**IERG 6154: Network Information Theory (Spring 2019)**

**Time**: M: 9:30 - 11:15, Tu: 9:30 - 11:15 (SHB 833)

Instructor: Prof. Chandra Nair

**Course outline**

1. Review of basic information theory: information measures and typicality
2. Point-to-point channel coding theorem
3. Multiple access channel
4. Degraded Broadcast channel
5. Interference channel
6. Channel with state
7. General broadcast channel
8. Gaussian vector channels
9. Distributed lossless source coding
10. Miscellaneous topics

**Course material**

Textbook: Network information theory by Abbas El Gamal and Young-Han Kim

**Note: While this is a very useful book to have in your library, I will also hand out lecture notes. These lecture notes are also available on arXiv.**

***Projected outcome***: The course aims to cover chapters 1-10 in the textbook. The emphasis will be on the mathematical details and a thorough learning of a few of the basic concepts as opposed to a breadth of topics. Some of the treatment of the proofs will be vastly different from that in the book. A particular focus of this offering of the course will be in non-convex optimization problems that arise in the computation of the various rate regions.

This course intends to equip you with the relevant tools and techniques needed to conduct research in multiuser information theory. You will see a variety of open problems that will come up during the course of the lectures.

**Grading**

Homework: 20% (There will be weekly/bi-weekly homework.)
Midterm: 40% (This will be a take-home exam)
Project: 40% (Potential project topics will be handed out in the middle of the semester. You are also free to choose your own topic after confirming the topic with me.)

**Pre-requisites**

Basic knowledge of information theory is recommended. A mathematical mind is good enough.

**Questions/comments**

Please feel to email me: chandra@ie.cuhk.edu.hk

**Disclaimer**

This class will be a mathematical class with lots of theorems and proofs. The math required for this class will be reasonably self-sufficient as long as you have a prior exposure to probability.