Math 345 – Information Theory (Spring 2013)

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

Class: MWF 3:30-4:20pm, King 237.

Office Hours:

Monday 4:30-5pm, Wednesday 12-1:30pm & 4:30-5pm, Thursday 3:30-5pm, Friday 11am-12pm, 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).

Recommended Textbook:

A Student's Guide to Coding and Information Theory, by Stefan Moser and Po-Ning Chen, first and only edition, Cambridge UP. We will cover most of this book, plus I will give you some extra readings. I do not expect you to know anything I don't say in class, and I will give you problem sets as handouts. However, we will follow this book most of the time, and it is a good read. And the paperback version is cheap! A copy is also on reserve at Mudd.

Other Recommended Books (all on reserve, or will be eventually):

Cover and Thomas, Elements of Information Theory. *The classic mathematical treatment. Harder than our text, 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.*

McKay, Information theory, Inference, and Learning Algorithms. *A little harder than our text, but it has lots of great additional topics.*

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

Blackboard:

http://oncampus.oberlin.edu. I will post homework, reading, and other announcements on Blackboard.

Grading:

Problem Sets (40%),
Project (15%),
Two Take-Home Midterms (15% each),
Final Exam (15%).

Problem Sets (40%).

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 Friday.

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 4:30pm that day, you get full credit. If they are handed in the next school day before 4:30, you get 90%. Two school days, 70%, three school days 50%, more than that 0%.

Project (15%).

You will work in small groups 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 presentation in the last couple of weeks of the semester. We will probably schedule special class times on the weekend to do this. I will give more information soon about possible topics, requirements, etc.

Take-home midterms (15% each).

Tentatively due Friday, March 15 and Friday, April 26. These will be open book, and you'll get several days to work on them. I'll give you more information as the time approaches.

Final Exam (15%).

Friday, May 17, 9-11am. The final exam will cover the entire course. It will be closed book, but you will be able to use something like an 8.5x11 sheet with notes.

Disabilities:

If you have a disability of any sort that may affect your performance in this class, please consult with me and with Jane Boomer in the Office of Disability Services. All requests for accommodation must go through that office.