents found on the Internet.

d. A student must not collaborate with other persons on a particular project and submit a copy of a written report that is represented explicitly or implicitly as the student’s individual work.

e. A student must not use any unauthorized assistance in a laboratory, at a computer terminal, or on fieldwork.

f. A student must not steal examinations or other course materials, including but not limited to, physical copies and photographic or electronic images.

g. A student must not submit substantial portions of the same academic work for credit or honors more than once without permission of the instructor or program to whom the work is being submitted.

h. A student must not, without authorization, alter a grade or score in any way, nor alter answers on a returned exam or assignment for credit.

2. **Fabrication:** A student must not falsify or invent any information or data in an academic exercise including, but not limited to, records or reports, laboratory results, and citation to the sources of information.

3. **Plagiarism:** Plagiarism is defined as presenting someone else’s work, including the work of other students, as one’s own. Any ideas or materials taken from another source for either written or oral use must be fully acknowledged, unless the information is common knowledge. What is considered “common knowledge” may differ from course to course.

   a. A student must not adopt or reproduce ideas, opinions, theories, formulas, graphics, or pictures of another person without acknowledgment.

   b. A student must give credit to the originality of others and acknowledge indebtedness whenever:

      1. directly quoting another person’s actual words, whether oral or written;
      2. using another person’s ideas, opinions, or theories;
      3. paraphrasing the words, ideas, opinions, or theories of others, whether oral or written;
      4. borrowing facts, statistics, or illustrative material; or
      5. offering materials assembled or collected by others in the form of projects or collections without acknowledgment

4. **Interference:** A student must not steal, change, destroy, or impede another student’s work, nor should the student unjustly attempt, through a bribe, a promise of favors or threats, to affect any student’s grade or the evaluation of academic performance. Impeding another student’s work includes, but is not limited to, the theft, defacement, or mutilation of resources so as to deprive others of the information they contain.

5. **Violation of Course Rules:** A student must not violate course rules established by a department, the course syllabus, verbal or written instructions, or the course materials that are rationally related to the content of the course or to the enhancement of the
learning process in the course.

6. **Facilitating Academic Dishonesty**: A student must not intentionally or knowingly help or attempt to help another student to commit an act of academic misconduct, nor allow another student to use his or her work or resources to commit an act of misconduct.

**OTHER POLICIES**

1. **Right to revise**: The instructor reserves the right to make changes to this syllabus as necessary and, in such an event, will notify students of the changes immediately.

2. **IUPUI course policies**: A number of campus policies governing IUPUI courses may be found at the following link: [http://registrar.iupui.edu/course_policies.html](http://registrar.iupui.edu/course_policies.html)

3. **Classroom civility**: To maintain an effective and inclusive learning environment, it is important to be an attentive and respectful participant in lectures, discussions, group work, and other classroom exercises. Thus, unnecessary disruptions should be avoided, such as ringing cell phones, engagement in private conversations, and other unrelated activities. Cell phones, media players, or any noisy devices should be turned off during a class. Texting, surfing the Internet, and posting to Facebook or Twitter during class are generally not permitted. Laptop use may be permitted if it is used for taking notes or conducting class activities. Students should check with the instructor about permissible devices in class. IUPUI nurtures and promotes “a campus climate that seeks, values, and cultivates diversity in all of its forms and that provides conditions necessary for all campus community members to feel welcomed, supported, included, and valued” (IUPUI Strategic Initiative 9). IUPUI prohibits “discrimination against anyone for reasons of race, color, religion, national origin, sex, sexual orientation, marital status, age, disability, or [veteran] status” (Office of Equal Opportunity). Profanity or derogatory comments about the instructor, fellow students, invited speakers, or other classroom visitors, or any members of the campus community shall not be tolerated. A violation of this rule shall result in a warning and, if the offense continues, possible disciplinary action.

4. **Bringing children to class**: To ensure an effective learning environment, children are not permitted to attend class with their parents, guardians, or childcare providers.

5. **Course Evaluation Policy**: Course evaluations provide vital information for improving the quality of courses and programs. Students are required to complete one course and instructor evaluation for each section in which they are enrolled at the School of Informatics and Computing. This requirement has three exceptions: (a) The student has withdrawn from the course; (b) fewer than five students are enrolled in the section (in which case anonymity is impossible); and (c) the section is a laboratory that must be taken with a course having a different section number. Course evaluations are completed at [https://soic.iupui.edu/app/course-eval/](https://soic.iupui.edu/app/course-eval/). Course evaluations are open from the eleventh week. Course evaluations are anonymous, which means that no one can view the name of the student completing the evaluation. In addition, no one can view the evaluation itself until after the instructor has submitted the final grades for the course. In small sections, demographic information should be left blank, if it could be used to identify the student.

6. **Communication**: The instructor should respond to emails within 48 hours, excluding
weekends and holidays, and announce periods of extended absence in advance. The instructor should provide weekly office hours or accept appointments for face-to-face, telephone, or teleconferred meetings.

7. **Email:** Indiana University uses your IU email account as an official means of communication, and students should check it daily for pertinent information. Although you may have your IU email forwarded to an outside email account, please email faculty and staff from your IU email account.

8. **Disabilities Policy:** In compliance with the Americans with Disabilities Act (ADA), all qualified students enrolled in this course are entitled to reasonable accommodations. Please notify the instructor during the first week of class of accommodations needed for the course. Students requiring accommodations because of a disability must register with Adaptive Educational Services (AES) and complete the appropriate AES-issued before receiving accommodations. The AES office is located at UC 100, Taylor Hall (Email: aes@iupui.edu, Tel. 317 274-3241). Visit http://aes.iupui.edu for more information.

9. **Administrative Withdrawal:** A basic requirement of this course is that students participate in all class discussions and conscientiously complete all required course activities and/or assignments. If a student is unable to attend, participate in, or complete an assignment on time, it is the student’s responsibility to inform the instructor. If a student misses more than half of the required activities within the first 25% of the course without contacting the instructor, the student may be administratively withdrawn from this course. Administrative withdrawal may have academic, financial, and financial aid implications. Administrative withdrawal will take place after the full refund period, and a student who has been administratively withdrawn from a course is ineligible for a tuition refund. Contact the instructor with questions concerning administrative withdrawal.

10. **Emergency Preparedness:** Safety on campus is everyone’s responsibility. Know what to do in an emergency so that you can protect yourself and others. For specific information, visit the emergency management website. http://protect.iu.edu/emergency

11. **Student Advocate:** The Student Advocate provides assistance to students with personal, financial, and academic issues. The Student Advocate Office is located in the Campus Center, Suite 350. The Student Advocate may also be contacted by phone at 317 274-4431 or by email at studvoc@iupui.edu. For more information visit http://studentaffairs.iupui.edu/advocate.

12. **Counseling and Psychological Services (CAPS):** Students seeking counseling or other psychological services should contact the CAPS office by phone at 274-2548 or email at capsindy@iupui.edu. For more information visit http://life.iupui.edu/caps/.

**MISSION STATEMENT**
The Mission of IUPUI is to provide for its constituents excellence in
- Teaching and Learning;
- Research, Scholarship, and Creative Activity; and
- Civic Engagement.
With each of these core activities characterized by
  • Collaboration within and across disciplines and with the community;
  • A commitment to ensuring diversity; and
  • Pursuit of best practices.
IUPUI’s mission is derived from and aligned with the principal components—Communities of Learning, Responsibilities of Excellence, Accountability and Best Practices—of Indiana University’s Strategic Directions Charter.

STATEMENT OF VALUES
IUPUI values the commitment of students to learning; of faculty to the highest standards of teaching, scholarship, and service; and of staff to the highest standards of service. IUPUI recognizes students as partners in learning. IUPUI values the opportunities afforded by its location in Indiana’s capital city and is committed to serving the needs of its community. Thus, IUPUI students, faculty, and staff are involved in the community, both to provide educational programs and patient care and to apply learning to community needs through service. As a leader in fostering collaborative relationships, IUPUI values collegiality, cooperation, creativity, innovation, and entrepreneurship as well as honesty, integrity, and support for open inquiry and dissemination of findings. IUPUI is committed to the personal and professional development of its students, faculty, and staff and to continuous improvement of its programs and services.