TATA82: Discrete Mathematics, 6 credits
Course Programme Spring 2020

Teaching and Self-Study

Teaching consists of lectures (Fö), 30 hours, and tutorials (Le), 26 hours.
This is a 6 credits course which corresponds to a total work of approximately 180 hours, divided into 56 contact hours and 124 hours of self-study .

Lectures

The purpose of the lectures is to show some of the course concepts. Fundamental concepts are defined and **discussed**.
Lectures are a complement to the literature and do not cover the whole material, which shall be read by the student on his/her own. All three books have many examples to help the student in reading them.

The exercises recommended are taken from the compendium for exercises in Swedish, and Grimaldi's book for Exercises in English:

Discrete and Combinatorial Mathematics, R. P. Grimaldi, Addison-Wesley, 1999

Diskret Matematik, Armen Asratian, Anders Björn och Bengt Ove Turesson, 2015

We also recommend to study *Discrete Mathematics and its Applications*, K. H. Rosen, Mc.Graw-Hill, 2013 or later. You can find it as e-book

The exercises in English can be found on the webpage under "Extra Files "

Tutorials

To learn mathematics is to do mathematics. To work with exercises is the best way to learn mathematics, and using it. During lessons you can ask questions and discuss exercises. **Use it**.
Around 10 exercises will be proposed for each 2 hours tutorial. In general one cannot solve all them during tutorial time. But one should solve totally more than 150 exercises to grasp the material.

Tutorials are held in two group: A and B. **Exchange students and students in Industrial Economy, International are placed in group A**, together with students in Industrial Economy whose surnames begin by Ai to H. The rest of the students, i.e. **industrial Economy, non-international with surnames beginning by I to Ös, are placed in group B**.

Programme for Spring 2020. Proposed Exercises in Swedish, Compendium

För 1	Principles of Counting (Recalling high school maths)	5.1-5.9.
Le 1	5.1, 5.3, 5.25, 5.26, 5.6, 5.8-9, 5.31, 5.33, 5.10, 5.11, 5.12, 5.28, 5.16	
För 2	Sets, Principle for Inclusion and Inclusion	2.1–2.6
Le 2	2.9, 2.10, 2.33, 2.34, 5.5, 5.24, 6.5, 2.2, 2.16, 2.17, 2.12, 2.30	
För 3	Principle of Induction. Recursion	4.1-4.4 and Hand out material
Le 3	4.1, 4.8a), f), g), h), 4.9, 4.11, 4.14, 4.16, 4.23, 4.18, 4.17, 4.5	
För 4	Combinatorics: Multinomial Expansion, Pigeon Hole Principle, The Principle of Inclusion and Exclusion	5.7-5.13
Le 4	5.15, 5.21, 5.22, 5.23, 5.39, 5.44, 5.40, 5.41, 5.47, 5.55, 5.57, 5.56	
För 5	Combinatorics and Recursion: Derangement and Catalan Numbers, Modeling with Recursion.	Hand out material and Ch5
Le 5	Hand out material: Pages 357-358: 5, 7, 9, 13, 15, and pages 510-512: 7, 17, 11, 21	
För 6	Recursion: Linear Recursion	4.4 and Hand out material
Le 6	Pages 524-527 hand out material : 3c,d,e, 14, 19, 21, 27a,b, c,g, 29, 28, 31, 40	
För 7	Relations: Equivalence Relations and Partitions	7.1-7.4
För 8	Relations: Posets	12.1-12.4
Le 7	7.4, 7.5, 7.7, 7.10, 7.21, 7.24, 7.16, 12.2, 12.4, 12.6, 12.13, 12.15	
För 9	Number Theory: Divisibility	6.1-6.6
Le 8	6.3, 6.6, 6.7, 6.9, 6.20, 6.26, 6.31, 6.32, 6.37, 6.36	
För 10	Number Theory: Diophantine Equations and Congruences	6.7 & 8.1-8.2
Le 9	6.15, 6.18, 6.19, 6.33, 6.34, 8.3, 8.4, 8.5, 8.14, 8.15	
För 11	Number Theory: Applications and Chinese Remaining Theorem	8.3-8.5
Le 10	8.6, 8.8, 8.9, 8.10, 8.18, 8.23, 8.25, 8.26, 8.22 and the list on the webpage	
För 12	Graphs: Basic Concepts	9.1-9.4
Le 11	9.2, 9.3-5b), 9.7, 9.9, 9.11, 9.12, 9.17, 9.28, 9.31, 9.32	
För 13	Graph Theory: Trees with Applications	10.1-10.5
Le 12	10.1, 10.2, 10.3, 10.5, 10.11, 10.20, 10.21, 10.24	
För 14	Graph Theory: Planar and Bipartite Graphs, Colorings	11.1-11.3, 9.5-9.6 & 11.4
Le 13	11.2, 11.6, 11.15, 11.16, 11.3, 9.18, 9.34, 11.10, 11.11, 11.12	
För 15	Repetition	

Programme for Spring 2020. Proposed Exercises in English. Grimaldi's book

För 1	Principles of Counting (Recalling high school maths)	1.1-1.4.
Le 1	**1.2**.: 3, 5, 11, 13, 19; **1.3**: 7, 11, 13; **1.4**.: 1, 3, 5a), 7a,b,c) 17	
För 2	Sets, Principle for Inclusion and Inclusion	3.1–3.3
Le 2	**3.1**.: 3, 15, 13; **3.2**.: 4, 17; **3.3**.: 1, 3, 9, 4 **suplem. exer.**: 17; **5.1**.: 11	
För 3	Principle of Induction. Recursion	4.1-4.2 and Hand out material
Le 3	**4.1**.: 1, 11, 13a,b), 19a); **4.2**.: 13; **suplem. exer.**: 1, 6, 7a), 27, 26	
För 4	Combinatorics: Multinomial Expansion, Pigeon Hole Principle, The Principle of Inclusion and Exclusion	1.3, 5.5, 8.1-8.3
Le 4	**1.3**.: 25d), 27d; **1.4**.: 7e,f; **sup. ex. ch 1**: 21; **5.5**.: 3, 7a), 9a), 11; **8.1**.: 1, 5, 9; **8.3**.: 1, 11a), 7	
För 5	Combinatorics and Recursion: Derangement and Catalan Numbers, Modeling with Recursion.	Hand out material & 1.6, 8.3
Le 5	Hand out material: Pages 357-358: 5, 7, 9, 13, 15, and pages 510-512: 7, 17, 11, 21	
För 6	Recursion: Linear Recursion	Hand out material & 10.1-10.3
Le 6	Pages 524-527 hand out material : 3c,d,e, 14, 19, 21, 27a,b, c,g, 29, 28, 31, 40	
För 7	Relations: Equivalence Relations and Partitions	5.1, 7.1, 7.4
För 8	Relations: Posets	7.3
Le 7	**5.1**.: 12; **7.1**: 1, 11, 5; **7.4**.: 7, 13, 11a); **7.3**.: 17, 19, 27a,c,e), 25	
För 9	Number Theory: Divisibility	4.3-4.5
Le 8	**4.3**.: 3, 9, 19, 29; **4.4**: 1c), 13, 19; **4.5**.: 11, 27; **suplem. exer. ch 4**.: 7b), 15, 17	
För 10	Number Theory: Diophantine Equations and Congruences	4.4 & 14.3
Le 9	**4.4**.: 15, 14; **suplem. exer. ch 4**: 16; **14.3**.: 5, 9, 14-15, 13, 16	
För 11	Number Theory: Applications and Chinese Remaining Theorem	8.3-8.5 in kompendium
Le 10	See the list of exercises on the web page	
För 12	Graphs: Basic Concepts	11.1-11.3 & 11.5
Le 11	**11.1**.: 7a, b, c, d, e, f); **11.2**: 9; **11.3**.: 1, 3, 21, 17, 19; **11.5**: 3; **suplem exer ch 11**: 15a), 5a)	
För 13	Graph Theory: Trees with Applications	12.1-12.4 & 13.2
Le 12	**12.1**.: 3, 7, 13; **12.4**.: 1, 3 (only first digit); **suplem. exer. ch 12**: 12, 5, 11; **13.2**.: 1, 4-5a)	
För 14	Graph Theory: Planar and Bipartite Graphs, Colorings	11.4 & 11.6
Le 13	**11.4**.: 3, 7, 5, 13, 19, 21; **11.6**: 1, 9, 15a, b, c), 5	
För 15	Repetition	