Bachelor of Science
in
Information Technology
and Web Science

Curriculum
and
Concentrations

-- Version --
Fall 2020

Rensselaer Polytechnic Institute

Overview

In the ITWS degree we are combining Information Technology and Web Science so that we are understanding the interplay between the social, scientific and technical issues underlying the WWW and other information technologies. ITWS combines technical courses and courses in human computer interaction, the social implications of IT, communications, management, leadership, team building and now we are highlighting courses in web science. Students also select a concentration, of which 8 courses are in a selected field. So they graduate with a foundation in IT/Web Science and an area of expertise to apply the technology. Students receive a broad yet focused degree and are prepared to apply the technology to their given field and understand the impact it has on society.

Web Science models how the Web is structured. It helps us engineer a better Web. The Web needs to be understood and it needs to be engineered. Web science offers the prospect of creating more powerful ways to define, link and interpret data.
Some of the issues being addressed in Web Science:

Design Principles – new science will model the web structure.

Online human interactions – a small technical innovation can launch a large social phenomenon.

Laws relating to intellectual property. Web Science can provide ways to check information, while offering rules and conditions about reuse of material.

Trust of material – provide users a better way of determining if material on a site can be trusted.

The program consists of 128-130 credit hours, of which 36-38 credit hours constitute an ITWS Core, 32 credit hours constitute a concentration, and the remaining credit hours fulfill Rensselaer degree requirements. The ITWS Core requirements establish a solid foundation for the application of ITWS to any discipline. The Rensselaer requirements ensure the breadth of the degree and that it is consistent with the long established tradition of a Rensselaer degree. The required concentration provides an opportunity for in depth study of an ITWS application area. Available concentrations are listed in the Table of Contents. With faculty advisement, students may also select their own courses to fulfill concentration requirements and explore their own interests. It is expected that new concentrations will be created as new ITWS application areas are identified and developed. For the most recent list of available concentrations, see the ITWS home page (http://itws.rpi.edu/).

Both a professional and research track are offered for the BS in ITWS degree. For the research track, the capstone course is replaced with a two-semester thesis.

If a student chooses to pursue a dual degree with Information Technology and Web Science as one of the degrees, the dual degree must be the degree that is closest to the concentration. For example, if a student's concentration is Psychology then the dual degree would need to be in Psychology.

Concentrations

Arts
Civil/Structural Engineering
Cognitive Science
Communication
Computer Hardware
Computer Networking
Data Science
Economics
Entrepreneurship
Finance
Information Security
Machine & Computational Learning
Management Information Systems
Mechanical/Aeronautical Engineering
Medicine
Pre-Law
Psychology
Science & Technology Studies
Science Informatics
Special Interest
Web Technology

Degree Requirements

The requirements for the Bachelor of Science in Information Technology and Web Science degree are shown below. Only Free Electives and HASS Electives may be taken with the Pass/No Credit option.

ITWS Core Requirements: (36 - 40 credits)		
	1. ITWS-1100 Introduction to Information Technology and Web Science	4 credits
	2. Select one of the four Technical Tracks based on Concentration (see table on page 7)	12 credits
	3. ITWS-2110 Web Systems Development	4 credits
	4. ITWS Elective (one of): CSCI-4380 Database Systems MGMT-4170 Data Resource Management	4 credits
	5. One of:[1] ITWS-4100 Information Technology and Web Science Capstone (Professional Track) ITWS-4990 Senior Thesis (Research Track – Two Semesters)	4 credits 6 credits
	6. ITWS-4500 Web Science Systems Development	4 credits
	7. ITWS-4310 Managing IT Resources	4 credits

Math/Science Requirements: (24 credits)		
	1. MATH-1010 Calculus I	4 credits
	2. Math Elective	4 credits
	3. CSCI-1100 Computer Science I	4 credits
	4. CSCI-1200 Data Structures	4 credits
	5. Physical Science Elective (PHYS-XXXX)	4 credits
	6. Life Science Elective (BIOL-XXXX)	4 credits

Humanities, Arts and Social Sciences Requirements: (24 credits)		
	1. ITWS-1220 IT and Society (HASS - ITWS Integrative Pathway Course, Inquiry Course, Communication Intensive)	4 credits
	2. ITWS-2210 Intro to Human Computer Interaction (HASS ITWS Integrative Pathway Course)	4 credits
	3. HASS ITWS Integrative Pathway Course	4 credits
	4. HASS Elective	4 credits
	5. HASS Elective	4 credits
	6. HASS Elective	4 credits

Free Elective Requirements: (8-12 credits)		
	1. Free Elective	4 credits
	2. Free Elective	4 credits
	3. Free Elective	4 credits

Student-Selected Concentration: (32 credits)		
	1. Concentration Course	4 credits
	2. Concentration Course	4 credits
	3. Concentration Course	4 credits
	4. Concentration Course	4 credits
	5. Concentration Course	4 credits
	6. Concentration Course	4 credits
	7. Concentration Elective	4 credits
	8. Concentration Capstone/Course	4 credits

The student selects a concentration from a list of available concentrations later in this document. Each concentration prescribes the courses that it requires. Alternatively, a student may choose his or her own courses with faculty advisement to fulfill concentration requirements and explore a special interest.

[1] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Technical Tracks

(Select technical track based on concentration)

	Technical Track Courses	Concentrations
Computer Engineering Track	1) ECSE-2610 Computer Components and Operations 2) ENGR-2350 Embedded Control 3) ECSE-2660 Computer Architecture, Networking and Operating Systems	Civil Engineering Computer Hardware Mechanical/Aeronautical Engineering
Computer Science Track	1) CSCI-2200 Foundations of Computer Science 2) CSCI-2300 Introduction to Algorithms 3) CSCI-2500 Computer Organization	Cognitive Science Computer Networking Data Science Information Security Machine and Computational Learning
Information Systems Track	1) CSCI-2200 Foundation of Computer Science 2) CSCI-2500 Computer Organization 3) One of the following: • MGMT-2100 Statistical Methods • BIOL-4200 Biostatistics • CSCI-2300 Introduction to Algorithms	Arts Communication Economics Entrepreneurship Finance Management Information Systems Medicine Pre-law Psychology STS
Web Science Track	1) CSCI-2200 Foundations of Computer Science 2) CSCI-2500 Computer Organization 3) CSCI-2300 Introduction to Algorithms	Science Informatics Web Technologies

Humanities, Arts & Social Sciences (HASS) Core

- Integrative Pathway – 12 credit HASS integrative pathway
    - An Integrative Pathway (IP) is a themed set of courses that allows students to explore a designated topic area in greater breadth & depth. Students may choose from the list of over 40 topic areas to explore. Please visit this site for approved pathways (https://info.rpi.edu/pathways). This list also includes required courses for each pathway and other FAQs regarding the IP requirement. Many of the IPs can also lead to minors.
    - Courses counting toward the integrative pathway may not be designated as P/NC.
- 1 4000-level course*
    - This must be a 4 credit course.
- 1 communication intensive course in first 3 semesters* (ITWS-1220 fulfills this requirement)
    - P/NC designation may not be used.
- 1 HASS inquiry (IHSS) course in first 2 semesters* (ITWS-1220 fulfills this requirement)
- 24 credits total
    - A maximum of 12 credits at the 1000-level can be counted toward the HASS core.
    - A maximum of 8 AP or transfer credits can be counted toward the HASS core.
    - A maximum of 8 credits can be designated as P/NC.

*these courses may be included in the Integrative Pathway

NOTE: For ITWS students ITWS-1220 IT and Society and ITWS-2210 Intro to Human Computer Interaction are two of the three courses needed for the ITWS Integrative Pathway. The third course will be chosen from the list of courses found here - https://info.rpi.edu/pathways.

Sample Layout of Courses

The requirements for the Bachelor of Science in Information Technology and Web Science can be organized into an eight-semester program, with four courses each semester, as shown below. This layout of the courses is intended only as a suggestion. Other arrangements of the courses are possible.

Fall	Spring
Semester I ITWS-1100 Introduction to Information Technology and Web Science Concentration Course CSCI-1100 Computer Science I MATH-1010 Calculus I	**Semester II** ITWS-1220 IT and Society (HASS - ITWS Integrative Pathway Course, Inquiry Course, Communication Intensive) CSCI-1200 Data Structures Math Elective Physical Science Elective (PHYS-XXXX)
Semester III ITWS-2110 Web Systems Development Technical Track Course #1 (see chart on page 7) Concentration Course HASS Elective[1]	**Semester IV** ITWS-2210 Introduction to Human Computer Interaction (HASS ITWS Integrative Pathway Course) ITWS-4500 Web Science Systems Development Technical Track Course #2 (see chart on page 7) HASS ITWS Integrative Pathway Course
Semester V (Arch) Life Science Elective (BIOL-XXXX) Concentration Course Concentration Course Free Elective	**Semester VI (Fall/Spring)** ITWS-4310 Managing IT Resources ITWS Elective (one of): - CSCI-4380 Database Systems - MGMT-4170 Data Resource Management Technical Track Course #3 (see chart on page 7) Concentration Course
Semester VII One of:[2] - ITWS-4100 Information Technology and Web Science Capstone (Professional Track) - ITWS-4990 Senior Thesis (Research Track) Concentration Course HASS Elective[1] Free Elective	**Semester VIII** Concentration Capstone/Course Concentration Course HASS Elective[1] Free Elective ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Minor in ITWS

The ITWS minor requires a minimum of 16 credit hours that must be approved by the minor advisor in ITWS. The specific requirements are:

1) ITWS-1100 Introduction to Information Technology and Web Science

2) ITWS-4310 Managing IT Resources[1]

3) Humanities Elective:[2]
   ITWS-1220 IT and Society (also listed under IHSS-1220)

4) Technical Elective (one of):
   ITWS-2110 Web Systems Development
   CSCI-2300 Introduction to Algorithms
   CSCI-4380 Database Systems
   MGMT-4170 Data Resource Management

[1] MGMT Majors only – Take ITWS-4100 Information Technology and Web Science Capstone or other course as approved by faculty advisor.

[2] Other courses as approved by faculty advisor.

Arts

(Humanities, Arts and Social Science)

Contact Person: Kate Tomlin

Description

The Information Technology and Web Science degree with an Arts concentration presents students with an exciting program of study that emphasizes the creativity of arts studio practice in shaping and influencing information technology. The program extends the activities of the Integrated Electronic Arts program at Rensselaer (iEAR), an extensive, state-of-the-art facility dedicated to interdisciplinary research / artistic development in interactivity, digital video, computer imaging, digital audio, animation, virtual reality, web design, multi-media installation and performance. Students will take a series of courses designed to give them hands-on experience with a full range of arts practice within our unique technological environment. Intermediate and advanced courses offer the student the opportunity to focus on an area of research specialization, and to develop innovative collaborative projects. Study in the Arts concentration will provide students with both theoretical foundation, and practical experience needed for careers in the many fast-growing fields related to digital arts and multi-media.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
Choice of ARTS Intro Class[3] (Concentration)
CSCI-1100 Computer Science I
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
ITWS-1220 IT and Society
Math Elective
Physical Science Elective (PHYS-XXXX)

Semester III

CSCI-2200 Foundations of Computer Science
ITWS-2110 Web Systems Development
HASS Elective[1]
Choice of ARTS Intro Class[3] (Concentration)

Semester IV

CSCI-2500 Computer Organization
ITWS-2210 Introduction to Human Computer Interaction
ITWS-4500 Web Science Systems Development
ARTS-2540 The Multimedia Century (Concentration)

Semester V (Arch)

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

Studio Focus I (see below) (Concentration)
Life Science Elective (BIOL-XXXX)
Free Elective

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

ARTS-4130 New Media Theory (Concentration)
Studio Focus II (see below) (Concentration)

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

Studio Elective (see below) (Concentration)
HASS Elective[1]
HASS Elective[1]

Semester VIII

ARTS-4420 Experimental Telepresence (Concentration)
HASS Elective[1]
Free Elective
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

[3] Choose two ARTS Intro classes from following:
IHSS-1010 Exploring Music @ Rensselaer
ARTS-1020 Digital Imaging
ARTS-1030 Digital Filmmaking

Studio Focus I (one of):
ARTS-2010 Intermediate Video
ARTS-2020 Music and Technology I
ARTS-2040 Intermediate Digital Imaging

Studio Focus II (one of):
ARTS-4010 Interactive Arts Programming
ARTS-4020 Advanced Digital 3-D Projects
ARTS-4040 Rethinking Documentary: Video Production
ARTS-4060 3D Visual Effects
ARTS-4070 3D Animation
ARTS-4410 Deep Listening
Studio Seminar Topics (rotating topics in current research areas, collaborative projects encouraged, focus on research and development of new technologies).

Studio Elective: 2000 or 4000 level studio course

Civil Engineering

(Engineering)

Contact Person: Prof. O'Rourke

Description

Students in this concentration can specialize in one of two areas. The first involves the creation of 3-D and 4-D visualizations of buildings, bridges, highway systems and other kinds of civil systems. These virtual reality environments will be the essence of civil engineering design and construction in the coming millennium. The second specialization focuses on the collection, analysis and dissemination of information concerning the operation of civil systems.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
ENGR-1100 Introduction to Engineering Analysis (Concentration)
CSCI-1100 Computer Science I
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
MATH-1020 Calculus II (Math Elective)
ITWS-1220 IT and Society
ENGR-2530 Strength of Materials (Concentration)

Semester III

ECSE-2610 Computer Components and Operations
ENGR-2350 Embedded Control
ITWS-2110 Web Systems Development
PHYS-1100 Physics I (Science Elective)

Semester IV

ECSE-2660 Computer Arch, Networking and OS
ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CIVL-2670 Intro. to Structural Eng. (Concentration)

Semester V (Arch)

Life Science Elective (BIOL-XXXX)
HASS Elective[1]
Civil Engineering Science Elective (Concentration)
Free Elective

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

MATH-2400 Intro to Differential Equations (Concentration)
HASS Elective[1]

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

HASS Elective[1]
Free Elective
CIVL-4070 Steel Design (Concentration)

Semester VIII

CIVL-4080 Concrete Design (Concentration)
CIVL-4920 Civil Engineering Capstone Design (Concentration)
HASS Elective[1]
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Civil Engineering Science Elective (one of):

PHYS-1200 Physics II
ENGR-1600 Materials Science

Cognitive Science

(Humanities, Arts and Social Science)

Contact Person: Bram van Heuveln

Description

Cognitive Science applies to IT and Web Science majors in a natural and important way. An understanding of how the human mind takes in and processes information in terms of perception, attention, and memory, will form important guidelines for the actual human usability of any piece of information technology beyond its pure functionality. The Cognitive Science concentration in IT and Web Science thus allows students to incorporate cognitive science knowledge into their design of information technology to create, for example, more efficient and effective human-computer interfaces. However, knowledge about the human mind will also open the doors for information technologies that try to mimic or augment some of the strategies employed by human minds, thus leading to artificially intelligent information technology, or brain-computer interfaces.

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
MATH-1010 Calculus I
IHSS-1140 Minds and Machines (Concentration)

Semester II

CSCI-1200 Data Structures
COGS-2120 Introduction to Cognitive Science (Concentration)
ITWS-1220 IT and Society
Math Elective

Semester III

CSCI-2200 Foundations of Computer Science
HASS Elective[1]
ITWS-2110 Web Systems Development
PSYC-4370 Cognitive Psychology (Concentration)

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
PSYC-2220 Human Factors in Design (Concentration)

Semester V (Arch)

PSYC-2310 Research Methods and Statistics I (Concentration)
Physical Science Elective (PHYS-XXXX)
Life Science Elective (BIOL-XXXX)
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

PSYC-4410 Sensation and Perception (Concentration)
CSCI-2300 Introduction to Algorithms

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

COGS Elective (Concentration)
HASS Elective[1]
Free Elective

Semester VIII

COGS Elective (Concentration)
HASS Elective[1]
Free Elective
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Communication

(Humanities, Arts and Social Science)

Contact Person: Kate Tomlin

Description

The Information Technology and Web Science degree with Communication as a concentration prepares students to make effective use of the communication resources in the context of developing information technologies. Students will learn how to integrate oral, visual, and written elements into coherent messages; and to design and manage communication systems so we achieve appropriate blends of media and technologies for specific communication purposes. This degree will prepare students who see Information Technology as a means of taking a leadership role in careers as communication specialists and information officers. Students begin with courses introducing them to the basics of communication theory, literary theory, and written and visual communication, followed by advanced work in one or more of the following areas: communication, film, human-computer interaction, popular culture, technical communication, visual and hypermedia design, web design, and writing.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
WRIT-2110 Strategic Writing (Concentration)
CSCI-1100 Computer Science I
MATH-1010 Calculus I

Semester II

COMM-2520 Communication Theory and Practice (Concentration)
CSCI-1200 Data Structures
ITWS-1220 IT and Society
Math Elective

Semester III

CSCI-2200 Foundations of Computer Science
Free Elective
ITWS-2110 Web Systems Development
COMM-2660 Intro to Graphic Design (Concentration)

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
LITR-2110 Introduction to Literature (Concentration)

Semester V (Arch)

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

Communication or Writing Elective (Concentration)
Life Science Elective (BIOL-XXXX)
Free Elective

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

Communication or Writing Elective (Concentration)
HASS Elective[1]

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

Communication or Writing Elective (Concentration)
HASS Elective[1]
Physical Science Elective (PHYS-XXXX)

Semester VIII

Communication Thesis (see list on next page) (Concentration)
HASS Elective[1]
HASS Elective[1]
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Communication Thesis (one of):

COMM-4180 Studio Design in Human Computer Interaction
COMM-4320 Visual Poetics & Narrative
COMM 4380 Writing and Response
COMM-4400 Cross Cultural Design
COMM-4420 Foundations of HCI Usability
COMM-4430 Design for Global Society
COMM-4460 Visual Design: Theory and Application
COMM-4470 Information Design
COMM-4530 Reality TV and Post-Factual Media
COMM-4540 Visual Culture
COMM-4550 Religion in the Media
COMM-4580 Advertising Culture
COMM-4620 Language and Culture
COMM-4690 Interface Design: Hypermedia Theory and Application
COMM-4770 User Experience Design
COMM-4780 Interactive Narrative
COMM-4880 Interactive Data Visualization

Computer Hardware
(Engineering)

Contact Person: Tong Zhang

Description
Provides students with a strong background in circuits and electronics, with particular application to computer hardware. Topics include basic electronics, microelectronics, electromagnetics, integrated circuit design and computer hardware design.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
MATH-1010 Calculus I
PHYS-1100 Physics I (Science Elective)

Semester II

CSCI-1200 Data Structures
MATH-1020 Calculus II (Math Elective)
PHYS-1200 Physics II (Science Elective)
ITWS-1220 IT and Society

Semester III

ITWS-2110 Web Systems Development
ECSE-2610 Computer Components and Operations
ENGR-2350 Embedded Control
Free Elective

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
ECSE-2660 Computer Arch, Networking and OS
MATH-2400 Introduction to Differential Equations (Concentration)

Semester V (Arch)

ECSE-2010 Electric Circuits (Concentration)
ENGR-2600 Modeling and Analysis of Uncertainty (Concentration)
HASS Elective[1]
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

ECSE-2050 Introduction to Electronics (Concentration)
ECSE-2100 Fields and Waves I (Concentration)

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

Capstone Experience (one of): (Concentration)
- ECSE-4770 Computer Hardware Design
- ECSE-4220 VLSI Design

ECSE-2210 Microelectronics Technology (Concentration)
HASS Elective[1]

Semester VIII

Any CSCI or ECSE course (Concentration)
HASS Elective[1]
Free Elective
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Students are encouraged to take a Biology course (BIOL-XXXX)

Computer Networking

(Information Technology and Web Science)

Contact Person: Richard Plotka

Description

Prepares students for careers in designing, building and managing computer networks. The concentration provides a background in basic communications techniques, including those for both wired and wireless channels, as well as computer networking so students will understand the network from the physical layer up through the application layer.

Required Courses

Semester I

ITWS-1100 Introduction to ITWS
CSCI-1100 Computer Science I
MATH-1010 Calculus I
PHYS-1100 Physics I (Science Elective)

Semester II

ITWS-1220 IT and Society
CSCI-1200 Data Structures
Math Elective
BIOL-XXXX (Life Science Elective)

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
CSCI-2500 Computer Organization
HASS Elective [1]

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2300 Introduction to Algorithms
HASS Elective [1]

Semester V (Arch)

CSCI-4210 Operating Systems (Concentration)
Concentration Elective 1 (Concentration)[3]
HASS Elective [1]
Free Elective

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

Concentration Elective 2 (Concentration)[3]
Free Elective

Semester VII

One of: [2]
- ITWS-4100 ITWS Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

CSCI-4230 Cryptography and Network Security I (Concentration)
ECSE-4670 Computer Communication Networks (Concentration)
HASS Elective [1]
Free Elective [4]

Semester VIII

ITWS-4370 Information Sys. Security (Concentration)
CSCI-4220 Network Programming (Concentration)
One of: (Concentration)
- CSCI-4310 Networking in the Linux Kernel
- ECSE-4964 Internetworking of Things

Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

[3] Concentration Electives are 4000 or 6000 level courses, typically in CSCI or ECSE, that are approved by your academic advisor.

[4] Free Elective may be needed to get to 128 credits required for graduation.

Data Science

(Information Technology and Web Science)

Contact Person: Peter Fox

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
Life Science Elective (BIOL-XXXX)
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
Math Elective
ITWS-1220 IT and Society
Free Elective

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
CSCI-2500 Computer Organization
Physical Science Elective (PHYS-XXXX)

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2300 Introduction to Algorithms
HASS Elective [1]

Semester V (Arch)

CSCI-4210 Operating Systems (Concentration)
Free Elective (6-7 credits)**
HASS Elective [1]
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
CSCI-4380 Database Systems
Statistics Sequence A* (Concentration)
HASS Elective[1]

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

ITWS-4350 Data Science (Concentration)
CSCI-4100 Machine Learning from Data (Concentration)
CSCI-4220 Network Programming (Concentration)

Semester VIII

ITWS-4400 X-Informatics (Concentration)
Free Elective
CSCI-4150 Intro to Artificial Intelligence (Concentration)
Statistics Sequence B* (Concentration)
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

***<u>Statistics Sequences (Choose either Sequence 1 or 2):</u>**

Sequence 1

A. MGMT-2100 Statistical Methods
B. BIOL-4200 Biostatistics

Sequence 2

A. ENGR-2600 Modeling and Analysis of Uncertainty (4 credits)
B. One of:
   ISYE-4140 Statistical Analysis
   ISYE-6180 Knowledge Discovery with Data Mining (3 credits)

**Number of free elective credits in Semester V will be 6-7 credits. There are two factors that determine the correct number: (1) Statistics Sequence choice and; (2) two courses in later terms are only 3 credits each.

Economics

(Humanities, Arts and Social Science)

Contact Person: Kate Tomlin

Description

The BS in Information Technology and Web Science with Economics as the concentration prepares students for careers in the intersection of information technology and the global economy. Graduates with this concentration will be trained in the application of new information technologies to specific economic fields of study such as global economics, regional economics, and environmental/ecological economies. The widespread availability of techniques such as GIS mapping is beginning to revolutionize economic analysis and has the potential to change the way we view the economic system and the world we live in. As the information revolution penetrates the classroom, courses will increasingly be taught around local, national, and global databases. Graduates will have a va-riety of career options ranging from local governments and local development agencies, to worldwide economic development and environmental organizations. All students begin by taking *Introduction to Economics: The Global Economics in the Information Age* (first year studies), which provides an introduction to economic theory, and a hands-on, project-based introduction to the economics of the information age.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
MATH-1010 Calculus I
IHSS-1200 Principles of Economics (Concentration)

Semester II

CSCI-1200 Data Structures
ITWS-1220 IT and Society
MATH-1520 Mathematical Methods in Management and Economics
HASS Elective[1]

Semester III

CSCI-2200 Foundations of Computer Science
ITWS-2110 Web Systems Development
ECON-2010 Intermediate Microeconomics (Concentration)
Life Science Elective (BIOL-XXXX)

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
ECON Elective (Concentration)

Semester V (Arch)

One of: (Concentration)
ECON-4120 Mathematical Methods in Economics
ECON-4570 Econometrics
One of the following two courses: (Concentration)
ECON-4130 Money and Banking
ECON-2020 Intermediate Macroeconomic Theory
Free Elective
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

ECON Elective (Concentration)
One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

Semester VII	Semester VIII
One of:[2] - ITWS-4100 Information Technology and Web Science Capstone (Professional Track) - ITWS-4990 Senior Thesis (Research Track) ECON-4xxx Senior Economics Capstone or similar (Concentration) HASS Elective[1] Free Elective	Economics elective (Concentration) Physical Science Elective (PHYS-XXXX) HASS Elective[1] Free Elective ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Entrepreneurship

(Management)

Contact Person: Chris Meyer

Description

In combination with the Information Technology and Web Science core, the Entrepreneurship concentration leads to a multidisciplinary degree with a special emphasis on technological entrepreneurship in the information technology field. This concentration focuses on the process of discovering, creating and turning information technology-based opportunities into new products in existing organizations and new ventures.

The Entrepreneurship concentration curriculum is designed to provide a solid foundation of skills, knowledge and practical field experience at the intersection of information technology and entrepreneurship. It emphasizes recognizing new product and/or new venture opportunities; creating business plans to bring them into existence, and managing the launch, growth and harvest of information technology and web science-based opportunities.

Students interested in the following career possibilities should pursue an Entrepreneurship concentration: new product development and/or corporate venturing in larger, entrepreneurial businesses; multidisciplinary opportunities in newer, high potential ventures; and direct participation in the creation of a new, information technology and web science-based venture.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
MATH-1010 Calculus I
MGMT-1100 Introduction to Management (Concentration)

Semester II

CSCI-1200 Data Structures
ITWS-1220 IT and Society
MGMT-2300 Financial Accounting (Concentration)
Math Elective

Semester III

CSCI-2200 Foundations of Computer Science
ITWS-2110 Web Systems Development
HASS Elective[1]
Free Elective

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
MGMT-2430 Marketing Principles (Concentration)

Semester V (Arch)

MGMT-2320 Managerial Finance (Concentration)
One of: (Concentration)
- MGMT-4850 Organizational Behavior in High Performance Organizations
- MGMT-4860 Human Resources in High Performance Organizations

Life Science Elective (BIOL-XXXX)
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

Physical Science Elective (PHYS-XXXX)

Semester VII	Semester VIII
One of:[2] - ITWS-4100 Information Technology and Web Science Capstone (Professional Track) - ITWS-4990 Senior Thesis (Research Track) MGMT-4510 Invention, Innovation, and Entrepreneurship (Concentration) MGMT-4520 Introduction to Technological Entrepreneurship (Concentration) HASS Elective[1]	MGMT-4530 Starting Up a New Venture (Concentration) HASS Elective[1] Free Elective ITWS-4990 Senior Thesis (Research Track Only) Free Elective

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Finance
(Management)

Contact Person: Chris Meyer

Description

The Finance concentration prepares students for careers in the financial sector and in corporate finance functions. To complement the Information Technology and Web Science core, the student will experience financial analysis and trading, financial decision-making, and their applications. Special finance problems in high-tech industries will be explored, as well as the impact of technology on financial markets, financial institutions, and financial management in modern corporations. This concentration provides an in-depth understanding of investment decision making and risk management including stocks, bonds, options, futures, and swaps; that is, the elements of financial engineering. You'll be expected to take additional information systems and operation research courses.

The capstone course will closely integrate the ITWS and MIS course experiences in an extended application involving either corporate financial information systems or real time trading and market information management.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
MGMT-1100 Introduction to Management (Concentration)
CSCI-1100 Computer Science I
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
ITWS-1220 IT and Society
MGMT-2300 Financial Accounting (Concentration)
Math Elective

Semester III

CSCI-2200 Foundations of Computer Science
ITWS-2110 Web Systems Development
HASS Elective[1]
Free Elective

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
MGMT-2430 Marketing Principles (Concentration)

Semester V (Arch)

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

MGMT-2320 Managerial Finance (Concentration)
Life Science Elective (BIOL-XXXX)
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

MGMT-4320 Investments I (Concentration)
One of: (Concentration)
- MGMT-4420 Student Managed Investment Fund
- MGMT-4360 International Finance
- MGMT-4540 Venture Capital Finance
- MGMT-4960 Financial Technology
- ECON-4330 Economics of Financial Institutions and Markets

Semester VII	Semester VIII
One of:[2] - ITWS-4100 Information Technology and Web Science Capstone (Professional Track) - ITWS-4990 Senior Thesis (Research Track) MGMT-4340 Advanced Corporate Finance (Concentration) HASS Elective[1] Free Elective	One of: (Concentration) - MGMT-4850 Organizational Behavior in High Performance Organizations - MGMT-4860 Human Resources in High Performance Organizations Physical Science Elective (PHYS-XXXX) Free Elective HASS Elective[1] ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Information Security

(Information Technology and Web Science)

Contact Person: Brian Callahan

Description

The Information Security concentration prepares students for careers designing, building, and managing secure computer systems and networks. The concentration includes study in encryption and network security, formal models and policies for access control in databases and application systems, secure coding techniques, and other related information assurance topics. The combination of coursework provides comprehensive coverage of issues and solutions for building and operating high assurance systems. It prepares students for careers ranging from secure systems analyst, to security engineer, to security manager and chief security officer. It is also appropriate for others who expect to follow a different career path but want a comprehensive background in information assurance.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
PHYS-1100 Physics I (Science Elective)
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
Math Elective
ITWS-1220 IT and Society
Life Science Elective (BIOL-XXXX)

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
CSCI-2500 Computer Organization
HASS Elective[1]

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2300 Introduction to Algorithms
Select one of: (Concentration)
PHIL-2100 Critical Thinking
PHIL-4240 Ethics
STSH-4250/PHIL-4500 - Bioethics

Semester V (Arch)

CSCI-4210 Operating Systems (Concentration)
HASS Elective[1]
Free Elective
Free Elective

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

CSCI-4220 Network Programming (Concentration)
Stream Course* (Concentration)

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

CSCI-4230 Cryptography & Network Security I (Concentration)
Stream Course* (Concentration)
HASS Elective[1]

Semester VIII

ITWS-4370 Information System Security (Concentration)
Stream Course* (Concentration)
HASS Elective[1]
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

*Students select and follow one stream taking all three courses in their selected stream:

Stream: Application Systems

1. ITWS-4400 X-Informatics
2. CSCI-4020 Computer Algorithms or CSCI-4150 Introduction to Artificial Intelligence
3. ITWS-496X – Modern Binary Exploitation

Stream: Risk Assessment

1. MGMT-2300 Financial Accounting
2. MGMT-2320 Managerial Finance
3. MGMT-4370 Risk Management

Machine and Computational Learning

(Science)

Contact Person: Malik Magdon-Ismail

Description

This concentration of study prepares a student to work in the areas of Information Technology and Web Science that involve the development of intelligent systems for complex computational tasks in areas such as bioinformatics, voice and image recognition, and Internet development. The knowledge of the methods of machine and computational learning enables the student not only to identify situations where intelligent algorithms would amplify performance, but also to develop such algorithms.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
Physical Science Elective (PHYS-XXXX)
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
Math Elective*
ITWS-1220 IT and Society
HASS Elective[1]

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
CSCI-2500 Computer Organization
HASS Elective[1]

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2300 Introduction to Algorithms
Free Elective

Semester V (Arch)

Life Science Elective (BIOL-XXXX)
Machine Learning Elective (Concentration)
Machine Learning Elective (Concentration)
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

CSCI-4150 Intro to Artificial Intelligence (Concentration)
Machine Learning Elective (Concentration)

Semester VII

One of: [2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

Machine Learning Elective(Concentration)
Machine Learning Elective (Concentration)
Free Elective

Semester VIII

ISYE-4810 Computational Intelligence (Concentration)
Systems-Oriented Option (Concentration)
HASS Elective[1]
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Machine Learning Electives may be chosen from among (from CS-Concentration Area "AI and Data):

CSCI-4100/6100 Machine Learning from Data
CSCI-4110/6110 Computational Social Processes
CSCI-4130/6130 Natural Language Processing
CSCI-4150 Introduction to Artificial Intelligence
CSCI-4340/6340 Ontologies
CSCI-4350/6350 Data Science
CSCI-4370/6370 Data and Society (CI)
CSCI-4380 Database Systems
CSCI-4390/6390 Data Mining
CSCI-4400/6400 Xinformatics
CSCI-4480 Robotics I
CSCI-4490/6490 Robotics II
CSCI-496x/696x Cognitive Computing
CSCI-496x Learning and Advanced Game AI
CSCI-496x Game AI
CSCI-496x/696x Language Endowed Intelligent Agents
CSCI-496x/696x Intelligent Virtual Agents
CSCI-496x/696x Semantic Web Topics Course
CSCI-496x/696x Knowledge Discovery and Extraction
CSCI-496x/696x Advanced Topics in Robotics
CSCI-496x Affective Computing
CSCI-496x Programming for Cognitive Science and AI
CSCI-496x Cognitive Modeling I
CSCI-496x/696x Bioinformatics and Computational Biology
CSCI-496x/696x Advanced Web Science
CSCI-496x/696x Large-Scale Matrix Computation and ML
CSCI-496x/696x Network Resilience
CSCI-496x/696x Social Processes and Networks
ECSE-496x Deep Learning
ECSE-6610 Pattern Recognition

Systems-Oriented Option Course may be chosen from the following:

CSCI-496x/696x Parallel Graph Analysis
CSCI-4270/6270 Computational Vision
CSCI-4320/6360 Parallel Programming/Parallel Computing
CSCI-4380 Database Systems
CSCI-496x (ITWS-4500) Web Science Systems Development
CSCI-496x Learning and Advanced Game AI
CSCI-496x Game AI

* Math courses that are relevant the ML concentration.

CSCI-4270 Computational Vision
MATH-4100 Linear Algebra
MATP-4660 Probability Theory and Applications
MATP-6640 Linear Programming

Management Information Systems

(Management)

Contact Person: Chris Meyer

Description

The Management Information Systems concentration prepares you for careers in information systems analysis and programming, design, management, and consulting. Beyond the Information Technology and Web Science curriculum and the management core, the student will cover such topics as systems analysis, telecommunications, database design, and computer programming.

The capstone course will closely integrate the ITWS and MIS course experiences in an extended application, possibly with a large local company.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
MGMT-1100 Introduction to Management (Concentration)
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
Math Elective
MGMT-2300 Financial Accounting (Concentration)
ITWS-1200 IT and Society

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
HASS Elective[1]
Free Elective

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
MGMT-2430 Marketing Principles (Concentration)

Semester V (Arch)

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

MGMT-2320 Managerial Finance (Concentration)
Life Science Elective (BIOL-XXXX)
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

Physical Science Elective (PHYS-XXXX)
One of: (Concentration)
- MGMT-4850 Organizational Behavior in High Performance Organizations
- MGMT-4860 Human Resources in High Performance Organizations

Semester VII	Semester VIII
One of:[2] - ITWS-4100 Information Technology and Web Science Capstone (Professional Track) - ITWS-4990 Senior Thesis (Research Track) MGMT-4130 Enterprise IT Integration (Concentration) MGMT-4240 Systems Analysis and Design (Concentration) HASS Elective[1]	MGMT-4150 IT Project Management (Concentration) HASS Elective[1] ITWS-4990 Senior Thesis (Research Track Only) Free Elective Free Elective

[1] See HASS requirements listed in the front of this document

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Mechanical / Aeronautical Engineering

(Engineering)

Contact Person: Diana Borca-Tasciuc

Description

For those ITWS students with an interest in aviation systems, the Aeronautics track provides an introduction to the fundamentals of flight technology. The Mechanical track, on the other hand prepares one for a more broad-based career in thermofluids engineering and mechatronic systems.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
ENGR-1100 Introduction to Engineering Analysis (Concentration)
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
PHYS-1100 Physics I (Science Elective)
MATH-1020 Calculus II (Math Elective)
ITWS-1220 IT and Society

Semester III

ITWS-2110 Web Systems Development
ECSE-2610 Computer Components and Operations
ENGR-2350 Embedded Control
PHYS-1200 Physics II (Science Elective)

Semester IV

ITWS-4500 Web Science Systems Development
ECSE-2660 Computer Arch, Networks and OS
MATH-2400 Differential Equations (Concentration)
Track Option (4 cr.) (Concentration)

Semester V (Arch)

Track Option (4 cr.) (Concentration)
Track Option (4 cr.) (Concentration)
Free Elective
Free Elective

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

ITWS-2210 Intro. to Human Computer Interaction
MANE-4500 Modeling and Control of Dynamic Systems (3 cr.) (Concentration)
MANE-4510 Control Systems Lab (2 cr.) (Concentration)

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

Track Option (3 cr.) (Concentration)
HASS Elective[1]
HASS Elective[1]

Semester VIII

ENGR-2090 Engineering Dynamics (Concentration)
HASS Elective[1]
HASS Elective[1]
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Students are encouraged to take a Biology course (BIOL-XXXX)
Choose at least 15 credits from a single track

Avionics and Aerospace Systems Track

4 cr. - ENGR-2300 Electronic Instrumentation
4 cr. - ENGR-2350 Embedded Control (see footnote 1)
3 cr. - ENGR-2600 Modeling and Analysis of Uncertainty (see footnote 2)
1 cr. - MANE-1060 Fundamentals of Flight
1 cr. - MANE-1090 Introduction to Mechatronics Hardware and Software
3 cr. - MANE-2720 Fluid Mechanics (see footnote 3)
4 cr. - MANE-4070 Aerodynamics I (requires MANE-2720, see footnote 3)
4 cr. - MANE-4200 Rotorcraft Performance, Stability, & Control (requires MANE-2720, -4070; see 3)
3 cr. - MANE-4490 Mechatronics
3 cr. - MANE-4860 Introduction to Helicopter Design (see footnote 4)
1-4 cr. - MANE-4940 Projects in MANE

Control Systems Track

4 cr. - ENGR-2300 Electronic Instrumentation
4 cr. - ENGR-2350 Embedded Control (see footnote 1)
3 cr. - ENGR-2600 Modeling and Analysis of Uncertainty (see footnote 2)
1 cr. - MANE-1090 Introduction to Mechatronics Hardware and Software
3 cr. - MANE-4490 Mechatronics
3 cr. - MANE-4530 Control Systems Engineering
3 cr. - MANE-4540 Digital Control Systems
1-4 cr. - MANE-4940 Projects in MANE

Manufacturing Systems Track

1 cr. - ENGR-1300 Engineering Processes
3 cr. - ENGR-2700 Introduction to Manufacturing Planning
3 cr. - ENGR-2710 General Manufacturing Processes
3 cr. - ENGR-2720 Computer Aided Machining
4 cr. - ENGR-4710 Manufacturing Processes & Systems Lab I (recommends ENGR-1300, ENGR-2710)
4 cr. - ENGR-4720 Manufacturing Processes & Systems Lab II (recommends ENGR-1300, ENGR-2710)
1 cr. - MANE-1090 Introduction to Mechatronics Hardware and Software
1-4 cr. - MANE-4940 Projects in MANE

Nuclear Data and Informatics Track

3 cr. - ENGR-2600 Modeling and Analysis of Uncertainty (see footnote 2)
1 cr. - MANE-1100 Introduction to Nuclear Engineering
4 cr. - MANE-2830 Nuclear Phenomena for Engineering Applications
4 cr. - MANE-4410 Applied Atomic and Nuclear Physics (requires MANE-2830)
3 cr. - MANE-4420 Radiation Technology (requires MANE-2830)
1-4 cr. - MANE-4940 Projects in MANE

Footnotes

(1) Cannot be double-counted if taken on the Computer Engineering Track.
(2) Cannot be counted if a different statistics course (BIOL-4200 Biostatistics or MGMT-2100 Statistical Methods) is taken on the Information Systems Track.
(3) MANE-4200 Rotorcraft Performance, Stability, and Control requires MANE-2720 Fluid Mechanics (3 credits) and MANE-4070 Aerodynamics I (4 credits) as prerequisites. These two prerequisite courses are outside the scope of this ITWS concentration, and should only be taken with this three course sequence in mind.
(4) Normally MANE-4860 Introduction to Helicopter Design requires MANE-4200 Rotorcraft Performance, Stability, and Control and all of its prerequisites. However, depending on the semester's design project, strong ITWS students may meaningfully and successfully contribute to the design project without the prerequisites (other than those required for this concentration). Consult with the course instructor to see if this is a good option for you.

Medicine
(Science)

Contact Person: Michael Hanna

Description

Modern physicians are caregivers, small business persons, and community leaders. They are bombarded with information from medical journals, pharmaceutical companies, insurance companies and HMOs to mention a few. They collect information from the mundane realms of scheduling and billing to precise documentation needed for patient records and outcome studies. They are well equipped to provide care but overwhelmed by the information flow. The standard undergraduate curriculum for students applying to medical school has not changed in 30 years. Certainly, students need the basic science courses in order to perform well in medical school. The ITWS concentration in medicine will provide the premedical requirements and a fresh approach toward information management. A physician trained in the ITWS curriculum will be able to lead the profession into the next century where information flow will dominate both in diagnostics and management. New technologies and new mechanisms of providing care drive the practice of medicine. The application of information technology to these expanding areas will be the next wave as medicine struggles to keep up. Without appropriate information guidance and flow, the next generation of physicians will be overwhelmed.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
CHEM-1100 Chemistry I (Concentration)
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
MATH-1020 Calculus II (Math Elective)
HASS Elective[1]
ITWS-1220 IT and Society

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
CHEM-1200 Chemistry II (Concentration)
BIOL-1010 Intro to Biology (Science Elective)

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
BIOL-2120 Intro to Cell and Molecular Biology (Concentration)

Semester V (Arch)

-
CHEM-2250 Organic Chemistry I (Concentration)
PHYS-1100 Physics I (Science Elective)
PHYS-1200 Physics II (Concentration)
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics

CSCI-2300 Introduction to Algorithms
CHEM-2260 Organic Chemistry II (Concentration)

Semester VII	Semester VIII
One of:[2] - ITWS-4100 Information Technology and Web Science Capstone (Professional Track) - ITWS-4990 Senior Thesis (Research Track)	ITWS-4940 Capstone (Concentration)
BIOL-4270 Human Physiology (Concentration)	HASS Elective[1]
Free Elective	Free Elective
HASS Elective[1]	Free Elective
	ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Pre-Law

(Humanities, Arts and Social Science)

Contact Person: Lawrence Howard

Description

The Pre-Law concentration with the Values and Public Policy track will earn you a dual degree with Science, Technology, and Society. STS has an established sequence of pre-law, ethics, and public policy courses that will place you in a great position for an advanced degree in law, public administration, or public policy. Pre-law students from ITWS who pursue this track will be especially well positioned for a law degree in patent, Internet, and intellectual property law. Students who have pursued the STS pre-law track have been accepted at many of the nation's top law schools.

The Pre-Law concentration with the Psychology track focuses on the interplay between psychology and logic and the legal system.

A student can choose either the Values and Public Policy Track or the Psychology Track. Each semester lists courses 1 through 8 in which the student must select the appropriate course from the chosen track. Courses cannot be intermixed between the two tracks.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
HASS Elective[1]
CSCI-1100 Computer Science I
Course 1 (Concentration)

Semester II

CSCI-1200 Data Structures
Course 2 (Concentration)
MATH-1010 Calculus I
ITWS-1220 IT and Society

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
Course 3
Math Elective

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
Course 4 (Concentration)

Semester V (Arch)

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

Course 5 (Concentration)
Life Science Elective (BIOL-XXXX)
Free Elective

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

Course 6 (Concentration)
HASS Elective[1]

Semester VII	Semester VIII
One of:[2] - ITWS-4100 Information Technology and Web Science Capstone (Professional Track) - ITWS-4990 Senior Thesis (Research Track) Course 7 (Concentration) Physical Science Elective (PHYS-XXXX) Free Elective	Course 8 (Concentration) HASS Elective[1] HASS Elective[1] Free Elective ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

For selection of concentration courses and HASS Electives, see the appropriate contact person above.

Psychology Track:
Course-1: PSYC-1200 General Psychology
Course-2: PSYC-2730 Social Psychology
Course-3: PHIL-2140 Introduction to Logic
Course-4: Law and Computing Elective
Course-5: PSYC-4740 Psychology and the Law
Course-6: WRIT-2110 Rhetoric and Writing
Course-7: MGMT-1100 Introduction to Management
Course-8: PSYC-4200 Industrial and Organizational Psychology

Values and Public Policy Track:
Course-1: STSS-1110 Science, Technology, and Society
Course-2: STSS-2350 Law, Values, and Public Policy: Perspectives on Science and Technology
Course-3: STSS 2000 Level Concentration Course
Course-4: STSS 2000 Level Concentration Course
Course-5: STSS 4000 Level Concentration Course
Course-6: STSS 4000 Level Concentration Course
Course-7: STSS-4800 Public Service and Social Justice
Course-8: STSS-4990 STS and Sustainability Senior Project

Psychology

(Humanities, Arts and Social Science)

Contact Person: Holly Traver

Description

The Psychology concentration in the ITWS focuses on the human element in Information Technology and Web Science. An understanding of how individuals process information, or cognitively respond to pieces of Information Technology and Web Science in terms of motivation or performance allows for better design of such systems. Moreover, social and organizational psychology will inform students as to how groups or organizations share and process information or make decisions, and this knowledge will be crucial in the development of new information and web technologies that allow groups to use them effectively and efficiently.

Required Courses (Human-Computer Interface/Cognitive Engineering Track)

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
MATH-1010 Calculus I
IHSS-1140 Mind and Machines (Concentration)

Semester II

CSCI-1200 Data Structures
PSYC-1200 General Psychology (Concentration)
ITWS-1220 IT and Society
Math Elective

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
PSYC-2220 Human Factors in Design (Concentration)
HASS Elective[1]

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
PSYC-4110 Motivation and Performance (Concentration)

Semester V (Arch)

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

PSYC Elective (Concentration)
Life Science Elective (BIOL-XXXX)
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

Physical Science Elective (PHYS-XXXX)
PSYC Elective (Concentration)

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

PSYC-4200 Industrial and Organizational Psychology (Concentration)
HASS Elective[1]
Free Elective

Semester VIII

COGS-4360/PSYC-4360 Behavioral Neuroscience (Concentration)
HASS Elective[1]
Free Elective
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Required Courses (Industrial/Organizational Psychology Track)

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
PSYC-1200 General Psychology (Concentration)
CSCI-1100 Computer Science I
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
ITWS-1220 IT and Society
HASS Elective[1]
Math Elective

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
PSYC-2730 Social Psychology (Concentration)
Free Elective

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
PSYC-2310 Research Methods and Statistics I (Concentration)

Semester V (Arch)

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

PSYC-4200 Industrial and Organizational Psychology
One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

Life Science Elective (BIOL-XXXX)
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

PSYC-XXXX Elective (Concentration)
Physical Science Elective (PHYS-XXXX)

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

PSYC-4110 Motivation and Performance (Concentration)
HASS Elective[1]
Free Elective

Semester VIII

PSYC-4990 Undergraduate Thesis (Concentration)
PSYC-XXXX Elective (Concentration)
HASS Elective[1]
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Science and Technology Studies: Information and Society

(Humanities, Arts and Social Science)

Contact Person: Brian Callahan

Description

Whether they are in business, government, or the professions, Science and Technology Studies (STS) graduates report that they are uniquely prepared to understand today's multi-faceted problems. STS is a perfect companion to ITWS for those students who wish to combine their technical expertise in ITWS with a deep understanding of ITWS's place in the world. The STS Department has achieved an international reputation for its research and teaching on the social effects of science and technology and, likewise, the impact of society on the shaping of science and technology. STS faculty draw on anthropology, history, philosophy, political science, sociology, and social psychology to develop unique interdisciplinary courses about the place of science and technology in today's world. Students generally specialize in a cluster of courses in one of the five main "tracks": information and society, environment and society, health and society, engineering and society, and law, values, and public policy. A special public service internship allows students to gain hands-on experience in a local nonprofit, government or public-service organization. Some students with STS degrees go on to graduate programs in law, management, social science, public policy, public health and medicine. The rest enter the workforce immediately, often in government, the nonprofit sector, or in consulting firms.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
STSS-1110 Science, Technology, and Society (Concentration)
CSCI-1100 Computer Science I
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
ITWS-1220 IT and Society
HASS Elective[1]
Math Elective

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
One of: (Concentration)
- STSS-2100 Investigating Society
- STSS-2510 Cultural Anthropology
- STSS-2520 Sociology

One of the following:
- MGMT-2100 Statistical Methods
- BIOL-4200 Biostatistics
- CSCI-2300 Introduction to Algorithms

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
STSS-2350 Law and Society (Concentration)

Semester V (Arch)

4000 Level STS Course (Concentration)
Life Science Elective (BIOL-XXXX)
HASS Elective[1]
Free Elective

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

STSS-4800 Public Service and Social Justice (Concentration)
Physical Science Elective (PHYS-XXXX)

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

STSS-4980 Research Design (Concentration)
HASS Elective[1]
Free Elective

Semester VIII

STSS-4990 STS and Sustainability Senior Project (Capstone) (Concentration)
One of: (Concentration)
- STSS/H-4250 Bioethics
- STSS-4560 Gender, Science and Technology
- STSS/H-4961 History of Science and Technology

HASS Elective[1]
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Science Informatics

(Science)

Contact Person: Lee Ligon (Biology Track)
Ron Bailey (Chemistry Track)
Sandra Nierzwicki-Bauer (Ecology Track)

Description

Chemistry Track

The drive in pharmaceutical research currently (and most certainly in the decades to come) is the human genome project (HGP). The information stored in our 3 billion base pairs is a "gold mine" for new molecular targets to treat diseases with huge unmet therapeutic need (e.g., AIDS, cancer). Millions of gene sequences will translate into thousands of high throughput screens (HTS). Thousands of HTSs will require millions of new chemicals. Millions of new chemicals will require millions of inputs regarding structure, purity, diversity, etc. There is no way the technology currently available in the industry can cope with these numbers. With the advent of combinatorial chemistry (CombiChem) there is unprecedented demand for synthetic chemists as well as CombiChem and chemical information scientists. A perusal of the chemistry trade publication Chemical & Engineering News will verify this demand.

The volume of data that will derive from HGP - HTS - CombiChem is enormous and Rensselaer, though its ITWS program, can help the industry and humankind by supplying the chemical and biological scientists to generate, handle, and analyze these data. There will be a "magic bullet" some day soon for treating cancer and it will come from the HPG - HTS - CombiChem approach.

Ecology Track

The Ecology Track is designed to serve students with ecological interest in topics ranging from global change to water quality. The expansive environmental datasets that exist as well as new kinds of environmental and ecological data emerging from the application of more sophisticated and sensitive instrumentation, requires scientists that have the ability to process this information in meaningful ways. The application of information technology for addressing ecological issues using extensive datasets describes the emerging field of "ecoinformatics". In this unique program students will take advantage of the basic Information Technology core that requires courses including data structures and systems, probability and statistics, as well taking courses in biology and ecology.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
MATH-1010 Calculus I
CSCI-1100 Computer Science I
CHEM-1100 Chemistry I (Science Elective)

Semester II

CSCI-1200 Data Structures
ITWS-1220 IT and Society
CHEM-1200 Chemistry II (Science Elective)
HASS Elective[1]

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
Track Option 1 (Concentration)
MATH-1020 Calculus II (Math Elective)

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2500 Computer Organization
Track Option 2 (Concentration)

Semester V (Arch)

Track Option 3 (Concentration)
Free Elective
HASS Elective[1]
HASS Elective[1]

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
ITWS Elective (one of):
- CSCI-4380 Database Systems
- MGMT-4170 Data Resource Management

CSCI-2300 Introduction to Algorithms
Track Option 4 (Concentration)

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

Track Option 5 (Concentration)
Track Option 6 (Concentration)
Free Elective

Semester VIII

Track Option 7 (Concentration)
Track Option 8 (Concentration)
HASS Elective[1]
Free Elective
ITWS-4990 Senior Thesis (Research Track Only)

[1] See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Track Option 1 (one of):
CHEM-2250 Organic Chemistry I (Biology Track)
CHEM-2250 Organic Chemistry I (Chemistry Track)
BIOL-1010 Introduction to Biology

Track Option 2 (one of):
BIOL-2120 Intro to Cell and Molecular Biology (Biology Track)
CHEM-2260 Organic Chemistry II (Chemistry Track)
BIOL-2120 Intro to Cell and Molecular Biology (Ecology Track)

Track Option 3 (one of):
CHEM-4760 Molecular Biochemistry I (Biology Track)
CHEM-4760 Molecular Biochemistry I (Chemistry Track)
Ecology Elective

Track Option 4 (one of):
BIOL-2500 Genetics and Evolution (Biology Track)
CHEM-4530 Modern Techniques in Chemistry (Chemistry Track)
BIOL-4850 Principles of Ecology (Ecology Track)

Track Option 5 (one of):
BIOL-4620 Molecular Biology I (Biology Track)
CHEM-4770 Molecular Biochemistry II or CHEM-4300 Medicinal Chemistry (Chemistry Track)
BIOL-2500 Genetics and Evolution (Ecology Track)

Track Option 6 (one of):

BIOL-4540 Sequence Analysis (Biology Track)
CHEM-6510 Computational Chemistry (Chemistry Track)
ERTH- 4500 Earth's Climate: Past, Present and Future (Ecology Track)

Track Option 7 (one of):

BIOL-4550 Molecular Modeling (Biology Track)
CHEM-4330 Drug Discovery (Chemistry Track)
BIOL- 4XXX Ecoinformatics (Ecology Track)

Track Option 8 (one of):

✶BIOL- 4720 Molecular Biology Laboratory (Biology Track)
CHEM- 4XXX Chemistry Informatics (Chemistry Track)
IENV-4700 One Mile of the Hudson River

A student can choose the Biology Track, Chemistry Track or the Ecology Track for all track options. Courses cannot be intermixed between the tracks.

✶Swap with free elective in semester VII.

Web Technologies

(Science)

Contact: Richard Plotka

Description

The Web Technologies concentration provides students with the skills necessary to plan build and assess effective and efficient web-based information systems. By focusing on the technical aspects of building these web-based systems, it is an alternative to other concentrations and degree programs that focus instead on development of web content. Students in the Web Technologies concentration develop expertise in systems-level and applications-level programming concepts through coursework in database systems, operating systems and networking programming. Additional coursework on software design focuses on large-scale systems modeling and development. Collectively, this coursework provides a strong background for web-based systems development. To complete the concentration, students develop expertise in communicating information effectively with the help of courses in visual communication, usability and cognitive science. Students who complete the Web Technologies concentration are well-prepared for a career in the technical branch of a small or large company with responsibility for development and operation of sophisticated web-based systems.

Required Courses

Semester I

ITWS-1100 Introduction to Information Technology and Web Science
CSCI-1100 Computer Science I
Life Science Elective (BIOL-XXXX)
MATH-1010 Calculus I

Semester II

CSCI-1200 Data Structures
Math Elective
ITWS-1220 IT and Society
Free Elective

Semester III

ITWS-2110 Web Systems Development
CSCI-2200 Foundations of Computer Science
CSCI-2500 Computer Organization
Physical Science Elective (PHYS-XXXX)

Semester IV

ITWS-2210 Intro to Human Computer Interaction
ITWS-4500 Web Science Systems Development
CSCI-2300 Introduction to Algorithms
HASS Elective[1]

Semester V (Arch)

CSCI-2600 Principles of Software (Concentration)
CSCI-4210 Operating Systems (Concentration)
HASS Elective[1]
Free Elective

Semester VI (Fall/Spring)

ITWS-4310 Managing IT Resources
CSCI-4380 Database Systems
Intelligent Systems Elective (Concentration)
Communication Design Elective (Concentration)

Semester VII

One of:[2]
- ITWS-4100 Information Technology and Web Science Capstone (Professional Track)
- ITWS-4990 Senior Thesis (Research Track)

CSCI-4220 Network Programming (Concentration)
Assessment Elective (Concentration)
HASS Elective[1]

Semester VIII

Computing Elective (Concentration)
Free Elective
HASS Elective[1]
Database Elective (Concentration)
ITWS-4990 Senior Thesis (Research Track Only)

[1]See HASS requirements listed in the front of this document.

[2] Co-terminal students would replace ITWS-4100 Information Technology and Web Science Capstone with ITWS-4980 Special Projects course which will be the culminating experience.

Communication Design Elective (one of):

COMM-2660 Introduction to Graphic Design
COMM-4320 Visual Poetics and Narrative
COMM-4420 Foundations of HCI Usability
COMM-4690 Interface Design
COMM-4460 Visual Design: Theory and Application
COMM-4470 Information Design
COMM-4690 Interface Design

Intelligent Systems Elective (one of):

COGS-4210 Cognitive Modeling
ISYE-4810 Computational Intelligence
CSCI-4100 Machine Learning from Data
CSCI-4150 Introduction to Artificial Intelligence

Assessment Elective (one of):

COMM-4420 Foundations of HCI Usability
COMM-4470 Information Design
ISYE-4760 Mathematical Statistics
MGMT-2100 Statistical Methods

Computing Elective (one of):

CSCI-4020 Design and Analysis of Algorithms
CSCI-4320 Parallel Programming
CSCI-4430 Programming Languages
ECSE-4750 Computer Graphics

Database Elective (one of):

CSCI-4390 Data Mining
CSCI-4100 Machine Learning from Data
CSCI-4150 Introduction to Artificial Intelligence
CSCI-4440 Software Design and Documentation