

Study guide: The mathematics behind Internet MAA507

Course homepage:

Additional information and course material is available here:

<http://www.mdh.se/amnen/matematik/kurser/kurshemsidor/maa507>

Objectives:

The course aims to provide students with knowledge of key mathematical ideas, concepts, methods, algorithms and computational tools behind the success of the Internet and Internet-based technologies, and to explain the basic mathematical concepts and techniques with concrete examples of applications in modern information and Internet technologies, other fields of technology and society. The course will also provide training in logical and algorithmic thinking, and in mathematical modeling and computational techniques of particular importance for applications in the Internet and information technology, as well as the ability for independent analysis of mathematical problems and models used in Internet and database technologies.

Examination:

PRO1, 4.5 credits, marks Pass (G) or Pass with distinction (VG), Project.

SEM1, 3 credits, marks Pass (G) or Pass with distinction (VG), Seminars

Course literature:

Lecture notes and other material handed out during the lectures. For the projects some additional material will be provided.

See the course homepage or Blackboard.

Course content:

Lectures:

The course consists of 14 two-three hour lectures as well as approximately 3 two-three hour seminars. Lectures will consist primarily of presentation of the course material and give an introduction to the subjects talked about during the seminars.

Lecture	Lecturer	Contents	Additional information
L1	ssv01	Roll call and introduction	
L2	?	Time complexity	
L3	?	Multiprecision	
L4	?	Information theory and coding	Last day to choose group and subject.
L5	?	Information theory and coding	
L6	?	Hash functions and security	
L7	?	Introduction to graph theory	
L8	?	Distance and similarity on graphs	
L9	?	Graph clustering	
L10	?	Data mining	
L11	?	Graph centrality and applications	
L12	?	Power/QR and other methods for computing eigenvalues	
L13	?	Handling large sparse matrices	
L14	?	Natural language processing / extra	
S1	?	Seminar 1, groups ?	
S2	?	Seminar 2, groups ?	
S3	?	Seminar 3, groups ?	
21 March	-	Last day to hand in project report	

Examination:

PRO1, 4.5 credits, marks Pass (G) or Pass with distinction (VG), Project.

SEM1, 3 credits, marks Pass (G) or Pass with distinction (VG), Seminars.

Examination consists of a project report and oral presentation on one of the seminars as well as acting opponent on 2 other groups presentations

Seminars

The seminars consists of a roughly 30 min (with reservation for change depending on number of groups) presentation of the topic by one or two students, after which the opponents will have some time to give some questions and comments on the presentation.

Your grade on the seminars depend on both your presentation (and following discussion) as well as the two times you act opponent. You can get 1-3 points each time you act opponent (for a maximum of 6 points) and 1-4points on your own presentation.

After your presentation or whenever you act opponent you might be asked to clarify or explain a few things verbally after the lecture.

Due to the different dates for the seminars and in order to make sure that everyone gets the opportunity to present their topic you will be required to choose topic and time at the latest on lecture 5. More information of possible subjects to choose from and when we would prefer to have these topics presented can be found on blackboard.

Presentation

- Your presentation should be 20 – 30 min long and should be written using Powerpoint, Beamer, or similar so that it can be read by your opponents before your presentation.
- Your presentation should be available at the latest some time Thursday the week before your presentation so that your opponents have time to read it before the actual presentation.
- It is important that your presentation include your references in order for your opponents to have some additional material to work with.
- After your presentation you might be asked to give a verbal complementation after the lecture to show that you have understood the material.

Opponent

You will be assigned 2 presentations for which you will act opponent together with 1–2 other people. For this you will need to read the presentation and probably some other sources to get familiar with the material and topic.

- Before the presentation you are to submit at least 3 different questions / comments on the file for presentation you got beforehand which you plan to ask after the presentation. These should be handed in electronically at the latest 12.00 the day before the presentation.
- After the presentation you will take turns with the other opponents to give comments and ask questions.
- At the latest some time Thursday the week before the seminar the presentation file should be available for you to read, but you are encouraged to and might need to read up on the subject before that.

- The opponent part will be done individually, and the groups you will be opponent on will be assigned by the lecturers.
- After you have acted opponent you might be asked to give a verbal complementation after the lecture to show that you have read and understood the material.

Project:

- The projects are to be done in groups of 1–2 people. The project consists of a written report of approximately 5–15 pages.
- The reports should be submitted at the latest Sunday March 21, if you want some comments on how you could improve your report you may submit a preliminary report at least one week before final submission date.
- You are encouraged (but not required) to write your report in \LaTeX .
- Together with your final output of your report you should also supply any additional files used which could be relevant to the examination (program code, word/ .tex files of your report, etc.).

Examination	Maximum	Passed	Grade (ECTS)	Grade (3-5)	Points
Project	20	10	A	5	27–30
Seminar	10	5	B	4	23–26
Total	30	15*	C	3	20–22
			D	3	17–19
			E	3	15*–16

* To pass the project you need at least 10 points on the project report. To pass the seminars you need to have done (and passed) both your own presentation as well as acted opponent on two other presentations. Both the project and the seminars needs to be passed in order to pass the course.

Course evaluation:

The course will be evaluated at the end of the course. The students are encouraged to express their opinions and give suggestions during the course as well.

Teachers:

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