



Credit: [https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQn4lgDMfZJEGKZOeK7XQPF4d\\_DnMP3Cf32UymsC3YSQAIXOiBig](https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQn4lgDMfZJEGKZOeK7XQPF4d_DnMP3Cf32UymsC3YSQAIXOiBig)

# Chartering Your Course Through the Human Factors Program

Version 1, August 2019

Descriptions of human factors professional roles:

1. Researcher (Basic)
2. Researcher (Applied)
3. Hybrid Designer
4. User Interface/User Experience Designer
5. HFE Educator

Testimonials from several alumni

# Descriptions of human factors professional roles

# 1. User Researcher (Basic)

## Role

A human factors professional who conducts basic user research usually seeks to expand knowledge about how people think and behave either fundamentally or in a particular context. For example, a basic user researcher might study how people work independently or in teams; a study of a person's ability to multi-task could someday be applied in the development of an aircraft cockpit. As such, this type of professional is conducting work that had considerable overlap with individuals conducting basic psychological research, the difference being that the research results are likely to guide product and system development efforts. Research activities include such tasks as conducting literature searches to assemble human factors knowledge on selected topics, conducting field observations to understand deeply how people interact within existing systems and products, and conducting lab-based studies of how people perform such tasks as acquiring information, reaching decisions, formulating action plans, and taking action. The research results might be disseminated through technical papers, journal articles, and conference presentations, or they might be kept private by a corporation that considers the information to be proprietary and of competitive benefit. Research might be funded by a corporation interested in such as topics as how people will function in a semi-autonomous system (partially self-driving cars in public). Or, such research might be sponsored by a governmental agency such as the US Departments of Transportation's Federal Highway Administration, with its logical interest in the same topic: semi-autonomous driving. In the first case, the end-goal might be to draw upon the research results to inform autonomous driving systems development efforts. In the second case, the end-goal might be to draw upon research results to establish government policy and regulatory requirements pertaining to autonomous driving systems.

## Work activities and products



*Conduct eye tracking study*



*Conduct driving study*



*Conduct haptics study*



*Conduct medical error study*



*Conduct military systems study*



*Conduct pilot performance study*



*Conduct augmented reality study*



*Write technical paper on use errors*

**Important knowledge and skills**

- Anatomy and physiology
- Data visualization
- Experimental design
- Human behavior
- Human cognition
- Human subjects protection
- Individual interviewing
- Kinesiology
- Linear programming
- Perception
- Performance assessment
- Public presentations
- Statistical analysis
- Task analysis
- Teamwork
- Workload measurement
- Writing

**Sample coursework**

Freshman – Fall Semester	Freshman – Spring Semester
<ul style="list-style-type: none"> <li>• EN 1: Applications in Engineering</li> <li>• ENG 1: Expository Writing</li> <li>• MATH 32: Calculus I</li> <li>• PHY 11: General Physics I</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 64: Methods for Human Factors Engineering</li> <li>• ES 2: Introduction to Computing in Engineering</li> <li>• MATH 34: Calculus II</li> <li>• PSY 1: Introduction to Psychology</li> <li>• Free Elective</li> </ul>
Sophomore – Fall Semester	Sophomore – Spring Semester
<ul style="list-style-type: none"> <li>• COMP 11: Introduction to Computer Science</li> <li>• ES 3: Introduction to Electrical Systems OR ME 30: Electromechanical Systems &amp; Robotics I OR ES 5: Introduction to Mechanical Statics and Dynamics OR ME 20: Mechanics I</li> <li>• PSY 31: Statistics for Behavioral Science OR ES 56: Probability and Statistics</li> <li>• ENP 53: Engineering Psychology</li> <li>• HASS Elective</li> </ul>	<ul style="list-style-type: none"> <li>• COMP 15: Data Structures OR COMP 20: Web Programming</li> <li>• PSY 32: Experimental Psychology Recommended PSY Elective</li> <li>• ENP 130: Advanced Engineering Psychology</li> <li>• Natural Science Elective</li> <li>• Mathematics Elective</li> </ul>
Junior – Fall Semester	Junior – Spring Semester
<ul style="list-style-type: none"> <li>• EM 52: Technical and Managerial Communication</li> <li>• PSY 207: Advanced Statistics I <i>Recommended PSY Elective</i></li> <li>• Domain Focus Elective</li> <li>• Domain Focus Elective</li> <li>• Natural Science Elective</li> </ul>	<ul style="list-style-type: none"> <li>• COMP 171: Human-Computer Interaction <u>OR</u> ENP 166: Computer Interface Design</li> <li>• ENP 161: Human Factors in Product Design</li> <li>• Domain focus elective</li> <li>• ES 18: Computer Aided Design w/ Lab <u>OR</u> ME 40: Engineering Design I</li> <li>• COMP Elective <u>OR</u> ENP Core Elective</li> </ul>
Senior – Fall Semester	Senior – Spring Semester
<ul style="list-style-type: none"> <li>• ENP 120: Senior Capstone</li> <li>• ENP 163: Analytical Methods in Human Factors Engineering <i>Recommended ENP Core Elective</i></li> <li>• Domain Focus Elective</li> <li>• Free Elective</li> <li>• HASS Elective</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 120: Senior Capstone</li> <li>• Engineering Elective</li> <li>• ENP 164: Applied Behavior Statistics for Engineering <i>Recommended ENP Open Elective</i></li> <li>• Domain Focus Elective</li> <li>• HASS Elective</li> </ul>

### Courses of potential interest

- ANTH 0010: Introduction to Sociocultural Anthropology (HASS/HASS Social Sciences OR Domain Focus)
- ANTH 0032: Introduction to the Anthropology of Science and Technology (HASS/HASS Social Sciences OR Domain Focus)
- ANTH 0136: Cultures of Computing (HASS/HASS Social Sciences OR Domain Focus)
- BIO 0049: Experiment in Physiology (Natural Science OR Domain Focus)
- BIO 0134: Neurobiology (Natural Science OR Domain Focus)
- BME 0143: Biological Systems Analysis (Engineering OR Domain Focus)
- CSHD 0001: Child Study and Human Development (HASS/HASS Social Sciences OR Domain Focus)
- CSHD 0042: Inquiry and Analysis in Child Study and Human Development (HASS/HASS Social Sciences OR Domain Focus)
- COMP 0013: How Systems Work (COMP)
- COMP 0020: Web Programming (COMP OR Engineering)
- COMP 0061: Discrete Mathematics (Mathematics OR COMP OR Domain Focus)
- COMP 0135: Intro Machine Learning (Mathematics OR COMP OR Domain Focus)
- COMP 0177: Visualization (COMP)
- EM 0051: Engineering Management (Domain Focus OR Engineering)
- EM 0054: Engineering Leadership (Domain Focus)
- EM 0153: Innovation Management (Domain Focus)
- ENP 0099: Internship in Psychology (Engineering)
- LING 0015: Introduction to Linguistics (HASS/HASS Social Sciences OR Domain Focus)
- LING 0033: Logic (HASS/HASS Social Sciences OR Domain Focus)
- OTS 0104: Kinesiology (HASS/HASS Social Sciences OR Domain Focus)
- PSY 0009: Introduction to Cognitive & Brain Sciences (HASS/HASS Social Sciences OR Domain Focus)
- PSY 0028: Cognitive Psychology (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 0029: Human Neuropsychology (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 0041: Perception/Cognition Laboratory HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 0140: Mathematical Psychology (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 0144: Memory and Retention (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 0147: Multitasking (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 0208: Advanced Statistics II (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- SOC 0100: Research Design and Interpretation (HASS/HASS Social Sciences OR Domain Focus)

### Enrichment options

- Summer internship following Junior Year; Fall internship during Senior year, Fall and/or Spring Semesters.
- Research with professors in the Human Factors Department, Psychology Department, or other department of interest.
- Independent study on human factors research topic of particular interest.
- Attend/contribute to Human Factors and Ergonomics Society (HFES) meetings and conferences (national and local events) as a student.

## 2. User Researcher (Applied)

### Role

A human factors professional who conducts applied user research is often engaged in a system or product development effort. The team's end-goal might be to create software, hardware, or hybrid system or product, such as a mobile application for a smart phone, a power tool, or an automobile.

Research activities include such tasks as conducting literature searches to assemble human factors knowledge that pertains to a user interface development effort, conducting field observations to understand better how people interact with existing systems and products, conducting interviews with individuals and groups of people to gain deeper insight into their needs and preferences, and conducting various types of user interface design assessments such as usability tests.

While the applied researcher might not serve as a user interface designer per se, s/he can still play an important role in shaping design solutions. For example, s/he might develop user interface specification based on research results, contribute to high-level conceptual design studies, and develop recommendations for design improvement based on usability test results.

### Work activities and products



Conduct field research on exoskeletons



Interview consumers about product preferences



Perform task analysis

#### Risk Matrix

		Likelihood	
		Very Likely	Likely
Consequences	Fatality	High	High
	Major Injuries	High	High
	Minor Injuries	High	Medium
	Negligible Injuries	Medium	Medium

Perform risk analysis



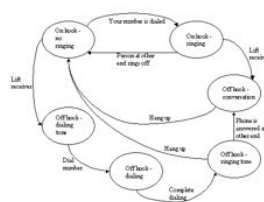
Conduct usability test of website



Conduct literature search on effects of aging



Conduct workflow analysis



Conduct workflow analysis

### Important knowledge and skills

- Cognitive walkthroughs
- International cultural norms
- Data visualization
- Experimental design
- Field observation
- Group interviewing
- Human behavior
- Human cognition
- Human subjects protection
- Individual interviewing
- Journey mapping
- Motivation
- Performance assessment
- Project management
- Statistical analysis
- Story telling
- Task analysis
- Teamwork
- Usability testing
- Workload analysis
- Writing and presenting



### Sample coursework

Fall Semester	Spring Semester
<b>Freshman Year</b>	
<ul style="list-style-type: none"> <li>• PSY 1: Intro to Psychology (also counts towards LA-Distribution-Social Sciences)</li> <li>• COMP 11: Intro Computer Science (also counts towards LA-Distribution-Mathematics)</li> </ul>	<ul style="list-style-type: none"> <li>• COMP 15: Data Structures (also counts towards LA-Distribution-Mathematics)</li> </ul>
<b>Sophomore Year</b>	
<ul style="list-style-type: none"> <li>• ENP 64: Methods for Human Factors Engineering (Fall Only)</li> <li>• PSY 31: Statistics for the Behavioral Sciences</li> </ul>	<ul style="list-style-type: none"> <li>• PSY 32: Experimental Psychology</li> <li>• ME 1: Mechanical Design and Fabrication (Spring Only)</li> </ul>
<b>Junior Year</b>	
<ul style="list-style-type: none"> <li>• ENP 53: Engineering Psychology (Fall Only)</li> <li>• EM 52: Technical and Managerial Communication</li> <li>• ES 18: Computer Aided Design w/ Lab</li> <li>• DRWM24: Intro Drawing (also counts towards LA-Distribution-Arts)</li> </ul>	<ul style="list-style-type: none"> <li>• PSY 130 - Advanced Engineering Psychology (Spring Only)</li> <li>• ENP 166: Computer Interface Design (Spring Only)</li> <li>• ENP 161: Human Factors in Product Design (Spring Only)</li> <li>• EM51: Engineering Management</li> <li>• DRWM63: Perspective Drawing (also counts towards LA-Distribution-Arts; Spring Only)</li> </ul>
<b>Senior Year</b>	
<ul style="list-style-type: none"> <li>• ENP120: Product Study in Human Systems (full year)</li> <li>• ENP105: Assistive Technology (OR other PSY/ENP elective; Fall Only)</li> <li>• ENP164: Applied Behavioral Statistics in Engineering (Fall Only)</li> </ul>	<ul style="list-style-type: none"> <li>• ENP120: Product Study in Human Systems (full year)</li> <li>• ENP165: Industrial Design (Spring Only)</li> <li>• ENP163: Analytic Methods in Human Factors (Spring Only)</li> </ul>
<b>Courses of potential interest</b> <ul style="list-style-type: none"> <li>• ENP162: Human-Machine System Design</li> <li>• PSY 28: Cognitive Psychology (also counts towards LA-Distribution-Social Sciences)</li> <li>• PSY 9: Intro to Cognitive and Brain Science (also counts towards LA-Distribution-Social Sciences OR LA-Distribution-Natural Sciences)</li> <li>• PSY 11: Developmental Psychology (also counts towards LA-Distribution-Social Sciences)</li> <li>• CSHD 01: Child Study and Human Development (also counts towards LA-Distribution-Social Sciences)</li> <li>• COMP 20: Web Programming (also counts towards LA-Distribution-Mathematics)</li> <li>• COMP 171: Human-Computer Interaction</li> <li>• COMP 177: Visualization</li> <li>• EM 54: Engineering Leadership</li> <li>• EM 153: Innovation Management</li> <li>• LING 15: Introduction to Linguistics</li> <li>• PSY 144: Memory and Retention</li> <li>• PSY 207: Advanced Statistics I</li> <li>• PSY 41: Perception/Cognition Laboratory</li> <li>• ANTH 24: Anthropology of Environment</li> <li>• ANTH 32: Introduction to the Anthropology of Science and Technology</li> </ul>	
<b>Enrichment options</b> <ul style="list-style-type: none"> <li>• Summer internship following Sophomore and Junior Year; part-time Fall internship during Senior year, Fall and/or Spring Semesters.</li> </ul>	

- Applied research coursework (transferable) at other academic institution (e.g., Harvard, Northeastern, and multiple distance learning programs) offering design-related courses.
- Independent study on human factors research topic of particular interest.
- Attend/contribute to User Experience Professionals Association (UXPA), Human Factors and Ergonomics (HFES), and Special interest Group of the Automated Computing Machines (SIGCHI) meetings and conferences (national and local events) as a student.



# 3. Hybrid Designer

## User Interface (UI) / User Experience (UX) / Industrial Design (ID)

### Role

The User Interface (UI)/ User Experience (UX)/ Industrial Design (ID) hybrid role suits an individual who sees herself/himself as a “creative” who welcomes a wide variety of design challenges and is prepared to develop an equally wide array of knowledge and skill. The hybrid path suits individuals who might be torn between pursuing a degree in human factors versus user interface, industrial design, but ultimately sees value in treating human factors as their core competencies. This hybrid is likely to begin her/his career in a startup or small company that sees value in hiring one person who can wear a UI/UX/ID “hat.” This can put such an individual under some pressure to perform all related tasks effectively, at least to the standard of other professionals who focused on one area, such as human factors or industrial design. Beware that many hybrids will choose to focus in one area (e.g., UI design) during their undergraduate career and then a second area (e.g., Industrial design) during their graduate career. Generally, an individual with a B.S. degree in one of these fields and an M.S. degree in the other is a highly valued individual; perhaps more than someone who tried to cover both topics in the course of their undergraduate studies. However, the hybrid might not be called upon to “do it all.” Rather s/he might be asked to “drive” the UI/UX/ID aspects of a product design process, depending to some degree on other contributors, such as retained consultants. Many hybrids will ultimately rise in product development organizations to manage UI/UX/ID departments that concentrate on producing use-centered design solutions that must be safe, effective, usable, and satisfying to the intended users. Typical employers include product development consultancies and central design departments within manufacturing companies. The UI/UX/ID hybrid should graduate college with a deep understanding of design from a user interaction, functional, and aesthetic standpoint. For example, s/he should be able to assume a significant role in designing products such as a dental chair, wearable fitness monitor (e.g., Fitbit), Internet-enabled refrigerator, automobile infotainment system, prosthetic arm, and motorcycle helmet.

### Work activities and products



*Design EKG watch user interface*



*Conduct usability test of kitchen appliance*



*Conduct usability test of mobile app*



*Conceptual design or ergonomic wheelchair*



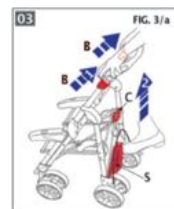
*Evaluate performance of a medical exoskeleton*



*Critique the design of controls of a tractor*



*Collect user feedback on camera user interface*



*Develop instructions for use for stroller*

### Important knowledge and skills

- Animation
- Branding
- Color theory
- Composition
- Computer-aided-design (solid modeling)
- Conceptual modeling
- Design history
- Design language
- Design studio
- Emotional design
- Ergonomics
- Form/sculpture
- Graphic design
- Industrial design
- Manufacturing/fabrication methods
- Materials engineering
- Project management
- Prototyping
- Typography
- User interface design methods
- User interface design principles
- User interface structures
- Value engineering
- Web design
- 3-D Prototyping

### Sample coursework

Freshman – Fall Semester	Freshman – Spring Semester
<ul style="list-style-type: none"> <li>• EN 1: Applications in Engineering</li> <li>• ENG 1: Expository Writing</li> <li>• MATH 32: Calculus I</li> <li>• PHY 11: General Physics I</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 64: Methods for Human Factors Engineering</li> <li>• ES 2: Introduction to Computing in Engineering</li> <li>• MATH 34: Calculus II</li> <li>• PSY 1: Introduction to Psychology</li> <li>• Free Elective</li> </ul>
Sophomore – Fall Semester	Sophomore – Spring Semester
<ul style="list-style-type: none"> <li>• COMP 11: Introduction to Computer Science</li> <li>• ES 3: Introduction to Electrical Systems <i>OR</i> ME 30: Electromechanical Systems &amp; Robotics I <i>OR</i> ES 5: Introduction to Mechanical Statics and Dynamics <i>OR</i> ME 20: Mechanics I</li> <li>• PSY 31: Statistics for Behavioral Science <i>OR</i> ES 56: Probability and Statistics</li> <li>• ENP 53: Engineering Psychology</li> <li>• HASS Elective</li> </ul>	<ul style="list-style-type: none"> <li>• COMP 15: Data Structures <i>OR</i> COMP 20: Web Programming</li> <li>• PSY 17 - Industrial and Organizational Psychology Recommended PSY Elective</li> <li>• ENP 130: Advanced Engineering Psychology</li> <li>• Natural Science Elective</li> <li>• Mathematics Elective</li> </ul>
Junior – Fall Semester	Junior – Spring Semester
<ul style="list-style-type: none"> <li>• EM 52: Technical and Managerial Communication</li> <li>• PSY 13 - Social Psychology <i>Recommended PSY Elective</i></li> <li>• Domain Focus Elective</li> <li>• Domain Focus Elective</li> <li>• Natural Science Elective</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 166: Computer Interface Design</li> <li>• ENP 161: Human Factors in Product Design</li> <li>• Domain focus elective</li> <li>• ES 18: Computer Aided Design w/ Lab</li> <li>• COMP Elective <i>OR</i> ENP Core Elective</li> </ul>
Senior – Fall Semester	Senior – Spring Semester
<ul style="list-style-type: none"> <li>• ENP 120: Senior Capstone</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 120: Senior Capstone</li> <li>• Engineering Elective</li> </ul>

<ul style="list-style-type: none"> <li>• ENP 162 - Human-machine System Design <i>Recommended ENP Core Elective</i></li> <li>• Domain Focus Elective</li> <li>• Free Elective</li> <li>• HASS Elective</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 165 - Industrial Design <i>Recommended ENP Open Elective</i></li> <li>• Domain Focus Elective</li> <li>• HASS Elective</li> </ul>
---	--

**Courses of potential interest**

- COMP 13: How Systems Work (COMP)
- COMP 20: Web Programming (COMP OR Engineering)
- COMP 61: Discrete Mathematics (Mathematics OR COMP OR Domain Focus)
- COMP 135: Intro Machine Learning (Mathematics OR COMP OR Domain Focus)
- COMP 175: Computer Graphics (COMP)
- COMP 177: Visualization (COMP)
- COMP 272: User Interface Software (COMP)
- COMP 275: Advanced Computer Graphics (COMP)
- COMP 277: Data Visualization (COMP)
- DIG 5: Introduction to Digital Media (Domain Focus OR Free Elective)
- DIG 6: Digital Foundations (Domain Focus OR Free Elective)
- DIG 150: Virtual Reality (Domain Focus OR Free Elective)
- DRW 13: Introduction to Drawing Studio (Domain Focus OR Free Elective)
- DRW 28: Introduction to Interdisciplinary Drawing (Domain Focus OR Free Elective)
- DRW 35: Drawing Foundation (Domain Focus OR Free Elective)
- EM 51: Engineering Management (Domain Focus OR Engineering)
- EM 54: Engineering Leadership (Domain Focus)
- EM 153: Innovation Management (Domain Focus)
- ENP 61: Introduction To Human Factors And Ergonomics (ENP Open Elective OR Domain Focus)
- ENP 109: Medical Technology Development (ENP Open Elective OR Domain Focus)
- ENP 110: Human Factors in Medical Technology (ENP Open Elective OR Domain Focus)
- ENP 215 - Interface Design In Complex Systems (ENP Open Elective OR Domain Focus)
- GRA 5: Pictograph and Symbol Drawing (Domain Focus OR Free Elective)
- GRA 10: Letterform Anatomy (Domain Focus OR Free Elective)
- GRA 11: Type as Image (Domain Focus OR Free Elective)
- GRA 21: Illustration (Domain Focus OR Free Elective)
- GRA 37: Theory of Graphic Design (Domain Focus OR Free Elective)
- GRA 50/51: Branding: Signs & Symbols (Domain Focus OR Free Elective)
- GRA 60: Oral and Visual Storytelling (Domain Focus OR Free Elective)
- GRA 66: Graphic Design Studio (Domain Focus OR Free Elective)
- LING 15: Introduction to Linguistics (HASS/HASS Social Sciences OR Domain Focus)
- ME 40: Engineering Design I (Engineering Elective OR Free Elective)
- PSY 28: Cognitive Psychology (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 29: Human Neuropsychology (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 41: Perception/Cognition Laboratory HASS/HASS Social Sciences OR Domain Focus OR PSY)
- SCP 31: 3D Foundations (Domain Focus OR Free Elective)

**Enrichment options**

- Summer internship following Junior Year; Fall internship during Senior year, Fall and/or Spring Semesters.
- Art or Digital media coursework through the Tufts School of the Museum of Fine Arts (SMFA)
- UI/UX/ID design-related coursework (transferable) at other academic institution (e.g., Harvard, Northeastern, Bentley, RISD, Massachusetts College of Art, and multiple distance learning programs) offering design-related courses.

- Participate in hackathons or design challenges.
- Independent study on UI/UX/ID design topic of particular interest.
- Attend/contribute to Industrial Designers Society of America (IDSA) and User Experience Professionals Association (UXPA) meetings and conferences (national and local events) as a student

# 4. User Interface/User Experience (UI/UX) Designer

## Role

User interfaces (UIs) are the access points where users interact with products and contribute to the overall user experience (UX). Applying a deep understanding of industrial design, art, science, engineering, and psychology, UI/UX designers solve complex user interaction problems in an artful and effective manner. Designers aim to create products that users will find easy to use and pleasurable. UI design typically refers to graphical user interfaces but also includes others, such as voice-controlled user interfaces (e.g., Amazon Alexa), and hardware user interfaces (e.g., a car's audio and climate controls).

UI/UX design is a craft that involves building an essential part of the user experience; users are very swift to judge designs on usability and likeability. Designers focus on building interfaces and features users will find highly usable and efficient. Thus, a thorough understanding of the context users will find themselves in when making those judgments is crucial. Designers create the illusion that users aren't interacting with a device so much as they're trying to attain goals directly and as effortlessly as possible.<sup>1</sup>

## Work activities and products



*Design aircraft infotainment system user interface*



*Design automobile infotainment system user interface*



*Design smart television user interface*



*Develop conceptual designs*



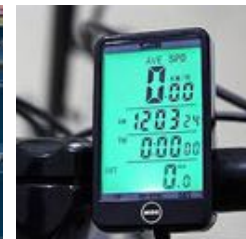
*Design museum website user interface*



*Write user interface design "style guide"*



*Design electronic medical record user interface*



*Design bicycle computer user interface*

<sup>1</sup> <https://www.interaction-design.org/literature/topics/ui-design>

### Important knowledge and skills

- Animation
- Color theory
- Composition
- Conceptual modeling
- Ergonomics
- Emotional design
- Graphic design
- Programming (e.g., HTML, C++)
- Motion Design
- Project management
- Prototyping
- Speech interfaces
- Teamwork
- Typography
- User interface design methods
- Usability testing and other design inspection methods
- User interface design principles
- User interface structures
- Web design
- UX Writing

### Sample coursework

<b>Freshman – Fall Semester</b>	<b>Freshman – Spring Semester</b>
<ul style="list-style-type: none"> <li>• EN 1: Applications in Engineering</li> <li>• ENG 1: Expository Writing</li> <li>• MATH 32: Calculus I</li> <li>• PHY 11: General Physics I</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 64: Methods for Human Factors Engineering</li> <li>• ES 2: Introduction to Computing in Engineering</li> <li>• MATH 34: Calculus II</li> <li>• PSY 1: Introduction to Psychology</li> <li>• Free Elective</li> </ul>
<b>Sophomore – Fall Semester</b>	<b>Sophomore – Spring Semester</b>
<ul style="list-style-type: none"> <li>• COMP 11: Introduction to Computer Science</li> <li>• ES 3: Introduction to Electrical Systems <i>OR</i></li> <li>ME 30: Electromechanical Systems &amp; Robotics I <i>OR</i> ES 5: Introduction to Mechanical Statics and Dynamics <i>OR</i> ME 20: Mechanics I</li> <li>• PSY 31: Statistics for Behavioral Science <i>OR</i> ES 56: Probability and Statistics</li> <li>• ENP 53: Engineering Psychology</li> <li>• HASS Elective</li> </ul>	<ul style="list-style-type: none"> <li>• COMP 15: Data Structures <i>OR</i> COMP 20: Web Programming</li> <li>• PSY 17 - Industrial And Organizational Psychology <i>Recommended PSY Elective</i></li> <li>• ENP 130: Advanced Engineering Psychology</li> <li>• Natural Science Elective</li> <li>• Mathematics Elective</li> </ul>
<b>Junior – Fall Semester</b>	<b>Junior – Spring Semester</b>
<ul style="list-style-type: none"> <li>• EM 52: Technical and Managerial Communication</li> <li>• PSY 13 - Social Psychology <i>Recommended PSY Elective</i></li> <li>• Domain Focus Elective</li> <li>• Domain Focus Elective</li> <li>• Natural Science Elective</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 166: Computer Interface Design</li> <li>• ENP 161: Human Factors in Product Design</li> <li>• Domain focus elective</li> <li>• ME 40: Engineering Design I</li> <li>• COMP Elective <i>OR</i> ENP Core Elective</li> </ul>
<b>Senior – Fall Semester</b>	<b>Senior – Spring Semester</b>
<ul style="list-style-type: none"> <li>• ENP 120: Senior Capstone</li> <li>• ENP 162 - Human-machine System Design <i>Recommended ENP Core Elective</i></li> <li>• Domain Focus Elective</li> <li>• Free Elective</li> <li>• HASS Elective</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 120: Senior Capstone</li> <li>• Engineering Elective</li> <li>• ENP 215 - Interface Design In Complex Systems <i>Recommended ENP Open Elective</i></li> <li>• Domain Focus Elective</li> <li>• HASS Elective</li> </ul>
<b>Courses of potential interest</b>	
<ul style="list-style-type: none"> <li>• COMP 13: How Systems Work (COMP)</li> <li>• COMP 20: Web Programming (COMP <i>OR</i> Engineering)</li> <li>• COMP 61: Discrete Mathematics (Mathematics <i>OR</i> COMP <i>OR</i> Domain Focus)</li> </ul>	



- COMP 135: Intro Machine Learning (Mathematics OR COMP OR Domain Focus)
- COMP 175: Computer Graphics (COMP)
- COMP 177: Visualization (COMP)
- COMP 272: User Interface Software (COMP)
- COMP 275: Advanced Computer Graphics (COMP)
- COMP 277: Data Visualization (COMP)
- DIG 5: Introduction to Digital Media (Domain Focus OR Free Elective)
- DIG 6: Digital Foundations (Domain Focus OR Free Elective)
- DIG 150: Virtual Reality (Domain Focus OR Free Elective)
- EM 51: Engineering Management (Domain Focus OR Engineering)
- EM 54: Engineering Leadership (Domain Focus)
- EM 153: Innovation Management (Domain Focus)
- ENP 61: Introduction To Human Factors And Ergonomics (ENP Open Elective OR Domain Focus)
- ENP 109: Medical Technology Development (ENP Open Elective OR Domain Focus)
- ENP 110: Human Factors in Medical Technology (ENP Open Elective OR Domain Focus)
- ENP 165: Industrial Design (ENP Open Elective OR Domain Focus)
- ES 18: Computer Aided Design w/ Lab (Engineering Elective OR Free Elective)
- GRA 5: Pictograph and Symbol Drawing (Domain Focus OR Free Elective)
- GRA 10: Letterform Anatomy (Domain Focus OR Free Elective)
- GRA 11: Type as Image (Domain Focus OR Free Elective)
- GRA 21: Illustration (Domain Focus OR Free Elective)
- GRA 37: Theory of Graphic Design (Domain Focus OR Free Elective)
- GRA 50/51: Branding: Signs & Symbols (Domain Focus OR Free Elective)
- GRA 60: Oral and Visual Storytelling (Domain Focus OR Free Elective)
- GRA 66: Graphic Design Studio (Domain Focus OR Free Elective)
- LING 15: Introduction to Linguistics (HASS/HASS Social Sciences OR Domain Focus)
- PSY 28: Cognitive Psychology (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 29: Human Neuropsychology (HASS/HASS Social Sciences OR Domain Focus OR PSY)
- PSY 41: Perception/Cognition Laboratory HASS/HASS Social Sciences OR Domain Focus OR PSY)

#### **Enrichment options**

- Summer internship following Junior Year; Fall internship during Senior year, Fall and/or Spring Semesters.
- Art or Digital media coursework through the Tufts School of the Museum of Fine Arts (SMFA)
- UI design-related coursework (transferable) at other academic institution (e.g., Harvard, Northeastern, Bentley, and multiple distance learning programs) offering design-related courses.
- Participate in hackathons or design challenges.
- Join the Bay State Design Shop (BSDS) design community.
- Independent study on UI design topic of particular interest.
- Attend/contribute to User Experience Professionals Association (UXPA), Human Factors and Ergonomics (HFES), and Special interest Group of the Automated Computing Machines (SIGCHI) meetings and conferences (national and local events) as a student.

# 5. HFE Educator

## Role

A human factors educator is most likely to teach at a university, although there is some opportunity to serve primarily as an educator in government and private industry settings as well.

Individuals preparing to teach human factors at a university are likely to follow the traditional path of obtaining a Ph.D., although an M.S. or even B.S. degree might suffice in some educational settings. Still, obtaining a Ph.D. in the human factors or related field is highly advised. Earning a Ph.D. can take an additional five years, after earning a B.S. degree. University professors may stay at one university or work at several during their career. Typically, a “new Ph.D.” will start work as an Assistant Professor, progress after perhaps five years to be an Associate Professor with tenure, and then after perhaps 10+ years progress to be a Full Professor. Tenure is usually granted to individuals who are considered good teachers, have conducted meaningful research (leading to multiple publications that validate their work), have advised the work of graduate students, and attracted funding from outside organizations.

Human factors educators at the college level might focus on teaching alone, but most will assume mixed responsibilities that include teaching, conducting research that is likely to be related to their earlier Ph.D. studies, and perhaps some private consulting. For example, a Human Factors Engineering professor might teach two classes per semester, lead a \$1 Million, multi-year research project that supports multiple graduate students, and serve periodically as an expert witness.

Undergraduate studies should be focused on developing broad and deep knowledge about human factors, human development, and education as possible. Noting there are few opportunities to learn about college-level education during a bachelor’s degree, efforts to learn about human development and education best practices will likely focus on primary and secondary education, but can also be generalized to the college level.

## Work activities and products



*Teach course*



*Conduct research on educational technology*



*Consult on child’s car seat product liability case*



*Advise student*



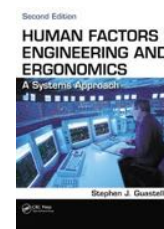
*Write white paper for publication*



*Write grant application*



*Work with faculty on university initiative*



*Write textbook*

### Important knowledge and skills

- Technical approaches to Human Factors Engineering
- Advanced research methods
- Experimental design
- Human behavior
- Pedagogy (i.e., teaching methods)
- Learning styles
- Interdisciplinary collaboration and project management
- Statistical analysis
- Technical writing
- Public presentations
- Research management
- One or more special topics (Ph.D. related)
- Human cognition
- Broad-spectrum science (to pass Ph.D. entrance exam, if applicable)

### Sample coursework

<b>Freshman – Fall Semester</b>	<b>Freshman – Spring Semester</b>
<ul style="list-style-type: none"> <li>• EN 1: Applications in Engineering</li> <li>• ENG 1: Expository Writing</li> <li>• Math 32: Calculus I</li> <li>• PHY 11: General Physics I</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 61: Intro. To Human Factors and Ergonomics</li> <li>• ES 2: Introduction to Computing in Engineering</li> <li>• Math 34: Calculus II</li> <li>• PSY 1: Introduction to Psychology</li> </ul>
<b>Sophomore – Fall Semester</b>	<b>Sophomore – Spring Semester</b>
<ul style="list-style-type: none"> <li>• COMP 11: Introduction to Computer Science</li> <li>• ES 3: Introduction to Electrical Systems OR ES 5: Introduction to Mechanical Statics and Dynamics</li> <li>• PSY 31: Statistics for Behavioral Science</li> <li>• PSY 53: Engineering Psychology</li> <li>• Mathematics elective</li> </ul>	<ul style="list-style-type: none"> <li>• COMP 15: Data Structures</li> <li>• PSY 32: Experimental Psychology</li> <li>• PSY 130: Advanced Engineering Psychology</li> <li>• HASS elective2</li> <li>• Natural science elective</li> </ul>
<b>Junior – Fall Semester</b>	<b>Junior – Spring Semester</b>
<ul style="list-style-type: none"> <li>• COMP elective (COMP 20: Web Programming recommended)</li> <li>• EM 52: Technical and Managerial Communication</li> <li>• PSY 107: Advanced Statistics I</li> <li>• Foundation elective</li> <li>• Natural Science Elective</li> </ul>	<ul style="list-style-type: none"> <li>• COMP 171: Human-Computer Interaction</li> <li>• ENP 161: Human Factors in Product Design</li> <li>• ENP 166: Computer Interface Design</li> <li>• HASS elective</li> </ul>
<b>Senior – Fall Semester</b>	<b>Senior – Spring Semester</b>
<ul style="list-style-type: none"> <li>• ENP 120: Senior Capstone</li> <li>• ENP 162: Human-Machine System Design</li> <li>• PSY 17: Industrial and Organizational Psychology</li> <li>• Foundation elective</li> <li>• Free elective</li> </ul>	<ul style="list-style-type: none"> <li>• ENP 120: Senior Capstone</li> <li>• Engineering elective</li> <li>• Foundation elective</li> <li>• Free elective</li> <li>• HASS elective</li> </ul>

### Courses of potential interest

- ED 0001: School & Society (HASS/HASS Social Sciences)
- ED 0119: Engineering Education (HASS/HASS Social Sciences)

- ED 0130: Human Development and Learning (HASS/HASS Social Sciences)
- ED 0142: Educating the Exceptional Child (HASS/HASS Social Sciences)
- EM 0051: Engineering Management (Foundation elective/Engineering Elective)
- EM 0054: Engineering Leadership (Foundation elective)
- EM 0153: Innovation Management (Foundation elective)
- ENP 162: Human-Machine Systems Design (Foundation elective/Engineering Elective)
- CSHD 0001: Child Study and Human Development (HASS/HASS Social Sciences)
- CSHD 0145: Technological Tools for Learning (HASS/HASS Social Sciences)
- CSHD 0151: Advanced Intellectual Development (HASS/HASS Social Sciences)
- ME 0171: Engineering Education Design

#### Enrichment options

- Consider seeking a minor in Engineering Education (<https://engineering.tufts.edu/me/current/undergraduate/minor-engineering-education>)
- Tufts Student Teacher Outreach Mentorship Program (“STOMP”). This program coordinates Tufts students teaching engineering topics at elementary, middle, and high schools in the Boston Area. To learn more: <https://sites.tufts.edu/stomp/>
- Conduct research at Tufts Eliot-Pearson Children’s school (<https://sites.tufts.edu/eliotpearsonchildrenschool/>). Many staff members in the Child Development department conduct research in collaboration with Eliot-Pearson.
- Work at Tufts Center for Engineering Education and Outreach (<https://ceeo.tufts.edu/>). Often, the CEEO has work study or volunteer positions available. They host a variety of programs for elementary, middle, and high school students.
- Participate in ED 0099 - Field Experience In Education.
- Join Tufts chapter of the American Society of Engineering Education (ASEE), and participate in extracurricular activities (e.g., attending the yearly conference).
- Internships starting the summer after sophomore year. Consider opportunities to intern during fall and spring semesters as well, schedule-permitting.
- Consider pursuing the Teacher Engineering Education Program (TEEP) Certificate Program (<https://asegrad.tufts.edu/academics/explore-graduate-programs/engineering-education>) through Tufts.
- Transferrable applied research coursework at other academic institution (e.g., Lesley University, which is well-known for their education program).
- Independent study or senior honors thesis on human factors engineering and/or education-related research topic of particular interest. If applicable, consider presenting a poster at ASEE.
- Attend/contribute to conferences and meetings, such as User Experience Professionals Association (UXPA) and Human Factors and Ergonomics (HFES).

# Alumni testimonials

## Testimonial



**Alexander Golin, Class of 2017**  
**Scrum Master, Pegasystems**

### **My Path**

I received my B.S. degrees in Human Factors Engineering and Computer Science from Tufts in 2017 and then immediately dove into industry as a Software Engineer on the data visualization team at Pegasystems in Cambridge, MA. Even in a software focused role, I found my education from the Human Factors Department indispensable, particularly in the visualization space where an understanding of design and psychology enabled me to engage in conversations far beyond the scope of technical details. I quickly found myself drawn further and further into the human factors side of my work, particularly when it came to workplace psychology. I soon switched paths and became the company's youngest-ever Scrum Master after 8 months of being an engineer. As a Scrum Master, I support several platform development teams in the integration and DevOps spaces as well as the global organization by facilitating discussions, coaching people, promoting behaviors, fostering culture, and executing change initiatives. In each and every one of my functions, I always find myself reflecting on my education in human factors. Whether I'm designing materials, navigating conflict, or pushing change, I am always thinking through the lens of human psychology, design thinking, and user experience.

### **About Tufts**

When I joined Tufts, I thought I wanted to be a Mechanical Engineer because I love physics, but soon the piles of equations and conspicuous lack of emotional and psychological discussion took their toll on me and I found myself paging through Tufts' major handbook. I'll never forget coming across "Human Factors Engineering" for the first time and blurting out "What the \*\*\*\* is that?!" I was thoroughly shocked to discover there was an entire field that perfectly encapsulated my hybrid hodgepodge of interests ranging from psychology, to design, to technology, to ethics, to beyond. I redeclared the following day. Ever since then I've eaten, slept, and breathed human factors every day, and frankly it is all thanks to Tufts and its Human Factors Department. I know I wouldn't be where I am today had the human factors professors not gone out on a limb and pioneered a program for undergraduates, and I am eternally grateful. The program they created allowed me to pursue a plethora of interests concurrently and instead of ever feeling off-track, the community encouraged and supported me in taking pride in my multiplicity of passions and getting creative about forging a unique path in my mission to positively impact the world. I don't think I could have ever asked for more out my academic experience.



## Testimonial



**Beth Loring, E86, G94**  
Founder & Principal, Loring Human Factors, LLC

### My Path

I received my B.S. degree in engineering psychology (human factors) in 1986 and my master's in engineering design in 1994. I have spent almost my entire career in consulting, working for several firms that focused just on human factors/usability (e.g. American Institutes for Research and the Bentley User Experience Center) and others that included the entire product development process (e.g. IDEO and Farm Product Development). I love the fast pace and variety that consulting offers. Over the years I've worked on pretty much any product you can think of, from airborne radar platforms to consumer products, Amtrak trains, medical devices, software, and websites. I've grown from being an individual contributor to building and leading several human factors teams, to finally owning my own business. Even though I'm the owner, I'm still hands-on and enjoy conducting user research, running usability tests, and designing user interfaces. Over the past ten years there has been an ever-increasing demand for human factors in the healthcare industry, so I would advise students to try to get some experience with medical devices.

### About Tufts

I was very fortunate to hear about the engineering psychology program during my tour of Tufts while still in high school. Luckily the student tour guide knew about the program! At the time I was applying to engineering programs, and the engineering psychology option at Tufts was unique and intriguing. I also loved the Tufts campus and the fact that it was near Boston but not in the city itself. I'll admit that the first year and a half of the basic engineering was not my favorite, but once I started taking the human factors and psychology courses I knew I'd found my niche! After working for several years, I decided to go back to Tufts part time and get my master's in engineering design with a focus on human factors/usability. That was a great decision, and I'm still friends with people from my undergraduate and graduate days. During my career I have hired numerous Tufts human factors graduates because I know they will come well prepared to jump into applied research and design, and because the Tufts program is one of few that includes experience with physical devices, not just software.

## Testimonial



**Daniel Rosenberg, E79, MS81**

**Adjunct Prof. San Jose State Univ. Human Factors MS Program and rCDOUX LLC**

### **My Path**

I received my undergraduate degree in civil engineering in 1979. During that time period I discovered Human Factors and product design. I loved the topic so much I stayed at Tufts for an additional 2 years to get my MS-HFE. My first job out of graduate school was with Essex corporation. Essex was the HF firm hired to perform the investigation of the Three Mile Island nuclear plant accident. The unit at Essex I joined was branching out into consumer products which led to my deployment in Rochester NY within the industrial design department at Xerox which was trying to build an HF capability at the time. Following that, I join the HF department at Eastman Kodak, one of the first corporate HF departments in the world. While at Kodak I co-authored (with William Cushman) Human Factors in Product Design (1990) which became a popular text book in HF, ID and IE programs for the next decade. Then the personal computer revolution happened, and I jumped on board the world of UX. First, leading me to Ashton-Tate (invention of the PC database), Borland (invention of the C++ IDE), Oracle as VP of Design for 11 years, followed by SAP as SVP of Global Design for 7 years running a 275 person UX organization spread across 8 countries.

Now I am an adjunct professor in the MS HFE program at San Jose State University, in the heart of Silicon Valley. I teach a two-semester Interaction Design sequence and work with 8-10 students at a time as their thesis advisor. I do some UX consulting and am on the board of several starts up. I edit a forum for ACM Interactions Magazine and helped to create the Interaction Design Foundation. Expect a new Interaction Design textbook from me in early 2020 to be published by the Foundation. For more on my journey visit [rcdoux.com](http://rcdoux.com).

### **About Tufts**

My memories of 6 years spent at Tufts are quite positive. Perhaps that is just the fog of hindsight combined with the fact that my freshman girlfriend and I were married shortly after graduation and are still happily together. Memories of good friends and good times abound. Seriously though, looking back over my career, I can succinctly summarize what I learned at Tufts HFE. I learned how to solve future complex problems for which there was no precedent at the time. None of the technologies I have worked with or invented over the past 30 years existed during my college studies. The great HF professors who guided us, Percy Holmes Hill and John Kreifeldt to single out the most memorable, knew this was going to be the case. They taught us design and research skills that were universal and grounded in human context. How to deconstruct complexity and how to apply our creativity to generate solutions that improved the world. As an HF professor for the last 7 years I strive daily to live up to the role models they set. I know that my SJSU HF students will similarly be called upon to solve challenges that can't yet be imagined. That is more than a Tufts memory it is a legacy I am honored to be perpetuate.

## Testimonial



**Daniella DiPaola, A16**  
**Research Assistant, MIT Media Lab**

### **My Path**

After graduating from the Tufts Human Factors Program, I began my career at Jibo, a robotics startup dedicated to bringing the first companion robot into a home environment. As a user researcher, I was among the first to observe and analyze commercialized robots in the home. I conducted over 50 research projects, studying all facets of the user experience, including human-robot interaction paradigms, long term livability with machines, and character design. I designed and analyzed the company's pre-launch research study, a 3-week longitudinal study observing the robot in over 150 households. I became fascinated with the idea that I could design and study technology in the most user-centered way through social interactions. I am now a first year Master's student at the Personal Robots Group at the MIT Media Lab, and my research interests include understanding the ethical, social, and emotional implications of technology.

### **About Tufts**

Since robotics is a very cross-disciplinary field, the Human Factors Program gave me the unique ability to switch between being a designer, researcher, and engineer. I often found that being able to communicate with these functional groups put me in an ideal place to bridge different perspectives within the company. The field of personal robots is relatively nascent, and my human-centered approach to design has been important in ensuring that the field is considering its users' needs as it develops. Finally, the network I gained from this program has been invaluable. Two HF Alums gave me my first opportunity at Jibo, and I have been lucky enough to work with other graduates in all of my roles thus far.

## Testimonial



**David Aurelio, G'82**

**Senior User Experience Manager at SolidWorks, Part-Time Lecturer at Tufts University**

### **My path**

My education at Tufts University prepared me for teaching in college. I graduated from the Tufts Engineering Psychology program in 1982. The required courses were evenly split between psychology in liberal arts and design in engineering. Because I was registered in the Tufts School of Arts and Sciences, my distribution requirements were in the liberal arts and not engineering. Since my graduation from Tufts, my Tufts broad education has enabled me to teach at colleges in three different disciplines. I have taught at the School of Art at Syracuse University, the School of Arts and Sciences at Tufts University, and the School of Engineering at Tufts University.

While studying at Tufts, I augmented my engineering psychology major courses with courses in 2-dimensional art and 3-dimensional art. These two courses formed the basis for my sensitivity and skill in aesthetics and design. To learn more about applied design, I later took a course in industrial design at the College for Creative Studies in Detroit. Because the Tufts undergraduate engineering psychology program included many graduate-level courses, I was hired at General Motors, which had previously hired only employees with master's degrees in engineering psychology.

Although my undergraduate degree was technically from the Tufts Department of Psychology, I had taken enough engineering courses at Tufts to be able to matriculate into schools of engineering for graduate study. From these graduate schools of engineering, I earned my master's and Doctor of Philosophy degrees. I credit my broad Tufts background for this ability to succeed in engineering.

### **About Tufts**

I am very grateful to Tufts University for the foundation that it has provided to me as I leveraged my Tufts education into graduate studies, industry employment, consulting opportunities, and teaching appointments.

## Testimonial



### **Dr. James Won, G'11**

**Manager, Human Factors Engineering, Center for Healthcare Quality and Analytics at the Children's Hospital of Philadelphia; Assistant Professor of Pediatrics, Adjunct Track, Perelman School of Medicine at the University of Pennsylvania; Lecturer, Systems Engineering, University of Pennsylvania**

#### **My Path**

*I received my Ph.D. in human factors engineering/mechanical engineering from Tufts University in 2011. I had received my B.S. and M.S. degrees from MIT in mechanical engineering, but through my work experiences at MIT Lincoln Laboratory, working on projects related to Missile Defense and Intelligence, Surveillance, and Reconnaissance, I came across the field of Human Factors Engineering and decided to pursue further education related to the field.*

*After my Ph.D., my family moved down to the Philadelphia region to help with a new church plant, for which I serve as the assistant pastor. At the same time, I began work for the Federal Aviation Administration (FAA) at the William J. Hughes Technical Center, located at the Atlantic City airport. My projects involved application of human factors models, principles, and methodologies to various aviation-related applications. Projects included pilot attention to a new collision avoidance system on the flight deck, air traffic controller decision making related to unmanned aircraft integrated into the national airspace, and the effect of increased automation on aviation technology. While working for the FAA, I began teaching a graduate level course at the University of Pennsylvania called "Human Systems Engineering." The course is an introduction to the various human factors concepts and principles, primarily from a cognitive ergonomics perspective, but also touching upon physical ergonomics and macroergonomics. I also received an appointment as an assistant adjunct professor in the medical school. Then most recently, I joined the Children's Hospital of Philadelphia as the program manager for human factors engineering, charged with starting and building up the human factors initiative for the hospital. In the two years since I started, human factors has been integrated into various hospital initiatives, such as harm prevention, hand hygiene compliance, nursing workflow optimization, patient safety investigations, new technology implementation, and facility design. The integration of human factors is continuing to evolve, and I am looking forward to seeing the broad impact that I believe human factors can have upon the hospital, as well as in the healthcare space.*

#### **About Tufts**

*My time at Tufts was a tremendous blessing, primarily because of the time that I spent with my lab, and especially with my advisor, Professor Daniel Hannon. He has been a mentor and friend, and I am humbled to be able to carry his legacy to my students. Human factors engineering changed my career path, but more than that, it has changed my life – how I look at the world, how I approach problems, how*



SCHOOLS OF ARTS AND SCIENCES & ENGINEERING

Engineering Psychology  
Human Factors Engineering

*it integrates even with my faith life. Everything I learned and experienced at Tufts is being utilized in both my operational life at CHOP, as well as my academic life at the University of Pennsylvania, in how I teach my students and have them execute group projects. I am forever indebted to Professor Hannon and Tufts University for the invaluable role they played in my life, and hope that my story can inspire others at Tufts to pursue a degree in Human Factors Engineering!*



## Testimonial



**Jon Tilliss, G'10**  
**Design Lead/Design Director, Intrepid/Accenture**

### **My Path**

I received a B.S. degree in mechanical engineering in 2007, complimented by studies in psychology and human factors. My first job was with the Wiklund Research & Design (WR&D) as Human Factors Specialist. My responsibilities included planning and conducting user research (e.g., observations and interviews) and usability testing, and developing user interface design concepts. Most of our work was focused on the medical/laboratory/healthcare space, so I quickly had to understand human factors expectations of the Food and Drug Administration (FDA) in the U.S. and the International Electrotechnical Commission (IEC) abroad. In my 11 years at UL-Wiklund (WR&D was acquired by UL in 2012), I was responsible for advising clients about a range of human factors topics, including helping them to design and validate safe and usable products. During that time, I also completed a Masters Degree in Digital Media and Interactive Design from Northeastern University, became a certified Human Factors Professional, and published a book titled "Designing For Safe Use: 100 Principles for Making Products Safer." I am currently with Intrepid Pursuits (acquired by Accenture in 2017), serving as a design lead and the design director of our New York office. In this role, I set the overarching design strategy and direction on various digital products, review and comment on evolving design solutions, develop and mentor design team members, and help our clients navigate the process of user centered design and product development. The group's work spans many industries including health sciences, telecommunications, education, energy, and consumer technology.

### **About Tufts**

While I technically majored in mechanical engineering, I focused a lot of my studies on psychology, human factors, architecture and design. This created a broad foundation for entering the field of human factors and user interface design. In particular, I valued the hands-on, project-based nature of courses on user interface design, computer-aided design, and mechanical design. Those courses in particular taught me how to solve real problems with real constraints. It might sound trite, but I truly owe my career to Tufts. For the first 11 years of my career I had the pleasure to work with a former professor, Michael Wiklund. His class, ENP166, was my first introduction into user interface design and opened my eyes to a field that combined many of my passions: technology, engineering, psychology, art, mathematics, and design. I have been fortunate enough to return to Tufts to TA, guest lecture, co-teach, and now teach ENP166 and hopefully spark the same curiosity and passion in others that lead me to a career in user interface design. Tufts has so much to offer students by enabling them to pursue and combine their interests in unique ways, creating a broad foundation for a career in human factors, product development, and design.

## Testimonial



**Laurie Reed, '00**  
**Senior Director, Human Factors at Farm Design Inc. (A Flex company)**

### **My Path**

I received my B.A. in human factors in 2000. I was eager to gain industry experience and joined the human factors consulting team at the American Institutes for Research (AIR) in Concord, MA straight out of school, where I ended up staying for about 4 years. At AIR, I gained a variety of user research experience across the consumer product, medical device, and software/web verticals and employed a wide variety of human factors methodologies including observational research, focus groups, surveys, usability testing, comparison testing, card sorting, etc. I loved the fact that every project was different; each product presented an opportunity to learn about a new content area and each client provided an opportunity to refine my consulting skills.

I soon moved on to become an independent contractor which allowed me the flexibility to raise a family while still doing what I loved. In 2011, I had the good fortune of coming across Farm Design in Hollis, NH, where an old colleague of mine was working. Farm presented an opportunity for me to hone in on one of the verticals I found most rewarding, medical device product development. I started working at Farm as a Human Factors Engineer, then became a Director of the team, then Senior Director. At Farm, I have been able to develop expertise in creating human factors programs and conducting human factors activities in accordance with regulatory body expectations. I've also gained deeper insight into the full product development cycle, since I have the benefit of working alongside our own industrial designers, user interface designers, and engineers.

On a day to day basis, I am responsible for supporting the company's business development efforts, personnel management, team and resource management, contributing to the strategic direction of the business, and sometimes even still some program management or field research. The best part is that I am still learning and I have the privilege of seeing what cutting edge medical technologies are on the horizon.

### **About Tufts**

When I discovered the human factors program at Tufts, I was searching for a discipline that would enable me to use my strengths and interests in a very applied way. I had strong skills in math and science but adored the field of psychology. I had a passion for understanding human behavior and for making a difference in people's lives. The Tufts program was the perfect fit for me, providing an ideal union of these seemingly disparate worlds. Knowing what I know about how many people come into the human factors field now, I have a strong appreciation for the traditional human factors fundamentals that I was taught at Tufts. My studies included a lot of hands-on projects in which I practiced collaborating with multi-disciplinary teams, and I loved that our senior research project was 'real work' conducted for a well-known company. The Tufts HF program provided me with the foundation and experience I needed to be able to directly enter the workforce and put my human factors skills to immediate work.

## Testimonial



**Maya (née Jackson) Pellegrini, E'08**  
**Staff User Experience Researcher, Google**

### **My Path**

I received my B.S. degree in engineering psychology in 2008. In my sophomore year, I connected with a Tufts alumni who helped me achieve an internship at [Fidelity Investments](#) as a Usability Intern. During my senior spring semester I took a course with Michael Wiklund (E'79, M'84) who subsequently hired me to join his firm (then Wiklund Research & Design, now [UL-Wiklund](#)) following my graduation. In my 3 years at WR&D I led and assisted numerous research studies on medical devices and training materials, focusing on the diabetes and dialysis space. During my time I enjoyed traveling and working with clients throughout the US and Europe and also co-authored a [paper](#) with Wiklund and Jon Tillis (E'07). During my time at Wiklund I also attended [Bentley University](#) and received my Masters degree in [Human Factors in Information Design](#) in 2012. I moved to New York in 2011 and joined [Sachs Insights](#), followed by [AnswerLab](#), both consulting firms focused on UX research. At both firms I worked with clients to design and conduct user research on digital products, focused in the insurance, financial services and logistics industries. In 2017 I joined Google as a Senior User Experience Researcher on Google Apps. My team's work is focused on improving the work productivity experience via collaboration tools.

### **About Tufts**

I look back on my time at Tufts with great joy, fond memories and lasting friendships. I am so grateful to have found the engineering psychology program, after feeling lost with my original path of civil engineering. With the help of Dean Kim Knox I found my perfect "hybrid major" that blended my interests in science and technology with human behavior. What I appreciated most about my later coursework at Tufts was working with professors of the practice who gave us projects that prepared us for real-world team interactions, deadlines, and work. This coursework helped me tremendously when I entered the workforce after graduation. I've kept in touch with many people in the program (including a few current colleagues at Google) and am eager to speak with and recruit graduates from the Tufts program to help them find their ideal career path after college, be it at Google or any other company.

## Testimonial



**Mona Patel, E'99**  
**CEO, UX Strategist, Motivate Design**

### **My Path**

I stumbled upon the Human Factors program in 1996 when trying to find a major. I knew I loved psychology and understanding people and found the ability to apply that to the design of products fascinating. It also passed the “Indian father” test because the major was called *Engineering Psychology* at the time. My senior year, I took a class, impressed my teacher, and landed an internship and then Research Associate job at American Institutes for Research. There, I learned what it took to do research well. We worked with clients like Guidant to test out medical devices, Microsoft to assure each release of their software was better than the one before, Fast Company to launch their first (yes first!) website, and my favorite, Mini USA. After I completed my Masters in Communication, I moved on to Human Factors International to do more design-related work and found that it was the account management and pitching/selling I loved the most. I grew from a Senior Designer to Executive Director there - from working on projects to leading teams and managing the Eastern Region of an international consultancy. I left HFI and started Motivate Design in 2009, where I'm currently the Founder and CEO. Motivate has a few offerings - an agency for UI/UX consulting work, a staffing firm called UXHires for full-time placements, and Insider Insight, a proprietary research method that uses peer-to-peer conversations as the basis of understanding what people who know each other tell each other about brands, services, and products. Clients come to us because they need to understand what people want, and our job is to ask, observe, listen and synthesize for them, and then inspire and lead them to better design solutions. While running Motivate, I also wrote two books, *Reframe: Shift The Way You Work, Innovate and Think* and *The Thing About Swings*, gave a TEDx talk called, “See Problems as Opportunities” and taught at Parsons The New School for 7 years.

### **About Tufts**

How would you redesign a vacuum? What about a razor? These were the projects that introduced me to the world of Human Factors, and I know that I wouldn't have found them anywhere else but Tufts. I know how hard the program can be and respect the students that stick with it and perform well. My best friends are the ones I made at Tufts. I married the man I dated at Tufts and we have two amazing boys together. Many of the memories I made there, from dancing on stage at a TASA show to frat parties that went on and on to debates on the quad about whatever was happening in the world are still the ones that make me smile most.

## Testimonial



**Peter Sneeringer, E'08, EG'10**  
**Director, Research & Strategy at Design Science Consulting Inc.**

### **My Career Path**

I received a B.S. in mechanical engineering in 2008 and then an M.S. in human factors in 2010. Shortly after graduation, I started working at Design Science, a medical human factors consultancy based in Philadelphia. I am still working at Design Science today, nearly 9 years later! In my time here, my role has changed many times so that I've gotten experience in many different aspects of human factors research in the healthcare industry. I have conducted thousands of hours of usability testing, facilitated remote and in-home field research interviews, conducted heuristic analyses, written reports that have been sent to the FDA and other regulatory bodies, and led a team of other human factors professionals. I have helped design and test medical products ranging from common at-home use devices, like insulin pumps, to laparoscopic surgical equipment, like surgical staplers, to life-sustaining devices, like left ventricular assist devices. In all of these projects, I have worked with clients at medical device or pharmaceutical companies to create products that are more usable for the end-user and are safer for the users and patients.

### **About Tufts' HF program**

During my 6 years at Tufts, I learned how to problem solve, how to work as part of a team, and how to manage competing priorities and timelines. The undergraduate education of mechanical engineering helped me understand the mechanics of product design and the inherent constraints that come with it. Then, as I completed my masters, I learned how the product design is so dependent upon the user interface. Understanding the complexities of the user interface and how to mold it to the users became an obsession for me; I constantly comment on every product that is designed well (or poorly!). My time at Tufts gave me the foundation I needed in human factors, and then I was able to translate that into working for a healthcare consultancy. I now lead a team of human factors engineers and have hired multiple Tufts alums!

## Testimonial



**Rachel Terveer, A'16**  
**Senior User Experience Researcher, Fidelity Investments**

### **My Path**

Fidelity Investments was founded in 1946 as Fidelity Management & Research by Edward C. Johnson. It is a financial services corporation headquartered in Boston, Massachusetts. One of the largest asset managers in the world, Fidelity offers a variety of financial accounts and product offerings as well as investment advice and guidance, retirement services, wealth management, life insurance, among many other things. In addition to the above offerings, Fidelity actually has a very large in-house user experience design and user experience research teams. Dealing with finances is a complicated subject that involves numerous decisions, rules, regulations, and labor-intensive processes. Our large, in-house design and research teams aim to simplify these financial decisions and processes as much as possible by providing intuitive, user-friendly, informative online experiences. The members of the user experience research team specifically help project teams identify pain points or confusion within current experiences and partner with designers to aid in creating solutions to remedy these identified issues, therefore, providing an exceptional customer experience. Before I joined Fidelity, I worked as a Human Factors Intern at the Natick Soldier Research, Development, and Engineering Center working on optimizing a soldier's range of motion in different bullet proof IOTV vests throughout the summer of 2014. After participating in this internship with the Army evaluating physical products, I switched gears a bit and interned at Fidelity Investments where I worked on the evaluation of digital user interfaces throughout the summer of 2015. After my internship, I worked at Fidelity part-time during my senior year at Tufts and then converted to a full-time Fidelity employee in August 2016, after graduation. Currently, I work on the Digitization and Automation of Service team that aims to reduce call volume to the call centers by encouraging online self-service and increasing customer confidence levels. Some of the initiatives that I work on include the process of moving money (e.g., deposits, withdrawals, peer to peer payments), engagement with Fidelity's Virtual Assistant/chatbot, streamlining the communication, alerts, and preference setting experiences, among many others! Throughout my experience, I have utilized many user research methods, both qualitative (e.g., usability testing, eye tracking) and quantitative (e.g., generative and evaluative surveys, card sorts, treejacks, first-click tests), depending on the team's overall goals for the project in question.

### **About Tufts**

My education at Tufts gave me a great foundation to apply both engineering, design, and psychology/human behavior principles in numerous contexts. The Human Factors/Engineering Psychology program allows for a well-rounded education within these multiple concentrations, allowing students to take this major down a variety of career paths within development, design, research, etc. I catered my major more toward the research route, and the experience that I had definitely taught me how to apply user research principles to both physical products as well as user interfaces/graphic interfaces in order to create more user-friendly products. Additionally, the classes that I took and the projects that I was a part of throughout my time at Tufts directly translated to the work that I am currently doing at Fidelity. At Tufts, I learned and applied all of the steps involved to plan, perform, analyze, and present findings for valid qualitative as well as quantitative studies/experiments. Having such a good base from my Engineering Psychology major jump started both my interest in and career in user experience research and definitely put me in a very successful position for my first full-time corporate job out of college.



## Testimonial

**Rungtai Lin, G'88, G'92**

**Professor, Graduate School of Creative Industry Design, Design College, National Taiwan University of Arts**

### **My path**

I received my M.S. and Ph.D. degrees in Human Factors Engineering at Tufts University in 1988 and 1992, respectively. After graduated, I moved to Mingchi Institute of Technology to continue my teaching and research careers. My research interests are in Ergonomics in Product Design, Human-Computer Interaction, and Cognitive Approaches to Design. Now, I am a Professor in the Graduate School of Creative Industry Design, Design College, National Taiwan University of Arts, Taipei, Taiwan. Recently, my research has focused on Cultural and Creative Product Design.

During my time at Tufts, I learned how to interact with different people and objects in their environment. My Human Factors Engineering course of study was not only helpful for my academic research but also benefitted my career as a whole. For example, I was the President of Taiwan Design Center, Mingchi Institute of Technology, and Chang Gung Institute of Technology, Taiwan.