

STINT Teaching Sabbatical 2017
Final report



Chinese Heritage Centre at NTU, by night

Nanyang Technological University (NTU), Singapore

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I had the wonderful opportunity to spend five months (August – December 2017) on a teaching sabbatical at the School of Materials Science and Engineering, Nanyang Technological University (NTU), Singapore. My academic host at NTU was Prof Tim White, Associate Chair of Research at the School of Materials Science and Engineering (MSE). Prof Tim White is also responsible for creating a new fully on-line Masters program in Materials Science and Engineering for NTU. One of the capstone courses in this Masters program is a course on Biomaterials, which is also one of the main research and education areas at MSE, and Prof Tim White asked if I would be interested to put together this on-line course during my STINT Teaching Sabbatical. This was a new challenge for me – while I had created and taught numerous biomaterials courses at the doctoral and masters levels, I had no experience of on-line courses, so I immediately replied “Yes!”.

Preparation and planning

Prof Tim White and I met first in Stockholm in February 2017, where we viewed and discussed the planned Masters program as well as the new on-line course platform called ATLAS (Adaptive, Teaching, Learning and Application System) being developed together with the Parmenides Foundation in Germany for this purpose.

I then spent five days at NTU in March 2017 on a Planning visit in order to discuss the work I would do there, as well as address practical matters such as arranging for an apartment (via the NTU International Office) and preparing the work permit application (via the administrators at MSE). While I received excellent help at both NTU administration levels, I would recommend for sake of clarity and efficiency that one office handle all of these administrative issues for the STINT Fellows. The most practical organization to handle all such matters would in my opinion be the central International Office, as they will handle STINT Fellow visitors year after year, and should be quite familiar with the routines.

During the Planning visit, the NTU faculty member who was supposed to work with me to put together the on-line course unfortunately had to back out due to new working tasks. In order to ease the pressure on MSE to find a new faculty member to work with me at this late date, I offered to teach half of a classroom lecture course on Biomaterials so that I could free up time for the course instructor to work with me on developing the on-line course. Luckily Dr Lisa Lao, Lecturer at MSE who was scheduled to teach the classroom lecture course on Biomaterials for the first time during the autumn 2017, agreed to this. Discussions and Skype meetings about the on-line course started in June 2017. Unfortunately, however, I was not able to put time into working on either course before physically arriving to NTU in August 2017.

Tasks and responsibilities

My position at NTU was Guest Professor at MSE, and I was referred to as “Prof Julie” – a bit out of the ordinary for a Swedish professor, but enjoyable just the same. Prior to my arrival, the teaching tasks and responsibilities had already been divided up for the two courses. In fact Dr Lisa Lao had already finished

recording all of her lectures for the on-line masters course as well as preparing her lectures for the classroom lecture course, which was an amazing feat!

MS4013 Biomaterials – a classroom lecture course

This is a required course for all 4th year Materials Science Bachelor degree student. Since there are over 200 students accepted each year to the program, the course runs twice a year with roughly half of the students in each term. However, this past autumn 2017, there were 180 students taking the course. Dr. Lisa Lao and I were replacing the ordinary course instructor, who was on leave.

We received strict instructions to not change anything about the course – including the content and how it was organized and executed. We were given the Powepoint files for all 10 lectures in the course and there was a teaching assistant assigned to run the same 5 tutorial sessions as in previous years. Needless to say, there was very little pedagogical input or work put into this course on my part, except for understanding, interpreting and making some small changes to the Powerpoint files, eg inclusion of content maps for each lecture.

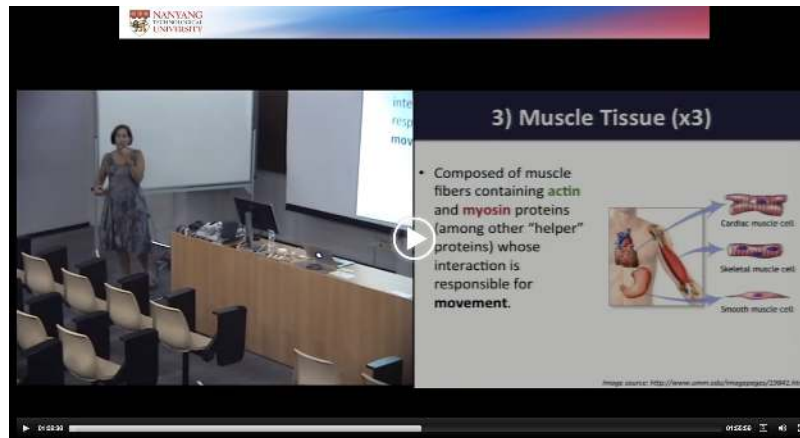
We split the course in half – Dr Lisa Lao gave the first 5 lectures + multiple choice quiz and I gave the second 5 lectures + multiple choice quiz. We split the final exam into two equal parts, which consisted of open-ended questions. Unfortunately, there was very little discussion between us about the two halves of the course regarding content or pedagogy, due mainly to the “no-change” instructions we received as well as our heavy remaining workload. In addition, Dr Lisa Lao had already prepared her half of the course by the time I had arrived, which coincided more or less with the start of the course.

The overall course grades at MSE need to be fit to a predefined distribution curve, which proved to be a new and tedious experience for me. This required re-marking several times 180 exam papers within a limited amount of time (all grades must be set within one week after the final exam), and adjusting my marks with respect to changes in grading on the other half of the exam, in order to reach the expected grade distribution. In the end, we succeeded!

One recommendation I have for the future is to have the multiple choice quizzes be administered and graded by the Learning Management System rather than in paper format. However I understand that it is currently not feasible to assure that students would not cheat if administering the quiz on-line. Perhaps IT infrastructure development is needed to allow this to happen. Some differences I experienced between my Chalmers courses and NTU is that the NTU quiz and exam questions were based solely on the Powepoint files from the lectures and tutorials. I was surprised that there was no homework and so few deeper learning activities in the course, and that the students were not accustomed to being tested on the textbook reading assignments as well.

It is perhaps difficult to have such a topic-focused course as a *required* course in the last year of the bachelor studies, when, according to the students I discussed this with, most students have already identified which subject area they wish to

specialize in. Only a portion of the students in the course was actually interested in Biomaterials. This, combined with the fact that all lectures are automatically recorded and uploaded onto the course homepage on the Learning Management System (LMS) iNTU Learn, contributed to the fact that there were typically only 30-40 students attending the lectures. Additionally, attendance at lectures is not obligatory. There is also the possibility that the students did not prefer my lectures and/or lecturing style. In any case, there were typically few students attending the lectures, and they sat all the way in the back of the lecture hall, possibly to avoid being caught in the recording camera's field of view (? See images below). There was very limited interaction between the students and myself, despite efforts otherwise. Some students did come to me during the breaks or after the lectures to ask questions or to point out errors or inconsistencies in the Powerpoint slides. In addition, there was a flurry of emails during the week prior to the exam with questions on course content and requests for consultation sessions. This behavior apparently holds world-over!



A screen shot of how the recorded lectures appear to the students when viewed on the LMS iNTU Learn. Actual video recording of the lecture and lecturer appears on the left, together with a focused view of the associated PowerPoint slide on the right.



Typical class attendance and seating during the lectures in MS4013 (180 students registered).

MS742M Biomaterials – creating a new on-line Masters course

My main task during the STINT sabbatical involved preparing and recording a series of lectures on biomaterials, creating in-video quiz questions, preparing continuous assessment MCQs, and discussing/planning for the final exam or project work in the course. As I would no longer be working at NTU when the course was offered, the MSE faculty member needed to be comfortable with the student tasks and assessment methods, and be able to assess the students' performance on all topics of the course.

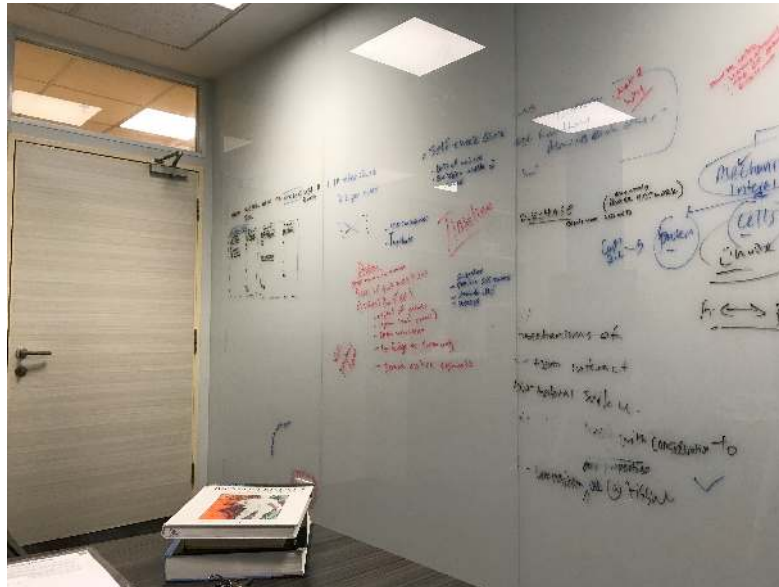
As I have already mentioned above, the MSE faculty member also working on this course, Dr Lisa Lao, had already chosen the topics of her lectures and recorded them prior to my arrival. So I was able to define the content of the remaining lecture topics and group them into different Modules. By far the biggest challenge for me was to distill out the most important content of what would normally be a 2 x 45 min lecture and condense it down into a 10 minute recorded lecture. Unfortunately, I have to report that I did not succeed in reaching this desired lecture length in any of my 21 lectures.

Another major challenge we faced was deciding which level to set the lectures (and the course) at, as it was not clear who would be the target group of students taking the course. There were three possible groups of individuals: Skills future students – working middle age/older individuals wanting to switch or further their careers by obtaining a Masters Degree while still working full time; graduate students working at MSE/NTU; or possibly even undergraduate students, if the on-line courses were offered to them as alternative or replacements for the current lecture courses. In the end, I matched the level Dr Lisa Lao had already set in her completed lectures so the level would be consistent through out the course modules.

The production of the video-taped lectures was a major ordeal, coordinated by the Learning Management Team at the NTU Center for Information Technology Services (CITS). There was a team of specialists that included Learning Designers skilled in teaching and pedagogy, content editor, visual editor working on production of graphics and animations, and recording technicians and video editors who clipped and edited the final files. Each person screened and edited my Powepoint slides from different perspectives, regarding pedagogical approach and clarity, spelling and grammar, amount of information per slide, allowable choice of images (not copyright protected), proper references and acceptable sources, asthetic layout, image quality, etc. Once each Powerpoint file was approved, reviewed and finalized, filming commenced in the recording studio, sometimes segments needed to be re-filmed. The recorded videos were edited, reviewed by myself and a learning designer, and then further edited. Once the videos were complete, they were transcribed, and in-video MCQ quiz questions were inserted at specified time points in the video. Needless to say, there was a well-defined task flow and time plan contained in a master excel file produced by the managing Learning Designer, Ms YY Tan. Completing the production of the recorded lectures by the end of December required a very tight and packed schedule for all of us involved. It quickly became clear to me that this

was not a “feet up on your desk” type of sabbatical, and there was little hope of me traveling around South East Asia...

But we managed to complete the course by the course start date, thanks to the many hours and hard work by all the team members, including the on-line Master Program coordinator Ms Jiang Shuo and the team at Parmenides in Germany! The course is now running for the first time during the Spring 2018 term as a beta-version with graduate students at NTU, and revisions will be addressed during the autumn 2018 after obtaining feedback from the students.



Planning the Modules for the on-line course on my office wall



Filming a lecture in front of the interactive white board in the CITS recording studio

Activities during the semester

Additional activities I participated in during the autumn at NTU include the STINT Summer School on Linking Research and Teaching in Higher Education, which brought together Swedish and NTU teachers and researchers in a hands-on workshop that culminated in a manuscript on the topic which was submitted to a journal. I also attended the NTU TELFest – a huge, one-day festival showcasing the latest technologies available at NTU for technology enhanced learning. This ranged from the use of augmented reality/virtual reality in course activities to IT platforms and the new learning management system at NTU called iNTULearn. The target group was clearly the NTU students - there were live rock bands performing on stage, lottery prizes for students who attended a minimum number of booths and who tried different technologies, free food, etc. I also attended a one-day seminar co-organized by the Centre for IT Services (CITS) and the Teaching, Learning and Pedagogy Division (TLPD) called “IITS 2017 Pedagogies of learning technologies: How does technology create new possibilities for learning?”. The aim of this annual seminar on innovations in teaching is to share good teaching practices ongoing at NTU. In addition, I sat in on a Research Integrity Workshop for all new doctoral students working at MSE. I attended a course on how to use the learning management system iNTULearn, and wanted to take a course on Team Based Learning (TBL), but was not able to fit this into my schedule.

During my stay at MSE, I was not part of any research group, nor was I included in the faculty meetings, any discussion or working groups regarding teaching, or on the faculty email list or internal webpages. I believe this is the department/university policy for guest faculty members. I did, however, get invited to the monthly faculty happy hour, typically held on the last Friday of every month, which was an informal gathering in the reception area of the building. In addition, I received the departmental emails listing upcoming seminars and thesis defenses, some of which I managed to attend. I had Googled the research activities of the permanent faculty at the MSE, emailed the ones working in areas similar to me, and arranged for meetings with them to exchange information on our respective research projects.

Instead of being part of a research group, I was instead part of a group of MSE faculty and staff working on the on-line Masters Program. We had a couple of meetings during the term to discuss logistics and updates on the ATLAS web platform as well as progress on the production of the individual courses. I often chatted with the other faculty members about our approach to develop our respective courses, about filming lectures in the studio, tips, etc. These contacts were valuable for me and appreciated.

Important lessons

The pedagogical highlight of my sabbatical was working with the Learning Design Team at CITS and in particular Ms YY Tan, a highly experienced and skilled pedagogy expert and Learning Designer Manager. I truly enjoyed and learned from our many discussions on curriculum, course and lecture design; her pedagogical coaching during my struggles with structuring the course content, deciding the order of topics and distilling out the key concepts and ways to present them (eg interactive timelines); and her suggestion for producing

content maps of the modules and of each individual lecture, presenting for the students how we will move through the topics and how they are related to each other in a complimentary video made for each recorded lecture. I have taken this content mapping idea back with me to Sweden.

Other important and rewarding *experiences* I gained during my time as a STINT Fellow include not being the person in charge of the project I am working on, which is typically the case for me in at Chalmers, as well as learning to “let go” of my lecture materials, letting them evolve and improve in the hands of others with complementary expertise. In addition, I sincerely enjoyed working and living in a diverse and multicultural environment, where communication and respect between individuals is not taken for granted or ignored, rather constantly worked hard at to continuously be achieved.

Comparison between the foreign and the home institutions (in Sweden)

Of the many similarities and differences between MSE & NTU and the Dept of Physics & Chalmers, I choose to highlight only one aspect here in this report.

- Pedagogy and its importance and the status of pedagogical merits compared to research merits

I believe that on the faculty level, there is no difference in the status of pedagogy compared to research at both institutions – research carries much greater weight in the two university cultures and practice. However, NTU has officially and outwardly expressed a goal, supported with much financing, infrastructure and personnel, on flipping half of the university’s courses to incorporate technology enhanced learning /blended learning within the coming years. The on-line masters program in Materials Science is one example of this initiative. This top-down approach at NTU is very admirable and attractive from a STINT Fellow’s perspective. My experience of my home institution is that Chalmers University of Technology focuses on the individual faculty member’s development of their Pedagogical Portfolio and completion of courses required for faculty promotions. Each faculty member is encouraged and rewarded when advancing their teaching competence within the performance evaluation discussions. In this way incentive is provided for faculty to revise their courses on their own initiative, time and money, a sort of bottom-up approach. Chalmers has nowhere near the level of resources, infrastructure and personnel to assist with incorporating technology enhanced learning /blended learning into course activities as NTU, unfortunately. But, at the end of the day, both universities recognize the importance and need to meet today’s students learning behaviors and needs.

The NTU faculty is evaluated and ranked in their yearly performance reviews with a 5-5-2 point system. There is a maximum of 5 points for research, 5 for teaching, 2 for outreach. While it appears that research and teaching are weighted equally, the 5 points for teaching come directly from the average course evaluation score from students. In fact, the course evaluation is in reality an “instructor” evaluation, and teachers with good performance evaluations from students do everything they can to maintain this level of feedback and to

keep the students “happy”. In this system, things become tricky when there is more than one instructor teaching a course, and separate “course” review forms/web interfaces are generated for each instructor in any course. Hence the keen interest in clearly separating instructors input and activities in any given course. In my opinion, this lowers the motivation for pedagogical exchange and development amongst the faculty. As the overall ranking of faculty within the school is connected to distribution of yearly salary bonuses and teaching tasks, I believe this must contribute to a competitive rather than collegial working environment amongst the faculty.

If the 5 teaching points were instead split into contributions from student evaluation as well as contributions for attempts to improve ones teaching, to incorporate new teaching approaches that encourage deeper learning, such as problem based learning or team based learning, technology enhanced learning, flipped classrooms etc, faculty would be rewarded for developing both their own teaching abilities at the same time advancing the pedagogical approach for the school and university at large. Such efforts would presumably result in enhanced learning experiences by the students. One can imagine the scenario where students start to demand that teachers incorporate new teaching and learning technologies and approaches, and that the teachers that do so would receive higher scores in the “course” evaluation. I believe this is one of the reasons behind the TELFest (see description above) being marketed towards the NTU students rather than the faculty.

University rankings are very much in focus in Asia and other parts of the world, while they don’t seem to have had as much attention in Scandinavia, at least not in my experience. However, this appears to be changing at the moment, and Chalmers is putting more and more attention on quantitative indices of quality and our national and international ranking. The vision statement for the School of Materials Science and Engineering at NTU is “to be the leading materials science and engineering and engineering institution worldwide”. They managed to achieve this position according to at least one ranking index, U.S. News Best Global Universities Rankings, moving from the number 2 spot to the number 1 position this past October – a fantastic achievement! As I understand, there has been a conscious and active plan over many years to align recruitments, activities and output at the department with the quantitative parameters used to calculate the ranking scores, in order to reach this goal. I think this is fantastic. One way that we maybe can influence the relative status of pedagogical merits compared to research merits in universities in general would be to increase the relative weighting of pedagogical merits used in calculating the overall university scores in the various ranking systems existing today.

Action plan - topics to address and if possible introduce in Sweden

The adjustment back to Swedish life was more challenging than I had anticipated. Besides the differences in climate and amount of daylight between Singapore and Sweden at mid-winter, and the change in culture, food and not least architecture, it was the sudden distancing from the colleagues and friends at NTU with whom I had such an intense contact with during the previous five

month period that was difficult to adjust to. Luckily we continue to work on the online course development together. I am hoping that I will be able to return to NTU next year for a more comprehensive revision/upgrade of the on-line course, to incorporate eg films showcasing biomaterials research and spin-off companies from MSE. It would also be interesting to engage in a pedagogy research project to investigate student learning in the on-line course at NTU as compared to the “in classroom” course, based on the same content, at Chalmers.

I will present a summary of what I did and learned at NTU during my STINT Teaching Sabbatical, as well as what it was like to live and work in Singapore, at a seminar for the Department of Physics, as well as for the Chemistry Department at Chalmers. I would like to share the work on content mapping, as well as to demonstrate the ATLAS on-line course platform under development, and will in particular invite in the group of teaching mentors that we have at the Department of Physics. I also intend to use the lectures I recorded to “flip” the biomaterials courses I teach at Chalmers. This work will begin on a lecture-by-lecture basis, and hopefully the majority of the courses will incorporate blended learning over next few years. Additionally, I have shared my reflections on the university ranking systems, ranking of individual faculty members, and quality assessment schemes with the people responsible for the ongoing Chalmers-wide assessment of research quality, as well as the Chalmers Management group.

Acknowledgements

The list of individuals who I would like to thank for helping me in one way or another in this journey is very long, and I have already personally thanked everyone, many times more than once. I would therefore like to address my sincere gratitude to Christofer Carlsson and the entire STINT organization for continuing to offer and develop the Teaching Sabbatical program for Swedish university teachers to go abroad and enrich their work and their lives.



View from my apartment overlooking the green NTU campus, the famous Arts, Design and Media building, and Hall 8 student residence