

STUDYPLAN, HF1013 - DISCRETE MATHEMATICS

This document specifies how you can study for the course. It is divided into 9 parts, one for each course week, one part for the christmas break and one part for the last week of the course. You should regard the contents as **advice** of what to do, you may of course adjust it to your personal needs.

The best thing to do is to make a personal plan of how you will prepare each meeting. Please be aware that each Monday has a meeting which needs to be prepared, this means that the preparations must be done the week before (possible weekend work if you are not careful).

PART 1 - WEEK 45

This week has 4 meetings, one introductory meeting, two "Föreläsning" and one "Övning". It was not possible to prepare yourself for the introduction so we will not mention this here.

Preparations for meeting 2. *Logic.* During the introductory meeting, the preparations for meeting 2 were done, however, it could be good if you repeat these preparations on your own (you can watch the video again for example and go over the solutions to the exercises). From now on you are expected to independently prepare yourself for a course meeting. Also try to continue to read into the content of meeting 2: that is read as much as you can of Kapitel 1 in IDK. Also do as many of the exercises as you can.

Preparations for meeting 3. *Introductory Set Theory.* To meeting 3, Kapitel 2 in IDK needs to be worked with. Again there is a video to watch, do so and do as many exercises as you can. This week the Övning-session follow directly after the Föreläsning-session, which means that you need to work extra thoroughly on the exercises. You will notice though, that set theory and logic have many similarities. When you notice these similarities, be very happy! Then you are making an abstraction which is very useful in mathematics.

Preparations for meeting 5. *Introductory Number Theory.* Meeting 5 is held on Monday morning next week so preparations for meeting 5 will need to be completed this week. It is possible (maybe even desirable!) to make the preparations for meeting 5 before the preparations for meeting 4. The preparations consist of studying the video and doing some introductory exercises as usual. A little comfort is that there is not so much theory in meeting 5, it is introductory number theory, Kapitel 5, in IDK.

Preparations for meeting 4. This is the "Övning"-session - it is important to bring many questions to this session. Do as many exercises as you can from Kapitel 1 and Kapitel 2.

Other things to do during this week. See to it that you have the virtual machine *Groucho* installed and start working on the practical assignments. To get started watch the video `gettingstarted.mp4` on the course web.

PART 2 - WEEK 46

This week has three meetings and a "Redovisning" session. At the "Redovisning" you book yourself to show your progress with the practical work, so it is important that you start doing the practical work as soon as possible. Again, check the video `gettingstarted.mp4` if you have not done so yet.

Preparations for meeting 5. Was done the week before.

Preparations for meeting 6. *Modular Arithmetic and Introductory Cryptography.* Study Kapitel 6, in IDK and do as many exercises as you can. Of course you can use the accompanying video to support your work.

Preparations for meeting 7. This is an "Övning"-session which means that you need to bring all of your questions to the session so that they can be answered.

Preparations for the "Redovisning". Of course work as much as you can with the practical work and try to get it ready. If it is not ready, book a time anyway and show what you have got so far.

Preparations for meeting 8. *Reflections on Congruences and Proof in Number Theory.* Monday morning next week has meeting 8, this means that you have to prepare this meeting this week. The preparations are as usual study the literature, watch the video and do as many exercises as you can.

PART 3 - WEEK 47

This week has three meetings and a "Redovisning"-session, and of course, as usual preparations for next week's Monday meeting is needed.

Preparations for meeting 8. Were done last week.

Preparations for meeting 9. *Induction and Recursion.* Study the lecture notes given (by me) and page 67-72 in *Lecture Notes in Discrete Mathematics* (by Finan). Try to do some of the review problems 11.1-11.13. Some of the exercises on page 126 and forwards in *Discrete mathematics for computer Science Students* can also be of interest.

Preparations for meeting 10. This is an "Övning"-session and you bring problems you have not solved or questions to this session.

Preparations for meeting 11. This is a meeting for repetition before the mid-term exam. This means that you can bring any questions and problems to this meeting dealing with anything you have encountered during the course.

"Redovisning". There is an opportunity to show completion of practical work here.

PART 4 - WEEK 48

Preparations for meeting 11. Were done last week.

Upon completion of the repetition (meeting 11), we have finished the first half of the course which is what will be the content of the mid term exam. These are the **foundations** and the rest of the course can be regarded as **applications**.

Preparations for meeting 12. *Fundamentals of Graph Theory.* We will start with graph theory and before starting with that, you need to study specifically the video and short notes on functions, in Swedish "Funktioner.pdf" and "Funktioner.mp4" which will introduce functions in a more abstract setting. After studying that, read the lecture notes on graph theory and particularly study chapter 6 pages 263-293 in *Discrete Mathematics for Computer Science Students*. (Not all pages 263-293 is for this meeting.) Try to do some exercises.

Preparations for meeting 13. This is the "Övning" immediately prior to the Mid-term exam. ("Kontrollskrivning".) Of course you will have lots of questions prepared to this session!

Mid term exam. The mid-term exam is on Friday this week. There will be a mid-term re-exam in the end of the course. The mid-term exam will cover the foundations of the course. The mid-term re-exam will also cover the foundations of the course.

"Redovisning". Just after the mid-term there is a small opportunity to show some practical work.

Preparations for meeting 14. *More Graph Theory.* We will continue with graph theory, read the lecture notes and continue to work with the exercises you worked with for meeting 12.

PART 5 - WEEK 49

Preparations for meeting 14. Were done last week.

Preparations for meeting 15. *Relations.* You can read either the lecture notes or pages 100-110 in *Lecture Notes in Discrete Mathematics*. Then try to do as many of the exercises as you can starting on page 110. Then read 113-117 and work with exercises starting on page 118.

Preparations for meeting 16. This is an "Övning"-session which means that you need to bring all of your questions to the session so that they can be answered.

Preparations for meeting 17. *Functions.* Read lecture notes and pages 119-124 in *Lecture Notes in Discrete Mathematics* and work with exercises starting on page 125. Then continue with the same 127-130 and the exercises starting on page 131.

"Redovisning". There is an opportunity to show completion of practical work here.

PART 6 - WEEK 50

Preparations for meeting 17. Were done last week.

Preparations for meeting 18. *Counting and Combinatorics.* Read through the lecture notes and pages 175-178 in *Lecture Notes in Discrete Mathematics*. Do some of the exercises on page 181.

Preparations for meeting 19. This is an "Övning"-session which means that you need to bring all of your questions to the session so that they can be answered.

Preparations for meeting 20. *Combinatorics, Probability and The Binomial Theorem.* Read the lecture notes and continue to read pages 179-185 in *Lecture Notes in Discrete Mathematics*, the concept of **conditional probability** is not part of the course. Do more exercises on page 181 and also on page 192. (Skip exercises that involve conditional probability. There are also more exercises on probability in the other free book.)

"Redovisning". There is an opportunity to show completion of practical work here.

PART 7 - WEEK 51

Preparations for meeting 20. Were done last week.

Preparations for meeting 21. This is the repetition-meeting where we look back at all the material that the course contained. Feel free to bring lots of questions to this session.

Preparations for meeting 22. This is the final "Övning"-session and it is of course as usual important to bring problems to this session that you have had trouble with.

Mid-term re-exam. This is the second chance to get a pass on the mid-term exam, if you get a on this you will have a bonus on the written exam.

PART 8 - CHRISTMAS BREAK

During the Christmas break the mid term exams will be corrected so that you certainly know your bonus status before the written exam. During the break you can also email me questions on the whole course and I will collect all the questions and reply to them so every one can benefit from the answers. Also do take time to complete the practical work since this also supports your mastery of the theoretical parts.

PART 9 - FINAL WEEK BEFORE WRITTEN EXAM

After the break we will have many "Redovisning"-sessions which will enable you to show all the practical work you have completed. A final longer (4 hours) "Övning"-session will precede the written exam.