

Copenhagen Scholars Participant Comments Fall 2017

Joseph Donermeyer '18 – Computer Science Caltech/ Department of Applied Mathematics and Computer Science DTU

Studying abroad at DTU has been a great decision. My semester abroad has been so much fun. There is a reason that Denmark is one of the happiest countries in the world. There may be the occasional bit of rain, but it does not rain on the parade. Denmark is a very enjoyable place to live.

My favorite part of studying abroad has been the people. All the Danes I've met have been friendly and inviting. There is no problem with a language barrier as pretty much everyone I've encountered in Denmark speaks English very well. It is very easy to make friends at DTU. Since DTU allows Caltech students to live in student housing, you will be surrounded by Danish students. There are many parties and frequent social events that you can attend with other members of your residence. Between the Danes I live with and the group of other international students I met at orientation, I've made so many great friendships.

One thing I like about DTU is that it takes a different approach to learning than Caltech. For one thing, homework sets are often ungraded and are seen as tools to further understanding of the material more so than miniature examinations. This worked really well for me as it makes the assignments less stressful and allows me to focus more on what I should be taking away from the assignment. Since this also requires more personal responsibility to complete these assignments, I think it really helps emphasize taking your learning into your own hands. DTU courses also tend to be less focused on theory than Caltech courses. It's really great to develop some practical skills to complement the strong theoretical background Caltech offers.

At DTU, lectures tend to meet one time per week in 4 hour blocks. The first 2 hours are a traditional lecture and the following 2 hours are an exercise section where students are able to ask questions, clarify their understanding of the lecture, and work on sets together. 4 hours might sound like a long time, but there are plenty of 10 minute breaks in the blocks that make it easy to refresh and stay focused. The exercise sessions are great for promoting collaboration and incentivizing students to work right after lecture when the newly learned material is still fresh in your mind.

Another nice thing about DTU is how easy it is to get around. DTU is situated in Lyngby, a convenient bus ride away the heart of the Copenhagen. Copenhagen is a beautiful city with a traditional yet modern feel that looks amazing when lit up at night. Getting to the airport is easy and making weekend trips outside of

the country is very doable. Since classes meet fewer times per week compared to Caltech, there is a good chance that your schedule will not have class on certain days, allowing even more time to travel. Sweden, the Netherlands and Germany are all very close and there is a weeklong fall break that can be used for more extensive travel. There are a multitude of cheap flights and busses that make it very easy to get around Europe.

Though travel is easy, it might be hard to leave DTU. DTU is a lot of fun and I would recommend it to anyone. My study abroad experience has been both academically and socially fulfilling in a completely new way. It has been great to take a semester away from Caltech and experience the world. I hope that as many people as possible get a chance to do the same.

Devi Ganapathi '18 – Chemical Engineering, Caltech/Chemical Engineering, DTU

Having lived in Los Angeles my entire life, I was motivated to study abroad partially by the fear of never having the chance to live somewhere other than southern California. After spending almost two months in Copenhagen, I've experienced a completely different university, climate, and culture.

I chose to study at DTU mainly due to Denmark's commitment to sustainability (and definitely not my obsession with Vikings). I am very passionate about renewable energy practices, and it made sense that a country which pioneers sustainable technologies would incorporate these teachings at the university level. As a senior in Chemical Engineering, I'm done with most of my core requirements for the major, so the classes I'm taking here will count towards my track elective requirements, allowing me a greater level of flexibility. There are numerous courses offered here that focus on sustainability in practice and emphasize application of these technologies in the real world - I've taken advantage of this by enrolling in several of them.

For one of my classes, Development of Solar Energy Systems, I have been lucky enough to get involved in a research project as part of the course. This project is directly applicable to renewable energy technologies, and is something that I've become incredibly fascinated with. The motivation behind this project is to capture solar energy and store it in the form of latent heat in phase change materials. This energy can then be used at a future time for water or space heating applications in homes by triggering the transition from liquid to solid in the material, thus releasing heat. This research captures one of my favorite things about the academics at DTU – it tends to be far more applied, less theoretical, than the work at Caltech. Both theory and application are important, but at Caltech, I often feel like we get so caught up in understanding fundamentals that we often forget the motivation behind our work. DTU is

refreshing in that I can clearly see how my work here will contribute to a sustainable future.

Another aspect of DTU that I have enjoyed is the large presence of international students on campus. Almost a quarter of the students here are non-Danes, which means that I get to talk to people from all over the world. I've never been to Europe, and I won't have time to see all of it during this semester, but being able to interact with students of different nationalities makes up for that.

The ability to travel and see different parts of Europe was another reason I chose to study abroad, and my expectations have been surpassed. Traveling is relatively cheap, easy, and feasible with the nearly four day weekends my schedule has granted me. I recently took a trip to Oslo, Norway, and during the fall break (week off in the middle of the semester that was traditionally intended for the potato harvest, but for us is now a vacation) I will be going to Germany, Italy, France, and the Netherlands. I am also planning weekend trips to Belgium, Sweden, and Iceland. I look forward to spending time in all these places, and hopefully the language barrier won't hinder my exploration!

Overall, I'm very grateful to have had this opportunity to study abroad. I initially thought that because of the large course load for the chemical engineering major, I wouldn't be able to satisfy my major requirements if I studied abroad. However, a recurring theme that I've learned through this whole process is that with the appropriate planning, anything is possible, and the outcome can be amazing.

Yiwei Jiang '18 – Chemical Engineering, Caltech/Chemical Engineering, DTU

Studying abroad in Copenhagen at DTU has been an experience like none other. I have been planning to study abroad since freshman year, and it feels like a great way to begin senior year. After the constant academic stress of not falling behind at Caltech, the more relaxed pace at DTU is a welcome change.

Instead of weekly problem sets, the focus is more on long-term group projects. The emphasis is on applying the material taught to a practical case study. In comparison to Caltech, students at DTU have much more academic flexibility and freedom since the final grades are dependent on either group projects/presentations or a written final or a combination of both; rather than problem sets, midterms, and finals. Most of the work to be done outside of lecture is optional, but highly recommended, so it's really up to you to dictate how much effort you put into classes. As a result, I think that people at DTU have a much better and healthier work-study-life balance.

Courses at DTU are taught on a block schedule, so you only meet once a week for four hours at a time. However, don't be daunted, as the four hours are not simply spent with a professor just lecturing at you. We have problem solving sessions, group work problems, and debates to break up the monotony of lectures. One of the major reasons I wanted to study abroad at DTU is the emphasis placed on practical applications. All three of the chemical engineering courses I am taking at DTU heavily emphasize industrial applications, and the professors often use real-life situations from Danish companies that they've consulted for as examples for the material being taught in class. It is an interesting and different approach from Caltech's rigorous, theoretical teaching style that I find very refreshing.

Another rewarding aspect of study abroad is being able to travel freely to different countries and experience novel sights, exotic foods, interesting cultures, new people, and unique experiences. Since all the European countries are fairly close to each other and don't require visas or other paperwork, you can just hop on an overnight bus or a short flight or train ride and visit another country in a matter of hours. Thus far, I have been to Berlin, Amsterdam, Madrid, Barcelona, Marrakech, and Porto. I have further plans to travel to London, Paris, Italy, and Greece. Very rarely do people have the freedom and funds to sustain such intensive travels, but study abroad affords the opportunity to do so. Surprisingly, budget airlines and Airbnbs don't really cost that much. If you travel in a group, it makes things much cheaper. Also, compared to Denmark, generally food at other countries is cheaper so you actually save on meal costs when traveling, as unbelievable as it seems. Since you would already have to pay for board costs, why not spend it on delicious food?

One of my major reservations about studying abroad in Denmark was the language, since I can't speak any Danish. However, my worries were completely unfounded. Not only do the Danes speak perfect English, a lot of the signs and public transit announcements are in English as well as Danish. Communication is not an issue, and even if you do get lost you can always ask someone for directions since the Danes are perfectly friendly and willing to help.

Overall, I would definitely recommend studying abroad. I think that the pros outweigh the cons and it's a rare opportunity that you won't be able to experience later in life.

Joon Hee Lee '18 - Computer Science, Caltech / Computer Science, DTU
Studying abroad at DTU has been full of eye-opening experiences. Having lived in Southern California for most of my life, I wanted to go outside my comfort zone by taking this rare opportunity to live in Europe for several months. Although I considered going to the U.K., I decided to study abroad in Denmark for an even more novel environment.

First of all, Copenhagen is an amazing city with plenty of cultural events and famous attractions, including the beautiful Nyhavn and Tivoli, one of the oldest amusement parks in the world. The public transportation system is great, allowing you to easily explore different parts of the city. Although DTU itself is in Lyngby, the buses will take you directly to Copenhagen in about 40 minutes.

In addition, it's easy and affordable to take weekend trips to nearby countries during the term. There is a weeklong break in the middle of the semester, which is the perfect time for traveling. Personally, I've taken trips to Berlin, Amsterdam, Barcelona, Madrid, Marrakech (in Morocco), and Porto in the last two months, and plan to visit many other cities including London, Venice, and Oslo. Each European (and African!) city has its own, unique color, and these trips really allow you to be adventurous and explore many parts of the world rather than being confined to just Copenhagen or Denmark.

The courses in Denmark are very different from those at Caltech. Currently, I'm taking 4 courses at DTU, consisting of 2 computer science courses and 2 electives, and a Danish language course at KU. DTU has a block system, which means that most courses have a weekly 4-hour block. Each block usually consists of a 2-hour lecture followed by a 2-hour period in which you work on exercises or projects with TA's around. This means that most of your work is done in class with supervision, which is a different style from the more independent approach at Caltech. While the classes may cover less material due to the slower pace, the courses are designed to ensure that you really learn all of the material that is taught.

DTU courses also tend to be much more industry-oriented than those at Caltech. For example, one of my CS classes, Computational Tools for Big Data (02807), teaches Apache Spark and GraphQL, technologies that I've encountered in my previous software engineering internships. In addition, another course, Introduction to Financial Engineering (42104), teaches practical techniques regarding stocks rather than financial theory. These classes nicely supplement the theoretical learning at Caltech and provide opportunities to broaden your education.

Finally, living in Kampsax, one of the student dormitories at DTU, is completely different from living in one of the houses at Caltech. At Kampsax you have your own furnished room and bathroom, which is an experience most students will not have while at Caltech. Also, you share the communal kitchen with your "kitchen group". Usually, a kitchen group is mostly comprised of Danish students, who speak fluent English and are very nice and approachable. The kitchen group participates in many activities together, such as the Tour de Kampsax party, in which each group hosts a party for other groups, or the weekly dinner, where people take turns cooking for others in the group. These weekly dinners are

great as they give you the chance to interact with your Danish neighbors and to try homemade Danish dishes. Also, along with the high prices at most restaurants, they will force you to become proficient at cooking, an essential life skill most Caltech students lack! Finally, Kampsax has its own bar and a small music room (with amps, keyboards, and a drum set), where you can go to have fun and meet new people.

Overall, my time at DTU has been a series of awesome new experiences. Studying abroad is truly a once-in-a-lifetime opportunity, and I can't imagine missing out on all the things I've done so far in only two months. They say that Denmark is one of the happiest countries on Earth, and you will definitely be taking some of that happiness back with you after studying abroad at DTU.

Grace Ma '18 – Electrical Engineering, Caltech/Electrical Engineering, DTU

Ever since I heard about the Study Abroad Program in my freshman year, I was determined to study abroad in my senior year and I'm so glad I was able to study abroad in Denmark of all places. Studying at DTU has allowed me to both continue my academic studies and also to truly enjoy the study abroad experience. More importantly, the real-life skills I've learned while living here and the friends I've made from all over the world will stay with me for the rest of my life.

One of my favorite parts about studying abroad is the firsthand exposure to a new culture. They say Denmark is the happiest country in the world and that is something I've slowly come to understand over the course of my time living here. At DTU, I live at the on-campus dorm, Kampsax. Since most of the students living in Kampsax are Danish, I've really been able to immerse myself in Danish culture. The students at Kampsax are also divided into "kitchens", and these kitchens serve as the social hub in the dorms. My kitchenmates often gather together to cook large communal meals, watch TV shows together (The Great Bake-Off is a kitchen favorite), play video/board games, and relax and have a beer. From my kitchen, I've gotten a great sense of hygge – a Danish word for the indescribable "coziness" you feel when you're in a warm atmosphere and enjoying a good time with your friends.

In terms of academics, studying at DTU was the perfect fit for me as an electrical engineering major. There are many electrical engineering classes available and in a wide variety of subjects that aren't available at Caltech. For example, I'm taking a course on Power Engineering where we are developing a semester-long project. In this project, we are completely designing the power grid for a small country, which I think is really interesting and practical. In general, I've noticed that classes here tend to be more practical, so it's great to be able to put the theory I've learned at Caltech into action.

The learning style at DTU is extremely different from Caltech in that it's very independently driven. Rather than weekly sets, there are optional weekly exercises. Although you don't get graded on the exercises, it's still crucial to complete them in order to understand the material. There is also a strong emphasis on group projects; I have group projects in three out of my four classes. The group projects have given me the chance to work with international students in other majors; it's amazing to put everyone's different skillsets and perspectives together on a single project.

Furthermore, the block schedule here at DTU has allowed me to experience a different way of learning. Each class is scheduled for four hours long, either in the morning block or afternoon block. It may sound like a lot, but it's usually divided into two hours of lecture (with 2-3 ten or fifteen minute breaks in between) and then two hours of problem solving. There's always either a TA or professor present during the problem solving session so it's easy to get help.

Since there aren't weekly sets I have to worry about, I've had more free time at DTU than at Caltech, which has afforded me the chance to travel to several countries in Europe. Since I don't have classes on Monday, I've been able to take trips over the weekend. It's unbelievable that I can literally go to a different country on a weekend trip! So far I've been to Berlin and Amsterdam, which are two very different but equally beautiful cities. There's also a weeklong break in October and I'm planning on going to Spain, Portugal, and Morocco. It's really great to have the flexibility in my coursework to get a chance to explore Europe and have fun. Overall, studying abroad at DTU has really broadened my horizons on the world and taught me many lifelong lessons I never would have been able to learn at Caltech.

Sophus Shackford '19 – Electrical Engineering, Caltech/ Electrical Engineering, DTU

I chose to study abroad in order to take a break from the unending (and sometimes unnecessary) rigor of Caltech academics. At DTU in particular, we don't have weekly problem sets that are handed in for a grade, nor do most of my classes have midterms. Most of my grade is based on either group projects or a final in December. Every week, we get problem sets to learn the material, but we don't have to turn them in and so there is no pressure of a deadline. As long as you do the work, you will learn, but you can learn at a more relaxed pace. Since the term is a 15-week semester instead of an 10-week trimester like Caltech, the teaching pace is slower and a lot easier to follow. Because I struggled in my sophomore year at Caltech, I only took four classes in Denmark—three at DTU, and a Danish language class at KU.

Because I went to Copenhagen twice a week for the Danish language class, I decided to buy a bike to make the journey in an attempt to save money. All

Copenhagen roads have bike lanes, so the city is extremely bike-friendly, and it is a great way to see the city without having to wait for the bus or train. The trek from Lyngby (the Copenhagen suburb where DTU resides) to south Copenhagen where the Danish language class is takes about an hour on bike, about fifteen more minutes than public transportation takes. I believe having a bike was great for a while when it was still warm, but I learned I do not have the tolerance for biking in the cold and wet when winter begins to set in. I decided to sell my bike to pay for train tickets, but I do not regret the experiences I had with it.

Copenhagen weather is pleasant in the summer, with hit-and-miss rain expected every few days. The fall begins to set in around the middle of September. The sun disappears under a constant sheath of clouds, and rain becomes far more common. The temperature drops to 40°-50° F and winds pick up. The result is a windy, chilly, rainy winter. On the bright side, the temperature almost never drops below freezing and so it rarely snows. For these reasons, I learned better investment is not a puffy winter coat, but a sturdy raincoat. I bought a neon yellow raincoat at an outdoors store in Lyngby for about \$100 USD which has proved useful on dozens of occasions and worth the price. You can also buy rain jackets at thrift stores in the area like Red Kors and Danmission, but it is tricky to tell if they're fully rainproof or not. I made that mistake, and thrift store purchases are not returnable!

Because it is a little yucky in the late months of the year, Denmark is a great place to be if you like to nestle in the wintertime. It doesn't get cold enough in southern California to turn up the heat and watch a movie under the blankets in your bed while it pours outside, but Denmark gives you plenty of opportunities. I like to knit, so I brought a ton of yarn with me when I moved to DTU. When I don't feel like leaving my room on the weekends, I sit in bed and knit and watch TV on my laptop for as long as I feel like. Other people like to cook or bake on rainy days, and still others play video games, call their families, hang out with friends, sleep late, read books, or watch movies. If you miss east coast winters, then Denmark is a good place for you!