



FEO3240 Fundamentals of Network Coding 10.0 credits

Grundläggande nätverkskodning

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FEO3240 valid from Spring 2012

Grading scale

Education cycle

Third cycle

Specific prerequisites

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After the course, the students should:

- (1). Know the max-achievable flow for different network setups.

- (2). Know the existence and construction of network codes.
- (3). Know the codes for acyclic or cyclic networks.
- (4). Have mastered the algebraic forms of network coding.
- (5). Have solid knowledge on coherent and non-coherent network codes.
- (6). Know the different application approaches of network coding.

Course contents

This course shall give a rigorous introduction on the fundamentals of network coding. The main contents are on the information theoretic and algebraic structure of network coding. We shall also study the existence, the complexity, the construction, and the properties of network codes. The recent topics of subspace network codes will be discussed.

Disposition

Lectures, homework and final paper presentation

Course literature

Textbook

1. Raymond Yeung, "Information Theory and Network Coding", Springer Publisher, 2008.
2. Christina Fragouli and Emina Soljanin, "Network Coding Fundamentals", NOW publisher, 2007.

Papers:

1. R. Koetter and M. Medard, "An algebraic approach to network coding," IEEE/ACM Transactions on networking.
2. T. Ho, M. Médard, R. Koetter, D. Karger, M. Effros, J. Shi, and B. Leong, "A random linear network coding approach to multicast," IEEE Trans. Inf. Theory, vol. 52, no. 10, pp. 4413–4430, Oct. 2006.
3. R. Koetter, F. R. Kschischang: "Coding for Errors and Erasures in Random Network Coding," IEEE Transactions on Information Theory 54(8): 3579-3591 (2008)

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Other requirements for final grade

The lecture is given once per week.

The final results are based on homework (64%) and the final report (26%) and presentation (Ph.D 10%).

Grade:

Each home work is has the grade 0 – 8. If you miss the deadline, you will be marked as -2.

Final report should be related to the students' own research background. That is, how the network coding can be (potentially) applied in your own area. What is the state of arts? Are there potentially some new area? Why not? The minimum requirement is 2000 Words.

Presentation: Based on your report or a selected paper by the teacher.

Ph.D students Should have the overall grade 80% to pass.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.