

Teaching Sabbatical at the College of Chemistry UC Berkeley Fall 2017

Nina Kann

Dept. of Chemistry and Chemical Engineering, Chalmers



Berkeley
UNIVERSITY OF CALIFORNIA



The College of Chemistry at UC Berkeley

The University of California is a public university with campuses in 10 different locations, including UCSF (San Francisco), UCSC (Santa Cruz), UCLA (Los Angeles), UC Davis (close to UC Berkeley) and UCSD (San Diego). The UC Berkeley campus located in the East Bay, approximately 30 min by public transport from central San Francisco using the BART train (Bay Area Rapid Transit). The university has around 30.000 undergraduate students, with a student to faculty ratio of 17:1, and approximately 11.000 graduate students. The university is locally referred to as *Cal* rather than UC Berkeley. The College of Chemistry has two departments, the Department of Chemistry and the Department of Chemical & Biomolecular Engineering, and is housed on the east side of campus, in a cluster of buildings that include Tan Hall, Latimer Hall, Lewis Hall, Stanley Hall and Hildebrand Hall.



Tan Hall and Latimer Hall

In total, UC Berkeley offers 350 degree programs (undergraduate/PhD) in a variety of subjects. The College of Chemistry offers four different types of Bachelor degrees: *Bachelor Degree of Science in Chemistry*, *Bachelor Degree of Science in Chemical Engineering*, *Bachelor Degree of Science in Chemical Biology* as well as a *Bachelor of Arts Degree in Chemistry*, where the latter contains a larger proportion of subjects within the humanities and social sciences than the *Bachelor of Science* programs. For the year of 2016-17, the number of undergraduate majors within these four programs was 760. In addition, the College has around 450 PhD students. Other degrees awarded by the College are *Master of Science* and *Doctor of Philosophy*. Apart from educating majors in the Chemistry area, the College of Chemistry also provides a Chemistry Minor program for students with a major in other subject areas. For undergraduates aiming to become teachers, the university offers a minor in Education that can be taken alongside a degree in the Science/Technology area.

Courses offered within the Bachelor Degree of Chemistry program include General Chemistry, Maths and Physics in the 1st year, followed by other courses in chemistry in higher years (Organic, Inorganic, Physical), as well as courses providing an introduction to research. In addition, the program allows some freedom in selecting courses in related science and engineering subjects, or alternatively specializing in the core chemistry subjects. Many of the courses offer practical laboratory training, in most cases as part of the course, in other cases offered as a separate optional course. A full-time enrolment corresponds to 12 course units per semester.

Preparation and Planning

After being notified that I would be going to UC Berkeley, I contacted my host, Prof. Anne Baranger, as well as my administrative contact, Ms Leslie Silvers, and arranged to meet with them the last week in March. Fortuitously, I had already planned to attend the American Chemical Society (ACS) Meeting in San Francisco early April, and could simply rebook my ticket to leave earlier. In February, I also attended the meeting with outgoing and incoming STINT fellows in Stockholm, and could talk to two earlier STINT scholars, Maths Bertell (2016) and Samuel Bengmark (2015). I received useful tips about practical things such as housing and cost of living.

During my trip in March, I first met up with Ms Leslie Silvers, who explained all the formalities I needed to prepare before arrival, and also provided me with information about insurance requirements. While the International Office at UC Berkeley handles the administration for visiting scholars, Ms Silvers acted as my contact person with this office. I then met up with Prof. Baranger to discuss teaching opportunities for the fall and she provided me with an overview of the courses given at UC Berkeley in Organic and General Chemistry (my subject areas) as well as the teachers involved. As there was a Spring break during the week I was visiting, I could unfortunately not visit any classes. However, I was invited to attend a group meeting with people involved in teaching in Chemistry/Bioengineering and research in Chemical Education. Some of the teachers at the College of Chemistry also gave lectures at the ACS meeting within the Chemical Education section and I attended several their presentations. I also met up with Håkan Edlund, a 2017- STINT fellow and chemist, who was attending the ACS meeting.

Part of the week in Berkeley was spent looking for housing. At the start, the plan was only for my husband and me to go to the US. In the end, one of our daughters ended up taking a gap year and came with us. Housing in the Bay Area is very expensive and we wanted somewhere to stay where we could walk or cycle to work, preferably an apartment. We looked at the Sabbatical Homes homepage, as well as the Craigslist, but were also advised by Ms Silvers to check Airbnb. While there were many houses available, there are fewer apartments and it was not so easy to find one in a reasonable price range, close to campus. Several of the apartments did not match up with the time we were going to spend in Berkeley or were only available for a full year. We finally found a suitable apartment via Airbnb, located a few minutes walk from the North Berkeley BART station and also with good bus connections to the university. We mainly walked or cycled to work however.

We arrived in Berkeley at the end of July. Upon arrival at Berkeley, there is some administration involved before one can start, so it can be good to arrive a few weeks before the semester starts. For the fall of 2017, teaching started on Aug. 23, allowing me sufficient time to attend the necessary meetings and obtain a pass card and keys. The administration includes a compulsory SIM (Scholar Information Meeting) as well as an onboarding session. Times for these can be booked before arrival. We also attended a useful New Affiliate Orientation, provided by VSPA (Visiting Scholar and Postdoc Affairs). After the onboarding session, there is a delay of a few days before one can complete the formalities to obtain a Cal passcard. For Chemistry, there is also a compulsory (and extensive) online safety course that must be completed before one can obtain keys to the College of Chemistry. While waiting to obtain a desk space and keys, I worked in the beautiful Doe Memorial Library.



Doe Memorial Library

Tasks and Responsibilities

In Sweden, I teach Organic Chemistry for 2nd year students and General Chemistry for 1st year students (as well as some courses at Masters level). I was especially keen to look at alternative methods of teaching larger groups of students (>100) compared to conventional lecturing and was thus interested in being involved in similar courses at UC Berkeley, to learn how teaching is carried out there. Co-teaching is not always an option for STINT scholars, but this was my preferred choice, and I had the opportunity to co-teach two courses where the course content was well matched with what I teach in Sweden, i.e. *General Chemistry* for 1st year students (Chem 1A) and *Organic Chemistry* for 2nd year students (Chem 12A). I could thus focus on the pedagogic methods used rather than preparing new material. In addition, I also attended other courses given at UC Berkeley to get a more general view of teaching in Chemistry.

General Chemistry - Chem1A section 4 for Chemistry minors in a 'flipped classroom' format

In comparison to Chalmers, student groups at UC Berkeley taking General Chemistry are much larger. This is partly because courses for Chemistry minor students are mainly provided by Gothenburg University and not by Chalmers. While our corresponding General Chemistry course at Chalmers has around 160 students, the number of students at UC Berkeley taking General Chemistry is around ten times this number. Different courses are provided for the majors and minors at UC Berkeley, with majors taking a course called Chem4A and minors taking Chem1A. The course content for these two courses is similar, with the major difference being that Chem4A also includes Quantitative Analysis. Both these courses are given primarily in a lecture format, with a lab course that is given as a separate entity for Chem1A (i.e. Chem1AL) while being included in Chem4A. The Chemistry minor students are also offered the choice of taking the Chem1A course in a different format, Chem1A section 4, involving 'flipped classroom' teaching. As this style of teaching was new to me, I was happy to have the opportunity to co-teach on this course together with Prof. Angelica Stacy.

Chem1A section 4 (corresponding to 3 units) is a relatively new course that has only existed for a few years. The curriculum and teaching materials were developed by a postdoc and a PhD student in Chemical Education together with Prof. Stacy. Some optimization and changes have taken place each year to find a suitable format for the course. In the current format, the class of ~110 students met up Mo/We/Fr, 50 min each time, in a large classroom in the basement of Moffitt Library, with desks arranged so that the students could work in groups of four students. The groups were defined from the start but students were moved around twice during the semester. Each session started with a 5 min introduction and the groups were provided with a

task sheet with assignments on a specific topic each time. Other resources such as work cards with information, data tables and links to videos, were also employed. The students discussed and solved their tasks together, entering their answers in a Course Reader, developed specifically for this course, while we checked in with the different groups to listen to their reasoning. One student in each group was assigned to be the spokesperson for their group. In addition to Prof. Stacy and myself, the teaching unit included the help of GSIs (Graduate Student Instructors) as well as a group of Teacher Scholars, i.e. undergraduates who had taken the course 1-2 years earlier (read more about the Teacher Scholar program later in this text). At the end of the session, 5 min were devoted to summarizing the result of the task for the day.

In addition to the classroom sessions, the course also included online video lectures by Prof. Stacy, intended for watching after each session. Also, a 50 min Q&A session was provided each week by Prof. Stacy and the GSIs, sometimes including a demo experiment relating to the topic for the week. As for Chem1A, a lab course is not included in this course, but provided as the Chem1AL course.

In comparing this format of the course in General Chemistry to our corresponding course Chemistry and Biochemistry for 1st year students at Chalmers, there are many differences in the teaching methods while the actual content is very similar (with the exception that the course at Chalmers also includes some basic Organic Chemistry and Biochemistry). At Chalmers, we demonstrate the origin of equations and laws by deriving them in a mathematical manner. In the Chem 1A section 4, the students instead use tables of empirical data to figure out the relationship between different chemical properties. Focus is more on understanding concepts via group discussions and looking at figures/videos, and less on being able to calculate numerical values. Some things are common, however: both the course at UC Berkeley and at Chalmers employs hand-in problems and several mid-term exams that contribute to the final grade, i.e. examination is not based only on the result from the final exam. Assignments that link the chemical knowledge acquired in the course with real-life applications are also included in both courses, and at Chalmers we also make use of undergraduate students to provide additional support on our problem solving sessions.

I attended a number of lectures on *Chem1A* (minors) and a few of the lectures for *Chem4A* (majors). Because of the large number of students in Chem1A and the fact that the largest lecture hall cannot fit all these students at once, the same lecture was given by three different teachers at 9 am, 11 am and 1 pm, 3 times a week. The same lecture material is used by all three teachers to avoid too many differences in the presentations. Three questions to be answered by the students using iClickers were also included in each lecture. I was very impressed by the fact that a demo experiment was shown at every single lecture. These were carried out by a very competent technician who assisted also with demonstrations in other courses. All three lecturers were very inspiring and enthusiastic, taking their teaching duties seriously.



Chem1A lectures in Pimentel Hall, showing also the revolving podium.

I also attended lectures for the Chem1AL lab course (1 unit) and visited some of the lab sessions. Courses that include lab will in general also have separate lab lectures, covering in more detail the theory involved in the labs for the upcoming week. I was especially interested in looking at Chem1AL, as this lab course underwent a major transformation a few years back, with a focus on Green Chemistry and sustainability issues. This update of the lab course was carried out by two of the lecturers in organic chemistry, Dr. Michelle Douskey and Dr. MaryAnn Robak, with the assistance of graduate students in Chemical Education. The labs now cover contemporary topics such as biodiesel synthesis, as well as methods for measuring the acidity of acid rain. Because of the large number of students (1200), each lab was given 40 times a week with 30 students in each group, and the labs were designed so that they could be performed using relatively simple and inexpensive equipment. The GSIs (Graduate Student Instructors) involved were generally in their first semester at Cal, and were assisted by a Teacher Scholar (thus one GSI and one TS per group of 30 students). Labs run from early morning to late in the evening to be able to fit in all the lab groups in one week.

Organic Chemistry - Chem 12A for 2nd year Chemistry major students

In addition to General Chemistry, I was also involved in co-teaching a course in Organic Chemistry for Chemistry major students (~ 200) in their second year (5 units). This course had two 80 min lectures per week (Tue/Thu), a lab lecture once a week, as well as weekly 5 h lab sessions. The format for this course was more similar to what I teach in Sweden, with a mixture of lecturing and problem solving. My tasks also included co-teaching one of the evening lab sessions each week together with a graduate student, as well as assisting with correcting exams. Problem solving sessions as well as review sessions, run by GSIs and undergraduate students, were a complement to the lectures. For correcting all types of assignments (i.e. exams, quizzes, homework and hand-in lecture problems), a program called Gradescope (<https://gradescope.com/>), developed at UC Berkeley, was used. The paper copies were first scanned, and could then be corrected online in a convenient fashion. As many students make the same mistakes on a problem, the reason for withdrawing points for this error could be

entered once into the program and be assigned a number. The next time the same error occurred, one could simply enter the number for this error (or click on the Rubric for the error). The online format saves time, makes it easier to correct from home, and for others to join in and correct a question together. In addition, total points for each exam are calculated automatically, and statistics for the exam (such as average points or point range for each problem) can be obtained easily.

Apart from Chem12A, there are also two courses in Organic Chemistry available for Chemistry minors, i.e. Chem 3A and Chem 3B, and I attended some lectures and lab lectures for these courses. The Chem 3A course can also be taken over the summer, allowing students to then take Chem 3B in the fall. Both of these courses are also large by Chalmers standards, with several hundred students attending both labs and lectures.

Activities During the Semester

I was involved in a number of other activities at my host institution in addition to teaching:

ChemEd group meetings: The ChemEd group is an assembly of teachers, postdocs and graduate students involved in research in Chemical Education or with a strong interest in this area. I was part of this group during my time at UC Berkeley and every Tuesday we had a group meeting with a presentation by one of the participants at every session (this person was also responsible for bringing snacks). The presentations concerned updates on research projects within the group, discussion of a recent publication of interest, a report from a conference or summer school, and in my case an overview of teaching activities in chemistry at my home university Chalmers. I found these group meetings very inspiring, and received advice on people to talk to and papers to read. An important role of these meetings was also to provide feedback and input on research, presentations and challenging teaching topics. I also booked times for individual discussions with many of the group members, to hear more about their teaching, research or the work they were involved in. Two of the graduate students also attended group meetings of another group with more of a focus on biology, and I was invited to participate in one of these meetings also.

Courses for graduate students: While not directly involved in any teaching at graduate student level, I was able to sit in on some courses for graduate students. I attended several sessions within two different courses on teaching for graduate students for new graduate students at UC Berkeley in their first semester. A difference compared to the Swedish system is that graduate students are accepted at UC Berkeley without necessarily knowing which research group they will belong to. The first semester is spent working in a few different research labs for some weeks before finally selecting the lab for continued graduate studies. New graduate students in chemistry also function as GSIs (Graduate Student Instructors) in the large Chem1AL lab course during this first semester. The graduate courses on teaching were given in a mixed lecture/project format and covered a variety of topics of relevance for GSIs, including how to deal with plagiarism or students taking all the attention in a class. Another difference compared to Chalmers is that teaching courses at UC Berkeley are given by teachers at the different departments and not by a central university department. An advantage of this is that the topics and examples covered in the course are of direct relevance to the actual courses that the graduate students will be teaching on. In one of the projects in the course, the students worked in groups of 4-5 and prepared a short lecture on any topic of choice (not necessarily connected to the science and technology area) to present to each other. In the larger class, each group then

presented not the actual lecture but rather a short reflection on how they felt their presentation had worked and what feedback they had received from the others in the group. I also attended a lecture in a graduate course on Reaction Mechanisms in Organic Chemistry.

Science Leadership and Management (SLAM): Graduate students in Chemistry, Physics and Molecular and Cell Biology have initiated a seminar series for both graduate students and postdocs, focusing on skills and interpersonal issues of relevance in a future career. I attended some of the SLAM seminars during the fall, which included a Q&A session with new faculty members in Chemistry, where they talked about their personal experiences leading up to their current positions, as well as talks by invited speakers on publishing in top journals, popular science communication, mentorship, career planning and performing research with undergraduates.

Organic Chemistry Seminar Series: A great luxury for me was the possibility to attend seminars in my research area, Organic Chemistry, every week, given by top-notch speakers, mainly invited from other universities but also including a few speakers from UC Berkeley. There were also seminar series in other related subjects such as Inorganic and Nano Chemistry, but these in part clashed with my teaching.

Teacher-Scholars: The Teacher-Scholars Program at UC Berkeley was started a few years ago and provides the opportunity for undergraduate students to gain experience in teaching as apprentice instructors by assisting in labs and discussion sections of lower divisions, typically the Chem1A and Chem1AL courses. In addition to the teaching experience, the Teacher-Scholars also attend a weekly class with lectures and discussions, also leaving time to work in groups to prepare the material for the classes in the upcoming week. One person in each group had the task of preparing some kind of task sheet or questions for this purpose each time. Participation in a full-day training session at the start of term, as well some individual work during the semester was also included as a requirement. The Teacher-Scholars receive 2 credits for taking part in this program. This program was developed with the assistance of graduate students in Chemical Education, and studies are ongoing to evaluate the impact of introduction Teacher-Scholars into different courses. I got to know several of the Teacher-Scholars involved in the Chem1A Section 4 course, and apart from being great company, they could also provide me with more insight into being an undergraduate student at UC Berkeley. I met up with Dr MaryAnn Robak and Dr Pete Marsden, who are running this program, to get more information, and I also attended one of the Wednesday evening classes.

CalTeach: I met up with Dr Elisa Stone, director of CalTeach to hear more about this program. CalTeach works with improving math and science education at K-12 level, i.e. primary and secondary schools, in the Bay Area. They provide a CalTeach Minor program, where Cal students can take a minor in Science and Math Education alongside their core subject. The program includes five courses in education, and also provides the possibility of field placements in local colleges to obtain practical experience. Elisa also gave me tips on other people to talk to, as well suggestions on good teachers/lecturers giving classes that could be of interest for me to visit.

SESAME: The Graduate Group in Science and Mathematics Education (SESAME) is an interdisciplinary program for graduate students, providing expertise in a selected area of science while at the same time focusing on education, providing a combined PhD in

science/education. Many of the graduate students within the ChemEd group were also part of the SESAME program.

Center for Teaching and Learning (CTL): I booked a meeting with Dr. Richard Freishtat, director of CTL, to find out more about their activities. CTL provides support related to teaching to faculty at UC Berkeley and arranges a number of programs to improve and promote teaching-related issues such as pedagogy and curriculum development. New faculty and assistant professors can partake in a one-year program of lunch seminars, with themes of relevance to the different parts of a course, i.e. initial focus on course design, then on how students learn, formative assessment and finally evaluation of student learning. Other programs, such as the Transforming STEM Teaching Faculty Learning Program targets faculty that already have some teaching experience. CTL also manage the Distinguished Teaching Awards with five lecturer recipients per year. As CTL have limited resources, with only 4 permanent staff, they also make use of faculty that have participated in their programs, as teachers or discussion leaders on workshops and symposia arranged by CTL, creating a ripple effect.

Organic Faculty Lunches: I was invited to take part in the faculty lunch meetings with professors in Organic Chemistry on Tuesdays and got the possibility to meet and discuss with other chemists at the College of Chemistry.

Visit to San Diego State University: As we have an exchange program with Organic Chemistry at San Diego State University, which involves 4-8 graduate/Masters students spending the summer at Chalmers/University of Gothenburg in a research group, I also took the chance to visit San Diego. I visited a lecture in my subject area, Organic Chemistry, and also talked to the students who potentially will be visiting Sweden in 2018. I also met some of the students who had taken part in the program earlier years.

Important Lessons

The possibility to spend a full semester at UC Berkeley has given me a unique opportunity to gain insight into how teaching is organized and carried out at another university. I had a specific goal with my application to the Teaching Sabbatical program: to look at methods for getting students more involved and active in a larger lecture setting (100 students and more). I have seen many examples of this at UC Berkeley, including the extensive use of iClicker questions in lectures, flipped classroom lectures where the teacher and students work through a problem set together, mixed format lectures with lecturing interwoven with problem solving, as well as inviting students to participate in demo experiments during lectures. Also, rather than asking a question to all the students and receiving answers from the same students every time, the teachers would ask the students to discuss a certain issue with the person sitting next to them instead. This means that everyone is involved and is also a good way to make students talk about chemistry and not just listen to a lecturer.

UC Berkeley has much larger student groups than Chalmers and this allowed me to see how one can organize both lectures, but also practical laboratory work with many students in an efficient format. I found the students better prepared for each lab session as a result of more extensive 'pre-lab' preparation than we have in our courses, and this is something we can learn from. Likewise, involving undergraduate students as Teacher-Scholars to assist and mentor new freshman students in courses is something I find interesting. While the GSIs are more

focused on the lab itself, Teacher-Scholars can have a more informal talk with the students and share their own experiences of being a new student at UC Berkeley.

Comparison Between UC Berkeley and Chalmers

There are many differences between UC Berkeley and Chalmers but also many things that are similar. One difference that more concerns the American education system versus the Swedish one is the fees involved. While UC Berkeley is a public university, a freshman student from California nevertheless has to pay \$13 510 (numbers from 2016-17) and the fee for non-residents is even higher, \$40 192. These fees are only for tuition and do not cover room/board or textbooks. Around 60% of the students receive financial aid in some form (various stipends).

Student population: The student population is much more diverse at UC Berkeley, with many Asian-American students as well as international students. However, the majority of students (around 2/3) are from California. In the Fall of 2017, UC Berkeley had 30 574 undergraduate students and 11 336 graduate students, in comparison to around 10 000 undergraduate and 1 100 graduate students at Chalmers. The gender distribution is also slightly different, with around 30% female students at Chalmers and 50% at UC Berkeley. Many universities focused on the area of Technology have a lower proportion of female students, so this is not surprising.

The relation between research and education: While there are a few full time lecturers at the College of Chemistry, most of the teachers are also researchers, but this is the situation at most universities, including Chalmers. One difference is that many undergraduate students are involved in research within a research group, outside of the normal curriculum (i.e. not a required part of their education), just to gain experience of use in their future career. At Chalmers, we do have students carrying out Bachelor and Masters projects together with research groups, but this is a required part of their education. This type of voluntary participation in research by undergraduates is common at many universities in the US, thus not specific for UC Berkeley, but unusual in Sweden.

The relation between teacher and student: Students in a lecture setting are more respectful of the teacher, often calling the teacher Professor. However, in a lab setting, with more one-to-one interactions, the relation was more relaxed. I found the students at UC Berkeley less shy, more willing to engage in discussions and participate actively in the lectures by asking questions, even in a large lecture setting, than at Chalmers. However, at Chalmers we have more teaching in smaller groups in the form of problem sessions ('övningar') and here it is easier to get more interaction with the students.

The institution's view of breadth versus specialization in education: While a certain number of courses are required for a student in Chemistry at UC Berkeley, compared to Chalmers there is a wider choice in terms of the remaining courses, and the student has the possibility to either specialize more in selected areas of Chemistry, or to take courses in other STEM subjects. There is also the option of taking a *Bachelor of Arts Degree in Chemistry*, with more courses in humanities and social sciences than in the normal *Bachelor of Science* degree programs.

Competence development for teachers: The Centre for Teaching and Learning provides different opportunities for lecturers, both new and more experienced, to develop their competences in pedagogy. These activities have been described earlier in this text.

Teacher recruitment: As most teachers are also researchers, they are recruited via a tenure track process that is common at many universities (including Chalmers). There is substantially more mobility in the US in this respect, with many of the researchers having changed university (and state) several times, i.e. between undergraduate and graduate education and then on to one or several postdoc positions, in many cases also having gone to high school in a different city.

Several of the full-time lecturers at the College of Chemistry had also studied in a different state before moving to Berkeley.

Pedagogy and its importance: Here I find a large difference between Chalmers and UC Berkeley. While teaching meetings at Chalmers tend to focus on practical problems such as assigning courses to people and calculating numbers of teaching hours, discussions at UC Berkeley focused much more on pedagogy which I found was very refreshing. As I was part of the ChemEd group, which is a somewhat special environment, I cannot answer for if this is the situation at other departments at UC Berkeley or other universities.

The status of pedagogical merits compared to research merits: While research merits of course are highly important at UC Berkeley, I found that teaching also was considered very important, with top grade research professors discussion teaching issues over lunch and lecturing on the courses for the freshmen (1st year) students. This is not the case at Chalmers, where securing large research grants has the highest importance, while good teaching is not valued in any noticeable way (but hopefully appreciated by the students).

Curriculum and courses offered: As Chalmers is a University of Technology, while UC Berkeley is not, it is difficult to compare the curriculum and variety of courses offered. In terms of the subjects I was involved in teaching, i.e. General Chemistry and Organic Chemistry, the course content was essentially identical to what we teach at Chalmers, albeit with slightly more depth into the subject matter in the Organic Chem 12A course (but this also relates to the fact that Chalmers has a different focus and a somewhat smaller course).

Forms of examination: Examination at UC Berkeley is generally not only based on the result of a final exam, but takes into account a number of activities (homework, lab reports, quizzes, mid-term exams, presentations, projects) during the course, where points/grades for each activity can be weighted into the final grade to reflect its importance. For our corresponding course in General Chemistry at Chalmers, we also have a number of different forms of examination throughout the course, including also an oral exam for 160 students, but most courses at Chalmers are graded on a final exam. Many of the Chemistry courses at UC Berkeley generally also had a lab exam, something that we do not have at Chalmers, and lab reports were also graded which is not the case for us. The grading scale runs from A-D with F for fail, and also includes nuances in the form of + or -.

To what extent educational programs conform to labour market needs: Data for 2017 show that 37% of Chemistry graduate at UC Berkeley are employed full-time, 38% go on to graduate school and the remainder were either seeking employment or involved in other endeavours.

Use of technology: Technology was used to a similar extent as at Chalmers. The largest lecture hall (Pimentel) was better equipped than our lecture halls, with an on-site technician and use of video to show enlargements of the blackboard or a demo experiment, but this has to do with the size of the hall, i.e. it is difficult to see from the back rows. Lab reports and assignments were handed in on paper, but subsequently scanned and corrected online. At Chalmers we have a mix of both methods, with some assignments and lab reports being uploaded to a homepage while other types tasks may be corrected on paper.

Distance education: An online version of the Chem 1A course called eChem 1A is available. However, I was not involved in any activities concerning distance education and thus cannot comment on this.

Relation between the institution and its environment: As mentioned earlier, the majority of students at UC Berkeley are from California and also pay substantially lower tuition fees than students from out of state or abroad. Berkeley is a small city and the university thus dominates the environment, with a large proportion of the inhabitants being students, teachers or linked to the university in some way. The campus is very attractive compared to Chalmers, with many beautiful buildings and elaborate garden landscaping.

UC Berkeley has a number of programs that involve local schools and community colleges and also has links to the other University of California campuses, such as the one in Davis, with direct buses between the two campuses daily. UC Berkeley Extension, located close to the campus, offers shorter on-site or online courses as well as certificate programs to the general public for a fee, in a similar manner to the many evening schools (Folkuniversitet, ABF, Medborgarskolan) we have in Sweden.

Special investments in education at the institution: The largest lecture hall (Pimentel) has a rotating podium at the front (like in a theatre), something that I have never seen before in a teaching setting. In terms of investments, focus is more on providing high quality teaching than investing in modern teaching facilities.

Action Plan

Personally: I have seen many useful examples of how I can activate students more in a lecture setting. While I have limited time to make any major changes in my courses this spring, many of these techniques do not require any great effort on my part to implement, and I will be trying out some of these methods, i.e. use of iClicker questions, discussions between students, problem sheets, in my lectures. Over the summer, when I have more time, I will look at making more extensive changes in some of the courses I am involved in. I also plan to implement Gradescope for correcting exams if possible.

Being part of the ChemEd group has also introduced me into the world of research in Chemical Education and I plan to spend more time reading papers in this area to keep up with current theories of teaching. I would also like to attend a conference focused on teaching within the next 1-2 years and maybe also contribute a presentation or poster.

For the department: As the General Chemistry course at UC Berkeley is very similar in content to the course Chemistry and Biochemistry that we teach at Chalmers, I plan to have some discussions with my colleagues and co-teachers on this course to see if there are changes we would like to make, inspired by the corresponding course at UC Berkeley. I would also like to work more with changing the attitude to teaching at the department, and to initiate discussions that focus on pedagogy and not only on course planning.

While we arrange career activities for our graduate students in Chemistry at Chalmers, these are generally in a half-day seminar format and we have a problem of only a small portion of the graduate students showing up, despite the fact that many students ask us to arrange such activities. A seminar series like SLAM at UC Berkeley could be a better format for information on future careers, with shorter sessions each time and the possibility to attend selected seminars according to personal interest. Also, we currently have few common activities for postdocs in Chemistry and Chemical Engineering at Chalmers and this could be of interest to them as well.

For the institution: My Chalmers colleague Julie Gold and I will give a presentation on March 1 as part of the Thursday seminar series in Chemistry at Chalmers/University of Gothenburg, and talk about our experiences as STINT fellows in Singapore and Berkeley.

In the Swedish research and education system: I feel that the importance of teaching in higher education in Sweden is not valued enough in comparison to research, and this is something that needs to be discussed at all levels in the education system. Within the Chemistry area, we are now a group of teachers from different universities who have taken part in the STINT Teaching Sabbatical program. As the first National Swedish Chemistry Conference will take place this summer, I will ask around if some of my STINT fellow colleagues in Chemistry would be interested in giving a joint presentation to share our experiences from our Teaching Sabbatical and see if we can contribute towards improving the status of university teaching.

Advice to Future STINT Fellows at UC Berkeley

Initiate the visa application process as early as you can as it can take quite some time to get all the documents you need and there may be some waiting time involved also in getting a time slot at the US Embassy in Stockholm. Once this visit is completed, getting the actual visa is fairly rapid. There are several fees involved upon obtaining a visa, both from the US authorities but also from the university. There is yet another fee to pay to the university in order to obtain a pass card. Sorting out insurance also took some time for me, as Chalmers is a private foundation and I could thus not make use of the recommended insurance via Kammarkollegiet.

For housing, see Sabbatical Homes, Airbnb or Craigslist. Your local administrative contact can be a good source of information on alternative options for finding housing and recommended areas to live in. Housing in the Bay Area is shockingly expensive by Swedish standards so be prepared to use a large portion of your stipend towards this.

Good to know if cycling to work is that the east part of Berkeley (towards Grizzly Peak and Tilden Regional Park) is very hilly, while the side towards the bay is flat.

Public transport in Berkeley and the Bay Area is very good in comparison to many cities in the US, so a car is not necessarily a requirement. You can use the Clipper card for local transport in the whole Bay Area, including buses, BART and the MUNI tram. The card also works for buses/trams in San José (but you need an Amtrak ticket for the commuter train to get there). On campus, there are several campus bus services that are free for Cal students and employees (passcard must be shown to driver).

VSPA (Visiting Scholar and Postdoc Affairs) has a good webpage with information for visiting scholars (<https://vspa.berkeley.edu/>). They also arrange a half-day orientation course which provides useful information. VSPA also assist in coordinate activities for accompanying persons, such as excursions or playgroups for parents with smaller children.

There are no natural meeting places at the university for meeting up with colleagues. To get in contact with other teachers, ask your academic host for advice on people that could be interesting to talk to and then book a time with them to meet up for coffee or a meal. Most people are happy to talk about the teaching they are involved in if they are not too busy.

Do not underestimate the time and energy it takes to adjust to a new setting. The first few weeks can be rather exhausting.

There is a Scandinavian food shop on San Pablo Avenue that stocks Swedish foodstuffs if you want to prepare a Swedish meal for your friends or colleagues.

Local transport is very good, and depending on where you live, a car may not be necessary for everyday use. We rented a car from Enterprise on San Pablo Avenue for excursions. Several of the local bike shops sell second hand bikes that we could sell back at a reduced price upon leaving.

The Oakland Museum of California is well worth a visit and has foodtrucks on Friday evenings. A walk around Lake Merritt is also a nice way to spend a Sunday.

If you plan to go to Sausalito, the ferry from the Ferry Terminal in San Francisco is a better option than the one from Fishermans Wharf, as you can use your Clipper card on the former (much less expensive). There is also a commuter ferry from Berkeley to San Francisco, but we never tried this.

Enjoy Berkeley!

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