

# Report

From a semester at Ohio State University,  
Department of Chemistry & Biochemistry,  
August-December 2012



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## Introduction

When I was informed in February 2011, that I had been selected for participation in the STINT Programme “*Excellence in Teaching*” I was very honoured, quite surprised, and a little nervous - all at the same time.

***My home institute for the coming semester should be the Department of Chemistry and Biochemistry at Ohio State University in Columbus, Ohio!  
Almost unimaginably!***

Being away for a whole semester requires a lot of planning not only for the private sector of life, even the professional sector has to be considered, but it has been worth it. It has given me the opportunity not only to work at another university and all that comes with this, but also an opportunity to reflect over my work at Umea University. This together will improve the quality of my work, and my experience will also have some impact on my home university and my institution there.

So, a short summary will be;

It was a fantastic experience!

I can really recommend other to take the chance to participate in the STINT- program or similar activities!

## Ohio State University - an overview

Ohio State University dates back to 1870 when the Ohio General Assembly established the Ohio Agricultural and Mechanical College. The first class of six men graduated in 1878 and one year later the first women graduated. Until today (Aug. 2012) has 669 552 degrees granted. Today it is among the top 20 national public Universities in US with more than 55 000 students on campus and an additional about 8000 students attending Ohio State’s regional campuses. OSU offers a total of 175 undergraduate majors and 240 master’s, doctoral and professional degree programs and OSU’s total research expenditures in 2009 topped \$716 million, ranking OSU 13th nationally and ninth among public universities.

## Preparation and planning

As soon as I was informed that I had been selected for the programme I mailed my “Scientific advisor” and Vice chair for Undergraduate Studies Professor Patrick Woodward and Joanna Kukielka-Blaser who is responsible at OSU for the programme “*Excellence in Teaching*” to discuss the next step. We agreed upon a visit at OSU in the beginning of April. At this first visit I was welcomed by Prof. Susan Olesik, chair, and I meet Professor

Patrick Woodward and some of the faculty in organic chemistry. I discussed briefly, with Woodward, my coming duties at the department and what courses I could participate in. I was also meeting Director Gifty Ako-Adounova at Office of International Students and Scholars, who gave me some information about the University and also useful links and information in how to find housing, etc. Mallory J. Aliff at Business Service Centre helped me out to start the process of having the DS-2019 form and other papers necessary for the J-1 visa application and she has been helpful during the whole administrative paper process around the J-1 visa. I had also time to make some arrangements for housing which is a hard job, but before I left Columbus I had a contract on a small apartment in Short North, and it felt great.

## **Tasks and responsibilities**

During my stay in OSU I taught and had the full responsibility for a course in organic chemistry, *Chemistry 2310: Introductory Organic Chemistry*". The entry requirements for the course at least one course in general chemistry and my students was juniors and sophomores in material science engineering, environmental engineering, or biomedical engineering.

I had 121 students in my class and the class was divided into six groups for recitations hours with my teaching assistant (one hour/week). I had two lectures twice per week and in addition I held office hours three times a week (one hour sessions) for individual meetings. The examination of my course consisted of a summary of 5 out of 6 quizzes, two midterm exams and a final exam in the same way it had been done last year. This means that, during this semester, I have done 30 unique quiz questions and variations of this set of question in 6 different groups, 112 new unique questions for the midterm and final examinations.

## **Activities during the semester**

Apart from my teaching I participated in two seminars series, the weekly "Science Education Brown Bag Lunch discussion series" at the department of Chemistry & Biochemistry and selected seminars at UCAT, *University Center for the Advancement of Teaching*, I have also attended other seminars for example; PhD-seminars and some research seminars, and attended chemistry and biochemistry department faculty meeting. To get some impression of other teachers (and courses) I have listening to different lectures in mainly chemistry, but also other subjects, to see, learn, and get inspired from other teachers.

I have also made a study to compare students in USA and Sweden, and see if the skills in organic chemistry differ after similar course in organic chemistry by comparing examinations results after final examination.

The seminars in Science Education was informal talks on various topics related to science education research and innovative approaches to teaching covered many interesting topics and some of the interesting talks/discussions are mentioned below:

- *Digital courses on iTunes*  
Example from the course “Chemistry in Society”
- Hybride courses
- Talk about how to teach so called hybrid courses (split online and in person)
- *Course Development – New Platforms and New Curriculum*  
Chemistry 1215 General Chemistry Bridge course – was developed both as on line course as well as a course given in the standard lecture format. Data and discussion on how the students combined this two possibilities.
- *Discussion of new areas/curriculum*  
How to teach solid state concepts in general chemistry.
- *How to train Graduate Teaching Assistants (GTAs)*  
Caroline Breitenberger and Judy Rideway from Center for Life Sciences Education (CLSE) talked about a project “Integrating Pedagogical Instruction with Graduate Training: A Professional Development Program for CLSE GTAs”.
- *PhET interactive simulations*  
A talk about The PhET Interactive Simulations project aiming to develop interactive chemistry simulations.
- Peer-led Team learning (PLTL)  
([www.plt.org](http://www.plt.org))

UCAT, University Center for the Advancement of Teaching is an organization to assist all those who are teaching at The Ohio State University to become better teachers. You can, as a teacher, get help from UCAT with redesign your courses, learning outcomes assessments, and technology-enhanced teaching. They have seminars in different area for teachers and teaching assistants’, for example:

- Designing Service-Learning into Your Course,
- The American Classroom: Challenges for International Teachers,
- Techniques for student motivation,
- Facilitating Classroom Discussion, and
- Responding to Student Writing.

The seminars are open for teachers all over the University and accept about 30 participants/time. You can also get help as an individual – with for example classroom observation. They have also a very impressive program for training young teaching assistants to advance their professional development.

## Important lessons

First of all I want to emphasize the value, as a teacher, of spending several months at another university, and thus having been given the opportunity to reflect on my own work, my institution, and my home university from a new perspective.

I have seen and realized that there are different ways in terms of both how one teaches and examines, but also different ways of organizing it all. For me it has been really interesting to realize that you can teach thousands of students with different specializations (chemistry as a minor or major) at a department the same size as my home department.

Another thing I become aware of is that education has a high priority, and that both faculty and staff take teaching seriously and appear to take great interest incorporating new techniques to improve and modernize their courses. They were active participants in the pedagogical seminars once a week and ready to share their experiences with each other and both teachers and teaching assistants, have the opportunity to get good pedagogical as well as technical support.

As a chemistry teacher, I love to do demonstrations at lectures but this requires preparation time, a time that is often not available. At Chemistry & Biochemistry, OSU there is a stunning function, Chemistry Demonstration Lab, from where you can order a specific demonstration, *i.e.* , you get all that you need for a specific demonstration delivered at your lecture room in time for your lecturer.

The administration was also very effective, a must if the department should be able to effectively teach over 8000 students which means way over 150 students/professor (teacher). Notable is that as a teacher you can focus on your role as a teacher where as all course administration, such as room booking, scheduling, class lists, etc is handled by an efficient administration. Carmen, Ohio State's online learning management system,



student learning.

(corresponds to Cambro at UmU) is easy to use. Each course shells are created six weeks prior to the start of the semester and come complete with a class roster and a set of course tools. As an Instructor you must activate your courses when ready for student access and you use Carmen to manage your course, share course materials, communicate with the class (email, news, chat and online discussions), create assignments and grades, and to assess

The role as a teacher is in principle the same but there are both similarities and differences and the students group size makes impression in the teaching methods.




I have also realized the importance of a Swedish tradition of “fika” or coffee breaks and really missed the function of a “fika”-room, where people can meet and have coffee in a common area, get the chance to pop into co-workers and have informal discussions without having scheduled some appointment.

## Comparison between, Department of Chemistry & Biochemistry at Ohio State University and Chemistry Department, Umeå University

In terms of staff and faculty, there is a great similarity between my home department and the chemistry department at OSU. We are roughly equal in terms of number of employees, research support, working load, etc. but the really big difference is in the numbers of students, undergraduate and PhD students as can be seen in the table below.

### *Student, population and teacher student relations*

A comparison for fall 2012

Fall 2012	 	 Umea University Department of Chemistry
<b>Students</b>		
Undergraduate Chemistry	8213	135
Majors	850	15 <sup>2)</sup>
Graduate students	250-300 <sup>1)</sup>	70-80 <sup>3)</sup>
<b>Students/professor</b>		
undergraduate students	169	3
<b>Tuition fee</b>		
	About \$5000	About \$5000
<b>Revenues from</b>		
undergraduate education	85%	15%

<sup>1)</sup> Total of graduated students, that is masters and PhD students

<sup>2)</sup> Total students on a Life Science program, and number of master students

<sup>3)</sup> PhD students

The class and group size is different, and a normal class size at OSU is 150 to 400 students, where these groups are divided to small groups (about 24 students) for recitations and other group activities. At Chemistry, UmU the group size is about 10-40 students, and sometimes (often) we have classes with only six students. The class size will not only affect the way of teaching but also affect the interactions among the students.

I perceived a difference in the relationship between teachers and students at OSU from Swedish, maybe mostly due to the large teaching groups in OSU, and far from all the students took the opportunity to visit my office. Although it is often difficult to get a dialogue going in large groups I found that many teacher whose lectures I visited were highly skilled in this. As I see it the main interaction between teachers and students is at the recitation hours held by the teaching assistants in small groups. At chemistry, Umu, we have small groups at lectures, as well as at the exercise, which facilitates interaction with each student.

The teaching staff at OSU consists of graduate students, PhD-students, and faculty. Undergraduate students can participate for example in the grading sessions or at laboratory work. At UmU most parts of the teaching are conveyed by teachers and PhD-students, and since teaching groups are so small, the contact between individual students and their teachers it becomes very good.

The main student population, undergraduates, graduate students, and professional students together, at Columbus Campus is 87 % Americans from Ohio State, where 87 % are from Ohio, nearly 11 % are international students (undergraduate, graduate) and the remaining are American students from outside Ohio. 14% of the American students come from African, Asian, or Hispanic societies. Chemistry department, UmU, have during a long period of time, had a high proportion of international students at our first and second level programs, but partly due to the introduction of tuition fees , the proportion of international students have increased drastically, and today is less than 10 % from abroad.

### ***Competence development for teachers***

UCAT, University Center for the Advancement of Teaching is an organization to assist all those who are teaching at Ohio State University to become better teachers. You can, as a teacher, get help from UCAT with assessments, of redesigning your courses, learning outcomes and technology-enhanced teaching. You can also get help as an individual, e.g., if you experience difficulties in getting students engaged in your lectures. They have seminars aimed to teachers and teaching assistants, for example:

- Designing Service-Learning into Your Course,
- The American Classroom - Challenges for International Teachers,
- Techniques for motivating Students,
- Facilitating Classroom Discussion,
- Responding to Student Writing

The seminars are open for teachers all over the university and accept about thirty participants/time.

UCAT also has a very impressive training program for professional development of young Teaching assistant. And, as I mentioned above – pedagogical seminars at the institution

are well attended and there are also different pedagogical project and studies ongoing. It is my impression that competence development for teachers is considered important and most of the teachers involved in undergraduate education take this seriously.

When it comes to recruitment of new professors/teachers, they have the same procedure as we have, with calls for a specific professor/teacher position. Pedagogical merits are a must but decisive are the merits as a researcher.

### ***Courses and program offered***

Department of chemistry and biochemistry offer 4 undergraduate programs;

- B.S. of Science Degree in Chemistry (major)
- B.S. of Arts Degree in Chemistry (minor)
- B.S in Biochemistry, with minor or major in chemistry.

Normally, OSU Chemistry & Biochemistry does not, admit students to chemistry who are seeking a master degree only, yet a fraction of the students seeking a PhD obtain a master degree first, some go directly to the PhD, and some do not finish at all. Graduate courses and research programs leading to the MS and PhD degrees in chemistry are offered in analytical, biological, inorganic, organic, physical and theoretical chemistry. In Biochemistry the department offers several degree options that lead to Master degrees in biochemistry, and in Biotechnology.

At chemistry, UmU, we offer 2 undergraduate programmes, and 2 master programmes

- B.S of Science in Life Science
- B.S of Science in Pharmacy,
- M.S In Chemistry – the students can decide whether it should be aimed towards environmental, medicinal or protein chemistry
- M.S in Pharmaceutical Science
- M.S.in Bioresource engineering. New program form fall 2012

At first glance it may appear that we offer as many opportunities at OSU but it differs in the number of graduate courses and specializations offered.

During fall semester there were 27 different courses in chemistry available for the undergraduate chemistry students at OSU, covering, general chemistry, organic chemistry analytical chemistry, physical chemistry, inorganic chemistry, instrumental analytical chemistry, and biochemistry. This can be compared to our 26 courses for students during a semester 2012. We have the same number of courses but a huge difference in number of students.

The curricula for courses given at OSU resembles those of our department, and we are using if not same, at least equivalent type of books. A main difference is however, that teaching organic chemistry at UmU includes both theory and practical work in the lab. At



OSU the lab courses are separated from the theory courses and this affect the way of teaching practical chemistry.

### ***Examination***

The forms of examination are limited by the large groups and the requirement for rapid feedback, within 3-4 working days. As far as I know same or similar ways of examination are applied to all undergraduate courses. The examination is divided into three parts, Quizzes, one or two midterm examinations and a final examination, which are weighed together for the final grading. A typical distribution can be final 35%, mid-term 25% each, and Quizzes 12%. No exams can be done more than once except for students having a grade "I" incomplete, for example, if they have been absent for a long period during the course for medical reasons . None of the undergraduate courses are examined orally.

We have a greater variety in how we examine our undergraduates, although a final written examination is the most abundant. We often combine the final examination with an option of doing one or two quizzes, so called "Dugga" during the course. The credit on these quizzes is than added to the credits at the final exam.

### ***Distance education, use of technology and teacher's role***

Although OSU does not prioritize distance education, you can find pure distance courses in many different areas and one of the priorities for 2012 is to *"expand university-based distance education operations and provide support with the necessary central infrastructures"*.

The technical equipment in lectures room are up to date and many of the teachers are using modern techniques in there lectures. In May 2012, OSU launched a program called "Digital First" to help professors create courses that students can access on their mobile devices. At the chemistry department there were a couple of undergraduate distance courses during autumn 2012, a course in general chemistry with the examination at campus, and a course for non science majors "Chemistry in Society" a course which is transferred to iTunes U.

Most interesting is, however, so called "hybrid courses" which are a mixture of campus and distance courses, where the students can choose the media that is most attractive and stimulating for his/her learning, and I perceived that a lot of the course development is going on right in this area.

Department of Chemistry, UmU has focused on distance education several years and we have two programs on distance, B.S in Pharmacy (since 2003) and M.S in Pharmaceutical Science, which started two years ago. We have for many years had problems with recruitment to our chemistry programs, not only at UmU but also nationally. To expand our educational programs with pharmacy education and also make these web-based has been important from a recruiting standpoint. Ohio State University does not appear to have, any problem recruiting students to their undergraduate courses in chemistry and biochemistry.

The role as a teacher here and at OSU is basically the same. You are responsible for your course, to plan, teach, and examine the students on your course. One major difference is that a Swedish teacher, at least at Chemistry, UmU are more involved in administration, scheduling, room booking, and part of the registration process of student.

At OSU, all students attend several parallel courses and all courses are scheduled as a framework, that is all lectures on a given course are at the same time and same weekdays throughout the whole semester. As a teacher you get this scheduled frame and plan your teaching according to this time slot. At UmU chemistry department all teachers have to make the scheduling and booking premises for your own course.

Just like home, the lectures are central for the course and can, of course, differ greatly between different teachers, but similarities exist. As far I experienced, a lecture can be divided in several parts, first some form of reconnection to the last session, outlying the objectives of today's moments and then the lecture starts. The lecture is often interrupted with questions to students, using some form of "pull" system, mobile phones to see the response, finally connecting to students' knowledge or misconception at the continuing lecture. The lecture often ends with a reading instruction for the next session or homework (at least a reminder of homework). In addition, some use some program, Sapling, for example in Analytical chemistry, students' homework and the homepage contains lots of quiz questions to practice on.

So in a way I feel that the lectures had more secondary elements than we have, like homework and very clear weekly reading recommendation, but as I said lectures vary from teacher to teacher.

### ***Relation between OSU and its environment***

My opinion is that OSU has strong roots in the community and is, perceived as a positive driving force in their society. This is evident in activities such as music on Campus "Rock the Oval" bringing together thousands of people and not least when Buckeye has its home games. Then the whole city is red.

Service learning is a teaching and learning strategy incorporated in more and more courses at OSU, to integrate meaningful community service with instruction and reflection. These projects are very appreciated by the community as well as by the students. As far as I know, this is not yet implemented in any of the chemistry courses.

Chemistry & Biochemistry department are also involved in activities aimed towards the general public, for example, when student, staff, and faculty from the department arranged a Demonstration Lab at COSI (Center of Science and Industry) for hands-on demos and experiments to kick off National Chemistry Week.

## Final comments!

My ambition with the STINT-period was to get new ideas, impressions, and impulses that can be applied at home. I was, and still am, convinced that you learn a lot about your visiting University, but also about the business at home when you mirror these with each other. These experiences are useful in all aspects of your own work. To spend some months at another University as a teacher is of great value, not least from a personal point of view, and I do recommend everyone who gets a chance like this – TAKE IT!

I have realized that things can be managed and organized in different ways both within the administration and within education. I think we can learn a lot from the administration, where the teachers can focus on pedagogical issues and are, as far as I could see, not involved in processes for booking of premises, scheduling class rosters etc.

There is a huge difference in the number of students per teacher in the chemistry departments at OSU and at UmU. I have seen educational structures where I found many ideas that can be applied at home. Among other things, it can be a great benefit or at least a finesse of separating (some) laboratory moment from the theory parts, e.g. , by having theory and laboratory courses separate. This would be especially beneficial in situations when we have few students but many different specializations. Working in this direction could perhaps lead to a structure possible to handle few students and good quality within the available budget. Worth discussion!

Early on, I was struck by the feeling that I was, or at least was becoming an Ohioan. The idea was that wherever you are in the world and screamed, O H someone should proudly replies I O.

This I also experienced coming from a weekend trip to New York, where the steward said, loud and clear through the speaker O H and many passengers answered I O. (Buckeye's had just won their last match for the season!).



I brought home a lot of things to be inspired by, some of them mentioned above. Still I'll take the opportunity to say what gave me most, and was most inspiring was the lectures

that I listened to. My stay at OSU would have been even more rewarding if I had time to attend more of those. Working as a teacher at another university takes more time than the corresponding teaching job at home where you are familiar with all the routines, structures and demands. Teaching and examination, taken a little too much time, and I think it would have been even more rewarding to work as a co-teacher instead of having full responsibility for lecturing and examination of a whole course. As a co-teacher you probably have learned even more about the American way pedagogical consideration, structure, administration etc.

***Some important, take home items:***

On a personal level, I will work more continuously to monitor student progressions during a course and to develop systems so that the students can follow their own progression.

At the departmental level I will discuss and try to implement some ideas how we can reduce the teacher involvement in administration and instead increase time for actually teaching chemistry.

Changes in the structure of programs are not easy to achieve but I will contribute with my new experience to get a discussion within the department and faculty of alternative approaches to program structures.

And finally, I hope that I can inspire others to take the opportunity to apply to STINT or other similar programs.



Another dimension connected with my months in US was that I had the opportunity to see and experience parts of America and the American society a little closer. I also had a lot of fun with the association Swing Columbus!

The only thing I really missed during my time in US was "lösviktsgodis"!



**Thanks to UmU and STINT, who gave me this opportunity!!!**