

**Timothy Hickey**  
Computer Science

## Instructional Activities

Term	Course Number	Course Description	Enrollment
Summer 2016	COSI 154AJ 1	JBS INCUBATOR	23
Summer 2016	COSI 152AJ 1	WEB APPLICATION DEVELOPMENT	23
Fall 2016	COSI 164A 1	INTRO 3-D ANIMATION	126
Fall 2016	COSI 98A 1	INDEPENDENT STUDY	9
Fall 2016	COSI 400D 1	DISSERTATION RESEARCH	2
Fall 2016	TYP 6A 1	TYP: COMPUTER SCIENCE	20
Fall 2016	COSI 99D 1	SENIOR RESEARCH	1
Spring 2017	COSI 2A 1	INTRO TO COMPUTERS	158
Spring 2017	COSI 98B 1	INDEPENDENT STUDY	16
Spring 2017	COSI 93A 1	RESEARCH INTERNSHIP & ANALYSIS	1
Spring 2017	COSI 99D 1	SENIOR RESEARCH	1
Spring 2017	COSI 200B 1	READINGS	1
Spring 2017	COSI 400D 1	DISSERTATION RESEARCH	3
Spring 2017	COSI 210A 12	INDEPENDENT STUDY	2

### Teaching innovations:

#### Flipping of CS164a

I modified by CS164a Intro to 3D Animation course to allow up to 3 makeups for each of the three major unit exams and I tracked both the number of students who chose to participate and the change in their level of mastery (as measured by the exam). This demonstrated that the students achieved at a much higher level when provided with multiple opportunities to demonstrate their mastery, and that the number of students opting for the makeup dropped dramatically after each makeup opportunity, thereby limiting the commitment of faculty time.

#### Redesign/Flipping of CS2a

I also redesigned CS2a Intro to Computers to be a totally flipped class providing an Introduction to Computing using the Python language. The course currently is about 50% female and 12% students of color which is relatively close to the demographics of Brandeis overall. I also introduced a number of new teaching practices into this course, including unlimited makeups of quizzes and homeworks, removal of all late penalties (until the last day of class), and several new teaching innovation (Spinioza, Jupyter notebooks, Nota Bene, etc.) We will assess the effectiveness of these approaches with surveys and other mechanisms at the end of the semester.

#### Diversity in First Year CS

I worked with Antonella Di Lillo to explore a variety of options for increasing the diversity of the CS major in terms of gender and race/ethnicity. This year we explored a number of approaches involving mentoring. We won't know how successful we were until after registration and the end of the drop-with-a-W period next week. This was supported by the Provosts Teaching Innovation Grant program

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

I had one PhD student graduate this year  
William Tarimo -- Computer-Supported Agile Teaching

I have three PhD students that I am currently supervising

Fatima Abu Deeb -- who is developing tools for flipping Intro CS courses and use the collected data to discover how students learn to code

Kristian Kime -- who is developing tools for teaching Calculus skills for Math 10a,b and studying the effectiveness of Computer-Supported Game Theory based approaches. He is also being advised by Prof. Rebecca Torrey (MATH)

Xiaodong Qu - who is studying the ways in which consumer grade brain wave readers can be used to detect cognitive activities associated with learning and to potentially provide neurobiofeedback tools to improve student concentration and cognitive effectiveness. He is also being advised by Prof. Bob Sekuler (PSYC)

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

**Undergraduate Students:** 46                      **Graduate Students:** 0

My office hours this semester are Mon 2-3 Wed 12-2 and by appointment

I am running several independent studies including

\* A Tuvalu Website development project in cooperation with Aida Wong (FA) where we are developing a website to highlight the dangers of Global Warming by focusing on the effects it has on the Pacific nation Tuvalu. Several undergrads are working on this project.

\* A 4collegewomen website project in conjunction with Dr Susam Blumenthal (long time friend of Brandeis and wife of Senator Markey). This is a health information website targeted to college women. It was originally created 15 years ago and we are updating it using modern web development tools. Several undergrads are working on this project

\* A Therapeutic Games project in which we are developing a game to be used by Speech Therapists (at BU) to help patients improve their pronunciation of nasal and non-nasal vowels (this is work with Prof. Cara Stepp in the Department of Speech, Language, and Hearing Sciences at BU. Two MA students are working on this project.

\* Game Development -- several undergrads are working on Game Development projects learning how to use state-of -the-art Game Platforms to create immersive 3d games

\* Computer Security and Bitcoin -- I'm working with an MA student on a project to study computer security and to focus on the new bitcoin technology and its underlying algorithms..

**Scholarship****Conference Paper(s)**

Hickey, Timothy J and Abu Deeb, Fatima and Kime, Kristian and Torrey, Rebecca. "Measuring and Visualizing Learning with Markov Models." *Frontier in Education (FIE2016)*, Erie, PA. Oct 2016.

Hickey, Timothy J and Tarimo, William. "Fully Integrating Remote Students into a Traditional Classroom using Live-Streaming and TeachBack." *Frontiers in Education (FIE2016)*, Erie, PA. 10/12/2016.

**Journal Article(s)**

Hickey, Timothy J. "Catching Audiovisual Interactions With a First-Person Fisherman Video Game." *iPerception* (2017).

Hannah Goldberg, Yile Sun, Timothy J. Hickey, Barbara Shinn-Cunningham, and Robert Sekuler.. "Policing Fish at Boston's Museum of Science: Studying Audiovisual Interaction in the Wild." *i-Perceptions* 6. 3 (2016): 1-11.

Timothy J. Hickey and Jason K. Pontrello. "Building Bridges Between Science Courses Using Honors Organic Chemistry Projects." *The Journal of College Science Teaching* 46. 1 (2016).

William T Tarimo, Fatima Abu Deeb, and Timothy J. Hickey. "A Flipped Classroom With and Without Computers." *Computer Supported Education, CCIS* 583. (2016).

William T. Tarimo, Fatima Abu Deeb, Timothy J. Hickey. "Early Detection of At-risk Students in CS1 Using Teachback/Spinoza." *CCSCNE'16* 31. 6 (2016): 105-111.

**Forthcoming**

Hickey, Timothy J. "Groupwork: Learning During Collaborative Assessment Activities." *Computer Supported Collaborative Learning (CSCL2017)*, Philadelphia, PA. June 18-22, 2017. (forthcoming)

**Ongoing Work**

I'm currently working on several projects with various co-authors and papers in process

## The Scientific Benefits of Play: Gamifying Perceptual Research

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this is a paper based on work with Prof. Robert Sekuler, and grad student Yile Sun (Psyc) where we explore the effects of gamifying perceptual experiments and in particular report on a Gamification of an experiment as three web-based game tournaments with about 15 subjects each.

## Flipping Introductory Programming Classes using Spinoza and Agile Pedagogy

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with Fatima Abu Deeb. This is a paper for the Frontiers In Education 2017 conference on a new approach to flipping intro CS courses. This conference requires authors to first submit an abstract, and our abstract was accepted.

## The Calculus Dashboard - leveraging intelligent tutor techniques to provide automated fine-grained student assessment

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with Kristian Kime, and Rebecca Torrey. This is another paper for FIE2017 whose abstract was accepted. In this paper we analyze the performance of 1600 UMich students using the WebWork framework to answer 250 math questions for a total of 600,000 responses (with multiple responses allowed for each problem). We show that this data can be used to create a dashboard estimating the degree of mastery of several different kinds of Calculus skills.

## Mapping the Mental Activity Space with Museband.

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with Xiaodong Qu, Yile Sun, and Robert Sekuler. This is a paper in which we report on the results of studying the brainwaves of 9 subjects as they completed four 20 minute trials each, where each trial consists of 5 minute sections of GRE Math, Closed Eye relaxation, GRE Reading Comprehension, and Open Eye Relaxation. We demonstrate that the Museband data collects information on the relative strength of five bands (alpha, beta, delta, gamma, theta) from four electrodes and that these 20 numbers clusters naturally for each of the four activities on a per subject basis. The longer term goal is to use these observations to develop personalized neurobiofeedback tools to help subjects maintain high levels of focus and mastery on complex tasks.

## TeachBack - A Classroom Application for Interactive and Agile Pedagogy

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with William Tarimo. In this paper we describe the Audience Response System that Dr. Tarimo developed for his dissertation. The abstract for this paper was accepted for FIE2017

## Music App --

with Sarah Mead (MUSIC).

I'm also working with Prof. Sara Mead (MUSIC) to develop an app for teaching students about ensemble techniques for Renaissance music. The tools lets the student switch view to any of the four parts in real time and see the part (with original notation) in real-time.

## Speech Ninja

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with two CS MA students continuing work by 3 CS majors

I'm just now finishing up a Speech Therapy App which uses 3D game technology to attempt to increase the engagement of pediatric patients with nasality challenges. Once the software is complete my colleagues at BU will use it to and get feedback from their patients.

## Service

### Arts and Sciences

From: 09/2014 Through:08/2016 Member

Undergraduate Curriculum Committee (UCC)

From: 01/2017 Through:04/2017 Member

Other

Search Committee for Hires in the First Year Writing Program

From: 09/2014 Through:08/2017 Member

Other

MKTYP Advisory Committee

From: 09/2015 Through:08/2017 Member

Other

Experiential Learning Advisory Committee

From: 09/2016 Through:06/2017 Member

Committee for the Support of Teaching (CST)

### University Activity

From: 09/2016 Through:05/2017 Co-Director

Other

Head Faculty Fellow for the Center for Teaching and Learning

From: 09/2014 Through:08/2017 Member

Other

Center for Teaching and Learning Advisory Committee

From: 08/2013 Through:08/2017 Chair

The Committee on Faculty Rights and Responsibilities

From: 09/2014 Through:05/2016 Chair

Other

SOTL Faculty Learning Community

Other Service

## Grant Activity

### Grant Proposals

**Title:** Software Entrepreneurship (SEntre) Scholars Program  
**Role:** Principal Investigator      **Sponsor:** National Science Foundation  
**Total Cost:** \$ 994,296      **Start Date:** 09/01/2016    **End Date:** 08/31/2021

**Title:** Strategies: App Design Bootcamp for High School Teachers and Students  
**Role:** Principal Investigator      **Sponsor:** National Science Foundation  
**Total Cost:** \$1,044,819      **Start Date:** 03/01/2017    **End Date:** 02/28/2020

**Title:** The Software Entrepreneurship Scholars Program  
**Role:** Principal Investigator      **Sponsor:** National Science Foundation  
**Total Cost:** \$ 265,154      **Start Date:** 06/01/2017    **End Date:** 05/31/2020

### Grant Awards

I also submitted a preliminary proposal for the INCLUDES NSF grant but was not invited to submit a full proposal.

## 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

Association for Computing Machinery

## Work Outside the University

Courses taught at other institutions.

None

Employment and/or consultant arrangements

None

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

None

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

None

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.

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.