



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

COLLEGE OF ARTS & SCIENCES

STUDY ABROAD OFFICE

FedEx GLOBAL EDUCATION CENTER  
CAMPUS BOX 3130  
CHAPEL HILL, NC 27599-3130

T 919.962-7002  
F 919.962-2262  
studyabroad.unc.edu

August 29, 2018

Administrative Board of the College of Arts & Sciences

Dear Colleagues:

The Study Abroad Office submits for your approval a proposal for the establishment of a new program to be offered beginning **Summer 2019** and continuing annually.

Proposed Program: **UNC Computer Science in Copenhagen**

Proposed Program Location: **Copenhagen, Denmark**

Faculty Program Leader: **Kristopher Jordan**

## Program Information

This proposed faculty-led program would be offered for **3+ weeks (3 credits)** during the **Summer** term.

**Program Rationale:** Computer science majors have very few options for studying abroad while working toward their major. There are currently no UNC faculty led CS programs abroad, despite the large demand for this experience from our growing pool of over 1200 UNC students. There are also a shortage of Experiential Education (EE) courses in our department. Offering this course abroad and choosing a project theme that is centered on our locale will serve an important, unmet need to UNC Computer Science students.

My focus during the school year are on the courses COMP101 and COMP110. I have 750 students per semester in these courses in the past two years and a total of over 4,000 students in the past 3 years. My first passion is introductory programming and growing access and equity in computer science and teaching 3 large sections of these courses each semester aligns with this primary motivation. My second passion in the field is modern web application development. Prior to teaching, I cofounded a web development consultancy that grew to over 15 employees and \$2 million in annual revenues and I served as its technical director. My professional career was focused on designing, developing, and deploying modern web applications for a wide range of organizations. Teaching COMP426: Modern Web Programming abroad offers me a chance to share this second passion and expertise with students, in a city I adore, without diluting the impact and reach of my introductory courses during the school year.

**Target Audience:** The target audience for this experience are rising juniors or advanced sophomores in the Computer Science major or minor. There may also be some rising seniors interested, however this group tends to place a high priority on finding summer internships which are limited by the end dates of this program and start dates of an internship.

To attract students, fellow computer science faculty and I in the introductory sequence will advertise



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

COLLEGE OF ARTS & SCIENCES

STUDY ABROAD OFFICE

FedEx GLOBAL EDUCATION CENTER  
CAMPUS BOX 3130  
CHAPEL HILL, NC 27599-3130

T 919.962-7002  
F 919.962-2262  
studyabroad.unc.edu

the program to students. I have an undergraduate teaching staff of over 50 students, 12 of whom have indicated a high likelihood of attending if offered in 2019. Additionally, I have sent a one-off survey to the UNC CS Facebook group and received "very likely to enroll" responses from another 15 students. With a more serious advertising effort and complete details on the offering, I believe we will have no setbacks in reaching capacity for this program.

**Anticipated Number of Students:** 20

**Student Levels Allowed:** Sophomore, Junior, or Senior

**Program Learning Objectives:** At the conclusion of the program, participants will be able to:

- design and develop a complete, modern web application using a combination of front-end (HTML5 and JavaScript) and back-end (custom server programs, APIs, and data stores) technologies
- recognize the global reach of modern web applications and the challenges of serving a locality and geographically diverse audience
- compare and select appropriate technical solutions for common web application use-cases and requirements
- practice common systems administration / developer operations techniques in provisioning and deploying applications to a production environment
- apply best practices in software engineering and security to the web development process
- differentiate and classify today's leading platforms, tools, and frameworks
- develop a web application whose content theme aligns with the study abroad experience that will serve as a portfolio piece in the internship hiring process

## Program Academics

**Proposed Course Name/Number:** COMP426 Modern Web Programming

**Course Description:** The World Wide Web has evolved over the past two decades from a relatively simply hypertext system of linked documents to a full-featured platform for developing interactive, distributed applications. This course will introduce students to the architecture of modern web-based applications and the key technologies that underlie them. Emphasis is placed on understanding web applications as examples of the Model-View-Controller design pattern, asynchronous event-driven programming (i.e., AJAX), and the use of RESTful interfaces to web services. Students will exercise their understanding of these concepts in a series of programming assignments using HTML5, CSS3, JavaScript/TypeScript, Node.js, and SQL. The course is intended for majors.

**Description of Academic Instruction:** Instruction will primarily be held in a traditional classroom with students bringing their computer to engage in required coursework. We will additionally make a site visit either to Google's offices in Denmark (Copenhagen or Aarhus), the Danish Museum of Design, or an opportunity identified in collaboration with DIS.

**Adapting Course to Shortened Timeframe:** We'll need to take on some of the usual strategies courses do when they are offered in summer or Maymester. For this particular course, there are two



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

COLLEGE OF ARTS & SCIENCES

STUDY ABROAD OFFICE

FedEx GLOBAL EDUCATION CENTER  
CAMPUS BOX 3130  
CHAPEL HILL, NC 27599-3130

T 919.962-7002  
F 919.962-2262  
studyabroad.unc.edu

key strategies I'm pursuing. First is shifting some of the less important concepts and background to be outside reading offering more time during contact hours to focus on the big ideas and giving us time to actively engage with them as a group in class. The second is in how to address the difference in "breathing room to complete projects outside of class". Whereas during the semester there are multiple days between lectures and assignments can be out for multiple weeks, giving students more time to brainstorm multiple alternative solutions to singular projects, we'll have deadlines that are on much tighter time frames. Our projects will need to be more tightly specified than in a semester long class. That said, I anticipate being able to make the class and its projects far more collaborative than the semester long class because of the tight living quarters and singular focus of all students enrolled. I'm also open toward learning from the experiences of and applying other techniques UNC Faculty have found in transitioning a semester course into a Maymester course.

**Description of Excursions/Activities:** We would like to work with DIS and Google to coordinate feasible excursions during the experience. In addition to the ideas DIS will bring forward in our meeting next month, two leading ideas for excursions include: - A Visit to Google's Denmark Offices where their Google Chrome Web Browser's JavaScript engine is made - A visit to the Danish Museum of Design

**Course Prerequisites:** COMP401 and COMP410

**Degree Requirements?** This proposed course will fulfill Major-required courses or Minor-required courses

**Language Prerequisites:** NO

A proposed syllabus is included as an addendum to this proposal.

**Additional Academic Information:** In summer 2019, applicants will be strongly encouraged to extend the program and take an additional three-week three-credit course offered by DIS. There will not be any computer science courses on offer in summer 2019, which is why there is no second required course for the program. Students could find courses to satisfy general education requirements or second major requirements, however, some may prefer to return home for UNC summer school or computer science internships.

The long-term goal is to develop a second computer science course as a collaboration between DIS and Kris to be offered in 2020 and beyond so that the program will be six week and six credits.

## Faculty Program Leader Information

**Faculty Program Leader Bio:** Kris Jordan is a Teaching Assistant Professor in the Computer Science department. At UNC, he has taught over 4,000 students, won the Computer Science Department's Undergraduate Teaching Award in 2016 and won the University's Chancellor's Award for Student Undergraduate Teaching in 2017. Prior to teaching at UNC, Kris founded a web development consultancy and led the development of modern web applications for organizations including



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

COLLEGE OF ARTS & SCIENCES

STUDY ABROAD OFFICE

FedEx GLOBAL EDUCATION CENTER  
CAMPUS BOX 3130  
CHAPEL HILL, NC 27599-3130

T 919.962-7002  
F 919.962-2262  
studyabroad.unc.edu

Carolina Dining Services, Fleet Feet Sports, Budweiser, EpiPen, and more. Kris' graduate work at Brown University centered on touch-based web applications. He completed his undergraduate degree in Computer Science at UNC Chapel Hill.

**Experience in Proposed Location(s):** I last visited Copenhagen in the summer of 2016. I spent about a week with a home base in Christianshavn and fell in love with the city, its people, and the warm, hygge culture. I have spent more time in Europe and Scandinavia at large and believe Copenhagen offers a great mix of being a modern, European city without being overwhelmingly large or difficult to navigate by foot or bike that makes it particularly well suited for a study abroad experience. Additionally, flights or train tickets from Copenhagen to larger cities like Paris, London, Rome,

Barcelona, and so on are very affordable and able to be explored during a long weekend or after the program concludes.

**Experience Leading Student Groups:** My teaching team consists of 58 undergraduate learning assistants. Our all-hands meetings are on Sundays and we frequently do off-campus events (hikes, roller skating, game nights, and so on). For the past 5 semesters I have taught over 750 students per semester with an entirely undergraduate staff and no graduate TAs. I am also a Carolina Scholars Pod mentor. I organize small events like lunches, trips to escape rooms, etc., for a group of 15 Carolina Scholars currently in their first year.

## Program Location(s)

**Proposed Location(s):** Copenhagen, Denmark

**Location Rationale:** The project work of COMP426 involves the creation of a modern web application and students will theme the application to incorporate their experiences abroad. A great web applications should offer a simple, welcoming, comfortable user experience that brings well-being to its audience. Reinforcing this sentiment aligns with the Danish' cultural embrace of "hygge" as a way of life.

Google's Chrome internet browser sparked the modern web renaissance. The most important component of this browser was the V8 JavaScript engine developed by a team of computer scientists in Google's Denmark offices. My department chair has connections with Google employees working in this office and we are hoping to arrange a site visit to hear from the team that created the V8 JavaScript engine.

DIS has a network of connections and a wealth of experience in incorporating Danish culture in programs led by another university's faculty. The study abroad office and I will continue collaborating with DIS to identify the most meaningful opportunities available during our time in Copenhagen and organize them into the syllabus and student experience.

While there are a few options for UNC Computer Science Majors to go abroad at institutions where Computer Science courses are offered by non-UNC faculty, there are no such options in Copenhagen. Additionally, there are currently \*no\* UNC Faculty led computer science programs. This offering will



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

COLLEGE OF ARTS & SCIENCES

STUDY ABROAD OFFICE

FedEx GLOBAL EDUCATION CENTER  
CAMPUS BOX 3130  
CHAPEL HILL, NC 27599-3130

T 919.962-7002  
F 919.962-2262  
studyabroad.unc.edu

help satisfy a large, unmet demand among computer science majors.

**Connections at the Proposed Location:** Discussions with DIS have already begun and are ongoing with confirmation that our desired time frame and offering is feasible for the Summer of 2019. DIS will coordinate program logistics, housing (host families), excursions, and transportation for the program. DIS will also serve as the on the ground contract for any health or safety issues that arise.

## Health & Safety Information

**Health Insurance:** The Study Abroad Office coordinates with the Office of Risk Management Services to enroll student and faculty participants in international accident and health insurance through GeoBlue for the duration of the program.

**Safety & Risk Information:** Exercise increased caution in Denmark due to terrorism. Terrorist groups continue plotting possible attacks in Denmark. Terrorists may attack with little or no warning, targeting tourist locations, transportation hubs, markets/shopping malls, etc.

Study Abroad Office staff will continue to monitor events in the host country and the U.S. State Department Travel Advisories in accordance with the *UNC Policy Concerning Global Study, Travel, and Research*.

**Health Information:** There are no notices currently in effect for Denmark.

**Required Vaccinations (if applicable):** None

Health, safety, and security information will be presented to students during the required pre-departure orientation.

## Conclusion

A letter of support from the home academic department is included in as an addendum to this proposal.

We are happy to provide any additional information necessary for your review of this program. Thank you for your time and your support of global opportunities for Carolina students.

Sincerely,

---

Jason A. Kinnear  
Interim Associate Dean of Study Abroad



UNC  
COLLEGE OF  
ARTS & SCIENCES

THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

DEPARTMENT OF COMPUTER SCIENCE  
116 FREDERICK P. BROOKS, JR. BUILDING  
CAMPUS BOX 3175  
CHAPEL HILL, NC 27599-3175

T 919.590.6238  
F 919.590.6238  
<http://jeffay.web.unc.edu>  
[jeffay@cs.unc.edu](mailto:jeffay@cs.unc.edu)

KEVIN JEFFAY

*Gillian Cell Distinguished Professor and Chair*

Emily Marlton  
Study Abroad Office  
2009 FedEx Global Education Center  
Carolina Campus

October 24, 2018

Dear Emily,

As the Chair of the Department of Computer Science, I write to endorse the proposal for the course, COMP426, Modern Web Development, to be offered as a faculty-led study abroad program in Copenhagen by Teaching Assistant Professor Kris Jordan. COMP 426 is a very popular (and practical) course that satisfies a "COMP Elective" requirement for computer science majors (for both the BA and BS majors).

Kris is a most engaged and energetic teaching faculty member who has managed to organize a course with 1,600 students and 50 undergraduate TAs this year and deliver an instructional experience that won him a campus teaching award. As such he is well qualified to undertake the organization of a first-time offering of a more intimate study abroad course.

The demand for this experience will be exceptional. The Department Computer Science currently does not offer any UNC faculty-led study abroad programs despite growing demand from our students. Enrollments in our minor and two majors have grown over 400% in the last 6 years. Most of our classes are over-subscribed and we frequently are forced to turn away students. Partially as a result of this, most of our students do not even consider UNC study abroad programs due to the disconnect from, and disruption to, their CS degree program of study, or the time commitment required for an exchange program. Thus, offering COMP 426 as a summer study abroad course is a strong win-win. It will engage more computer science students in study abroad and allow them to satisfy a degree requirement. At the same time, it will serve to lessen the demand for the on-campus version of the class and enable more students to ultimately take the course.

For these reasons, I'm sure the course will be a hit and there's no better instructor to lead this effort than Kris Jordan. I encourage you to give Kris' proposal every consideration.

Sincerely

Kevin Jeffay  
Gillian Cell Distinguished Professor and Chair

# Modern Web Programming COMP426

Kris Jordan

Summer 2019

## 1 Bulletin Description

Developing applications for the World Wide Web including both client-side and server-side programming. Emphasis on Model-View-Controller architecture, AJAX, RESTful Web services, and database interaction.

## 2 Instructor Biography

Kris Jordan is a Teaching Assistant Professor in the Computer Science department. At UNC, he has taught over 5,000 students, won the Computer Science Department's Undergraduate Teaching Award in 2016 and won the University's Chancellor's Award for Student Undergraduate Teaching in 2017. Prior to teaching at UNC, Kris founded a web development consultancy and led the development of modern web applications for organizations including Carolina Dining Services, Fleet Feet Sports, Budweiser, EpiPen, and more. Kris' graduate work at Brown University centered on rich web application research. He completed his undergraduate degree in Computer Science at UNC Chapel Hill.

### 2.1 Guest Lecturers

TBA dependent upon further collaboration with colleagues in Denmark.

## 3 General Course Info

Course Number: COMP 426

Teaching Schedule: M-F 9am to 12pm Location: DIS Copenhagen Classroom TBD

## 4 Textbooks and Resources

There is no required textbook for this course. We will use a variety of freely available online materials.

## 5 Course Description

The World Wide Web has evolved over the past two decades from a relatively simply hypertext system of linked documents to a full-featured platform for developing interactive,

distributed applications. This course will introduce students to the architecture of modern web-based applications and the key technologies that underlie them. Emphasis is placed on understanding web applications as examples of the Model-View-Controller design pattern, asynchronous event-driven programming (i.e., AJAX), and the use of RESTful interfaces to web services. Students will exercise their understanding of these concepts in a series of programming assignments using HTML5, CSS3, JavaScript, Node.js, and SQL.

Summer Session II at DIS offers a variety of courses which will be available to our students to optionally enroll in. Please refer to [disabroad.org](http://disabroad.org) for additional details on the courses available in the Summer of 2019's Session II.

## 6 Target Audience

This course is intended for computer science majors or minors who have completed the prerequisite courses COMP401 and COMP410.

## 7 Goals and Key Learning Objectives

Upon completion of the course, participants will:

1. design and develop a complete, modern web application using a combination of front-end (HTML5 and JavaScript) and back-end (custom server programs, APIs, and data stores) technologies
2. recognize the global reach of modern web applications and the challenges of serving a locality and geographically diverse audience
3. compare and select appropriate technical solutions for common web application use-cases and requirements
4. practice common systems administration / developer operations techniques in provisioning and deploying applications to a production environment
5. apply best practices in software engineering and security to the web development process
6. differentiate and classify today's leading platforms, tools, and frameworks
7. develop a web application whose content theme aligns with the study abroad experience that will serve as a portfolio piece in the internship hiring process

## 8 Course Components

1. Approach to Teaching: A variety of teaching methods will be used, including lectures, interactive classroom activities, hands-on group work in the form of programming labs.
2. Required Hardware: All students will need their CCI approved laptops for the duration of the program.



## 9 Assignments and Evaluation

Methods of Evaluation	How Evaluated	Due Date	Weight
Participation	Individual	Ongoing	53/c
Server-side Project	Group	May 26th	133/c
Client-side Project	Group	May 31st	133/c
Quizzes	Individual	Ongoing	203/c
Final Project	Group	June 6th	243/c
Final Exam	Individual	June 7th	253/c

Active class participation (5%) Students must be active in discussions and group work. Active participation and engagement includes asking questions.

Server-side Project (13%) Pairs of students will build a dynamic, server-side web application that interacts with a data storage system (relational database or document store).

Client-side Project (13%) Pairs of students will design and develop an interactive, client-side web page that handles mouse, keyboard, and touch events and is responsive to being viewed on both a phone form-factor as well as a tablet or laptop form-factor.

Quizzes (20%) Students will complete 30-minute quizzes on the order of every other day to assess and reinforce understanding of key concepts covered in the course.

Final Project (24%) Pairs of students will design and develop a 3-tier web application that involves a RESTful API backed by a database on the server-side paired with an interactive, client-side web site that communicates with the API.

Final Exam (25%) Students will complete a written final exam covering concepts from the cumulative lessons learned through the course.

## 10 Course Policies

You are expected to attend all classes when scheduled. If you miss a class for any reason please contact the faculty no later than the day of the missed class. Absences will jeopardize your grade and your standing. Allowances will be made in cases of illness, but in the case of multiple absences you will need to provide a doctor's note.

## 11 Honor Code

As a member of this course, you are expected to follow the UNC Honor Code (<http://honor.unc.edu>). Any violation of academic integrity (e.g., cheating, plagiarism, non-independent work etc.) will be reported to the Honor System.

## 12 Course Schedule

The course will meet each morning from 9am to 12pm.

Date	Topic	Contact Hours
Mon May 20	Arrival	0
Tue May 21	Introduction to the WWW, HTTP, HTML	3
Wed May 22	Web Forms, HTTP Methods	3 (6)
Thu May 23	Database Primer & SQL	3 (9)
Fri May 24	Google Aarhus (or DIS Cultural Activity)	3 (12)
Mon May 27	JavaScript, the DOM, and React	3 (15)
Tue May 28	Event-based Programming	3 (18)
Wed May 29	Functional JavaScript, Closures, Immutable.js	3 (21)
Thu May 30	Holiday (no class)	0 (21)
Fri May 31	Babel, Modern ECMAScript, and WebPack	3 (24)
Mon Jun 3	RESTFul API Design and AJAX	3 (27)
Tue Jun 4	WebSockets and Real-time Updates	3 (30)
Wed Jun 5	Memcache, Redis, and Web App Scalability	3 (33)
Thu Jun 6	Web Servers and Production Deployments	3 (36)
Fri Jun 7	Final Exam and Wrap-up	3 (39)
Sat Jun 8	Departure	0 (39)