

Topics in Health Informatics

Instructor

Dr. Kamran Sedig, Rm. Rm. MC 420, sedig@uwo.ca

Office hours: Mondays, 12:00-2:00pm

About myself:

I am an Associate Professor in Computer Science and FIMS. My research is interdisciplinary at the intersection of information science, human-information interaction, visual analytics, health informatics, cognitive science, and design of visualization, interaction, and technology. To know more about my research, you can visit my research lab's web site: insight.uwo.ca

Time & Location

Lectures: Mondays, 9:00 to 11:50am

Start date: September 10, 2018

Location: MC 316

Course Description

Evidence-based healthcare (EBHC) and big data can play important roles in healthcare. EBHC's main purpose is to increase and improve the use of evidence (i.e., data and information) by stakeholders (e.g., health practitioners, policy-makers, public health managers, etc.). As health data continues to grow, big data can also play an increasingly important role in different aspects of EBHC. Despite the emergence of these two areas, the role that health informatics (HI) can play in EBHC and the analysis, design, and evaluation of HI tools often receive little attention. HI tools permeate EBHC at every turn—e.g., data and text mining tools for evidence generation, distillation, or synthesis; decision support for incorporating evidence-based protocols into clinical workflow; or web-based visualization tools for gaining insight into patterns of data. As HI tools advance, explicit understanding of and investigation into the relationship between HI tools and healthcare become increasingly vital.

In this course, we examine topics related to health informatics—with particular emphasis on different areas of health informatics, HI tools, big data in healthcare, analytics methods and their role in healthcare, health data presentation, and other new developments.

This course is *cross-listed* (with students from different programs: Health Information Science, Library and Information Science, and Computer Science). You should feel comfortable being in a course that has students from diverse backgrounds and viewpoints. Even though this course has no specific pre-requisites, you are expected to be interested in learning about interdisciplinary topics that sit at the intersection of health, information science, data science/analytics, and computational technology.

Learning Objectives

- Develop a broad understanding of different aspects and areas of health and medical informatics
- Understand the role of big data in health informatics
- Develop a general understanding of health data presentation and analytics
- Become familiar with some emerging research fields, technologies, and techniques in health informatics

Some Topics & Keywords

Health, medical, consumer, bio, public, nursing, and clinical informatics; health informatics tools; descriptive, predictive, and prescriptive health analytics; big health data; health data mining; health data presentation; health data presentation and visual analytics; evidence-based healthcare; electronic health records; conceptualization, design, and evaluation health informatics tools; health information technology

Structure and Method of Evaluation

This is not a lecture-based course. Students play a *central role* in class activities. A significant amount of class time will be spent discussing the listed topics above. Students will study selected papers (approx. 25 papers/300 pages), examine them carefully, and lead discussions about the papers. Students will also find an HI tool, present it, and analyze it based on the topics in the studied papers. Finally, students will select a topic that interests them, write a short research report about it, and share their findings in class.

Grading Scheme

1. Paper summaries (9)	18% (9*2%)
2. Paper discussion facilitation (2)	24% (2*12%)
3. HI tool presentation	12%
4. Research report	16%
5. Participation in class discussions	30%

Paper Summaries

A set of articles have been selected that cover different topics in health informatics. These will be studied during 9 weeks of the course, starting from the second week. You will study the readings for the week and prepare a 1-page summary of the readings. This is intended to prepare you for in-depth class discussions. You will submit your 1-page summary through the OWL system. These summaries are due by 11:59pm of the day before class discussions. If a summary is not submitted on time, there will be no make-up opportunity for it, and that assignment will receive a mark of zero. You will not receive these assignments. The mark for this assignment is based on the number of summaries that you submit--See the Grading Scheme.

Paper Discussion Facilitation

You (either alone or in a team, depending on the number of registered students) will facilitate two discussions in class. To help you facilitate these discussions, you should do the following:

- Give a 5-minute presentation of the main issues of the articles to prepare others for deeper discussion. **1%**
- Prepare a number of questions that address the following: the main purpose of the articles, their motivation and assumptions, their suggested conclusions, and their implications. These questions will help guide and facilitate the discussion. **3%**
- Prepare a well-analyzed executive summary of the articles. The summary is in the form of a bulleted outline to help the reader to quickly grasp the structure and main ideas of the articles. Each bullet will consist of a complete, yet short, sentence. The whole summary should be no more than a single page. To know what an executive summary is, see <http://libguides.usc.edu/writingguide/executivesummary>. You can share a copy of this with others in class. **1%**
- Prepare a visual concept map of the main ideas in the articles and their relationships—no more than a single page. See http://library.appstate.edu/sites/all/files/video/handouts/conceptmap_0.pdf and <https://library.usu.edu/instruct/tutorials/cm/CMinstruction2.htm>. You can share a copy of this with others in class. This visual map plays an important role in understanding how concepts are related to one another. **3%**
- Provide others with 4 other references (articles) that shed further light on the article(s) being discussed. This means you should do some extra research to have an in-depth understanding of the main points of the article. **1%**
- Prepare for a well-planned, systematic, yet open and engaging, discussion in class. Make sure that the discussions are related to the main themes and topics of the course. **3%**

Items 2, 3, 4, & 5 should be uploaded through the OWL system.

Keep in mind that the main purpose of the readings is to generate discussion in class and allow everyone to get exposed to different concepts relevant to the topics of the course.

HI Tool Presentation

Either individually or in teams of two (depending on the number of students in the course), you will find an HI tool and analyze it *in terms of the concepts that we have studied in the course*. This presentation will be based on the papers that we have already studied collectively in class. Your presentation is not formal, but it involves the following:

- Preparing a PowerPoint presentation in which you analyze the HI tool and discuss its novelty, features, and pros and cons. **8%**
- Demonstrating the functionality of the HI tool, either live or through screen shots. Selecting an appropriate tool is important here. Also, in this course, we are not interested in healthcare management tools. Please do not select these for demonstration purposes. **2%**
- Submit your PowerPoint presentation through the OWL system at least 24 hours before your presentation. **2%**

Keep in mind that the main purpose of this part of the course and your presentation is for class participants to get exposed to a variety of HI tools in different healthcare contexts.

Research Report

Another goal of this course is for you to conduct independent research. Each of you will select a topic and write a **1000-word report** (excluding references) about it. The reports you write are about *a recent development in health informatics* that you find interesting. Your report should include at least 8 references from reputable sources, excluding the assigned readings in class.

Breakdown of the research report marks (adds up to 16%):

1. Content:
 - a. Breadth and depth of reported research: 3%
 - b. Relating of concepts and ideas to those studied in the course: 2%
 - c. Novelty and newness of topic: 2%
 - d. Logical connection of concepts and flow of ideas throughout the report: 1%
2. References:
 - a. Number and relevance of references to the main theme of the report: 2%
 - b. Proper APA formatting (see <http://guides.libraries.psu.edu/apaquickguide/intext>): 1%
3. Form:
 - a. Quality of writing, grammar, and punctuation: 1%
 - b. Organization (including division of concepts, headings, sub-headings, etc.): 1%
4. In-class presentation:
 - a. PowerPoint presentation of the report and discussion generation: 2%

All components of your research report need to be submitted through OWL.

Participation in Class Discussions & Attendance

You will get to read a number of papers (e.g., journal articles, book chapters, and conference papers) dealing with health and medical informatics, big data, analytics, and other similar topics. Every student is responsible to study all the selected papers. These papers will be discussed in class, and, having studied these papers on your own, you are to participate knowledgeably in these class discussions. Furthermore, you are to actively participate in analyzing and evaluating ideas presented by your fellow classmates. As part of this participation, for weekly readings, you are encouraged to prepare some relevant questions to ask the presenter(s) and others to promote deep discussion of the topics at hand.

You are to attend all classes and arrive at least 5 minutes before the start of the class. Late arrival results in deduction of participation marks. Legitimate absence from classes is allowed, but you need to inform the instructor in advance.

Sample List of Assigned Readings

- Barrett, et al. (2014). Unravelling the tangled taxonomies of health informatics. *Informatics in Primary Care*.
- Andreu-Perez, et al. (2015). Big data for health. *IEEE Journal of Biomedical and Health Informatics*.
- Moen & Knudsen (2013). *Nursing Informatics: Decades of contribution to health informatics*. Health Informatics Research.
- Leyens, et al. (2017). Use of big data for drug development and for public and personal health and care. *Genetic Epidemiology*.
- Fang, et al. (2016). Computational health informatics in the big data age: A survey. *ACM Computing Surveys*.
- Hersh (2014). Healthcare data analytics. In Hoyt, RE, Yoshihashi, A, Eds. *Health Informatics: Practical Guide for Healthcare and Information Technology Professional*.
- Simpao, et al. (2014). A review of analytics and clinical informatics in healthcare. *Journal of Medical Systems*.
- Herland, et al. (2014). A review of data mining using big data in health informatics. *Journal of Big Data*.
- Belle, et al. (2015). Big data analytics in healthcare. *Biomedical Research International*.
- Tresp, et al. (2016). Going digital: A survey on digitalization and large-scale data analytics in healthcare. *Proceedings of the IEEE*.
- Cabitza, et al. (2017). Unintended Consequences of Machine Learning in Medicine. *American Medical Association*.

Course Schedule (Tentative)

<i>Week</i>	<i>Date</i>	<i>Activities</i>
#1	9-10	Introduction and setting goals.
#2	9-17	Theme: evidence-based healthcare & health informatics
#3	9-24	Theme: evidence-based healthcare & health informatics
#4	10-1	Theme: big data in health informatics
#5	10-8	Thanksgiving Holiday
#6	10-15	Theme: healthcare data analytics
#7	10-22	Theme: healthcare data analytics
#8	10-29	Theme: presentation & visual analytics in healthcare
#9	11-5	Theme: presentation & visual analytics in healthcare
#10	11-12	Theme: design of health informatics tools
#11	11-19	HI tool presentation.
#12	11-26	HI tool presentation.
#13	12-3	Final research report presentations.
#14	12-10	Final research report presentations. Final research reports due.

Written Materials and Deliverables

All written reports (for all assignments) should include a cover sheet: title of the report (e.g., research report), title, course number, date, and name of each student (make sure not to put your IDs on the cover sheet). Pages should be numbered. Furthermore, all written work should be in the Times New Roman font, be double-spaced, and have wide margins for digital comments. All your assignments should be submitted electronically as MS Word and PowerPoint files. All submissions will be through the OWL system, <https://owl.uwo.ca/>. All file submissions will have the following naming format: FamilyName_FirstName_AssignmentName (e.g., Smith_Joe_ResearchReport.docx). Group assignments will have the following format: Group#_AssignmentName (e.g., Group1_ToolPresentation.pptx).

Communication

All course-related emails should come **through the OWL system**. No emails from other accounts will be read or accepted. Also, any email you send should have a proper subject line (e.g., Reading papers question). **Make sure to put a checkmark where it says:** "Send a copy of this message to recipients' email address(es)". If you do send me an email, I generally answer within 5 days, depending on the volume of emails I have received during that week. However, I always try my best to reply to your emails as soon as I can. **Please do not expect replies to emails during weekends or after 6pm.**

Plagiarism

Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Discipline for Graduate Students at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)

Research papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Accessibility

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Support Services

Students who are in emotional/mental distress should refer to Mental Health@Western <http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.