INFO B642
Clinical Decision Support Systems
Department of BioHealth Informatics
Indiana University School of Informatics and Computing, Indianapolis
Spring 2015

Section No.: 10744
Credit Hours: 3
Time: Course is online; Assignments are due Mondays
Location: Course is online
First Class: Monday, January 12, 2015
Website: https://iu.instructure.com/courses/1423384
Prerequisites: None

Faculty Instructors: Richard J. Holden (lead)
Saptarshi Purkayastha
Josette Jones

Co-Instructor: Masoud Hosseini, doctoral student

Communication policies:
1) **Masoud Hosseini, a co-instructor, will be your first point of contact** for most questions or requests. He will either respond directly or request a response from a faculty instructor. (See below for contact information.)
2) Your email must contain “B642” in the subject line (no space, no dash). Failure to include this may result in the e-mail not being read or replied to.
3) **Attend office hours or make an appointment** if you wish to speak to an instructor in person. Phone- or Skype-based appointments are acceptable but must be made by appointment. For course-related meetings that are not specific to a course topic, you should meet with Dr. Holden. For meetings related to specific course topics or assignments, you should meet with the content-appropriate instructor (Holden, Purkayastha, or Jones).

Dr. Holden’s Office Hours and Contact Information
Office Hours: Wednesdays from 1:00pm to 3:00pm or by appointment
Office: 118 WK, Walker Plaza Building
Contact: (317) 278-5323 (Office)
Email: rjholden@iupui.edu

Masoud Hosseini’s Office Hours and Contact Information
Office Hours: Tuesdays from 1:00pm to 3:00pm or by appointment
Office: 117 WK, Walker Plaza Building
Email: hosseini@iupui.edu
Course Description
This course provides a state-of-the-science overview of computer-based Clinical Decision Support (CDS) and CDS Systems (CDSS). Topics include: the design principles behind clinical decision support systems, CDSS usability and cognitive support, implementation science, mathematical foundations of the knowledge-based systems and pattern recognition systems, clinical vocabularies, legal and ethical issues, patient centered clinical decision support systems, and applications of clinical decision support systems in clinical practice.

Readings
Required and optional readings will be defined for each session and can be found in the class schedule. The readings consist of journal articles, a topic narrative, and slides. Additional independent readings may be recommended.


(2) Articles: Articles are provided by the instructor or lecturer. Required readings will be made available in Canvas.

(3) Slides and topic narrative: Each week the slides and topic narrative will be posted online. It is highly recommended that students read any required articles or book chapters before reviewing the slides and narrative.

Course Outcomes:
Upon the successful completion of the course, the student should be able to:

• Define computer-based clinical decision support (CDS)
• Describe the infrastructure and components of a CDS system
• Outline and discuss health care decision-making processes
• Apply the mathematical foundations of CDS to health care decision-making processes and the design of a CDS system
• Describe different applications of CDS and application-specific issues
• Identify cognitive support, usability, and implementation problems and best-practices related to CDS

Software used:
Canvas (web), MS PowerPoint, Adobe PDF, Adobe Connect (web)
## Course Content and Instructors

*Course content, timing, and readings may change. Updates will be posted on Canvas.*

<table>
<thead>
<tr>
<th>Week #</th>
<th>Topic</th>
<th>Instructor</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Definition, Scope and History of CDS</td>
<td>Holden</td>
<td>Greenes: Ch 1, 2</td>
</tr>
<tr>
<td>2</td>
<td>CDS System Adoption</td>
<td>Holden</td>
<td>Greenes: Ch 5, 6, 7</td>
</tr>
<tr>
<td>3</td>
<td>Knowledge Management for CDS, Part 1 [Paper assignment posted]</td>
<td>Holden</td>
<td>Greenes: Ch 10, 11, 12</td>
</tr>
<tr>
<td>4</td>
<td>Knowledge Management for CDS, Part 2</td>
<td>Jones</td>
<td>Greenes: Ch 28, 29</td>
</tr>
<tr>
<td>5</td>
<td>Humans and CDS: Cognitive Support and Usability</td>
<td>Holden</td>
<td>Greenes: Ch 3, 22</td>
</tr>
<tr>
<td>6</td>
<td>CDS System Implementation</td>
<td>Holden</td>
<td>Greenes: Ch 23, 25</td>
</tr>
<tr>
<td>7</td>
<td>Bayes’ Theorem and Decision Theory</td>
<td>Purkayastha</td>
<td>Berner: Ch2 (online)</td>
</tr>
<tr>
<td>8</td>
<td>Design and Structure of CDS Systems</td>
<td>Holden</td>
<td>Tbd</td>
</tr>
<tr>
<td>9</td>
<td>(Recap and first draft of papers due)</td>
<td>Holden</td>
<td>none</td>
</tr>
<tr>
<td>-</td>
<td>Spring break</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Representing Knowledge Part 1: Clinical Guidelines and Clinical Workflow</td>
<td>Jones</td>
<td>Greenes: Ch 16, 19</td>
</tr>
<tr>
<td>11</td>
<td>Representing Knowledge Part 2: Decision Rules and Engines, Ontologies, and Data Models</td>
<td>Jones</td>
<td>Greenes: Ch 15, 17, 18</td>
</tr>
<tr>
<td>12</td>
<td>Legal, Regulatory, and Financial Issues</td>
<td>Jones</td>
<td>Greenes: Ch 21, 24, 26</td>
</tr>
<tr>
<td>13</td>
<td>Emerging and Future Directions, Part 1: Public &amp; Personal Health Decision Support (HIMSS week)</td>
<td>Purkayastha</td>
<td>Greenes: 13, 14</td>
</tr>
<tr>
<td>14</td>
<td>Emerging and Future Directions, Part 2: Patient-Centered Decision Support and Beyond</td>
<td>Holden</td>
<td>Greenes: Ch 30</td>
</tr>
<tr>
<td>15</td>
<td>(Wrap-up and final draft of papers due)</td>
<td>Holden</td>
<td>none</td>
</tr>
</tbody>
</table>

**TBD=to be determined**
INFO B642 Syllabus

Teaching Strategies/Methods
The course is offered online.

Students will be asked to complete a variety of assignments.

Evaluation and Assessment
Grades will be based on a weighted scale distributed as follow:

<table>
<thead>
<tr>
<th>#</th>
<th>Assessment Method</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Weekly Assignments</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>Homework</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Papers</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

(1) Weekly Assignments: Each week students will be required to complete an assignment to demonstrate comprehension of course material as well as participation. Examples include: an online post and discussion of a recent news article involving CDS or a CDS system; critical analysis of a recent CDS peer-reviewed article; a quiz covering material from the weekly readings and topic narrative; or an interview with a clinician using CDS in the real-world. Assignments are due on the date and time listed in Canvas; generally these will be due at 11:59pm on Mondays. Students should pay close attention to due dates as some weeks will be different due to Spring Break, holidays, etc. Students will not receive credit for late assignments or failing to submit an assignment.

(2) Homework: Students will be periodically assigned tasks to complete that will require work beyond the timeframe of a single week. Students will usually have 2-3 weeks to complete the homework assignment. Homework may include tasks such as the analysis of CDS data extracted from real-world alert logs; development of CDS alert logic; establishing weights for a Bayesian network; execution of scripts for processing health care data or alerts; locating information on clinical guidelines; or generating reports on CDS system activity. Students will complete the assigned tasks then submit their results and/or a report detailing their results/experiences. Homework reports are due on the date and time listed in Canvas; generally these will be due at 11:59pm on Mondays. Students should pay close attention to due dates as some weeks will be different due to Spring Break, holidays, etc. Late work will not be accepted.

(3) Papers: Students will be asked to complete 1-2 papers during the course. Papers will focus students on researching a particular topic in the area of CDS, critically analyzing some aspect of CDS systems, and summarizing their analysis in a written form. Students will generally have 3-4 weeks to complete a paper. Papers are due on the date and time listed in Canvas; generally these will be due at 11:59pm on Mondays. Students should pay close attention to due dates as some weeks will be different due to Spring Break, holidays, etc. Late work will be accepted but students will receive a penalty equal to or greater than a whole letter grade.
INFO B642 Syllabus

Note: International students are strongly encouraged to have their paper reviewed prior to submission by the IUPUI Writing Center. Graduate students can receive up to three (3) 1-hour sessions each week with a mentor at the Writing Center throughout the semester to address writing skills. Students are encouraged to contact the Writing Center early in the semester to schedule time before time slots at the end of the semester are filled. English writing skills are very important to success in any career. Improper use of the English language will result in a loss of points in this course.

Grading Scale
The final grade will be a weighed composite of many smaller grades. This should create a fair result.

The conversion table from numerical format to letter grades is followed:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>97-100</td>
</tr>
<tr>
<td>A</td>
<td>93-96</td>
</tr>
<tr>
<td>A-</td>
<td>90-92</td>
</tr>
<tr>
<td>B+</td>
<td>87-89</td>
</tr>
<tr>
<td>B</td>
<td>83-86</td>
</tr>
<tr>
<td>B-</td>
<td>80-82</td>
</tr>
<tr>
<td>C+</td>
<td>77-79</td>
</tr>
<tr>
<td>C</td>
<td>73-76</td>
</tr>
<tr>
<td>C-</td>
<td>70-72</td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
</tr>
<tr>
<td>F</td>
<td>0-59</td>
</tr>
</tbody>
</table>

Grading Principles and Policies
Students should review all grading forms that will be used by the instructor to grade projects, presentations, papers, and other assignments. If students want to see their grades at any time during the semester, they should contact the instructor by phone or email.

Criteria to evaluate written assignments:
Exceptional quality (not quantity): (90-100 %)
- Evident that individual has completed all requirements
- Demonstrates applied level of understanding through personal reflections
- Answer is well-developed and logically reasoned
- Provides original insights or responses; extends comments of others
- Supports and leads others in discussion; respects others and their ideas

Superior quality (not quantity): (80-89%)
- Evident that individual has completed all requirements
- Demonstrates applied level of understanding through personal reflections
INFO B642 Syllabus

- Answer is provided; logic may not be clear
- Provides original insights or responses
- Makes connections to what others say; respects others and their ideas

Satisfactory quality and quantity: (60-79 %)
- Evident that individual has completed all requirements
- Primarily consists of summary or paraphrasing of readings
- Answer is not fully developed; logic is not clear
- Contribution is primarily a response to others; minimal originality
- Is respectful of others and their ideas

Does not meet expectations: (< 60%)
- Not clear that individual has completed all requirements
- Only consists of summary or paraphrasing of readings
- Minimal effort put into answer
- Is not respectful of others and their ideas

Requirements not completed (0)

**Late work**
Assignments are due by the date and time posted in Canvas. Severe weather rarely results in cancellation of classes or changes in due dates/times of assignments. As such, previously assigned work will still be due as posted in Canvas. Please clarify with the instructor regarding due dates of future assignments.

**Extensions**
Extensions may be granted in the case of exceptional circumstances. You must discuss these circumstances with your instructor at least 24 hours before the assignment is due. (Note: Discussing the situation is not the same as merely informing your instructor.) In order for a late assignment to receive full marks, it must include a note from the instructor confirming the extension date. An instructor note, attached to your assignment, can include a printed copy of an e-mail exchange between instructor and student indicating that an extension has been granted. Medical reasons for a late assignment must be documented by a doctor's note. Under normal circumstances (according to university regulations) medical excuses must be presented promptly (within two weeks from the date of the illness).

**Backup copies**
Please keep an electronic copy and a hard copy of your final paper and presentation.

**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.
INFO B642 Syllabus

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

(2) A student must give credit to the originality of others and acknowledge indebtedness whenever:
   • Directly quoting another person’s actual words, whether oral or written;
   • Using another person’s ideas, opinions, or theories;
   • Paraphrasing the words, ideas, opinions, or theories of others, whether oral or written;
   • Borrowing facts, statistics, or illustrative material; or
   • Offering materials assembled or collected by others in the form of projects or collections without acknowledgment.

Please refer to http://www.psych.iupui.edu/capstone/plagiarism/what_is_it.htm for some tips about how to avoid plagiarism.

Equipment needed
Computer with email and web access for participating in the online parts of the course (notes, supplemental material, assignments, etc.). Any appropriate equipment to create papers, homework, and presentations. Practical assignments can be carried out on various equipment, including own PC or Laptop, general computer labs and IUPUI Unix servers.

Software used
Most materials are provided in either Microsoft PowerPoint or Acrobat PDF. Assignments should be submitted in a Microsoft Word document format.

Assignments may require the use of additional software available from IU Ware and/or open source software web sites. Please refer to the class schedule for information on special software needed. You will be expected to download and install any necessary software prior to class on the weeks indicated in the class schedule.

University Policies

There are a number of campus-wide policies governing the conduct of courses at IUPUI. These can be found at http://registrar.iupui.edu/course_policies.html

Administrative Withdrawal Policy
A basic requirement of this course is that you will participate in all class meetings and conscientiously complete all required course activities and/or assignments. Keep in touch with me if you are unable to attend, participate, or complete an assignment on time. If you miss more than half of the required activities within the first 25% of the course without contacting me, you may be administratively withdrawn from this course.

Our course meets once per week; thus if you miss more than two classes in the first four weeks, you may be withdrawn. Administrative withdrawal may have academic, financial, and financial aid implications. Administrative withdrawal will take place after the full
refund period, and if you are administratively withdrawn from the course you will not be eligible for a tuition refund. If you have questions about the administrative withdrawal policy at any point during the semester, please contact me.

**Bringing your children to class**
Although not applicable to online classes, it should be stated that “Children are not permitted to attend class with parents, guardians, or childcare providers. This conduct has the effect of unreasonably interfering with an individual’s work or academic performance creating an offensive learning environment.”

**Academic Dishonesty/Integrity and Plagiarism**
Using another student’s work on a project or assignment, cheating on a test, or any other form of dishonesty or plagiarism will result in a grade of zero on that assignment and possibly an “F” in the course, and will be referred to the Dean of Students. All students should aspire to high standards of academic honesty.

**Values and Ethics**
Profanity or derogatory comments about or towards the instructor or any members of the class will NOT be tolerated. Violating this rule will result in a warning and if the offence continues, administrative action will be taken.

**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 any accommodations needed for the course. Students with learning disabilities must provide written verification for this policy to be recognized. If you need any special accommodation due to a disability, please contact Adaptive Education Services at 317-274-3241. The office is located at CA 001E.