



Teaching Science at University

5 September 2022 to 16 January 2023



In this course, Kai and I share ideas and tools from our experience as teachers and from science education research. You will think critically about the teaching you experienced at university and learn about teaching strategies to adopt/adapt the good practices and change the bad ones. It is our hope that this course will make you feel like a skilled and effective teacher who sees teaching as fun and fulfilling.

Learning objectives

After taking this course, you will be able to:

1. choose effective and suitable evidence-based teaching strategies in different teaching situations
2. determine and use your students' pre-existing knowledge in the design and delivery of your teaching
3. create and use models and analogies to structure your teaching and clarify complex topics
4. frame your teaching such that it activates and motivates students
5. teach in the lab or field using a range of student inquiry and in a way that better reflects the nature of science research

Course leaders

Prof. Dr. Kai Niebert, Institute of Education, Professor of Science and Sustainability Education, kai.niebert@ife.uzh.ch

Sara Petchey, Institute of Education, PhD student, sara.petchey@uzh.ch

Course dates

- Monday, September 5th, 2022 from 9.00 to 12.00 – in-person class = introductions: to the course, to key teaching tools, to each other
- 5-week online course dates: Sept. 5th to Oct. 17th at 23.59 (all online work due by then).
- Monday, January 16th, 2023 from 9.00 to 12.00 – in-person class = reflection presentations and next steps in your teaching developments

Requirements to earn 2 ECTS

- Full participation in both in-person course dates
- Completion of the 5 week online course
- Completion and presentation of a reflection task at the January 16th course date:

Purpose of the task: to reflect on what did and did not work in your teaching this semester (or in the past) and how your ideas of “good university teaching” may have changed

Possible formats: a handout (just 1 or 2 pages, with copies for each participant) or 1 to 2 PowerPoint slides (but as PDFs)

Due date: Saturday, January 14th, 2023 - please send your slide PDFs to me so I can assemble them into a single presentation

Reflection task options:

- Share a teaching strategy or tool you found to help with one of your weaknesses.
- Report on a new teaching strategies you tried out in your teaching, how it was received by students, and how you would recommend its use by your colleagues.
- Make and watch a video of your teaching. Share self-reflection of this process.
- Schedule a date for Sara or Kai to observe your teaching. Share self-reflections of this process.
- Develop a philosophy of teaching. Share highlights.
- or....(turn to the back side)

Collect feedback from students. Share self-reflection of their feedback. (Below is sample text from Wheeler et al. 2017 you could adapt and use.)

Please indicate how much you agree or disagree with the following statements (1=strongly disagree to 5=strongly agree)

- a. My TA this semester was supportive during lab*
- b. My TA interacted with students consistently throughout lab*
- c. I wish my TA had given us more direct answers*
- d. My TA asked a lot of thoughtful questions*
- e. My felt my TA was an effective instructor*
- f. I feel like I learned a lot of chemistry content in the lab*
- g. I feel like I learned about how to write scientifically*

Wheeler, L.B., et al. (2017) Do teaching assistants matter? Investigating relationships between teaching assistants and student outcomes in undergraduate science laboratory classes. *Journal of Research in Science Teaching* 54(4): p463-492.

Other papers you might like to take a look at:

Feldon, D.F., et al. (2011). Graduate students' teaching experiences improve their methodological research skills. *Science* 333, p. 1037-38

Freeman, S., et al. (2014) Active learning increases student performance in science, engineering, and mathematics. *PNAS* 111(23), p. 8410-8415.

Smith, M.K., et al. (2009). Why peer discussion improves student performance on in-class concept questions. *Science* 323, p.122-124.

Wieman, C.E. (2014). Large-scale comparison of science teaching methods sends clear message. *PNAS* 111(23), p. 8319-20.