Inf 723 Information & Computing (Spring 2012)

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NOTE: This syllabus covers the part of Inf 722 covered by Jagdish Gangolly. You will get a separate syllabus for the part covered by Neil Murray. I shall be holding classes during the period March 19 to April 9. I also will need to take a few extra classes at times convenient to us all, by prior arrangement. Because of this, you will be freed from some classes later in the semester.

1 Administrivia

Office: Building 7A, Suite 220, Harriman Campus (March 19 – April 9). Available online throughout the semester for chat at gangolly on gchat and AIM, jagdish79 on Skype and by phone at 518-505-4557.
eMail: jgangolly@albany.edu or, preferably at gangolly@gmail.com

2 Catalog Description

Development of theories and concepts that underlie the operation of information processing and retrieval systems; consequences derived from these theories that should be considered in designing such systems; theoretical foundations of information and computation; technologies and application areas.
3 A more Honest Description:

- **Information Theory** (2 sessions) (Shannon entropy, Relative entropy or Kullbach-Leibler divergence, Maximum entropy, Information & inference) (Luenberger chapter 1 & 2, and bits and pieces scattered throughout the other chapters we’ll be covering in the class)

- **Coding theory & Compression** (2 sessions) (Data Compression, error correcting codes, noisy channel coding, Message passing) (Luenberger chapters 3–6)

- **Information & Decision Theory** (2 sessions) (Utility Theory, Bayesian Decision Theory, Belief Functions (time permitting) (Luenberger chapter 9, supplemented by readings)

4 Textbooks:


I shall be covering chapters 1–6, and chapter 9 from the Luenberger text. I addition, I also will be assigning additional readings throughout the semester which I’ll email to all students registered for the class.

5 Course Grading:

A short paper (5-10 double-spaced pages) and a long paper (15-25 double-spaced pages) are due on May 12, 2008. The topics should come from any two of the three areas covered my part of the course. The short paper should be written in the form of a short note that you may like to send for publication to a journal or conference. The long paper should be written in the form of a paper that you would send for publication to a journal. You also should indicate for each paper the target journal/conference, and the paper should be formatted for the target. I’ll send more detailed guidelines on the papers during the course.
6 Tentative Schedule:

NOTE: The readings preceded by double asterisks are advanced and may be referred to by those with quantitative backgrounds)

6.1 Introduction & Information Theory (2 sessions)

- **Week of March 19, 2012**
- **Topics:** Shannon entropy, Relative entropy or Kullbach-Leibler divergence, Maximum entropy, Information & inference
- **Readings:**
  - DL Ch.1,2. Also bits and pieces scattered throughout the other chapters we’ll be covering in the class.
  - entropy-Based Link Analysis for Mining Web Informative Structures, by Hung-Yu Kao, Shian-Hua Lin, Jan-Ming Ho, and Ming-Syan Chen, Conference on Information and Knowledge Management, November 4-9, 2002, McLean, Virginia, USA.

6.2 Coding Theory & Compression (2 sessions)

- **Week of March 26, 2012**
- **Topics:** Data Compression, error correcting codes, noisy channel coding, Message passing) (Luenberger chapters 3–6)
- **Readings:** DL: Ch. 3, 4, 5, 6. Our coverage of chapters 5 and 6 will be rather shallow.
6.3 Information & Decision Theory (2 sessions)

• Week of April 2, 2012

• Topics: Utility Theory, Bayesian Decision Theory, Belief Functions (time permitting) (Luenberger chapter 9, supplemented by readings TO BE ASSIGNED)

• Readings: DL: Ch. 9.

6.4 Student Class Presentations

• April 30 & May 7, 2010

• Topics: Student Class Presentations