CS-E5740 Complex Networks Course Practicalities

Course in brief:

- 9 lectures
- 8 ex. sheets with programming and pen-and-paper problems
- 1 project
- No exam
- Grading based on exercises and project
- Weekly exercise sessions to support your learning
- In Autumn 2021, **organized fully online**
- Lecturers: Prof. Jari Saramäki and prof. Mikko Kivelä
- Assistants: Onerva Korhonen, Arash Badie Modiri, Sara Heydari, Takayuki Hiraoka, Zhiren Huang, Tarmo Nurmi, Silja Sormunen, Ana Triana, and Javier Ureña Carrion
- Contact: cs-e5740@aalto.fi

Weekly cycle:

- Lectures available at MyCourses on Wednesdays at 10:15 at latest. The first lecture (on 15.9.2021) will be a live Zoom session, while the rest of lectures will be uploaded as video recordings. You can find instructions for using Zoom in the end of this document.
- The lecturer will be around in Zoom for a Q&A session on Wednesdays at 10:15 (you can find the Zoom link at the Lectures tab in MyCourses). The Q&A ends when all questions are answered (or at latest at 12). So, come early to ensure an answer for your question.
- Introduction to the exercise problems by teaching assistants available every Wednesday at 12:15 (after the corresponding lecture), either as a recording or a live session. Links to the introduction sessions will be posted on MyCourses.
- Exercise sessions on Mondays at 14:15. For details of the exercise sessions, see below.
- Start working on each exercise set right after the corresponding lecture. You can get help for each exercise set in two sessions: in the one on the Monday after the corresponding lecture and in the one 1.5 weeks after the lecture, right before the deadline. On the other hand, in each exercise session, you can ask questions about two exercise sets: the one with deadline on the day of the session and the one with deadline one week after the session.

- Deadline for handing in exercises: 1.5 weeks after the corresponding lecture, on Monday at midnight.

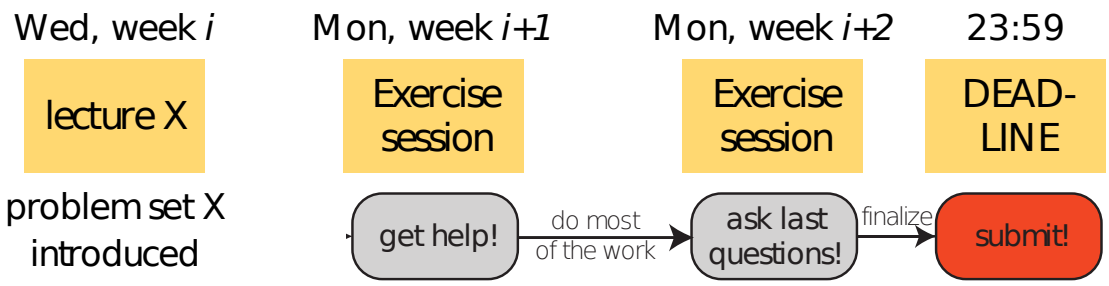


Figure 1: The pipeline for a single exercise set

Schedule

Round	Lecture (Wed)	Introduction to exercises (Wed)	Exercise sessions (Mon)	Deadline (Mon)
1	15.9.2021 (10:15)	15.9.2021 (12:15)	20.9. & 27.9.2021 (14:15)	27.9.2021 (23:59)
2	22.9.2021 (10:15)	22.9.2021 (12:15)	27.09. & 4.10.2021 (14:15)	4.10.2021 (23:59)
3	29.9.2021 (10:15)	29.9.2021 (12:15)	4.10. & 11.10.2021 (14:15)	11.10.2021 (23:59)
4	6.10.2021 (10:15)	6.10.2021 (12:15)	11.10. & 18.10.2021 (14:15)	18.10.2021 (23:59)
5	13.10.2021 (10:15)	13.10.2021 (12:15)	18.10. & 1.11.2021 (14:15)	1.11.2021 (23:59)
6	20.10.2021 (10:15)	20.10.2021 (12:15)	1.11. & 8.11.2021 (14:15)	8.11.2021 (23:59)
7	3.11.2021 (10:15)	3.11.2021 (12:15)	8.11. & 15.11.2021 (14:15)	15.11.2021 (23:59)
8	10.11.2021 (10:15)	10.11.2021 (12:15)	15.11. & 22.11.2021 (14:15)	22.11.2021 (23:59)
9/project	17.11.2021 (10:15)	17.11.2021 (12:15)	Last session: 13.12.2021 (14:15)	20.12.2021 (23:59)

Figure 2: Course schedule

Exercises:

- All exercise sets will be published in MyCourses at the beginning of the course.
- Exercise sets include both programming and pen-and-paper problems.
- In addition to the 8 exercise sheets, there is a course project which amounts to approximately 2.5 times the work of an individual exercise sheet.
- We provide code templates for each coding exercise. To fetch the templates, go to JupyterHub (https://jupyter.cs.aalto.fi/hub/spawn), log in with your Aalto account, and select the **CS-E5740 Complex Networks (2021)** course. Remember that using the templates is not mandatory.
- This is not a programming course. So, the templates contain quite a bit of ready-written code, in particular for visualizations. If you want to get extra programming practise or don't like the templates' style, feel free to write your own code from scratch.
- We use Python and NetworkX for the programming exercises. In addition, we also use binning of data for some exercises. If you are not familiar with these topics, check the self-studying material

available in MyCourses. This material contains 2 tutorials: Python and binning. The tutorials are also available in the JupyterHub course. There are also many online courses to get started with Python; one good one can be found at https://www.codecademy.com/tracks/python.

- The primary channels for getting help with the exercises are the Monday exercise sessions, the Zulip chat, and the MyCourses forum (for details see below).

Getting help with the exercises:

Exercise sessions

- Exercise sessions take place on Mondays at 14:15, first session being on 20.9.2021.
- Exercise sessions will be organized completely remotely. In these sessions, a teaching assistant is available to answer your questions similarly as in normal exercise sessions, but the sessions are organized fully online. Please notice that there will not be a single Zoom exercise meeting that everybody should join (as there is for lectures). Instead, we use Aalto Zulip and individual Zoom meetings to connect the teaching assistants and the students.
- The course Zulip workspace can be found at cs-e5740.zulip.cs.aalto.fi. When you log in for the first time from outside of the Aalto network, multifactor authentication (MFA, with an app or a confirmation SMS) is required; for details, see https://www.aalto.fi/en/services/aalto-multifactor-authentication-on-office-365-accounts (requires Aalto login). After that, you can log in with your Aalto username and password. If you log in from the Aalto network (from the campus or over VPN), MFA is not required. For general instructions for using Zulip, check https://scicomp.aalto.fi/aalto/zulip/.
- The workspace contains a separate stream for each exercise round, named as **#round-n** (e.g. #round-1 for the first exercise round).
- If you want to ask a question in writing, and especially if the question is something potentially interesting for others as well, you can just go to the stream of the round and write down your question. Please post every new question as a new topic.
- For having a one-on-one video consultation with a teaching assistant (similar to one you would get in a contact class), create a Zoom meeting and post a link to it to the stream **#remote-exercise-sessions** together with your help request. For further details about using Zoom, see (https://www.aalto.fi/en/services/zoom-video-tutorials; requires Aalto login) and the instructions in the end of this document.
- Please note that the Zoom consultations are only available during the normal exercise session schedule as detailed in the MyCourses pages of the course. Please also note that there might be some queuing time.
- If you no longer require help or have to leave because the queuing time is too long, please reply let the teaching assistants know by replying to your own request.
- **Please note that Zulip is available to anybody with an Aalto user account. So, do not post anything confidential there.** In particular, do not post long extracts of your solution code.

Getting help outside of the exercise sessions

- ***The primary channels of asking questions are through Zulip and the General Discussion forum in MyCourses***
  - Feel also free to help out other students, the course staff appreciates your efforts!
  - Do not paste any large portions of (solution) code to the forums.

- When required, it is also possible to contact the assistants via e-mail using the course e-mail address, cs-e5740@aalto.fi
- Note that we won't answer questions outside office hours.

Handing in exercises

- Collaboration is allowed (with proper acknowledgments), but each student should return their own solutions.
- All exercises should be returned in electronic form in MyCourses (Assignments page).
- Additionally, you should submit your reports to the plagiarism checker Turnitin in MyCourses. Reports submitted to Turnitin are saved to a Aalto-level repository in order to use them as reference material for plagiarism checks in future. If you have questions about the Turnitin originality report of your work or its interpretation or if you want to have your report removed from the repository after the course, contact the course staff. For more information on Turnitin and prevention of plagiarism, see https://wiki.aalto.fi/display/turnitin/Home (requires Aalto login).
- Note that sharing your solutions with anyone else, even after the course is finished, risks you being investigated for plagiarism. So, do not post your solutions to the course forums or anywhere else online or share them privately with anybody. All cases of suspected plagiarism are reported to the official investigator of School of Science.
- For each exercise, you should return a report as one **.pdf** file (NOT as .doc or .docx etc.).
  - For those using (pdf)latex, a simple template to get started with is available on MyCourses (Assignments tab).
  - For problems involving equations or symbols, both typed and scanned pen-and-paper solution are allowed. Make sure that your scanned solutions are easy to read.
  - For problems involving longer verbal answers (describing and explaining results etc.), please submit a typed solution since Turnitin is not able to read scanned solutions.
  - For concatenating scanned and typed solutions, on Linux machines, you may use the command line tool pdfunite:

    ```
    pdfunite in1.pdf in2.pdf output.pdf
    ```

    or alternatively with pdftk (https://www.pdflabs.com/docs/pdftk-cli-examples/):

    ```
    pdftk in1.pdf in2.pdf cat output out1.pdf
    ```
- For the coding exercises, you should return the accompanying code as one **.zip** file per exercise round.
- **When reporting results, remember the following:**
  - Always **mark your name and student number** to the pdf file.
  - Always properly cite your sources. You do not want to become accused of plagiarism.
  - If there are sections a), b), and c) in the exercise sheet, there should be corresponding sections in your report as well.
  - Whenever solving the problem requires programming, this is clearly mentioned in the problem statement. Otherwise, no programming is required.
  - **Your pdf report should be able to stand alone**. Especially, remember to **include all visualizations** needed to report your results. We'll **deduct 50% of points** from each problem where the results are not properly reported (e.g. plots or numerical values missing).

- Always **label your axes**. We will **deduct up to 1pt** for each plot that does not have properly labeled axes. Explaining the figure labels in the captions is not enough.
- Do not provide listings or tables of e.g. node centrality values if they are not explicitely asked for.
- Do not include any pieces of code in your report.

Late submissions and deadline extensions:

Late submissions

- If you return your submissions late we will automatically deduct 10% of the points (rounded to the closest integer).
- If you submit your report more than one day after the deadline, we deduct 20% of your that round's points.
- Submissions that arrive more than two days late (i.e. later than on 23:59 on Wednesdays) will not be accepted.

Deadline extensions:

- We will not grant deadline extensions without strong reasons. It is up to you to keep up with your schedules.
- If you nevertheless happen e.g. to be extremely ill please contact the teaching assistants well ahead of time. Extensions are granted on a casewise basis.

Student feedback

To continuously improve the course, we will collect feedback for each exercise set and the project; you can find the feedback forms in MyCourses at the Assignments tab. To motivate you for giving feedback, we reward you with 1 bonus point for each feedback given. We will provide (anonymous) summaries on the feedback you give after each round, so please keep this in mind when giving feedback! In case you want to give feedback anonymously, please use the form available at the top of the Assignments tab in MyCourses.

Grading:

- The grade of the course is based on completing the exercises and the project.
- To pass the course, you must gain at least 99 exercise points in total and 25 points from the project in particular.
- The final grade is determined by the sum of the exercise and project points. For total number of points for each exercise sheet, see the table below (feedback points for each round are shown in brackets).

Unit	**Points**
Ex. Set 1	17 (+ 1)
Ex. Set 2	13 (+ 1)
Ex. Set 3	14 (+ 1)
Ex. Set 4	14 (+ 1)

... continued on next page

Unit	Points
Ex. Set 5	16 (+ 1)
Ex. Set 6	16 (+ 1)
Ex. Set 7	18 (+ 1)
Ex. Set 8	17 (+ 1)
Project	52 (+ 1)
Total	177 (+ 9) = 186

- For preliminary grade limits, see the table below. During the course, these limits may be adjusted downwards (i.e. the limit for a grade may be lower, but not higher, than given in the table).

Grade	Points required
5	167
4	157
3	138
2	119
1	99

  By getting e.g. in total 157 pts (including the points from feedbacks), the student is *guaranteed* to get grade 4 given that they got enough points from the project.

- The assistants' comments and corrections are sent to the students via MyCourses.
- Grades will be published in late January. If you need the grade earlier, contact the course staff before the deadline of the final project and explain why you need to get the grade earlier. Please note that earlier grading is available only for good reasons (for example, for finalizing study exchange paperwork at the end of the term).

Required Sofware

- In the course we use Python 3.8.6 for performing data analysis. Especially, we will use the following Python packages: numpy, scipy, matplotlib and networkx. The Jyputer templates work with versions numpy 1.19.5, scipy 1.5.3, networkx 2.5, and matplotlib 3.3.3.
- All necessary software is available at JupyterHub and at Aalto IT's Linux workstations. If you want to use your own laptop instead, you need to install the above (cross-platform) Python software yourself. Since the course assistants can give only a limited amount of help on installing the software to student's own machines, we recommend working in the Aalto environment.
- If you decide to install the packages on your laptop, you may find the following instructions useful (however, there are many ways to install the packages, and these are just some guidelines).

  Windows users:

  - We recommend installing Anaconda distribution https://www.anaconda.com/download/
  - Use Python 3.8
  - numpy, scipy, matplotlib are included by default.
  - You can install networkx using Canopy's built-in package manager.

  Linux users:

- Use the system package manager for installing the required software (numpy, scipy, matplotlib, networkx) and their dependencies

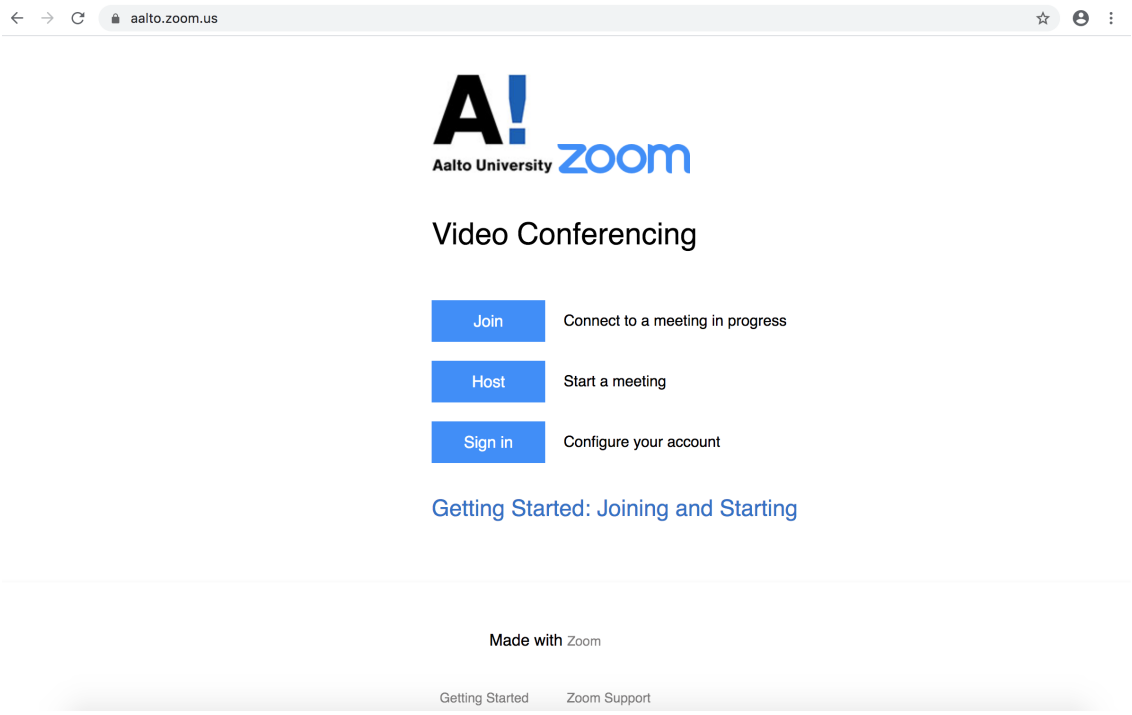
Yet another way:

1. Install Python **3.8** from https://www.python.org/download/
2. Install the SciPy stack (numpy, scipy, and matplotlib). See e.g. http://www.scipy.org/install.html
3. Install networkx according to http://networkx.github.io/documentation/latest/install.html

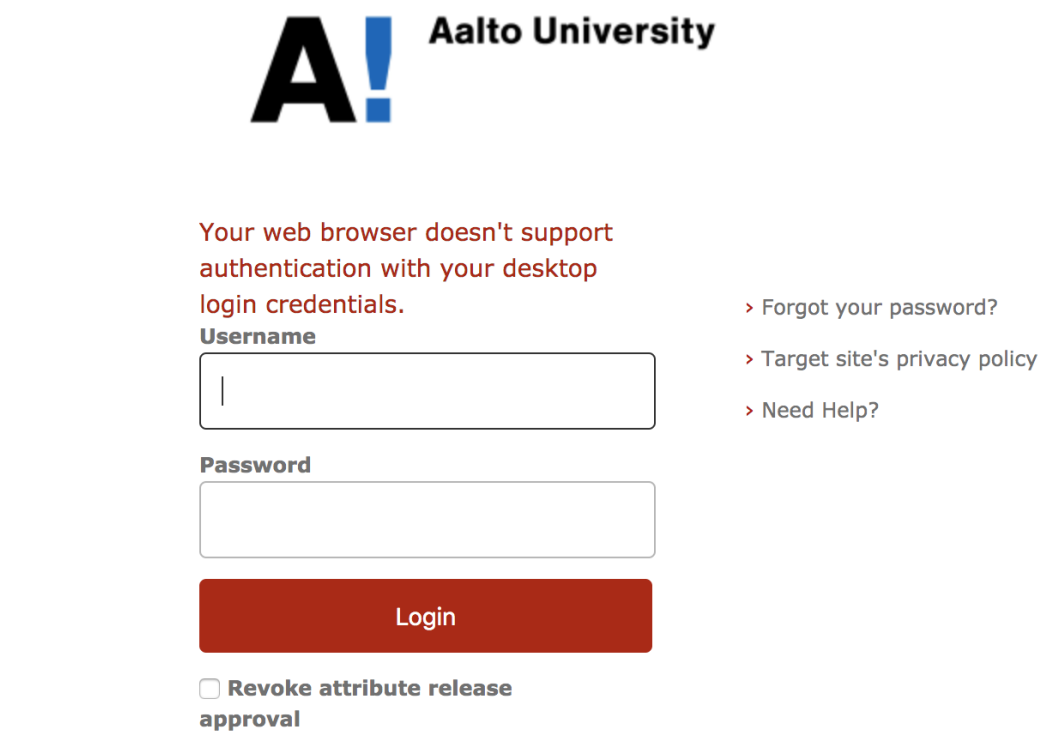
   - Instructions on the `Source archive file` should be the ones that work best.
   - For windows users, this may be useful piece of information: http://stackoverflow.com/questions/12324601/how-to-install-a-python-module-via-its-setup-py-in-windows

Setting up Zoom

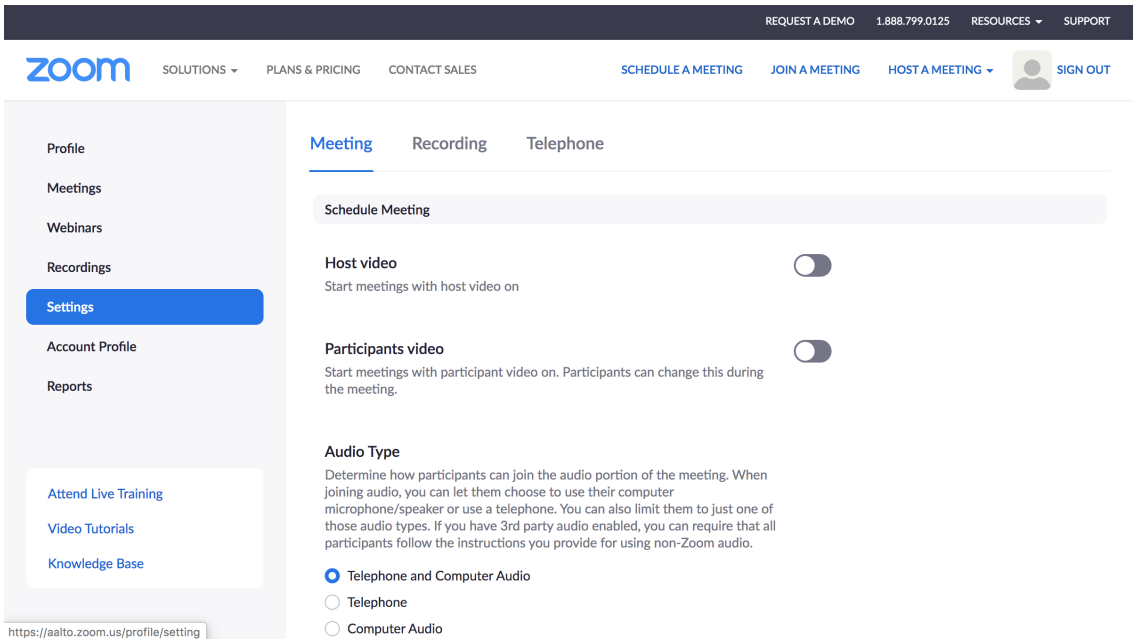
- We use Zoom (https://aalto.zoom.us/) for lectures and to organise video chats with the teaching assistants in order for you to get help remotely. For setting up and using Zoom in the context of this course, please follow the instructions below or check the Aalto Quick Guide (https://www.aalto.fi/en/services/zoom-quick-guide) for setting up and using Zoom (requires Aalto login).
- To start using Zoom, go to the website https://aalto.zoom.us/. To start the setup, press the "Sign in" button in the website:



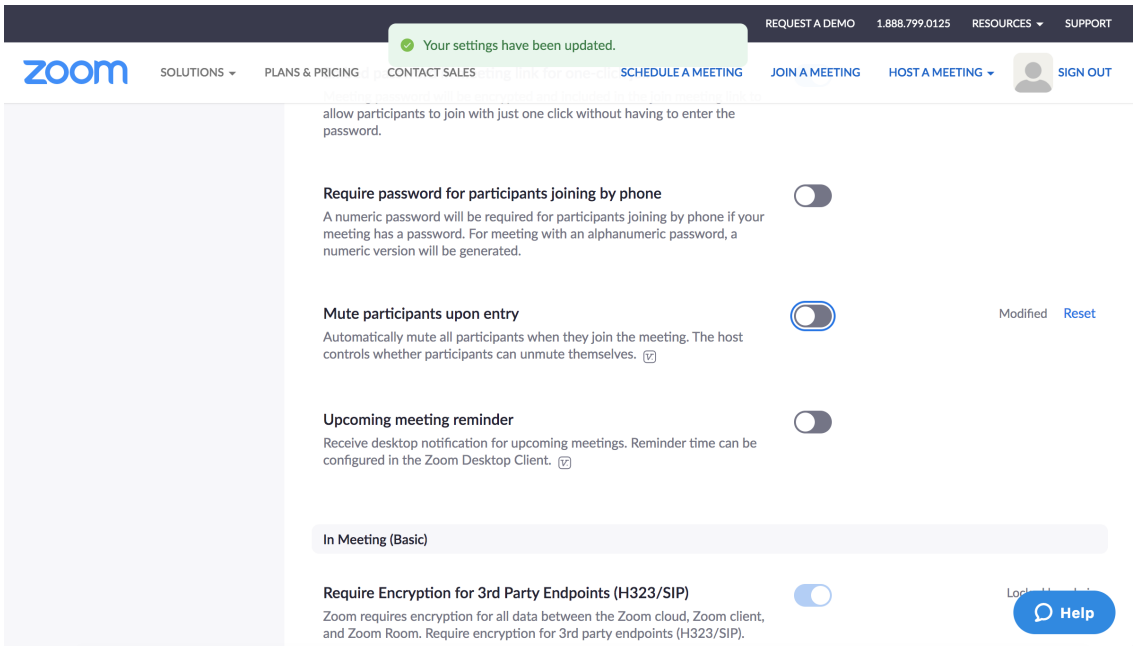
- After this, you might be prompted for you Aalto username and password. Fill them in to continue:



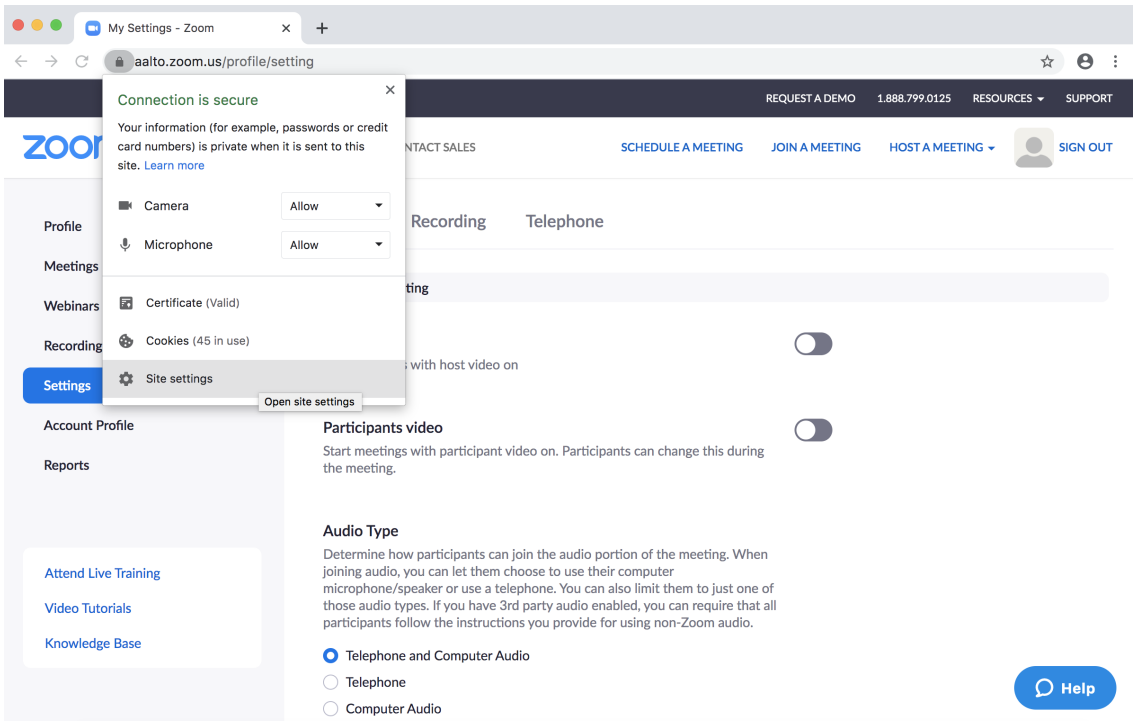
- Next we want to change the settings such that the teaching assistants joining your meeting are not muted by default, and you can hear them speak as they come in. To do this, select the "Settings" tab from the menu on the left:



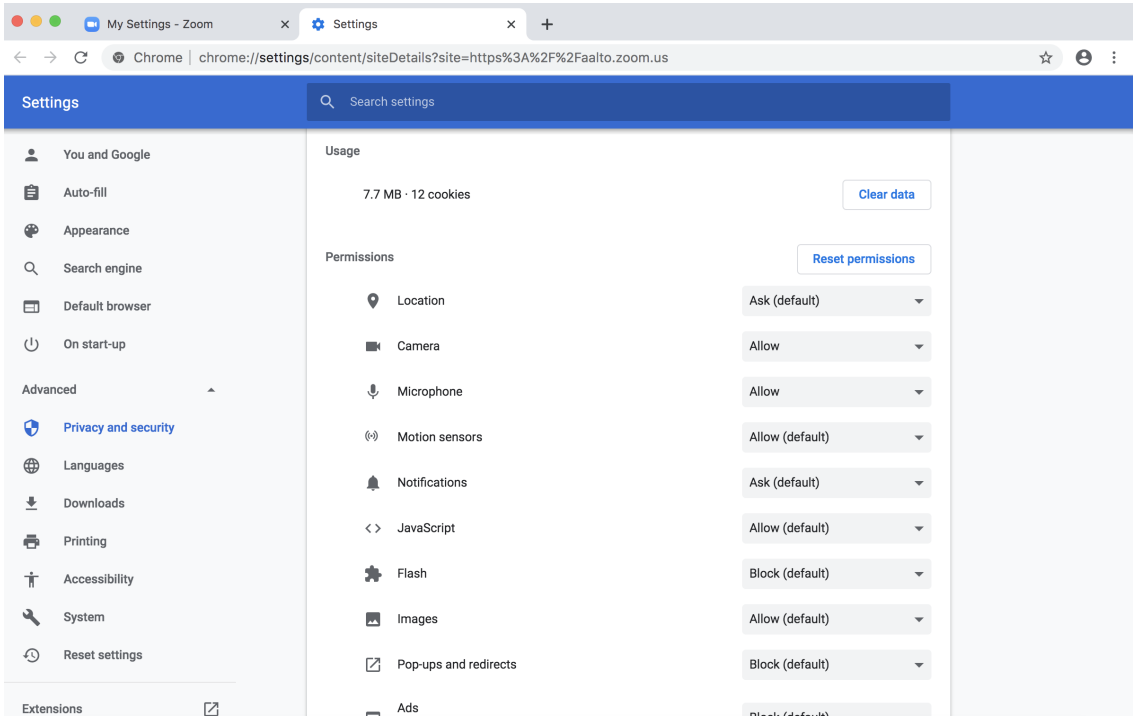
- Scroll down to the option "Mute participants upon entry", and make sure it is unselected:



- Finally, if you are not installing the Zoom client, but are using your browser to do the video calls, you should adjust the settings of your browser in a way that aalto.zoom.us has the permission to use your microphone and camera. Please use Google Chrome if you want to use the web client. In order to give to set the proper permissions, click on the small lock symbol next to the URL, and select "Site settings":



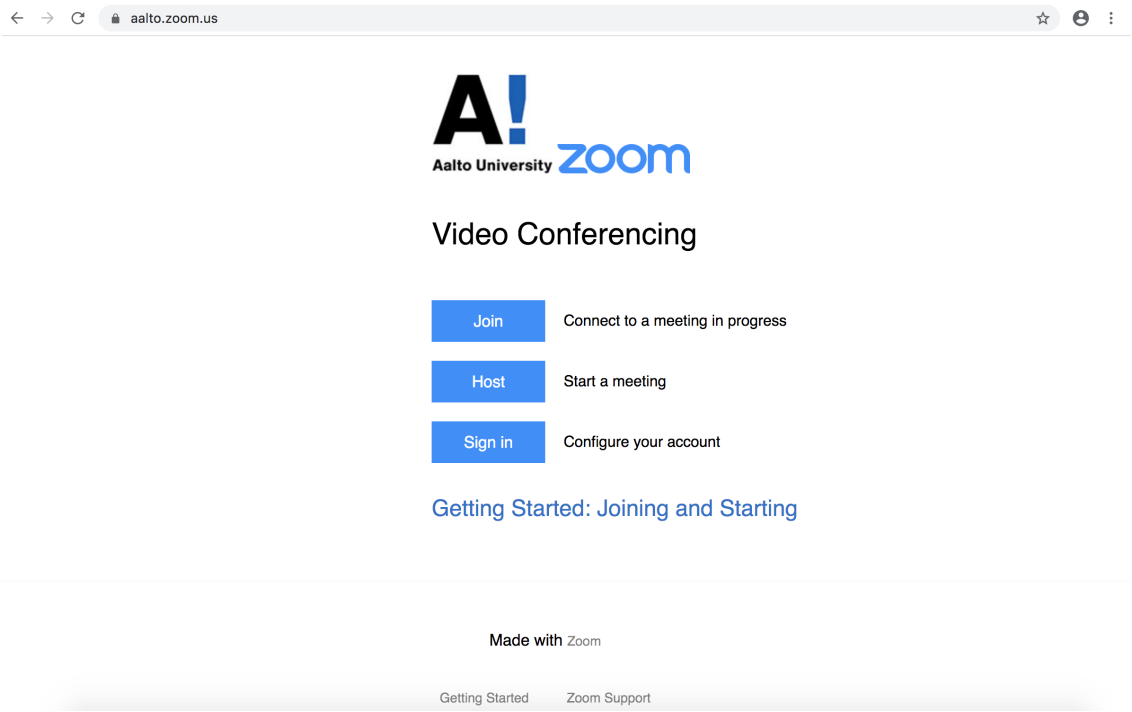
- In the site settings page, set the "Camera", "Microphone", and "Sound" to "Allow" by using the scroll down menus:



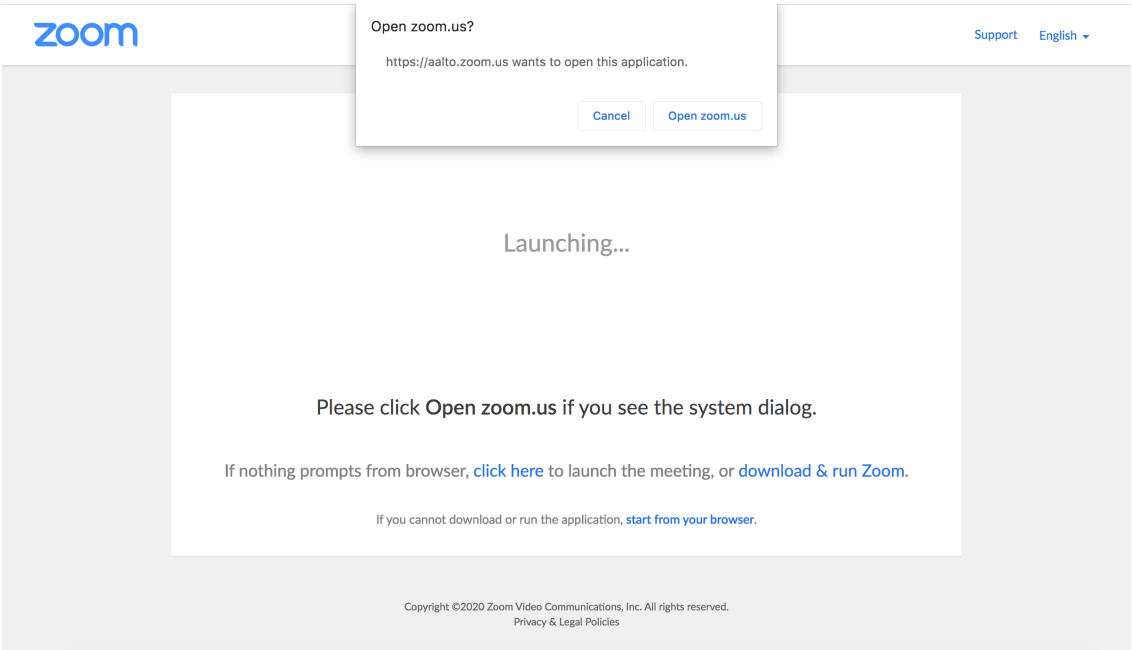
- You are now ready to use the Zoom web client. You can of course also install the stand-alone client and use that for your calls.

Setting up a Zoom meeting

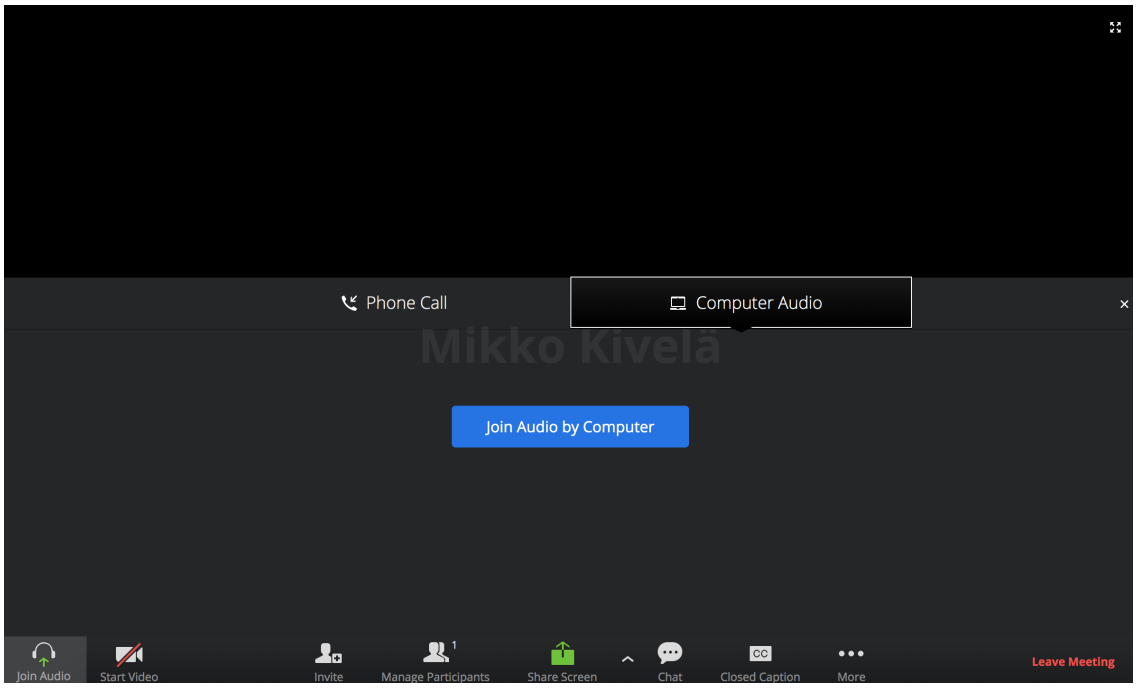
- Once you have set up your Zoom client (either web or the stand alone one), you can host a new meeting by going to https://aalto.zoom.us/ and pressing the "Host" button:



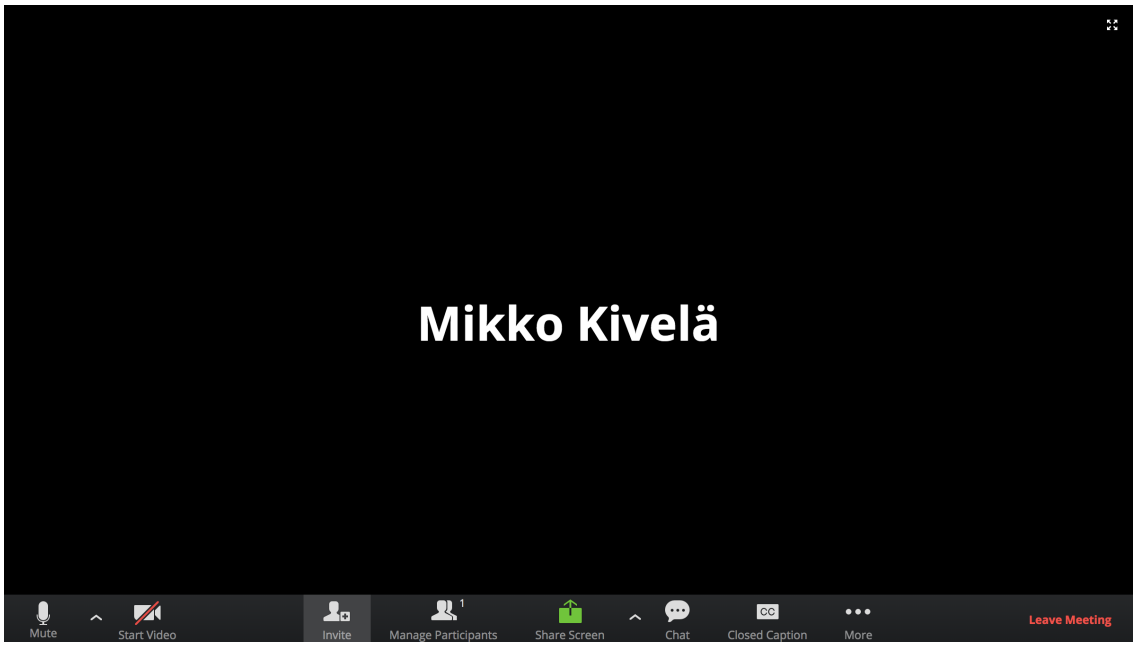
- If you have installed (or want to install) the stand alone client you choose the option to open the zoom.us application. If you want to use the web client with Chrome, press the "start from your browser" link at the bottom of the page:



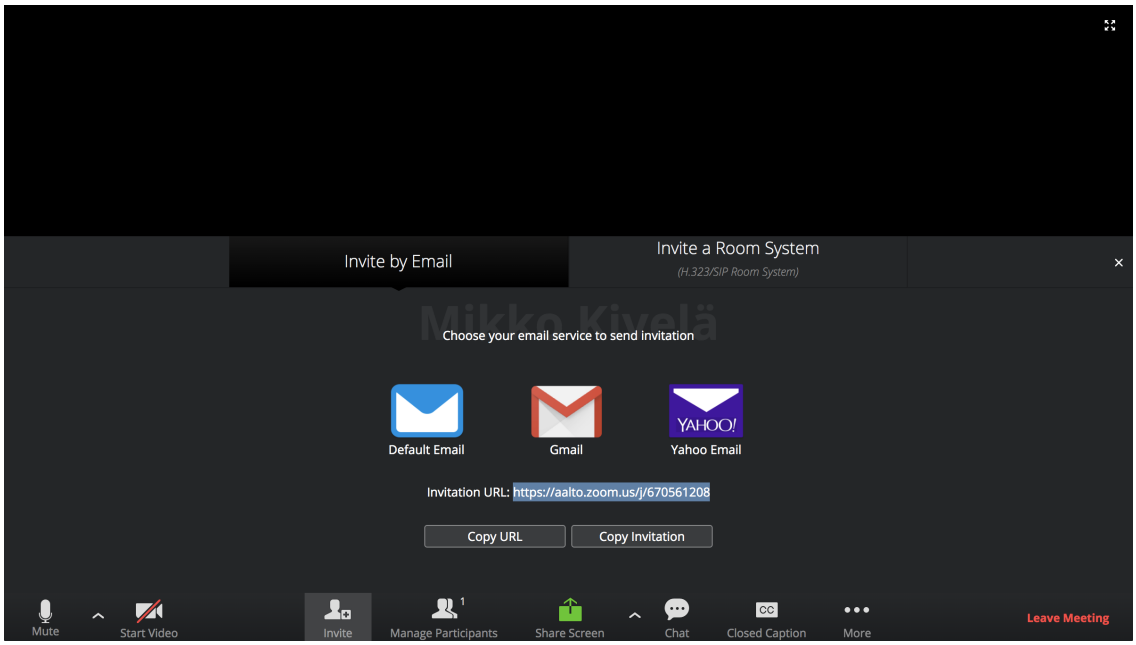
- After this the meeting opens. Select "Join Audio by Computer":



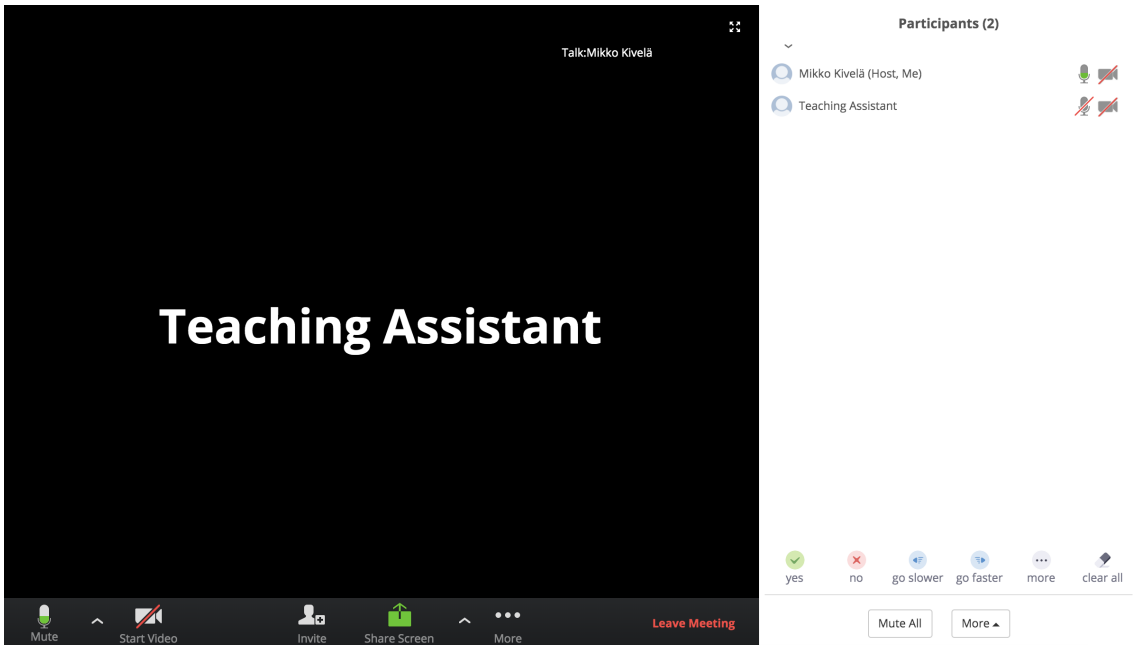
- You now have a meeting open. Check that your microphone is working: the microphone icon on the lower left corner of the screen should fill up with green color when you speak (depending on your computer setting, this may not happen in the stand alone client, although the microphone is active). You can also test the screen sharing or camera by selecting them from the menu bar on the bottom of the screen:



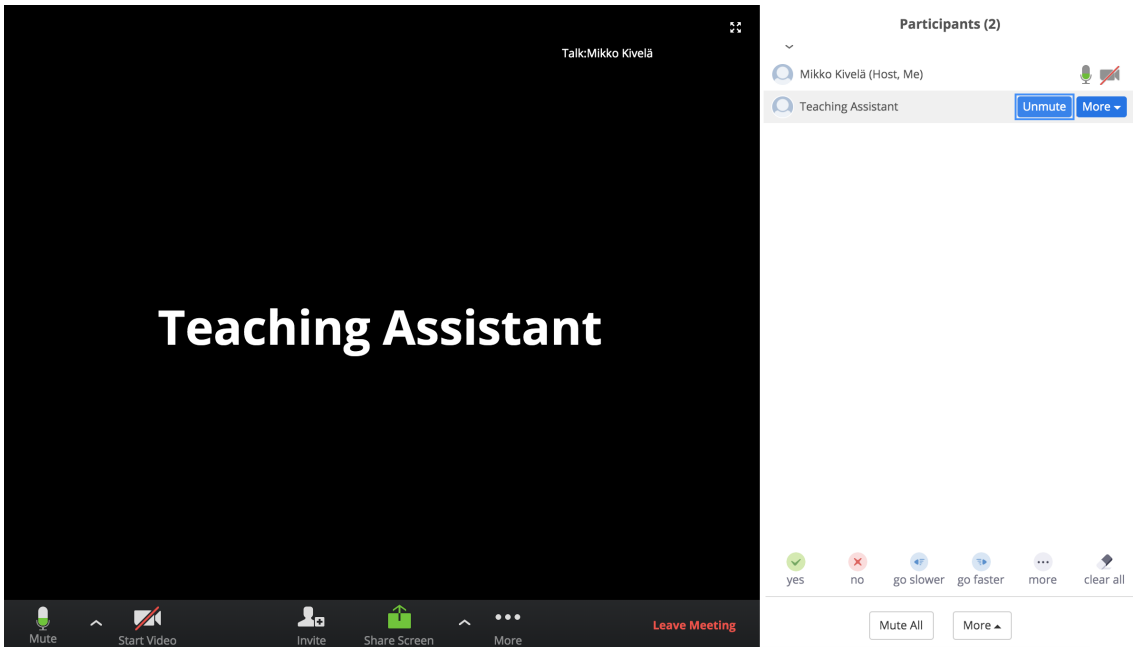
- You can now share a link which the teaching assistants can use to join your meeting. Press the "Invite" button, and copy the link and paste it to Zulip:



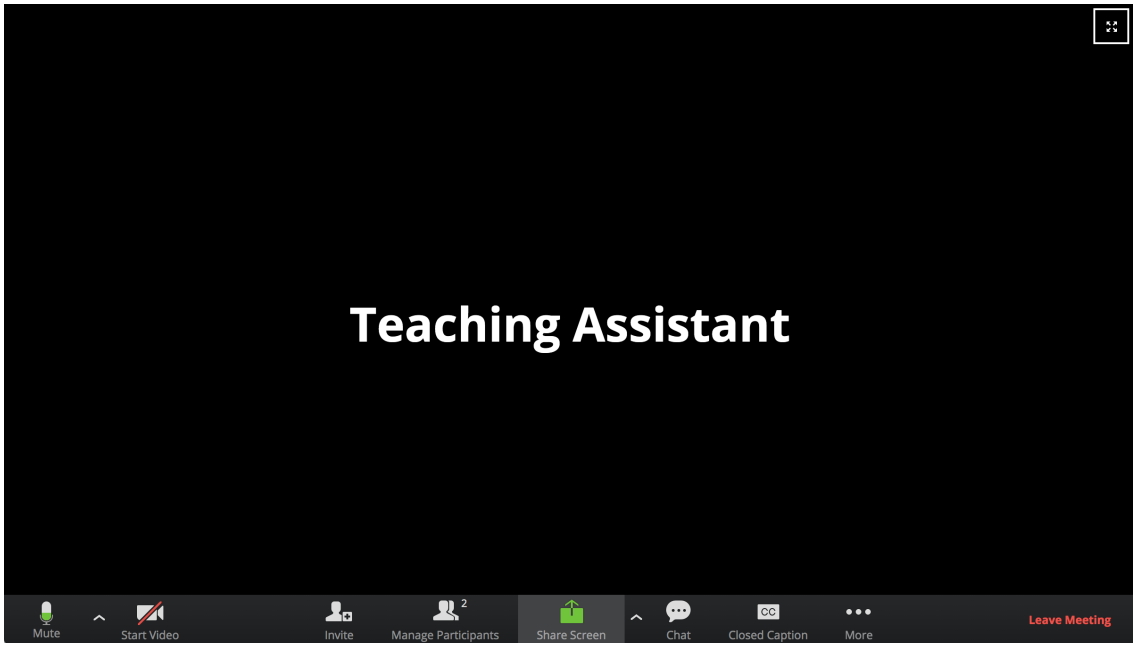
- Wait for the teaching assistant to join the meeting. The assistant should be unmuted by default if you followed the instructions for setting up Zoom above. If they are muted, you can go to "Manage Participants" menu:



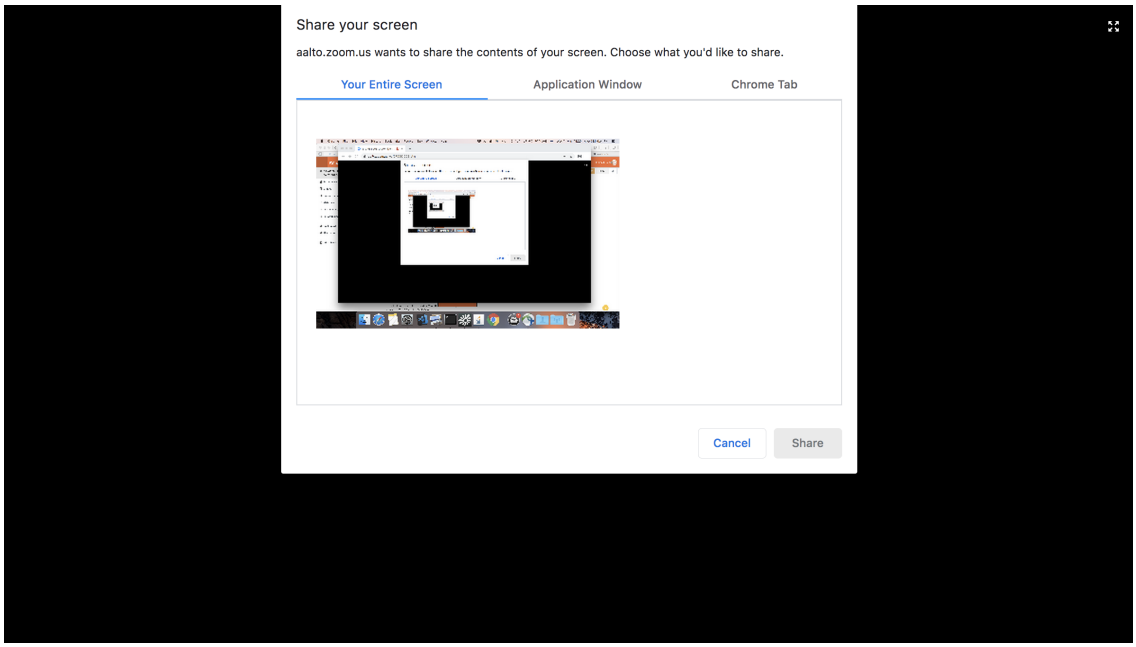
- In this case, choose to unmute the teaching assistant:



- During the consultation it might be good to share your screen to show some code or other things to the teaching assistant. Press "Share Screen" (or just "Share" in the standalone client):



- Select the entire screen and press "Share":



- Your screen is now shared with the teaching assistant: