Math 345 – Information Theory (Spring 2007)

Instructor: Kevin Woods, King 220B, Kevin.Woods@oberlin.edu

Class: MWF 10:00-10:50am, King 121.

Office Hours:

Monday 3:30-5pm, Tuesday 12-1:30pm, Wednesday 11am-12pm, Friday 2:30-3:30pm, and by appointment. Also, feel free to stop by any time my door is open (but be understanding if I say I am too busy).

Required Textbook:

David J.C. MacKay , *Information Theory, Inference, and Learning Algorithms* , Cambridge University Press. We will start with Chapters 4,5,6,8,9,10 (and pick up most of Chapter 2 along the way). Then we will proceed based on time permitted and interests of the class. The book is available free for on-screen viewing (but not for printing out) at http://www.inference.phy.cam.ac.uk/mackay/itila/. A copy is also on reserve at the library.

Other Recommended Books (all on reserve):

Cover and Thomas, Elements of Information Theory. *The classic mathematical treatment. Harder than MacKay, fewer examples, more theorem-proof oriented. Comprehensive and wonderful.*

Pierce, An Introduction to Information Theory: Symbols, Signals, and Noise. *Mostly words, little mathematics, good for giving an intuition of the subject, with a little philosophy on the side. A joy to read.*

Van der Lubbe, Information Theory. *About the same level as MacKay. More "classical" approach.*

Roman, Introduction to Coding and Information Theory. *Easier than MacKay.*

There are also many books on specific applications of information theory (not on reserve). Searching some out may be helpful for your project.

Blackboard:

http://bb.oberlin.edu. I will post homework, reading, other announcements, and grades on Blackboard. It will take a few days to get everyone enrolled and with access to the class.

Grading:

Problem Sets (30%),
Project (20%),
Two Take-Home Midterms (15% each),
Final Exam (20%).

Problem Sets (30%).

The best way to learn the concepts in this course is to get your hands dirty! I hope you will work in groups on these, though your written solutions must be in your own words. This is also an opportunity to work on writing careful, clear proofs and explanations. Good mathematics is articulate mathematics! Explain things carefully and in complete sentences. Imagine that another student in the class who hasn't done this problem yet will read your solution: they should be able to understand it without having to ask you questions. These problems will be graded very strictly for how coherently written they are. Problem sets will be due approximately every other Wednesday. I will also regularly assign other homework problems that will generally have solutions in the book and that I will not collect or grade.

Honor Code: You should (but aren't required) to work together on these problems, but your written solutions must be your own. Please indicate on your solutions who you worked with..

Late Work Policy: If they are handed in before I leave my office that day (no guarantee when that is), you get full credit. If they are handed in the next school day before I leave, you get 90%. Two school days, 70%, three school days 50%, more than that 0%.

Project (20%).

You will work in groups of 2 on a topic not covered in the course. This could be a topic in the textbook or some other book, or it could be a topic from a journal article. Your group will give a 50 minute presentation to the class on your topic, in the last couple of weeks of the semester. I will give more information soon about possible topics, requirements, etc.

Take-home midterms (15% each).

Tentatively due Friday, March 16 and Friday April 27. I'll give you more information as the time approaches.

Final Exam (20%).

Wednesday, May 16, 7-9pm. The final exam will cover the entire course.