

Timothy Hickey

Computer Science

AffiliationsFilm, Television and Interactive Media
Volen National Center for Complex Systems**Instructional Activities**

Term	Course Number	Course Description	Enrollment
Summer 2014	COSI 154AJ 1	JBS INCUBATOR	17
Summer 2014	COSI 152AJ 1	WEB APPLICATION PROGRAMMING	17
Fall 2014	COSI 210A 1	INDEPENDENT STUDY	3
Fall 2014	COSI 400D 1	DISSERTATION RESEARCH	3
Fall 2014	COSI 98A 1	INDEPENDENT STUDY	17
Fall 2014	COSI 11A 2	PROGRAMMING:JAVA AND C	148
Fall 2014	COSI 11A 1	PROGRAMMING:JAVA AND C	136
Spring 2015	COSI 320B 1	IT ENTREPRENEURSHIP PRACT. II	1
Spring 2015	COSI 98B 1	INDEPENDENT STUDY	8
Spring 2015	COSI 93A 1	RESEARCH INTERNSHIP & ANALYSIS	1
Spring 2015	TYP 6A 1	TYP: COMPUTER SCIENCE	15
Spring 2015	COSI 400D 1	DISSERTATION RESEARCH	3
Spring 2015	COSI 65A 1	INTRO 3-D ANIMATION	142

Teaching innovations:

I am teaching a new TYP Computer Science course this Spring on Web Design where the students learn to create database-backed interactive websites using a high level modern web application framework, all coded in Javascript. This is an exciting and challenging project as most of the students have no previous experience in coding.

I also introduced several new pedagogical innovations into my large Intro to Programming class (CS11a) in the Fall. My PhD student, Fatima Abu Deeb, built a web-based coding platform called Spinoza that I used to partly-flip the class, having students work with each other writing code in class (and in advanced recitations). My PhD student William Tarimo built an Audience Response System called TeachBack (somewhat similar to Learning Catalytics) and we used that extensively in CS11a. These tools supported a more interactive teaching style and the course was able to attract and retain a much higher percentage of students from traditionally under-represented groups (women and students of color). I'm planning on exploring the use of Advanced Recitations next year to attract and retain students from underrepresented groups through the first two years of the major....

I am continuing to use TeachBack in my Spring course (CS65a) on 3D Animation. That course is also introducing new content where we are showing students how to create web-based 3D games as well as Virtual Reality games using the \$15 Google Cardboard VR container for a smartphone. In CS65a I am currently holding a 2 day Game Festival where all 150 students share their 50 games (built with 3 person teams) with each other in a poster session format. This generates a huge amount of excitement and interaction and discussion of Game Design concepts. We will have a Game Showcase the last two days of class where students present their final games and again engage in discussions. Each person was tasked with researching a new feature or concept and integrating it into the game, so this was a way of adding 150 new exciting concepts into the curriculum. Daniel Langenthal from the EL office is helping me craft these experiential events. Again, this course is attracting and retaining a much higher level of women and students of color than we normally see (nationally) in Computer Science courses.

I've also been developing a new JBS, "Connect to Change" with Prof Kryder (POL) that will be offered for the first time this summer (if we get enough students to sign up).

I'm developing a 2 week High School program in Web App Development with the Brandeis Office of High School programs. We expect to get about 60 students. They will work in 10 groups of 6 students each. I will teach them the same curriculum as I've been using in the TYP course. We have a grant from Akamai to give a full scholarship to three (local) girls!

I've also been working with Becci Torrey (Math) and another one of my PhD students (Kristian Kime) to develop a game-based tool for helping students learn the mechanical aspects of Calculus outside the classroom. We have run some pilot studies and will be using it for a homework assignment for all Math10a students this semester.

At the end of last Spring (2014) I was working with Jason Pontrello (CHEM) to develop a

game to teach basic organic chemistry concepts. He has taken a leave of absence from Brandeis, so that work is on hold.

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

I have worked with eight student teams this past year in small group independent studies as they applied the skills and concepts they've learned in CS courses to a capstone-like project to create innovative digital projects, ranging from talking alarm clocks to GPS-enabled student safety apps.

I've also been working with an undergraduate, Daniel Fiterman, and with Sarah Mead (MUSIC) to develop an multiview web-app that could be used in teaching early music ensembles. It allows the user to view a performance from several different perspectives (focusing on any member or on the entire group) and to also see the music they are playing in either modern or archaic form.

I'm also supervising four PhD students and one MA in CS and ITE student.

I'm also working with an undergraduate, Daniela Dimitrova, who will create a virtual 3d immersive exhibit of the lost work of Louise Nevelson at the Rose next Spring. She is working with the curator, Jennifer Bedford, to develop a virtual component to the exhibit based on photos of Nevelson's work from a 1967 installation at the Rose. Dani is in my CS65a 3D Animation course and has developed an online model of the Rose with her two teammates.

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

Undergraduate Students: 75

Graduate Students: 8

I met weekly with my Teaching Fellows and Lab Assistants in CS11a during Fall2014. I have delegated much of that responsibility for the Spr15 courses to my PhD Teaching Fellows. I also invite them to give presentations to the class which I can observe and discuss.

Scholarship

Journal Article(s)

Hickey, Timothy J; Tarimo, William. "The Affective Tutor." The Journal of Computing in Small Colleges 29. 6 (2014): 50-56.

Forthcoming

Abu Deeb, Fatima and Hickey, Timothy J. The Spinoza Code Tutor. Proc. of Consortium for Computing Sciences in Colleges – Northeastern Region (CCSCNE15). Worcester, MA: ACM, 2015. (forthcoming)

Hickey, Timothy J and Tarimo, William. Adopting a "Flipped" Interactive Pedagogy Using Teachback. Proc. of Consortium for Computing Sciences in Colleges – Northeastern Region (CCSCNE15). Worcester, MA: ACM, 2015. (forthcoming)

Tarimo, William; Abu Deeb, Fatima; and Hickey, Timothy J. Computers in the CS1 Classroom. Proc. of 7th International Conference of Computer Supported Education. Lisbon, Portugal: SCITEPRESS, 2015. (forthcoming)

Hickey, Timothy J and Abu Deeb, Fatima. Spinoza: the Code Tutor. Proc. of International Conference on Computer and Information Science and Technology, CIST15. Ottawa, CA: International Academy of Science, Engineering, and Technology (ASET), 2015. (forthcoming)

Ongoing Work

I am working on several research projects with several different groups of students and faculty. The projects are listed below:

TeachBack

with William Tarimo, PhD student:

This is a project to explore new approaches to Audience Response Systems and new

technology-supported pedagogies for teaching large highly interactive classes. We are currently focusing on building in features to help support at-risk students and students from under-represented groups; and we are planning experiments to test the effectiveness of these new features.

Spinoza

with Fatima Abu Deeb, PhD students:

This is a project to develop an online coding environment that can be used to teach introductory programming classes. The main focus is on developing features that allow the instructor to determine in real-time the most common problems that the hundreds of students are encountering while trying to solve coding problems. The goal is to fully flip introductory programming classes effectively and efficiently. We are currently preparing a paper showing how this tool can be used to build a probabilistic model of the average student in a class solving a particular problem, and that model can be used to both address common misconceptions and to identify students that have unique misconceptions that greatly hinder their understanding.

CalcTutor

with Becci Torrey (Math Prof)

and Kristian Kime, PhD student

This is a project to develop an online tool for teaching/learning STEM concepts and skills based on Peer Instruction and especially the "Teacher's Dilemma". Our first large scale experiment is being planned for next week. All Math10a students will take a pre/post quiz, and play several Calculus games where they make up differentiation problems for each other and get scored as students and on their ability to pick good questions for their peers. We plan to expand the range of questions to include most of 1st semester calculus and to release this to a much larger audience including teachers at other schools (both college level and high school). This tool also allows us to study the kinds of mistakes that novice students make and to test the effectiveness of various interventions. It can also potentially serve as a tool to diagnose problems in teaching by comparing the problem solving strategies of students in different classes to an accumulated model of the average student!

FishPolice!!

with Bob Sekuler, (PSYC Prof)

and Eyad Fallatah (CS PhD student)

and Yile Sun (PSYC PhD student)

and Kerri Gardner (CS first year undergrad)

This is a project to develop a class of web-based games that can be used to study the interaction between different sensory modes (visual, auditory, tactile, ...) and perhaps also to enhance particular features of brain function such as attention focus, reaction time, executive function. The game asks students to classify fish that have both visual and auditory characteristics by focusing on only the visual features (or at other times only the auditory features). There is an extensive leaderboard and the system logs all aspects of the player's interaction with the tool. It has been used to replicate results that required extensive lab-based experiments and is showing promise as a new way study low-level brain function.

SOTL faculty learning community

I am coleading this group with Dan Perlman

he group consists of 10 Brandeis faculty and staff interested in the Scholarship of Teaching and Learning (SOTL)

We are meeting weekly to design experiments to study the effectiveness of our teaching with the goal of moving toward a more evidence-based approach to the selection of pedagogy for our classes. This semester we are reading papers on SOTL, designing experiments we can run in our classes this semester or next, and working on developing some standard IRB templates that can be used for SOTL research that should be exempted.

Teaching Innovations to improve retention of Students of Color in Computer Science courses with Antonella DiLillo (CS Prof)

We are designing a new approach to teaching the introductory CS classes in which we would recruit students from traditionally under-represented groups in the Intro class to participate in an EL Practicum which would provide them with additional support and challenge and would be taught using the best practices for STEM education including peer instruction and our own work on computer-supported CS education (Spinoza and TeachBack).

MusicApps to support Performance Instruction

with Sarah Mead (Music)

This is a project we've been working on for 18 months to develop an app that would allow music performance students to closely study the performance of all members of a small ensemble by switching in real-time between various views of the ensemble as they perform a piece. We hope to complete the project by the end of this semester.

Service

Arts and Sciences

From: 09/01/2014 Through:08/31/2015 Member

Undergraduate Curriculum Committee (UCC)

From: 09/01/2013 Through:06/01/2014 Member

Other

Experiential Learning Committee

Department Activity

From: 09/02/2013 Through:08/29/2015 Director

Other

Director of the MA in Computer Science and IT Entrepreneurship program

From: 09/01/2014 Through:08/31/2015 Member

Curriculum Committee

From: 09/01/2014 Through:08/31/2015 Director

Undergraduate Advising Head

From: 09/02/2013 Through: 08/31/2015 Member

Other

Graduate Admissions Committee

University Activity

From: 09/01/2014 Through: 08/31/2015 Member

Other

Center for Teaching and Learning Advisory Committee

From: 08/28/2013 Through: 08/27/2015 Chair

The Committee on Faculty Rights and Responsibilities

From: 02/03/2014 Through: 06/02/2014 Member

Other

Search Committee for Director of Rabb School

Other Service

I was the main organizer of the Computer Science Career Fair and Alumni Networking event in October 2014. This attracted 30 companies and 150 CS students and was a great success. We plan on doing this every Fall. We worked closely with Hiatt on this event.

I am one of the organizers of the New England Undergraduate Computing Symposium. This is an event which brings in about 150 undergraduates majoring in Computer Science from around New England. They present demos and posters and attend career panels and networking sessions. The goal of this event is to increase community and to support diversity in CS. We heavily recruit students from traditionally under-represented groups to attend the NEUCS event and typically have more than 50% of the students are women and 10-25% are students of color.

I was a coach for the ACM Programming Contest and we brought 5 teams of students to Wellesley to compete. This was preceded by several weeks of evening practice sessions.

I am working with Rick Alterman and Daniel Langenthal's EL office to develop an innovative portfolio based assessment methodology for the CS major. We have had two portfolio jams and are developing best practices for CS portfolios for our students.

Grant Activity

Grant Proposals

Grant Awards

I have been named as a collaborator in a large grant from BU. This status allows me to request seed funding from the project if they get funded, but I am not a PI. This is a potential source of future funding.

I have not submitted any grant proposals on my recent work on educational technology or the scholarship of teaching and learning as I am working to build up several publications

that would support such a grant proposal. I should have 5-6 related publications by this summer and I plan to submit one or more grant proposals next year on educational technology.

I may also submit an NSF or NIH proposal with Professor Sekuler (PSYC) after publishing a few papers on our work with web-based game platforms for studying brain function.

Finally, I'm working with the office of High School Programs at Brandeis to write proposals to support by work on innovative approaches to CS education for High School students in low-income neighborhoods, and they have submitted and received a grant from Akamai to give scholarships for 3 Waltham girls to attend my Web App Program this summer.

Honors and Awards

Title	From	Thru
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Intellectual Property

Intellectual Property
none

Professional Activities Outside the University

Professional activities (delegate, invited presenter, organizer, moderator, etc. at academic conferences, lectures, speeches and presentations) given outside the university.
none

Editorial work, reviews of publications, and membership on selection committees for national fellowship and grant programs
none

Society memberships
Member of the Association of Computing Machinery (ACM)

Work Outside the University

Courses taught at other institutions.
none

Employment and/or consultant arrangements

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

Other
none

Additional Comments

I am involved in building up a research group in Educational Technology and currently have four PhD students involved in interesting projects. We have just started to publish results from our research and I am hoping to get grant funding to support this research in the next year or two.

I am also quite active in educational innovation, creating new JBS courses and High School programs as well as experimenting with flipping my classes. I'm planning to start looking into offering online versions of some of our intro classes (Java Programming, 3D Game Design, Web Design) over the next few years as well. I'm also interested in building a culture of evidence-based teaching at Brandeis by working with my colleagues to collect and analyze data about our teaching and use that to develop and verify best practices.

Finally, I'm quite excited about the possibility of discovering new approaches for teaching our intro level CS classes that could help recruit and maintain more women and students of color in our CS major.