This worksheet explains what we are going to cover this week, and is meant to help you plan how to work with the material.

**Schedule:** The first week of the course is devoted to a "crash course" in mathematical proofs contained in Chapter 1 of the lecture notes.

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<th>Time</th>
<th>Monday 31/8</th>
<th>Tuesday 1/9</th>
<th>Wednesday 2/9</th>
<th>Thursday 3/9</th>
<th>Friday 4/9</th>
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<td>08:15-10:00</td>
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<td>10:15-12:00</td>
<td>Lecture 1</td>
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<td>12:00-13:00</td>
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<td>15:15-17:00</td>
<td>Problem session 1</td>
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<td>Problem session 3</td>
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**Practical information:** Both lectures and problem sessions will be held in Hörmansdorsalen, and will be streamed online for those not able to come to campus. Recordings of the lectures will be made available on the Canvas site of the course. The problem sessions will not be recorded (since students will present problems there).

As we have a limit on the number of students allowed in the lecture hall, we will use a rotating schedule to decide who can come to lectures and problem seminars. Everyone else should follow these activities online. The schedule will be announced on a weekly basis since the recommendations from the authorities may change at short notice. The rotating schedule for week 1 is:

- **Monday:** Mentor groups 1, 2, 3, 4.
- **Tuesday:** Mentor groups 5, 6, 7, 8.
- **Wednesday:** Mentor groups 9, 10, 11, 12.
- **Thursday:** Mentor groups 13, 14, 15, 16.
- **Friday:** Mentor groups 1, 2, 3, 4.

(You sign up to mentor groups on the course Canvas website.)

**Obligatory activities this week:**

- **Mentor meeting.** On the day that you are allowed on campus, you will meet the mentor of your group. The first meeting should be in person for the "campus groups". The format and time for subsequent meetings are up to each group.

- **Group-wise presentation of problems in problem seminar.** Further below, each group is assigned a problem to be presented in the problem seminar. Please make sure you familiarise yourself with the problem ahead of the lecture. You will meet with your mentors ahead of your presentation.
How and what to prepare: Below, we indicate what pages to read, films to watch, and problems to solve and present this week. For some of the problems to be presented, we have indicated "warm up" exercises and examples that may be helpful to consider. Problems in boldface are considered important (in addition to those chosen for presentation), while problems in parentheses should be considered optional. The YouTube films are in "post production" and will be made available as soon as possible.

Please note that you are not expect to solve every problem in the list below. While reading the text before the lecture, try to see if you can solve the problem immediately (some problems are just asking you to check some detail from an example), if you feel confident you can solve the problem following doing a little bit of work, or if you have no idea of how to attack it. Plan and spend your time accordingly – you should try to balance working on easy, moderate and difficult problems. Any questions that you have can be discussed with fellow students or mentors, on the Piazza discussion forum, in the Q&A sessions, in the problem seminars or in the lectures.

Finally, note that this worksheet will be updated whenever new films are made available.

Monday 31/8:

- Pages to read before lecture: 57 – 66.
- Films available on YouTube:
  - Proof by chain of equalities I (example 1.4), 3:01 min.
  - Proof by chain of equalities II (examples 1.7, 1.9), 2:56 min.
  - Proof by chain of equalities III (example 1.10), 4:28 min.
- Problems to work on: 1.2, 1.6a, 1.8, 1.11a, 1.13-14, 1.17, 1.18c, 1.19, 1.21, 1.23, 1.25d.
- Problems to present: (Each group should spend 5-10 minutes in total.)
  - Mentor group 1: 1.6bc (warm up: 1.4, 1.6a)
  - Mentor group 2: 1.11bc (warm up: 1.10, 1.11)
  - Mentor group 3: 1.18ab (warm up: 1.16, 1.18c)
  - Mentor group 4: 1.25abc (warm up: 1.22, 1.23)

Tuesday 1/9:

- Pages to read before lecture: 67 – 73.
- Films available on YouTube:
  - A proof by cases (example 1.39), 3:30 min.
  - Equations and proofs by chains of equivalences (examples 1.43, 1.45), 6:24 min.
- Problems to work on: 1.27-28, 1.36, 1.38, 1.40, 1.46, 1.47.
- Problems to present: (Each group should spend 5-10 minutes in total.)
  - Mentor group 5: 1.34.
  - Mentor group 6: 1.41.
  - Mentor group 7: 1.44 (warm up: 1.43)
  - Mentor group 8: 1.49.
Wednesday 2/9:

- Pages to read before lecture: 74 – 82.
- Films available on YouTube:
  - A proof by contradiction (example 1.60), 2:44 min.
  - A proof by contraposition (example 1.67), 3:15 min.
  - Inequalities and proofs by cases (example 1.72), 5:57 min.
- Problems to work on: 1.52, 1.53, 1.55, 1.56c, 1.57, 1.59, 1.61, 1.63-64, 1.68, 1.70, 1.71, 1.73ab, 1.75, 1.76-78.
- Problems to present: (Each group should spend 5-10 minutes in total.)
  - Mentor group 9: 1.56ab.
  - Mentor group 10: 1.62.
  - Mentor group 11: 1.65.
  - Mentor group 12: 1.73c (warm up: 1.72).

Thursday 3/9:

- Pages to read before lecture: 83 – 89.
- Films available on YouTube:
  - A proof by induction (example 1.82), 5:40.
- Problems to work on: (1.79), 1.80-81, 1.86, 1.89, 1.91, 1.92, 1.94, 1.95, (1.96).
- Problems to present: (Each group should spend 10-15 minutes in total.)
  - Mentor group 13: 1.83.
  - Mentor group 14: 1.84.
  - Mentor group 15: 1.85.
  - Mentor group 16: 1.90.

Friday 4/9:

- Pages to read before lecture: 90 – 96.
- Films available on YouTube:
  - The completeness axiom and a proof by contradiction (definition 1.97, example 1.98, part 4 of rulebook, and example 1.103), 6:56 min.
  - A proof using the completeness axiom (example 1.100), 4:47 min.
- Problems to work on: 1.99, 1.104-105, 1.107, (1.112), 1.113-114, (1.116).
- Problems to present: (Each group should spend 5-10 minutes in total.)
  - Mentor group 101: 1.101 (warm up: 1.100).
  - Mentor group 102: 1.102.
  - Mentor group 103: 1.106.
  - Mentor group 104: 1.108.