

Healthcare Decision Support Systems

HLTHINFO730

Semester 1 2009

University of Auckland
Faculty of Medical & Health Sciences
School of Population Health

Course Outline and Selected Reading

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Welcome and introduction

Welcome to this course on Healthcare Decision Support Systems.

There are many expectations nowadays that computers can somehow deliver solutions to problems of healthcare quality. One form of such expectations – when people bother to think this through at all – is that some form of ‘Artificial Intelligence’ (AI) will be embedded in health information systems to ensure safe and effective care. Alas, most people are more ‘informed’ by *I Robot* than by any experience of using, nonetheless programming, computer-based decision support tools. This course is about getting inside the reality of tools and methods to back up the expectations of healthcare decision support systems. Just how do we put the AI in healthcare systems?

Prof Jim Warren
Course Co-ordinator

Course Format

This course is delivered over four lecture days, each about a month apart and with four sessions within each lecture day (i.e., 16 sessions total). The 16 sessions include traditional lectures, including a guest lecture, a couple of hands-on sessions, and free-form discussion (ideally, driven by your questions), as well as your own presentations. These are timetabled on the next page. You’ll be doing an in-class presentation and three assignments. There is no exam.

HLTHINFO730 - Timetable at a glance

Day	No	Time	Session Topic	Presenter
Day 1: 9 March 2009	1	9.00 – 10.30	Ontology / Data Mining	Jim Warren
		10.30 – 10.45	Morning break	
	2	10.45 – 12.15	Standards / XML	Jim Warren
		12.15 – 1.15	Lunch	
	3	1.15 – 2.45	Hands-on: PREDICT / SNOMED CT	Koray Atalag
		2.45 – 3.00	Afternoon break	
	4	3.00 – 4.00	Diagnosis / Guidelines	Jim Warren
Day 2: 30 March 2009	5	9.00 – 10.30	Production Rule Systems	Jim Warren
		10.30 – 10.45	Morning break	
	6	10.45 – 12.15	Decision Trees	Jim Warren
		12.15 – 1.15	Lunch	
	7	1.15 – 2.45	Probability / Fuzzy Logic	Jim Warren
		2.45 – 3.00	Afternoon break	
	8	3.00 – 4.00	Discussion	All
Assignment 1 Monday Needs a date (literature review)				
Day 3: 4 May 2009	9	9.00 – 10.30	History / Success	Jim Warren
		10.30 – 10.45	Morning break	
	10	10.45 – 12.15	Case-based reasoning	Ian Watson
		12.15 – 1.15	Lunch	
	11	1.15 – 2.45	Hands-on with Production Rule Shell: E2Glite	Jim Warren / Thusitha Mabotuwana
		2.45 – 3.00	Afternoon break	
	12	3.00 – 4.00	Workflow / Service Oriented Architecture (SOA)	Jim Warren
Day 4: 25 May 2009	13	9.00 – 10.30	Monitoring	Jim Warren
		10.30 – 10.45	Morning break	
	14	10.45 – 12.15	Evaluation	Jim Warren
		12.15 – 1.15	Lunch	
	15	1.15 – 2.15	Assignment 2 Presentations and Demos	You!
		2.45 – 3.00	Afternoon break	
	16	3.00 – 4.00	Discussion	All
Assignment 2 Wednesday 27 May (design a system – final report incorporating peer feedback)				
Assignment 3 Monday 8 June (evaluate an existing system)				

General information

Who to contact

Prof Warren is available to discuss academic issues or student concerns in person by appointment, and may be contacted by e-mail or telephone at other times. Please do **not** leave requests for assistance with assignments to the week before assignments are due.

Karen Day should be contacted for any logistical or organisational issues associated with the course.

Course Co-ordinator Prof Jim Warren

Email: jim@cs.auckland.ac.nz

Telephone: 09 373 7599 ext 86422

Room: 730.357, Level 3, National Institute for Health Innovation

Course Administrator Dr Karen Day

Email: k.day@auckland.ac.nz

Telephone 09 373 7599 ext 83870

Room: 730.361, Level 3, National Institute for Health Innovation

Where are the sessions held?

All sessions are held on level 2 at the School of Population Health, Tamaki Campus, Morrin Rd, Glen Innes. Please check your Timetable at a Glance on page 4 for details.

When are the sessions held?

The course is taught in a number of block days, on Mondays starting at 9.00 am. The length of the days will vary from time to time but most go through to no later than 4.30 pm.

Housekeeping details

Please refer to the *Population Health Postgraduate Handbook 2008* for additional information about the School of Population Health regarding

Location, train and bus services and parking

Facilities at the School of Population Health

nDeva Student Self Service

The Cecil Student Learning Management System

Library resources

Student Learning Centre

Information about coursework including referencing styles, marking, cheating and plagiarism.

Students are strongly encouraged to make use of the Student Learning Centre for help with academic and computer skills and to attend library tutorials. Plan to do this early in the semester so that you are well prepared to manage your coursework.

Course objectives

On completion of this course, the student should be able to

- Discuss various decision models and their implications on healthcare decision support system design
- Select and demonstrate the use of knowledge representation technique(s) appropriate to healthcare decision support
- Appreciate the role of decision support systems in semi-structured problem solving
- Discuss international standards development work in clinical guideline/knowledge representation, medical logic modules, human-computer interface and decision support system design
- Analyse applications of evidence-based knowledge (clinical practice-guidelines), data mining, and advanced technologies (e.g. fuzzy logic, artificial intelligence) in clinical decision support, diagnosis, and managed care
- Examine internationally developed healthcare decision support systems/applications and evaluate their usefulness in healthcare
- Contribute to the design of healthcare decision support systems.

Course assessment

Please read this section carefully. It will be fully discussed on the first day of the course. This is a **fifteen point** paper, and the expectations for assignments reflect this. Assessment is by assignments and examination.

Assignment 1	Monday April 6 th (in class)	30%
Assignment 2	Monday May 25 th (in class presentation)	35%
	Wednesday May 27 th (final report including peer feedback; electronic submission by 11.59pm)	
Assignment 3	Monday June 8 th (by 11.59pm)	35%

Assignments

Assignment 1 is a report of approximately 2000 words (excluding references) where you will do a structured literature review on a topic of your choosing. Standard formats for bibliographic citations are available at the library.

Assignment 2 is a report on a system you have designed. Part of the assessment is based on your in-class presentation. We may do this assignment in groups of two students.

Assignment 3 is a report on your evaluation of an existing healthcare decision support system.

Please note that plagiarism and cheating are not tolerated by the University. Please refer to the Student Handbook for a description of plagiarism and cheating and the penalties incurred if either is detected.

Presentation of assignments

You must *type/word-process* your assignments.

Please use *one side* of the page only

Please use *double spacing*

Please use size *12 font*

Please leave an *ample margin* (3.5 cm is good) down the left hand side for the marker's comments

Please *number the pages* and *include your ID on each page* (header or footer)

Please observe the *word limit*

Please use the *cover sheet* downloadable from Cecil, and the *template* and insert your

- Student number on the cover sheet and in the header in the template
- Assignment Number (and topic if there is a choice)
- Date submitted for marking.

References

The Vancouver system for citing references used in the British Medical Journal is a good model to follow. Alternatively the APA system can be used. Using EndNote will simplify how you use references – a copy of the software can be obtained from the Student Learning Centre for a small fee.

Please refer to the Population Health Postgraduate Handbook or the University of Auckland Philson Library website for further details on referencing systems: <http://www2.auckland.ac.nz/lbr/med/setref.htm>

Either end notes or footnotes may be used in an assignment, but *stay with one or the other in a particular assignment*.

The website <http://www.nlm.nih.gov/tsd/serials/lsiou.html> provides access in .pdf format to a "List of journals indexed for online users" - with the abbreviations for all titles indexed by Medline. The librarian for this course is Anne Wilson, who is based in the Philson Library at Grafton Campus. You can contact her by email on a.wilson@auckland.ac.nz or call her on (09) 373 7599 ext 86126. Anne spends one day a week at Tamaki Campus – please email her to make an appointment to see her.

Deadlines

It is very important to get your assignments in on time.

Extensions will only be given for exceptional or unavoidable circumstances. Late assignments will be penalised by docking marks from the final grade for that assignment at the discretion of the marker.

Submission of assignments

Prior to submitting your assignments via CECIL please submit them to Turnitin on www.turnitin.com to assess potential plagiarism or unauthorised copying.

Submit your assignments via CECIL. You will receive feedback on your assignment via email.

The presentation component of **Assignment 2** will be marked on the day of the student presentations and feedback will be supplied via email within the following week. Your PowerPoint presentation must be submitted via CECIL by 8.00 am on the day of the presentations.

If you have to submit your assignments in hard copy (after discussion with the course co-ordinator) please send them to the following address.

Address for posting assignments

Attn Kashmira Irani
Teaching Administration
School of Population Health
University of Auckland
Private Bag 92-019
Auckland Mail Centre
Auckland 1142

Address for couriering assignments

Attn Kashmira Irani
Teaching Administration
School of Population Health
Gate 1, Tamaki Campus
261 Morrin Road
Glen Innes
Auckland

Writing essays

The student Learning Centre provides useful advice on writing essays. Take a look at their resources on the website or book into a session on www.slc.auckland.ac.nz. If you need help with your assignments please contact either Jim Warren or Karen Day.

Assignments

Assignment 1 [Semi] Structured Literature Review - 30% of total mark

(maximum 2000 words, excluding references)

Choose a topic apropos to healthcare decision support systems. A good topic will generally combine a technique and a clinical activity. For instance, you may wish to investigate “use of artificial neural networks for diagnosis”; or “case-based reasoning for care planning.” Alternatively, you may wish to choose a clinical domain and accept any decision support technology; e.g., “automated decision support for lung disease.”

You must identify MeSH terms and apply them to PubMed. You must also devise a search strategy for IEEEExplore. You may also search the ScienceDirect, the ACM Digital Library and Google (and/or Google Scholar). Toy with your terms until you get a reasonable number of ‘hits’ and feel that you are getting approximately the topic of interest. You may find you need to narrow or broaden the topic.

A full systematic literature review is just too much work to do in the format of this course – so we’ll compromise. Report your search methods and number of hits as per a systematic literature review. HOWEVER, you are permitted to examine just a few parts of your search results to assess against your inclusion/exclusion criteria. Aim to assess about 100 papers and come as close as possible to including 20 for analysis in the Results and Discussion of your essay. You must include papers found by at least: (a) PubMed or ScienceDirect AND (b) IEEEExplore or the ACM Digital Library.

Try to reach a concise conclusion about the state of the art in your topic area – what is known? What are some outstanding research questions?

It is strongly suggested that you email the lecturer to get feedback about your proposed topic before you begin work in earnest. Ask for help. We are available to discuss your assignment with you.

Assignment 2 Project - 35% of total mark

(report - 25% of total mark; in class presentation - 10% of total mark)

Choose a topic apropos to healthcare decision support systems. It's best if this topic is something of professional or personal interest to you. You will design and prototype a healthcare decision support tool for this topic. The topic should include an intended type of user; e.g., "Smoking cessation guide for health consumers" or "Back pain assessment guide for General Practice based nurses." There may be exceptions, but it's probably best if your topic is amenable to solution with production rule expert systems technology (e.g., *not* requiring significant signal or image processing capabilities). **Don't be too ambitious about the scope of the system – aim to do a thorough job on a tightly defined problem rather than take on the world.**

You will need to conduct and report on several steps:

1. **Introduction** – provide just a brief characterisation of the motivation for your topic (3 to 5 references) and give a clear characterisation of the type of user and setting for use that you envision.
2. **Review** – find guidelines that characterise the evidence-based for a process of care in your chosen domain; include 3 to 5 references in your report – it's OK if one reference is your dominant source. You may conduct other Knowledge Acquisition activities if you are able to access such people (e.g., interview or protocol analysis of experts)
3. **Ontology** – identify the concepts in the domain, including the relationships among concepts, and present a detailed model (you may wish to include models developed with Protégé or openEHR modelling tools)
4. **Process Model** – create an Influence Diagram and a Program Flowchart for the process of care in your chosen domain
5. **Decision Rule Formulation** – Provide one or more decision trees and/or decision tables that characterises the major decisions in your chosen domain
6. **Prototype** – implement a prototype of your decision support system; submit the software with our essay. In your essay, provide some example cases and step through the application of your prototype to those cases. Provide discussion of limitations of your implementation.
7. **User Interface** – describe an ideal user interface for your decision support system (ignoring limitations of your prototyping technology) – provide screen designs (probably about two screens, but this depends on how you see the user interacting with the system).

Your in-class presentation should provide highlights of the analysis, design and implementation process as per the report components above. Try to make it clear yet entertaining for your fellow students. Unless we have very few students enrolled, you will find that you have quite a short time in which to present.

It is strongly suggested that you email the lecturer to get feedback about your proposed topic before you begin work in earnest. Ask for help. We are available to discuss your assignment with you.

Assignment 3 Evaluation Report - 35% of total mark

Find a healthcare decision support tool that you are able to access. It may be just a guidelines with a small degree of automation, a stand-alone expert system, or a decision tool that you access at your workplace (be sure you have supervisor permission to perform the assignment on such a tool). If the tool has a number of modules, you should pick one tightly-defined function for evaluation. The domain of the tool should be something you are able to reason about reasonably well for yourself.

Produce a report that includes the following components:

1. **Definition of scope** – what is the tool for? How well does the tool explain itself in this regard?
2. **Provenance** – where does the knowledge in the tool come from? How appropriate is its source, knowledge engineering process and maintenance (and its documentation thereof)?
3. **Usability** – illustrate some instances of use of this tool. You may wish to include a Morea (or other) video of use of the tool (by yourself, and/or ask a fellow student or work colleague to have a try) to submit with your report. Provide some non-trivial Discount Usability Assessment results.
4. **Reverse engineering** – derive some of the system's rules from its behaviour. Does it offer any easy access to its rulebase? Create a decision tree and/or table for part of the system's behaviour.
5. **Decision quality** – how good are the tool's recommendations? Report its results for a set of test cases; make careful comparison to the recommendations you would expect based on evidence-based guidelines.
6. **Summary** – how well does this tool fill its domain niche? What more could one reasonably expect from future system implementations in this domain?

Marking Guide

Students will receive a grade and a mark out of 100 for all the assignments.

An outline of the expected criteria for essays and reports is reproduced on the next page. If you believe that your assignment hasn't been marked fairly or you need to have your mark clarified, please contact Jim to discuss your concerns.

Markers guide: grading essays - indicative only

	FAIL	(Flawed) C- (Barely Acceptable) C	(Acceptable) C+/B- (Average, Competent)	(Promising) B/B+ (Perceptive)	(Flair) A-, A, A+ (Scholarly)
SCOPE OF ESSAY AND UNDERSTANDING OF TOPIC 50%	Unreflective personal comment, incoherent argument. Entirely copied. Complete misinterpretation of topic. Major presentation flaws.	Topic not fully covered. Discussion too brief. Poor use of quotations, with little explanation.	A reasonably balanced summary of the issues as reflected in the study materials. Some explanation, illustration, and support is provided from the literature.	A fuller, more systematic explanation of the topic which may include an attempt at critical comment or appraisal.	Comprehensive exploration of topic with sound critical comment and a personal synthesis of issues shown.
STRUCTURE 20%	Structure confused, not discernible, not explained.	No organisational statements. Essay really only restates the topic. Some major points missed.	Introduction sketches approach to the topic, and may foreshadow main themes of the argument and possibly the conclusion. Definitions provided in context. Main points discussed in logically sequential paragraphs. Summary and/or conclusion in final paragraph.	Clear and logical progression of ideas presented in a well planned, structured essay.	
EVIDENCE OF READING AND KNOWLEDGE 20%	No evidence of reading in text of essay. No acknowledgments or bibliography.	Reading not well integrated into text of essay. Insufficient support from literature. Limited acknowledgments and light bibliography.	The text of the essay shows that the course materials have been read and acknowledged. An accurate bibliography is attached.	Extra references included. Regular support provided from the literature.	Extra references integrated into the argument. Detailed support from literature including extra references.
PRESENTATION (INCLUDING GRAMMAR) 10%	Major flaws. Poor construction of sentences and paragraphs.	Minor flaws	Most presentation details met, e.g. margin, legibility, citations, A4 paper, due date. Good basic grammar.	Few flaws.	Virtually flawless presentation. Excellent grammar.
GRADE & % RANGE	Below 40 E 40 – 49 D	55 – 59 C 50 – 54 C-	60 – 64 C+ 65 – 69 B-	70 – 74 B 75 – 79 B+	80 – 84 A-, 85 – 89 A 90 – 100 A+

Presentation Marking Guide

Marking criteria and the mark allocations for the in-class presentation will be as follows.

Aspect	Possible marks
Content Relevance, completeness, accuracy Substantiveness Identification of issues, limitations	50
Delivery Clarity of slides Appropriate level of detail Continuity of presentation	40
Questions Awareness of implications Ability to answer questions	10

Session outlines

Session 1

Ontology / Datamining

Presenter: Prof Jim Warren

Objectives

By the end of this session you will be able to:

- Relate the concepts of ontology, data warehousing, data mining and data linkage
- Describe association rule mining and determine when it is applicable
- Explain the nature of potential barriers to effective data mining
- Outline a method for confidentiality preserving data linkage

Required readings

Peter Christen , Privacy-Preserving Data Linkage and Geocoding: Current Approaches and Research Directions. In proceedings of the Workshop on Privacy Aspects of Data Mining (PADM) held at the IEEE International Conference on Data Mining (ICDM), Hong Kong, December 2006. Available from <http://datamining.anu.edu.au/linkage.html> under 'Publications'.

Additional reading

Hand, D., Mannila, H. & Smyth, P. *Principles of Data Mining*. Cambridge, Massachusetts: MIT Press, 2001.
ANU Data Mining Group home page - <http://datamining.anu.edu.au/linkage.html>

Session 2

Standards / XML

Presenter: Prof Jim Warren

Objectives

By the end of this session you will be able to

- Describe the roles of several significant standards in Health Informatics related to terminology, coding, guideline representation and interoperability
- View an XML document and comment on its contents
- Describe the relevance of various W3C technologies to Health Informatics

Required readings

S. W. Tu, P. D. Johnson, M. A. Musen. A Typology for Modeling Processes in Clinical Guidelines and Protocols. 2002. <http://smi.stanford.edu/smi-web/research/details.jsp?PubId=911>

Additional reading

XML Tutorial - <http://www.w3schools.com/xml/default.asp>

If you're really keen

HL7 Resource Library - <http://www.hl7.org/library/>

S. Bechhofer, I. Horrocks and P.F. Patel-Schneider, Tutorial on OWL, <http://www.cs.man.ac.uk/~horrocks/ISWC2003/Tutorial/>

Session 3**Hands-on with PREDICT and SNOMED CT**

Presenter: Dr Koray Atalag

Objectives

This is a hands-on session. By the end of this session you will be able to

- Discuss the features and utility of the PREDICT CVD/Diabetes decision support tool
- Appreciate the size of the SNOMED terminology system
- Search SNOMED using a terminology browser

Required readings

Wells S, Furness S, Rafter N, Horn E, Whittaker R, Stewart A, Moodabe K, Roseman P, Selak V, Bramley D, Jackson R. Integrated electronic decision support increases cardiovascular disease risk assessment four fold in routine primary care practice. *Eur J Cardiovasc Prev Rehabil.* 2008 Apr;15(2):173-8.

Additional reading

Will be tabled in the session.

Session 4

Diagnosis / Guidelines

Presenter: Prof Jim Warren

Objectives

This lecture emphasises the relationship between clinical concepts and healthcare decision support systems. At the end of this session students should be able to:

Define basic clinical concepts of relevance to healthcare decision support systems

Describe the relationships among RCTs, systematic literature reviews, guidelines and decision support systems

Present the reasons for development and use of decision support systems in healthcare.

Required Reading

Field, M.J. and K.N. Lohr, Guidelines for clinical practice: from development to use. 1992, Washington, DC: Institute of Medicine, National Academy Press. Available from <http://www.nap.edu/openbook.php?isbn=0309045894> (at least read Chapter 2 - http://www.nap.edu/openbook.php?record_id=1863&page=45).

Websites worth a look

The Cochrane Collaboration – see <http://www.cochrane.org/> and <http://www.cochrane.org/reviews/exreview.htm>

Proposed Joint British Societies Cardiovascular Disease Risk Prediction Chart http://www.bhsoc.org/resources/prediction_chart.htm

Session 5

Production Rule Systems

Presenter: Prof Jim Warren

Objectives

This session introduces the most fundamental technology of health decision support systems, the rule-based expert system. By the end of this session you will be able to:

- Describe methods for knowledge acquisition
- Correctly use the terminology of production rule systems
- Explain backward chaining
- Describe the role of an expert system shell

Required readings

Clem McDonald, "Medical Heuristics: The Silent Adjudicators of Clinical Practice," *Annals of Internal Medicine* 124(1): 56-62, 1996 (from http://www.annals.org/cgi/content/full/124/1_Part_1/56).

Introduction to expert systems by expertise2go - <http://www.expertise2go.com/webesie/tutorials/ESIntro/>

Additional reading

History and applications of AI by George Luger - <http://www.cs.unm.edu/~luger/ai-final/chapter1.html>

Session 6

Decision Trees

Presenter: Prof Jim Warren

Objectives

By the end of this session you will be able to:

- Identify situations where decision trees are an appropriate tool
- Manually create decision trees and decision tables
- Describe the process of induction of decision trees from data, including explaining the role of entropy measures and discretization therein

Required readings

Building Classification Models: ID3 and C4.5 - <http://www.cis.temple.edu/~ingargio/cis587/readings/id3-c45.html>

Decision Trees - http://dms.irb.hr/tutorial/tut_dtrees.php

J.H van Bommel and M.A. Musen, Eds., *Handbook of Medical Informatics*, section 15.4.2.1 Decision Tables and 15.4.2.1 Flowcharts. From http://www.mieur.nl/mihandbook/r_3_3/handbook/home.htm

Session 7

Probability and Fuzzy Logic

Presenter: Prof Jim Warren

Objectives

By the end of this session you will be able to

- Describe the role of uncertainty in healthcare decision support system logic
- Apply Bayes' Theorem to clinical problems
- Interpret a Bayesian Network diagram
- Explain the meaning of a Membership Function in Fuzzy Logic

Required readings

Bayes' Theorem, from Stanford Encyclopedia of Philosophy, <http://plato.stanford.edu/entries/bayes-theorem/>
Fuzzy Logic Overview – from <http://www.austinlinks.com/Fuzzy/overview.html>

Additional reading

Fuzzy Systems – A tutorial, from <http://www.austinlinks.com/Fuzzy/tutorial.html>

If you're really keen

Pearl, J. Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference, revised 2nd printing. San Mateo, California: Morgan Kaufmann Publishers, 1988.

Session 8

Discussion

All of us together (facilitated by Prof Jim Warren)

Objectives

Sessions 5, 6 and 7 introduce major core concepts for healthcare decision support systems. Also, this session finds us near the deadline for Assignment 1 and about to begin Assignment 2. It's a good time to consolidate our understanding with a student-driven question-and-answer session and general discussion.

Session 9

History/Success

Presenter: Prof Jim Warren

Objectives

By the end of this session you will be able to

- Assess the level of decision support automation provided by a given implementation
- Identify the success factors for guideline implementation and their relationship to decision support system implementation
- Describe the issues and challenges in successful health consumer decision support

Required readings

Kawamoto K, Houlihan CA, Balas EA, Lobach DF. Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success. *BMJ*. 2005 Apr 2;330(7494):765. Epub 2005 Mar 14.

Zielstorff RD. Online practice guidelines: issues, obstacles, and future prospects. *J Am Med Inform Assoc*. 1998 May-Jun;5(3):227-36.

Additional reading

Ash JS, Berg M, Coiera E. Some unintended consequences of information technology in health care: the nature of patient care information system-related errors. *J Am Med Inform Assoc*. 2004 Mar-Apr;11(2):104-12. Epub 2003 Nov 21.

Session 10

Case-based reasoning

Presenter: Assoc-Prof Ian Watson

Objectives

By the end of this session you will be able to:

- Assess the relative merits of Case-Based Reasoning (CBR) and production rule expert systems for a given healthcare decision support application
- Provide a high-level description of how CBR systems work
- Name a few applications of each of CBR for healthcare

Required readings

Holt, A., Bichindaritz, I., Schmidt, R., Perner, P. Medical applications in case-based reasoning. *The Knowledge Engineering Review* 20(3):289-292, 2006.

Session 11

Hands-on with Production Rule Shell

Presenter: Prof Jim Warren / Thusitha Mabotuwana

Objectives

This is a hands-on session. By the end of this session you will be able to:

- Use an expert system shell to enter and run a rule based decision support system
- Interpret the explanation facility output of an expert system shell

Required readings

E2gLite Free Expert System Shell – Download and Installation,
<http://www.expertise2go.com/webesie/e2gdoc/e2gmod2.htm>

Session 12

Workflow / Service Oriented Architecture (SOA)

Presenter: Prof Jim Warren

Objectives

By the end of this session you will be able to

- Describe the role of middleware and enterprise architecture in delivering effective healthcare decision support
- Define key SOA-related concepts
- Assess the relevance of Workflow Management Systems and SOA to current healthcare systems environments

Required readings

Kawamoto K, Lobach DF. Proposal for fulfilling strategic objectives of the U.S. Roadmap for national action on clinical decision support through a service-oriented architecture leveraging HL7 services. J Am Med Inform Assoc. 2007 Mar-Apr;14(2):146-55. Epub 2007 Jan 9.

Additional reading

Tutorial on Service Oriented Architecture - <http://icec06.net/WorkshopsAndTutorials/SOATutorial/SOA-Tutorial.htm>

If you're really keen

Business Process Execution Language for Web Services version 1.1, from <http://www.ibm.com/developerworks/library/specification/ws-bpel/>

Session 13**Monitoring Systems**

Presenter: Prof Jim Warren

Objectives

By the end of this session you will be able to

- Describe the principles of monitoring systems and their computational methods
- Appreciate the role of monitoring systems in home telecare

Required readings

Pare G, Jaana M, Sicotte C. Systematic review of home telemonitoring for chronic diseases: the evidence base. J Am Med Inform Assoc. 2007 May-Jun;14(3):269-77.

Additional reading

Parati G, Saul JP, Di Rienzo M, Mancia G. Spectral analysis of blood pressure and heart rate variability in evaluating cardiovascular regulation. A critical appraisal. Hypertension. 1995 Jun;25(6):1276-86.

Session 14

Evaluation

Presenter: Prof Jim Warren

Objectives

This session is core to accomplishing the final assignment where you evaluate an existing healthcare decision support system. By the end of this session you will be able to

- Select appropriate evaluation methods and criteria for a given healthcare decision support system implementation
- Describe how one applies 'discount' usability assessment methods to a decision support system

Required readings

A Dix, J Finlay, G Abowd, R. Beale, *Human-Computer Interaction*, 3rd Ed., Prentice Hall 2004. Chapter 9 – Evaluation Techniques.

Additional reading

Rousseau N, McColl E, Newton J, Grimshaw J, Eccles M. Practice based, longitudinal, qualitative interview study of computerised evidence based guidelines in primary care. *BMJ*. 2003 Feb 8;326(7384):314.

Session 15

Student Presentations

Presenter: You!

Objectives

Format of this session will vary depending on enrolment numbers (and hence on how much time each individual student can have allocated for their presentation). Pay careful attention to instructions that will be given in class. You will present (and possibly give a live demo) of the healthcare decision support system prototype you have designed for assignment 2. You will incorporate the feedback of your peers into your final report.

This session will allow you to

Gain further confidence in your ability to deliver timed oral presentation of technical material

Learn about a variety of clinical guideline topics and the relevance of specific decision technologies to these topics

Further appreciate the practical challenges of healthcare decision support system implementation

Required readings

SOYOUWANNA DELIVER AN EFFECTIVE SPEECH? -

<http://www.soyouwanna.com/site/syws/speaking/speakingfull.html>

Session 16**Closing Discussion**

Presenter: You!

All of us together (facilitated by Prof Jim Warren)

Objectives

This will be an opportunity to clarify and discuss any concepts from the entire course. It will be a last chance to finalise understanding of the deliverables for assignment due (due two days later) and a chance to discuss the requirements of assignment 3.