

**Timothy Hickey**

Computer Science  
Film, Television and Interactive Media  
Volen National Center for Complex Systems

**Instructional Activities**

Term	Course Number	Course Description	Enrollment
Summer 2018	COSI 154AJ 1	JBS INCUBATOR	18
Summer 2018	COSI 152AJ 1	WEB APPLICATION DEVELOPMENT	18
Fall 2018	COSI 210A 1	INDEPENDENT STUDY	3
Fall 2018	COSI 98A 1	INDEPENDENT STUDY	9
Fall 2018	COSI 93A 1	RESEARCH INTERNSHIP & ANALYSIS	5
Fall 2018	COSI 99D 1	SENIOR RESEARCH	1
Fall 2018	COSI 400D 1	DISSERTATION RESEARCH	2
Fall 2018	COSI 11A 3	PROGRAMMING IN JAVA	79
Fall 2018	COSI 11A 2	PROGRAMMING IN JAVA	169
Fall 2018	TYP 6A 1	TYP: COMPUTER SCIENCE	19
Spring 2019	COSI 164A 2DL	INTRO 3-D ANIMATION	48
Spring 2019	COSI 164A 1	INTRO 3-D ANIMATION	153
Spring 2019	COSI 400D 1	DISSERTATION RESEARCH	2
Spring 2019	COSI 93A 1	RESEARCH INTERNSHIP & ANALYSIS	3
Spring 2019	COSI 98B 1	INDEPENDENT STUDY	13
Spring 2019	PEER 94A 11	PEER ASSISTANTSHIP	1

**Teaching innovations:**

Creative Use of Technology ...

I developed a new app to help me explore aspects of Mastery Teaching. The app allows the instructor to create problems related to a set of skills for the class, the students attempt an answer and the graders either accept if the answer demonstrates mastery or reject if it doesn't. Students can resubmit as many times as they want to demonstrate mastery. I also used the PeerReview app I create which allows the instructor to create questions, the students answer the question, and then are asked to review other (anonymous) students answers with respect to a rubric. I used both of these in the CS11a Fall18 class.

I redesigned the 3D Animation class (CS164a-Spr19) to include a unit on creating Virtual Reality scenes and games.

I piloted a new approach to "Distance Education" to deal with a class enrollment which exceeded the classroom size. Students were allowed to enroll in section 2DL but they were required to attend the class through livestreaming and to answer questions during class using the DiscoveryTeaching App which accounted for 10% of their grade. During inclass exams, the 2DL students connected via Zoom so I could watch them working on their exams which were all online.

I made sure to hire students of color and women as TAs in my classes so they could serve as role models for younger students and also gain leadership skills themselves. This worked well.

I developed a new JBS with Prof Grace Zimmerman (IBS) on "App Design and Marketing" which we will be piloting this summer. We have already accepted about 16 students into the program.

I have also received two of the Provost's Teaching Innovation grants for this year and I am working on these projects:

- 1) Develop a set of Digital Literacy homework assignments for the Intro to Python course (CS10a) which are focused on problems of interest to each of the 4 divisions (FA, Hum, SS, S).
- 2) Provide a set of short videos explaining to my fellow colleagues various approaches to using technology in the classroom

**Reading courses, theses, dissertations, research projects (undergraduate and graduate):**

One of my PhD students, Fatima Abu Deeb, completed her dissertation last May and now has a faculty position at King Saud bin Abdulaziz University for Health Science in Alahsa, Saudi Arabia where she is teaching Health Informatics.

I am supervising two current PhD dissertations:

Kristian Kime is working on building cybereducation tools which support the teacher by analyzing online student performance using machine learning and displaying that information in a dashboard. Kristian will probably graduate in May 2020

Xiaodong Qu is working on a Thinking Cap project in which subjects will wear a cap or headband which records their EEGs during their daily work and then uses machine learning to cluster their brain waves and learn to analyze their rough cognitive activity during the day. In the long run, this could possibly provide neurobiofeedback on hard to observe cognitive features such as focus, cognitive workload, creativity, distraction, boredom, sleepiness, irritability, etc. Xiaodong will probably graduate in May 2021.

I have been involved in several undergraduate research projects and independent studies, both for credit and just for experience, including:

SpeechFlow -- a project by 3 former JBS students designing a multi-user app to replace powerpoint! They have received a Spark Grant and will be competing in Mass Challenge in May.

LookHear -- a project with Prof. Sarah Mead (MUS) that provides a multi-viewpoint review of string quartets from multiple perspectives along with an animated view of their score.

Higher Education Job Profile Visualizer -- a project with Dr. Jessica Liebowitz to develop a dashboard for exploring a database of information on job openings in higher ed from 2007 to the present.

Robost Single Linkage Hierarchical Clustering -- a project with two CS seniors to develop a new Hierarchical Clustering algorithm and to study its effectiveness on EEG data

4collegewomen.org I am working with students to update the 4collegewomen website which I originally constructed in 2002 with Dr. Susan Blumenthal (who was a Asst Surgeon General under Clinton and whose husband is Senator Ed Markey and taught a course at Brandeis on building this project.) We are revising it to meet 2020 standards..

I have also worked on several other entrepreneurial projects where students learn new technology by building a fully featured app. I have made an effort to include women and students of color in these independent study and student research projects.

#### **Advising and Mentoring (undergraduate advisees, graduate advisees, teaching fellows, other interactions, office hours):**

**Undergraduate Students:** 14

**Graduate Students:** 7

I meet with my undergraduate TAs and graduate teaching fellows every week.

I helped organize the annual Computer Science Jobs Fair (which we cosponsor with Hiatt) it attracts 30-40 companies and 150-200 of our Computer Science students every October.

I ran the local chapter of the ACM Programming Contest at Brandeis in the Fall.

In the summer I gave a lecture to the Gateway Students on 3D Game Design and I invite them to the JBS Final Project Showcase.

In the summer, I gave a workshop to the Science Posse students on using computers to support scientific research.

## **Scholarship**

### **Conference Paper(s)**

DeRusha, William; and Hickey, Timothy J. "21st Century Skill Building with Web-based Games." CSEU, Crete, Greece. 5/2/2019.

Abu Deeb, Fatima; and Hickey, Timothy J. "Recursive Pedagogy: Automatic question generation using real-time learning analytics." CSEU 2019, Crete, Greece. 5/2/2019.

Abu Deeb, Fatima; and Hickey, Timothy J. "Teaching and assessing debugging, testing, and coding style with Recursive Pedagogy using Spinoza." SIGCSE, Minneapolis, MN. 2/27/2019.

Qu, Xiaodong, and Sun, Venux Yixin, and Sekuler, Robert, and Hickey, Timothy. "EEG Markers of STEM Learning." Frontiers in Education, San Jose, CA. 10/3/2018.

Fatima Abu Deeb, and Timothy J. Hickey. "Classroom Orchestration with Problem Solving Markov Models." *Frontiers in Education*, San Jose, CA. 10/3/2018.

Kime, Kristian, Hickey, Timothy J, and Rebecca Torrey. "Machine Learning Based Directed Self Study in Calculus with CalcTutor." *Frontiers in Education*, San Jose, CA. FIE, 10/3/2018.

#### Ongoing Work

7/24/2018 Submitted paper to JACM on Collaborative Editing and I'm continuing that research with an undergraduate

I will be submitting papers to the International Frontiers in Education Conference (FIE2019) on

- \* Refining Skill Classification with Interactive Machine Learning with Kristian Kime, and Rebecca Torrey
- \* Teaching Introductory Cryptography using a 3D Escape-the-Room Game, with Fatima Abu Deeb
- \* Brainwave EEG learning analytics for written and verbal communication, with Xiaodong Qu
- \* A Taxonomy of Peer Learning educational technology

## Service

### Arts and Sciences

From: 09/2018                      Through:08/2019                      Chair

Dean's Advisory Committee

Digital Literacy Committee

From: 09/2017                      Through:08/2019                      Member

Other

University Writing Committee

From: 09/2014                      Through:08/2019                      Member

Other

MKTYP Advisory Committee

### Department Activity

From: 09/2018                      Through:08/2019                      Chair

Other

MA Admissions Committee

From: 09/2017                      Through:04/2019                      Member

Other

Graduate Admission Committee

### University Activity

From: 01/2019                      Through:03/2019                      Member

Ad hoc Tenure/Promotion Committee

From: 09/2014 Through: 08/2018 Member

Other

Center for Teaching and Learning Advisory Committee

#### Other Service

## Grant Activity

### Grant Proposals

**Title:** Collaborative Research: Agile CyberTeaching with Recursive Pedagogy

**Role:** Principal Investigator **Sponsor:** National Science Foundation

**Total Cost:** \$ 341,226 **Start Date:** 09/01/2019 **End Date:** 08/31/2022

### Grant Awards

I worked with Michael Dettelbach to submit a proposal for \$150,000 to the Mozilla Foundation for their "Responsible CS Challenge" program to introduce ethics instruction into core CS courses. This was submitted with co-PIs William Flesch and Dorothy Kim in the English Department.

## Honors and Awards

Title	From	Thru
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## Intellectual Property

Intellectual Property

## Professional Activities Outside the University

Professional activities (delegate, invited presenter, organizer, moderator, etc. at academic conferences, lectures, speeches and presentations) given outside the university.

Editorial work, reviews of publications, and membership on selection committees for national fellowship and grant programs

### Society memberships

I am a member of the Association of Computing Machinery (ACM) and of the IEEE.

## Work Outside the University

Courses taught at other institutions.

### Employment and/or consultant arrangements

I was on an external review committee for the UMass Lowell Computer Science department.

Management of fiduciary activities in which you have a role as an officer, director, trustee, supervisor, or founder with respect to any corporation, organization, or group

Intellectual property which has been developed by you outside of Brandeis University

Other

## Additional Comments

Please indicate below any additional information or clarification that you think would be helpful to your Chair and the Dean regarding your work this year and your plans for the next several years. This could include: did you participate in any programs/workshops/events related to excellence in teaching during the academic year? If so, in what ways did you change or revise your teaching as a result? It may also include in what ways you have engaged in issues of diversity and inclusion in your teaching, research, mentoring of students or otherwise in the past year.

I plan to create a Computer Science Diversity Task Force next year with students, faculty, and staff where the goal will be to attain full demographic diversity in Computer Science by 2025. I will create a New England CS Chair Workshop on Diversity where we share our diversity data and brainstorm about what works and what doesn't.

I am also planning on continuing to support the various majors at Brandeis to refine their Digital Literacy offerings and to develop non-major courses in Computer Science (such as CS10a: Problem Solving in Python) which could be used to instruct students in other majors to meet their Digital Literacy requirements. Ideally, I would like all students who graduate from Brandeis to be able read and write at a high level, to understand and be comfortable working with numerical data, and to be able to code in a scripting language relevant to their major.

Please feel free to include additional information such as new courses you might be interested in teaching, service or advising responsibilities that you would be willing to take on, grant or fellowship applications you have in process, new research you plan to undertake, or other information about the trajectory of your artistic creation or scholarship.

Please use the following space to provide specific information requested by your Dean.