

PRODUCT DESIGN & SOFTWARE INNOVATION

Bachelor of Science

Date of Proposal

PROPOSED BY:

Name of Student

UID

Address

Phone Number | Email

SPONSORED BY:

Name of Faculty Mentor

Department or Program

Location

Phone Number | Email

INTRODUCTION

I have always had a passion for making things, but my passion for making things for others, for building products, has been a long incremental journey. The first time I had the realization that I could make things that did not start with a box of Legos and list of instructions was when I was ten. I had the idea for a stuffed animal speaker. I found a stuffed penguin, to my dog's dismay as it was a favorite toy of his, and began cutting and gluing with a pocket knife and hot glue gun. Not long after, I had a stuffed penguin with a speaker for its chest that sat on my desk and played music from my iPod. It was useful, delightful, and it was all from my own creativity. This marked the beginning of my journey of building products.

My first exposure to building products for others was in high school. I started a music blog called LaidBack Beets, a pun inspired by my Russian family's obsession with borsch. I recruited five of my classmates to be writers, another to draw the logo, and began building a website. Soon after, I remember a friend saying to me that he was upset he did not have any new music and blamed me for not posting more frequently. At first I was upset, but then realized that our website had become something people relied on. This was the first time I felt like I was making something for others and began to feel the weight of responsibility that comes with having others' trust. This was a turning point; I realized I wanted that responsibility. I wanted to create things on which people relied.

Later, after a year as a computer science major at UMD, I had begun to learn about software, but I was not learning about building products. This was when I heard about an education startup called Make School that teaches computer science through a project based curriculum. I took a year off from UMD to live in the heart of Silicon Valley where I collaborated with other students to develop apps and websites as well as learn computer science theory. By the end of the year, I was hooked on developing software products. I had three of my own apps in the App Store and multiple live websites. My passion for building products had grown exponentially; I wanted to contribute towards making and designing innovative, successful products

After Make School, I hit another turning point when I interned at a design-focused software startup, Slide, and worked under the Head of Product. I was exposed to design and learned that it is not enough to build things that work or look good, but that creating well-designed products is a process where you find problems, test solutions, and iterate. I was also able to watch as the Head of Product interacted with both the business team and development team, playing a crucial role in both of these teams and also bridging the gap between them by having them play a shared role in the design process. I learned that designing a product touches every aspect of a company and that a designer must as well.

Following the internship, I took on those responsibilities at my own company, Passenger, that I started with my brother. For the first time, I began to call myself a designer. I knew I had a lot left to learn, but I also knew the best way to learn is in the deep end. Throughout this endeavor we had our successes, but we had even more failures. I learned it is not enough to make something, but that a product needs purpose and must aim to solve a problem. I learned products are not built by individuals, but by teams and users. I learned products are never finished, but that they must always be evolving. I also learned that if I want to be an impactful designer I have to learn all the aspects that go into building products and that requires a breadth of education. I want to be an impactful product designer and I believe I can do so by designing own major.

PRODUCT DESIGN & SOFTWARE INNOVATION *DEFINED*

Product Design and Software Innovation teaches the process and thinking needed to find problems worth solving, design feasible solutions, and build software products. This major blends business, design, and software to develop an understanding of the whole process of software product development from ideation and business feasibility through design and creation. Using an understanding of business, a student will be able to understand a market's pain points, constraints, and opportunities. Design thinking will then allow a student to narrow down these problems and find creative solutions. Technical knowledge in software development will then allow a student to turn creative solutions into tangible products. Thus, this major combines the following areas of study: design thinking, software, and business.

Design Thinking is about finding problems and creating solutions that make products innovative and useful. The design coursework first establishes an understanding of design thinking that enables a student to begin to assess problems, constraints, and the process needed to work towards a creative solution. The coursework also provides a foundation in the kind of empathetic thinking and psychology needed to develop user-centric design solutions.

Software powers the world from smartphones, to the stock market, to toasters. The software coursework establishes a foundational technical knowledge in computer science, and then moves towards higher-level concepts that are used in developing and understanding software products. After completing the software coursework, I will have a strong basis for learning new software, understanding the limitations of devices and software platforms, and playing an active role in navigating and leading software development.

Business stimulates responsible creativity by creating a path to a product's success. A product can only be successful if it has a place in a market and has the nourishment and know-how to grow. This area of study aims to empower me to evaluate an idea's financial viability through an understanding of long term costs associated with development, products, and distribution. The coursework also provides entrepreneurial skills involving market opportunity analysis, strategic decision making, and new venture creation.

LEARNING OBJECTIVES & FUTURE GOALS

This major, combined with work past experience, and network of entrepreneurs will open up a wide range of opportunities. I will be able to share a portfolio of work and past projects and also display the knowledge that I will gain from the courses within Product Design & Software Innovation. I will be able to apply human-centered design thinking, identify market opportunities, and assess the business and technical viability of an idea. This will allow me to confidently pursue a career path in design, with a strong background in product development and entrepreneurship.

In the short term, my goals are to maximize my exposure to different types of work, focus on developing my skills, and learn best practices from industry experts. To achieve these goals, immediately following school, I plan to explore two possible kinds of work experience. The first is to work in design consulting either as a personal freelancer or on a team at an established design agency. These options would allow me to work on many different types of short term projects, enabling me to develop my skills and expand my portfolio of work. At an established design agency I would be surrounded by other designers and be able to learn from best practices in the company while as a freelance design consultant I would have to find other ways to connect with industry experts and find mentors.

Another possibility is to work at a startup. Startup companies have broad role categories and every employee must take on responsibilities that extend past their title. As a designer at one of these companies, I could be responsible for roles that span from ideation and prototyping to overseeing and assisting with development to analyzing data and marketing. At an early stage startup I might also be able to assist in the process of establishing best practices.

In the long term, after learning industry best practices and having exposure to different types of work that require various skills, I hope to focus my efforts on solving a single problem and thus maximize my contribution to a single product. I can do this as the head of product or in a similar role at a company where I would be responsible for the vision of a product and how it will continue to develop to solve a problem. Ideally, I would have a role in all aspects of product development, be able to work with all parts of the company, and apply all the skills I had learned up to that point.

Another long term path I could pursue is a role in Research & Development. R&D touches all aspects of a company in a way that requires experimentation and the exploration of innovative iterations of a product's development. I would enjoy being at the center of innovation for a company, helping to set a direction through creative experimentation and exploration.

CAPSTONE *Empowering Student-Run Organizations*

For my capstone I will design a software solution for student-run organizations to allow them to better catalog their members. I aim to identify, classify, and analyze the problems associated with cataloging prospective members, active members, and alumni. Having identified the problems associated with cataloging members, I will design, prototype, and test solutions within these organizations.

This past fall I became the Director of Events at Startup Shell, a non-profit student-run startup incubator and coworking space that is located on campus. I have been responsible for tasks like organizing events to performing applicant interviews and evaluations to creating synergistic partnerships with on and off campus organizations. Through this position, I have been able to work with many student-run organizations and I have learned firsthand the value that communities like Startup Shell provide to their members, but I have also learned about the many difficulties and problems that come with operating a student-run organization.

Student-run organizations I have with worked personally include Terrapin Hackers, Association for Women in Computing, 301 Ventures, The Diamondback, Collider, The American Institute for Graphic Arts Student Group, and fraternities & sororities. I plan to work directly with these organizations by conducting user interviews and analyzing their current member cataloging methods to further understand the problems they face when cataloging members from both the operational perspective and the members' perspective. I also plan to use these organizations as a place to test prototypes and get feedback. The breakdown of the steps I plan to follow are:

1. Perform user analysis
2. Ideate solutions
3. Design, prototype, and test solutions

If I complete the previous steps quickly, I also plan to add on two additional steps:

4. Market analysis
5. Business viability

Throughout this process I will document any data collected, designs and prototypes, and information that influences product iterations. A final write-up will include analysis of the challenges student-run organizations face in cataloging members, product design iterations and user feedback, as well as data visualizations.

COURSEWORK *By Concentration*

* = course already taken
(CE) = course currently enrolled

DESIGN THINKING

ARCH170 Design Thinking and Architecture

(3) * Examines conceptual, perceptual, behavioral, and technical aspects of the built environment, and methods of analysis, problem-solving, and design implementation.

LARC160 Introduction to Landscape Architecture

(3) * Explores the interactive relationship between humans and their environment by examining people's perceptions of and changing attitude towards the landscape, as well as, an examination of how these are related to ecological and cultural influences.

EDHD201 Learning How to Learn

(3) (CE) Immerses students in the theoretical and empirical study of learning by engaging them in orchestrated experiences and activities drawn directly from the disciplinary research. Students achieve deep understanding of their own learning, as well as the means of enhancing that learning both in school and out-of-school contexts.

ARTT255 Introduction to Digital Art and Design Processes

(3) Introduction to basic software and principles of digital imaging, and how they are applied to art and design. Topics covered: Digital image construction and manipulation, Vector-Based digital techniques layout, typography, etc), time-based digital techniques (video and audio composition and manipulation), and basic interactivity (web-design).

Prerequisite: ARTT100 and ARTT110 (permission granted)

PHIL408G Emotion, Reason, and Motivation

(3) * Explore what are emotions from an evolutionary, psychological, and philosophical standpoint. With this framework in place, survey a collection of works that offer competing theories of affect/emotion, philosophy of the mind, and cognitive structure and their overlap with willpower, motivation, empathy, emotion, cognition, among other psychological traits.

PSYC100 Introduction to Psychology

(3) Brings students into contact with the major problems confronting psychology and the more important attempts at their solution.

PSYC354**Cross-Cultural Psychology**

(3)

Cultural components in theory and research in personality, social, and community psychology. Interplay of individual, ethnic, and cultural factors in psychosocial growth and well-being, cross-cultural and cross-ethnic communication, and counseling and psychotherapeutic interactions.

Prerequisite: PYSC100

CMSC434**Introduction to Human-Computer Interaction**

(3)

Assess usability by quantitative and qualitative methods. Conduct task analyses, usability tests, expert reviews, and continuing assessments of working products by interviews, surveys, and logging. Apply design processes and guidelines to develop professional quality user interfaces. Build low-fidelity paper mockups, and a high-fidelity prototype using contemporary tools such as graphic editors and a graphical programming environment (eg: Visual Basic, Java).

Prerequisite: PYSC100

INST362**User-Centered Design**

(3)

Introduction to human-computer interaction (HCI), with a focus on how HCI connects psychology, information systems, computer science, and human factors.

User-centered design and user interface implementation methods discussed include identifying user needs, understanding user behaviors, envisioning interfaces, and utilizing prototyping tools, with an emphasis on incorporating people in the design process from initial field observations to summative usability testing.

Prerequisite: PYSC100

Restriction: Information Science Majors (teacher permission granted)

SOFTWARE**CMSC131****Object-Oriented Programming I**

(4) *

Introduction to programming and computer science. Emphasizes understanding and implementation of applications using object-oriented techniques. Develops skills such as program design and testing as well as implementation of programs using a graphical IDE. Programming done in Java.

CMSC132**Object-Oriented Programming II**

(4) *

Introduction to use of computers to solve problems using software engineering principles. Design, build, test, and debug medium -size software systems and learn to use relevant tools. Use object-oriented methods to create effective and efficient problem solutions. Use and implement application programming interfaces (APIs).

Prerequisite: CMSC131, MATH140

CMSC216 Introduction to Computer Systems

(3) *

Machine representation of data including integers and floating point. Modern computer architectural features and their interaction with software (registers, caches). Interaction between user programs and the OS: system class, process, and thread management. Optimizing software to improve runtime performance using both compilers and hand turning.

Prerequisite: CMSC132, MATH141

CMSC250 Discrete Structures

(3) *

Fundamental mathematical concepts related to computer science, including finite and infinite sets, relations, functions, and propositional logic. Introduction to other techniques, modeling and solving problems in computer science. Introduction to permutations, combinations, graphs, and trees with selected applications.

Prerequisite: CMSC132, MATH141

CMSC330 Organization of Programming Languages

(3) *

The semantics of programming languages and their run-time organization. Several different models of languages are discussed, including procedural (e.g., C, Pascal), functional (e.g., ML, LISP), rule-based (e.g., Prolog), and object-oriented (e.g., C++, Smalltalk). Run-time structures, including dynamic versus static scope rules, storage for strings, arrays, records, and object inheritance are explored.

Prerequisite: CMSC216, CMSC250

CMSC411 Computer System Architecture

(3) (CE)

Input/output processors and techniques. Intra-system communication, buses, caches. Addressing and memory hierarchies. Microprogramming, parallelism, and pipelining.

Prerequisite: CMSC330, CMSC351

CMSC433 Programming Language Technologies and Paradigms

(3) *

Programming language technologies (e.g., object-oriented programming), their implementations and use in software design and implementation.

Prerequisite: CMSC330, CMSC351

BUSINESS**ECON200 Principles of Microeconomics**

(3)

Introduces economic models used to analyze economic behavior by individuals and firms and consequent market outcomes. Applies conceptual analysis to several policy issues and surveys a variety of specific topics within the broad scope of microeconomics.

- STAT400 Applied Probability and Statistics**
 (3) * Random variables, standard distributions, moments, law of large numbers and central limit theorem. Sampling methods, estimation of parameters, testing of hypotheses.
Prerequisite: MATH141
- PHIL309P Philosophy, Politics, and Economics**
 (3) (CE) Introduce rational choice theory, social choice, and game theory then explore how these mathematical theories are used in the social sciences.
- ENES461 Advanced Entrepreneurial Opportunity Analysis in Tech Ventures**
 (3) Explores the factors that influence entrepreneurial opportunity analysis in technology-based ventures. Uses a cognitive theoretical framework to examine the integration of motivation, emotions and information processing modes to make complex entrepreneurial decisions in fast pace technology venture environments.
Restriction: I&E Minor (taking class over the summer, restriction free)
- BMGT461N Entrepreneurship**
 (3) Process of creating new ventures, including evaluating the entrepreneurial team, the opportunity and the financing requirements. Skills, concepts, mental attitudes and knowledge relevant for starting a new business.
- ENES462 Marketing High-Technology Products and Innovations**
 (3) Examines the opportunities and challenges of marketing high-technology products in turbulent environments requiring rapid decision making with incomplete information. Explores how innovations are introduced at frequent intervals, research-and-development spending is vital, and there are high mortality rates for both products and businesses.
Restriction: I&E Minor (taking class over the summer, restriction free)
- ENES471 Legal Aspects of Entrepreneurship**
 (3) Explores critical legal and business issues entrepreneurs face as they build and launch a new venture. Examines real world scenarios, and addresses the legal issues at all of the important junctures along the path to success. Significant attention placed on new venture formation, intellectual property management, and financing arrangements.
Restriction: I&E Minor (holdfile or winter 2017)

INDIVIDUAL STUDIES

IVSP317	Progress Report (1)
IVSP318	Independent Learning Activities (3 - 9) (optional)
IVSP420	Capstone Project (3)
ENGL391	Advanced Composition (3)

TOTAL 300+ LEVEL CREDITS *excluding IVSP courses*

39/27 required credits, in 13 courses

TOTAL CREDITS *including IVSP courses*

81-87 credits

CURRENT STATUS

32/78 credits completed, 3 courses currently enrolled, 37 credits remaining

COURSEWORK BY SEMESTER

SPRING 2017 (12) (Currently Enrolled)

CMSC411	Fundamentals of Technology Start-Up Ventures (3)
PHIL409P	Philosophy, Politics and Economics (3)
PHIL409L	Human Life: Absurdity, Contingency, Meaning and Death (3)
EDHD201	Learning How to Learn (3)

SUMMER 2017 (9)

ENES460	Fundamentals of Technology Start-Up Ventures (3)
ENES462	Marketing High-Technology Products and Innovations (3)
ECON200	Principles of Microeconomics (3)

FALL 2017 (15)

PSYC100	Introduction to Psychology (3)
BMGT461N	Entrepreneurship (3)
INST362	User-Centered Design (3)
ENGL391	Advanced Composition (3)
ARTT255	Introduction to Digital Art and Design Processes (3)

SPRING 2018 (13)

IVSP317	Progress Report (1)
IVSP420	Capstone Project (3)
CMSC434	Introduction to Human-Computer Interaction (3)
PSYC354	Cross-Cultural Psychology (3)
BMGT350	Marketing Principles and Organization (3)

GENERAL EDUCATION COURSEWORK

FUNDAMENTAL STUDIES			
Category	COURSE #	Course Title	Semester Taken
FSAW	ENGL101	Academic Writing	Fall 2013
FSPW	ENGL393	Technical Writing	Fall 2016
FSOC	COMM107	Oral Communicati...	Fall 2013
FSMA	AP	N/A	N/A
FSAR	AP	N/A	N/A

DISTRIBUTIVE STUDIES			
Category	COURSE #	Course Title	Semester Taken
DSNL	AP	N/A	N/A
DSNS	ENMA289A	The Quest for Absolu...	Spring 2014
DSHS	EDHD201	Learning How to Learn	Spring 2017
DSHS	PHIL209B	Darwin's Dangerous...	Fall 2015
DSHU	ARCH170	Design Thinking and...	Spring 2014
DSHU	ARTH290	Art & Society in Asia	Spring 2016
DSSP	ENES140	Discovering New Ve...	Spring 2014
DSSP	LARC160	Intro to Landscape A...	Fall 2015

I-SERIES			
Category	COURSE #	Course Title	Semester Taken
SCIS	ENMA289A	The Quest for Absolu...	Spring 2014
SCIS	PHIL209B	Darwin's Dangerous...	Fall 2015

DIVERSITY			
Category	COURSE #	Course Title	Semester Taken
DVUP	ARTH290	Art & Society in Asia	Spring 2016
DVUP or DVCC	PSYC354	Cross-Cultural Psyc...	Spring 2017

NAME: Samuel Drozdov

MAJOR: Product Design & Software Innovation

FOR OFFICE PURPOSES	COURSE #	COURSE TITLE	CREDITS
CONCENTRATION 1: BUSINESS			
	ECON200	Principles of Microeconomics	3
	STAT400	Applied Probability and Statistics	3
	PHIL309P	Philosophy, Politics, and Economics	3
	ENES461	Advanced Entrepreneurial Opportunity Analysis in Tech Ventures	3
	BMGT461N	Entrepreneurship	3
	ENES462	Marketing High-Tech Products & Innov.	3
	ENES471	Legal Aspects of Entrepreneurship	3
CONCENTRATION 2: DESIGN THINKING			
	ARCH170	Design Thinking and Architecture	3
	LARC160	Introduction to Landscape Architecture	3
	EDHD201	Learning How to Learn	3
	PHIL408G	Emotion, Reason, and Motivation	3
	PSYC100	Introduction to Psychology	3
	PSYC354	Cross-Cultural Psychology	3
	CMSC434	Intro. to Human-Computer Interaction	3
	INST362	User-Centered Design	3
CONCENTRATION 3: SOFTWARE			
	CMSC131	Object-Oriented Programming I	4
	CMSC132	Object-Oriented Programming II	4
	CMSC216	Introduction to Computer System	3
	CMSC250	Discrete Structures	3
	CMSC330	Organization of Programming Languages	3
	CMSC411	Computer System Architecture	3
	CMSC433	Programming Language Technologies and Paradigms	3

FOR OFFICE PURPOSES	COURSE #	COURSE TITLE	CREDITS
TOTAL 300+ LEVEL CREDITS (EXCLUDING IVSP COURSES)			39
	IVSP317	Progress Report	1
	IVSP318 (optional)	Independent Learning Activity	3-9
	IVSP420	Senior Paper	3
	Writing Craft	ENGL391: Advanced Composition	3
TOTAL CREDITS (INCLUDING IVSP COURSES)			84