



IUPUI

SCHOOL OF INFORMATICS AND COMPUTING

DEPARTMENT OF BIOHEALTH INFORMATICS

Indiana University–Purdue University
Indianapolis

Clinical Decision Support Systems-INFO B642 Spring

Course Info	3 Credit hours
Location	Online
Prerequisites:	None

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 weekly module. The readings consist of journal articles, a topic narrative, and slides. Additional independent readings may be recommended.

(1) Book: Greenes, R.A. (Ed.) Clinical Decision Support: The Road to Broad Adoption. 2014. Waltham, MA: Academic Press. ISBN: 978-0-12-398476-0

***Note: this is 2014 2nd edition of this book. The 2007 book (“The Road Ahead”) is outdated and will not be used. The 2007 book is not an acceptable replacement for the 2014 2nd edition! The 2014 2nd edition is available as a Kindle book or in hardcover.**

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

(3) Slides and topic narrative: Each week the slides and topic narrative will be posted online in the weekly module. 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. Information in the Modules is the most current.

Week #	Topic	Readings
1	Definition, Scope and History of CDS [Paper assignment posted]	Greenes: Ch 1, 2
2	Knowledge Management	Greenes: Ch 4, 10, 11
3	Evidence Based Practice [Paper proposal due]	Greenes: Ch 12
4	Guidelines and Workflow	Greenes: Ch 16,19
5	Bayes' Theorem and Decision Theory	Berner: Ch2 (online)
6	Decision Rules and Engines, Ontologies, and Data Models CDS System Implementation	Greenes: Ch 15, 17, 18
7	Humans and CDS: Cognitive Support and Usability	Greenes: Ch 3, 22
8	Evaluation of CDS Systems	Articles in module
9	(Recap and annotated bibliography due)	none
-	Spring break	-
10	CDS Adoption	Greenes:

		Ch 5,6,7
11	CDS System Implementation	Greenes: Ch 23, 25
12	Consumer CDS	Greenes: Ch:27
13	Legal, Regulatory, and Financial Issues	Greenes: Ch: 24, 26
14	Emerging and Future Directions, Part 1: Public & Personal Health Decision Support	Greenes: Ch 13, 14, 30
15	(Wrap-up and final draft of papers due)	none

TBD=to be determined

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:

#	Assessment Method	Percent
1	Weekly Assignments	40
2	Homework	30
3	Papers	30
	Total	100

(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 8:00am 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 unless arrangements are made **prior** to the due date. Do not email your instructor on or after the due date to request an extension.

(2) Homework: Students will be periodically assigned tasks to complete that will require work beyond the timeframe of a single week. 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; these will be due at 8:00am 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 paper (literature review with accompanying annotated bibliography) during the course. The 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 most of the semester to complete a paper with the rough draft due before spring break. Papers are due on the date and time listed in Canvas; these will be due at 8:00am 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.

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:

Grade	Percentage
A+	97-100
A	93-96
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76

C-	70-72
D	60-69
F	0-59

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
- 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 ^[1]

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.

(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.