Proposal (DTU)

I. Essay

I've lived in California for most of my life, and there are many perks of having family less than an hour's drive away from campus. This is why spending a term studying abroad in a completely different environment, on the other side of the world, would be an amazing opportunity, both for my academic and personal growth.

As I naturally have a fairly reserved personality, studying abroad would push me out of my comfort zone and force me to meet new people, create new experiences, and expand my world view. I think this would be a healthy step for me, as college is a time where many young people, including me, are still trying to figure out who they are. The only other country I've traveled to outside of the US is China, because of extended family, so going abroad to Europe would be completely new, and different culture-wise from everything I know.

Additionally, taking courses in my major at a different university (in a completely different continent) would be good for intellectual growth, as I would get the chance to learn about different topics, and different perspectives that would be otherwise unavailable at Caltech. I am also considering applying to grad school at this point, so being immersed as a student in another school would give me a better idea of what other universities are like, as Caltech is unique in many ways (especially its size!).

After attending all the relevant study abroad meetings both last year and this year (as a junior), and also talking to people who have previously participated in the program, I feel extremely confident about my decision to apply. Everyone has had positive experiences, and learned and grew lot, and in the end no one ever regretted going abroad. I know this is an opportunity not too many people get the chance to experience, so I'm glad and grateful this program exists. I know if I were to be accepted, I would create memories I would remember and cherish for a lifetime.

II. Program Fit

I think studying abroad at DTU would be the best fit for me. I enjoy learning languages in my free time, so I look forward to taking Danish Language course. Since I don't have much, if any, prior knowledge of Denmark or its culture, I'm even more excited to learn about it and come back more knowledgeable of the world than before I left. I've never been to Copenhagen, or even Europe before, and have always wanted to, so this would be a great opportunity. Another thing I look forward to doing at DTU is taking courses I wouldn't otherwise be able to take, like cognitive modeling. I think for these various reasons, DTU would be a great fit for me for study abroad.

III. Proposed Course List

Total ECTS: 27.5

Total CIT Units: 45

Course by Correspondence/Units: 0

1. Course Name and Number: Deep Learning: 02456

Faculty and Department: Department of Applied Mathematics and Computer Science

Level/Normal year taken: MSc

Semester: 1

Block/Schema Group: E2A

Teaching period: Autumn

ECTS: 5

Caltech units: 9

Caltech evaluator:

Type of Caltech credit: Option elective (CS)

CIT equivalent course: N/A

Course description: Machine perception of natural signals has improved a lot in the recent years thanks to deep learning (DL). Improved image recognition with DL will make self-driving cars possible and is leading to more accurate image-based medical diagnosis. Improved speech recognition and natural language processing with DL will lead to many new intelligent applications within health-care and IT. Pattern recognition with DL in large datasets will give new tools for drug discovery, condition monitoring and many other data-driven applications.

The purpose of this course is to give the student a detailed understanding of the deep artificial neural network models, their training, computational frameworks for deployment on fast graphical processing units, their limitations and how to formulate learning in a diverse range of settings. These settings include classification, regression, sequences and other types of structured input and outputs and for reasoning in complex environments.

2. Course Name and Number: Introduction to Cognitive Science: 02454

Faculty and Department: Department of Applied Mathematics and Computer Science

Level/Normal year taken: MSc

Semester: 1

Block/ Schema Group: E3A

Teaching period: Autumn

ECTS: 5

Caltech units: 9

Caltech evaluator:

Type of Caltech credit: Option elective

CIT equivalent course: N/A

Course description: Humans and computers alike process information. Many computing problems, such as face recognition, language understanding and content-based search, are trivial for humans but difficult to implement in machines. Vice versa, many computing problems are simple for machines but difficult for humans. This is because humans and computers process information in different ways.

An understanding of cognition, i.e. how humans process information, can be helpful when developing new algorithms and when designing systems in which humans and computers interact. It is also useful for understanding the human brain and cognition in general.

The course introduces several methods for studying how humans process information and interaction socially. Behavioral measures, such as response time and accuracy is the main focus but physiological measures such as EEG and fMRI are also introduced.

The course describes how cognition can be divided into modules such as perception, attention and memory. The function of these modules is then described in relation to major theories of cognition both quantitative and qualitative. The results from key experiments are integral to the course.

3. Course Name and Number: Cognitive Modelling: 02458

Faculty and Department: Department of Applied Mathematics and Computer Science

Level/Normal year taken: MSc

Semester: 1

Block/ Schema Group: E2B

Teaching period: Autumn

ECTS: 5

Caltech units: 9

Caltech evaluator:

Type of Caltech credit: Option elective

CIT equivalent course: N/A

Course description: Theories of cognition as information processing can be implemented in quantitative models. In this course, we introduce models of attention, memory and perception. We extract commonalities and discuss model variations. The students will learn to evaluate models based on empirical and simulated data using mathematical analysis programs.

4. Course Name and Number: Introduction to Cyber Systems: 02135

Faculty and Department: Department of Applied Mathematics and Computer Science

Level/Normal year taken: BSc

Semester: 1

Block/ Schema Group: E4A

Teaching period: Autumn

ECTS: 5

Caltech units: 9

Caltech evaluator:

Type of Caltech credit: Option elective

CIT equivalent course: N/A

Course description: Computer systems have become an integral part of our society. They are the foundation for a wide range of technologies from Internet-of-Things and Smartphones to the Cloud. In this course, we will study how modern computers work. We will understand what the limitations of computers are as well as what opportunities are possible.

5. Course Name and Number: Danish Language Course

Faculty and Department: Department of Nordic Studies and Linguistics

Level/Normal year taken: Bachelor

Semester: 1

Block/ Schema Group: N/A

Teaching period: Autumn

ECTS: 7.5

Caltech units: 9

Caltech evaluator:

Type of Caltech credit: General HSS elective

CIT equivalent course: N/A

Course description: The courses in Danish as a Foreign Language for International Students at the University of Copenhagen consist of intensive language instruction classes. Danish is studied and taught as a foreign language for communicative as well as academic purposes. In accordance with a discursive view of language and a primarily cognitive view of language acquisition the courses integrate theoretical knowledge of lexicon, grammar and phonology in the process of developing communicative competences in modern Danish, spoken and written.

ECTS: 7.5

Caltech units: 9

Caltech evaluator:

Type of Caltech credit: General HSS elective

CIT equivalent course: N/A

Course description: The courses in Danish as a Foreign Language for International Students at the University of Copenhagen consist of intensive language instruction classes. Danish is studied and taught as a foreign language for communicative as well as academic purposes. In accordance with a discursive view of language and a primarily cognitive view of language acquisition the courses integrate theoretical knowledge of lexicon, grammar and phonology in the process of developing communicative competences in modern Danish, spoken and written.