

Department of

Computer Science & Electrical Engineering



Eric Karl, Department Chair

Scott Ercanbrack, Rex Fisher, James Helfrich, Ron Jones, Eric Karl, Rick Neff, Kevin Smith, Kevin Twitchell
Merlynn Price, Secretary (208) 496-1880
<http://www.byui.edu/CSE/>

Department of Computer Science and Engineering

The curricula in the Department of Computer Science and Engineering are designed to provide a broad background in the theory and practice of computer hardware and software. Students learn how to combine scientific knowledge and engineering methods with practical technical skills to help prepare them for life-long learning and rewarding employment. Three degree programs are offered:

- 1) B.S. in Computer Science (CS)
- 2) B.S. in Computer Engineering (CompE)
- 3) B.S. in Electrical Engineering (EE)

The graduates of the Department of Computer Science and Engineering will

- have a thorough grounding in the fundamental principles and practices of their respective programs
- have learned how to learn
- be prepared for a successful career
- be ethical and responsible employees who make a difference

The Department of Computer Science and Engineering continually strives to evaluate, improve, and modernize its curricula to keep pace with today's technological innovations. Advisors can help students determine the best sequence of courses to meet all graduation requirements within eight semesters. To qualify for graduation, students must achieve at least a C- grade in all major required classes.

Computer Science

The Computer Science major offers a solid background in Computer Science by providing experience in algorithm development, procedural and object-oriented design and programming, software engineering practices, computer security, web engineering, technical communication, and theoretical foundations. Graduates are prepared for employment as software engineers or to continue their education at graduate school.

Computer Engineering

The Computer Engineering major focuses on preparing students to enter industry as computer engineers as well as continuing their education at graduate schools. The program balances scientific and engineering theory with technical laboratory experiences in order to develop practical skills that working engineers must possess.

The Computer Engineering program at Brigham Young University-Idaho has been accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET) since October 1, 2004. Visit www.abet.org for more information about this accreditation.

Electrical Engineering

The Electrical Engineering major is a new program at Brigham Young University-Idaho. Students who desire to major in Electrical Engineering should contact the department for more information.

Electronics Engineering Technology

The Electronics Engineering Technology (A.A.S.) program has been discontinued at Brigham Young University-Idaho.

BS in Computer Engineering (450)

Major Requirements

No Double Counting of Major Courses - No Grade Less Than C- in Major Courses

<p><i>Take these courses:</i></p> <table> <tr><td>CHEM 105</td><td>4</td></tr> <tr><td>COMPE 150</td><td>3</td></tr> <tr><td>COMPE 224</td><td>3</td></tr> <tr><td>COMPE 250</td><td>4</td></tr> <tr><td>COMPE 324</td><td>3</td></tr> <tr><td>COMPE 340</td><td>3</td></tr> <tr><td>COMPE 350</td><td>3</td></tr> <tr><td>COMPE 360</td><td>3</td></tr> <tr><td>COMPE 398</td><td>1-7</td></tr> <tr><td>COMPE 499</td><td>3</td></tr> <tr><td>CS 124</td><td>3</td></tr> <tr><td>CS 165</td><td>3</td></tr> <tr><td>CS 235</td><td>3</td></tr> <tr><td>CS 237</td><td>3</td></tr> <tr><td>CS 308</td><td>2</td></tr> <tr><td>FDMAT 224</td><td>3</td></tr> <tr><td>MATH 215</td><td>4</td></tr> <tr><td>MATH 316</td><td>4</td></tr> <tr><td>PH 121</td><td>3</td></tr> <tr><td>PH 220</td><td>3</td></tr> <tr><td></td><td><hr/></td></tr> <tr><td></td><td>61</td></tr> </table>	CHEM 105	4	COMPE 150	3	COMPE 224	3	COMPE 250	4	COMPE 324	3	COMPE 340	3	COMPE 350	3	COMPE 360	3	COMPE 398	1-7	COMPE 499	3	CS 124	3	CS 165	3	CS 235	3	CS 237	3	CS 308	2	FDMAT 224	3	MATH 215	4	MATH 316	4	PH 121	3	PH 220	3		<hr/>		61	<p><i>Take 5 courses:</i></p> <table> <tr><td>COMPE 440</td><td>3</td></tr> <tr><td>COMPE 450</td><td>3</td></tr> <tr><td>COMPE 460</td><td>3</td></tr> <tr><td>COMPE 470</td><td>3</td></tr> <tr><td>COMPE 480</td><td>3</td></tr> <tr><td>COMPE 490</td><td>3</td></tr> <tr><td></td><td><hr/></td></tr> <tr><td></td><td>15</td></tr> </table> <p>OR</p> <p><i>Take 4 courses:</i></p> <table> <tr><td>COMPE 440</td><td>3</td></tr> <tr><td>COMPE 450</td><td>3</td></tr> <tr><td>COMPE 460</td><td>3</td></tr> <tr><td>COMPE 470</td><td>3</td></tr> <tr><td>COMPE 480</td><td>3</td></tr> <tr><td>COMPE 490</td><td>3</td></tr> <tr><td></td><td><hr/></td></tr> <tr><td></td><td>12</td></tr> </table> <p>AND</p> <p><i>Take 1 course:</i></p> <table> <tr><td>CS 306</td><td>3</td></tr> <tr><td>CS 345</td><td>3</td></tr> <tr><td>CS 460</td><td>3</td></tr> <tr><td>CS 490</td><td>3</td></tr> <tr><td></td><td><hr/></td></tr> <tr><td></td><td>3</td></tr> </table>	COMPE 440	3	COMPE 450	3	COMPE 460	3	COMPE 470	3	COMPE 480	3	COMPE 490	3		<hr/>		15	COMPE 440	3	COMPE 450	3	COMPE 460	3	COMPE 470	3	COMPE 480	3	COMPE 490	3		<hr/>		12	CS 306	3	CS 345	3	CS 460	3	CS 490	3		<hr/>		3	<p><i>Program Notes:</i></p>
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Total Major Credits=76

This major is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

BS in Computer Science (440)

Take required Foundations courses

Major Requirements

No Double Counting of Major Courses - No Grade Less Than C- in Major Courses

<p><i>Take these courses:</i></p> <table> <tr><td>CS 124</td><td>3</td></tr> <tr><td>CS 165</td><td>3</td></tr> <tr><td>CS 213</td><td>3</td></tr> <tr><td>CS 235</td><td>3</td></tr> <tr><td>CS 237</td><td>3</td></tr> <tr><td>CS 238</td><td>3</td></tr> <tr><td>CS 246</td><td>3</td></tr> <tr><td>CS 306</td><td>3</td></tr> <tr><td>CS 308</td><td>2</td></tr> <tr><td>CS 345</td><td>3</td></tr> <tr><td>CS 364</td><td>4</td></tr> <tr><td>CS 416</td><td>2</td></tr> <tr><td>CS 432</td><td>3</td></tr> <tr><td>CS 470</td><td>3</td></tr> <tr><td>CS 499</td><td>3</td></tr> <tr><td>COMPE 224</td><td>3</td></tr> <tr><td>COMPE 324</td><td>3</td></tr> <tr><td>FDMAT 224</td><td>3</td></tr> <tr><td></td><td><u>3</u></td></tr> <tr><td></td><td>53</td></tr> </table>	CS 124	3	CS 165	3	CS 213	3	CS 235	3	CS 237	3	CS 238	3	CS 246	3	CS 306	3	CS 308	2	CS 345	3	CS 364	4	CS 416	2	CS 432	3	CS 470	3	CS 499	3	COMPE 224	3	COMPE 324	3	FDMAT 224	3		<u>3</u>		53	<p><i>Take 15 credits:</i></p> <table> <tr><td>COMPE 360</td><td>3</td></tr> <tr><td>CS 313</td><td>3</td></tr> <tr><td>CS 356</td><td>1</td></tr> <tr><td>CS 371</td><td>3</td></tr> <tr><td>CS 460</td><td>3</td></tr> <tr><td>CS 480</td><td>3</td></tr> <tr><td>CS 490</td><td>3</td></tr> <tr><td>CS 499S</td><td>1-2</td></tr> <tr><td></td><td><u>15</u></td></tr> </table> <p><i>Take 1 course:</i></p> <table> <tr><td>CS 398</td><td>1-4</td></tr> <tr><td>CS 498R</td><td>1-4</td></tr> <tr><td></td><td><u>1</u></td></tr> </table>	COMPE 360	3	CS 313	3	CS 356	1	CS 371	3	CS 460	3	CS 480	3	CS 490	3	CS 499S	1-2		<u>15</u>	CS 398	1-4	CS 498R	1-4		<u>1</u>	<p><i>Take 1 course:</i></p> <table> <tr><td>MATH 113</td><td>3</td></tr> <tr><td>MATH 341</td><td>3</td></tr> <tr><td></td><td><u>3</u></td></tr> </table> <p><i>Take these courses:</i></p> <table> <tr><td>CHEM 105</td><td>4</td></tr> <tr><td>CHEM 106</td><td>4</td></tr> <tr><td></td><td><u>8</u></td></tr> </table> <p>OR</p> <p><i>Take these courses:</i></p> <table> <tr><td>GEOL 111</td><td>3</td></tr> <tr><td>GEOL 111L</td><td>1</td></tr> <tr><td>GEOL 112</td><td>3</td></tr> <tr><td>GEOL 112L</td><td>1</td></tr> <tr><td></td><td><u>8</u></td></tr> </table> <p>OR</p> <p><i>Take these courses:</i></p> <table> <tr><td>PH 121</td><td>3</td></tr> <tr><td>PH 150</td><td>1</td></tr> <tr><td>PH 220</td><td>3</td></tr> <tr><td>PH 250</td><td>1</td></tr> <tr><td></td><td><u>8</u></td></tr> </table>	MATH 113	3	MATH 341	3		<u>3</u>	CHEM 105	4	CHEM 106	4		<u>8</u>	GEOL 111	3	GEOL 111L	1	GEOL 112	3	GEOL 112L	1		<u>8</u>	PH 121	3	PH 150	1	PH 220	3	PH 250	1		<u>8</u>	<p><i>Program Notes:</i></p>
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Total Major Credits=80

This major is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

Minor in Computer Science (147)

Minor Requirements

<p><i>Take these courses:</i></p> <table> <tr><td>CS 124</td><td>3</td></tr> <tr><td>CS 165</td><td>3</td></tr> <tr><td>CS 235</td><td>3</td></tr> <tr><td>CS 246</td><td>3</td></tr> <tr><td></td><td><u>3</u></td></tr> <tr><td></td><td>12</td></tr> </table>	CS 124	3	CS 165	3	CS 235	3	CS 246	3		<u>3</u>		12	<p><i>Take 12 credits:</i></p> <table> <tr><td>COMPE 224</td><td>3</td></tr> <tr><td>COMPE 324</td><td>3</td></tr> <tr><td>CS 213</td><td>3</td></tr> <tr><td>CS 237</td><td>3</td></tr> <tr><td>CS 238</td><td>3</td></tr> <tr><td>CS 306</td><td>3</td></tr> <tr><td>CS 313</td><td>3</td></tr> <tr><td>CS 345</td><td>3</td></tr> <tr><td>CS 356</td><td>1</td></tr> <tr><td>CS 364</td><td>4</td></tr> <tr><td>CS 371</td><td>3</td></tr> <tr><td>CS 416</td><td>2</td></tr> <tr><td>CS 432</td><td>3</td></tr> <tr><td>CS 460</td><td>3</td></tr> <tr><td>CS 470</td><td>3</td></tr> <tr><td>CS 480</td><td>3</td></tr> <tr><td>CS 490</td><td>3</td></tr> <tr><td></td><td><u>3</u></td></tr> <tr><td></td><td>12</td></tr> </table>	COMPE 224	3	COMPE 324	3	CS 213	3	CS 237	3	CS 238	3	CS 306	3	CS 313	3	CS 345	3	CS 356	1	CS 364	4	CS 371	3	CS 416	2	CS 432	3	CS 460	3	CS 470	3	CS 480	3	CS 490	3		<u>3</u>		12	<p><i>Program Notes:</i></p>
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Total Minor Credits=24

This minor is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

Computer Science & Electrical Engineering

Brigham Young University-Idaho 2009-2010

Computer Science and Engineering Pre-approved Clusters

Computer Science

Take these courses:

CS 124	Introduction to Software Development	3
CS 165	Object-oriented Software Development	3

Take 2 courses:

COMPE 224	Fundamentals of Digital Systems	3
COMPE 324	Computer Architecture	3
CS 213	Web Engineering I	3
CS 235	Data Structures	3
CS 237	Discrete Mathematics I	3
CS 238	Discrete Mathematics II	3
CS 246	Software Design and Development	3
CS 371	Human-Computer Interaction	3
CS 460	Computer Communication & Networks	3
	Total Credits	12

Computer Engineering

Take these courses:

COMPE 150	Electric Circuit Analysis I	3
COMPE 224	Fundamentals of Digital Systems	3
CS 124	Introduction to Software Development	3
CS 165	Object-Oriented Software Development	3
	Total Credits	12

Course Descriptions	Credits*	
COMPE 150 Electric Circuit Analysis I Prerequisite: Proficiency in algebra, exposure to trigonometry Introduction to engineering. Analysis and design of DC and AC circuits. Resistors, capacitors, inductors, transformers, and batteries. Ohms Law, power and network theorems. Steady state and frequency domain analysis. Laboratory exercises are included. (Fall, Winter, Spring)	(3.0:2:2)	COMPE 460 Real-Time and Embedded Systems (3.0:2:2) Prerequisite: COMPE 360 Hardware/software interface, real-time kernel internals, implementation of high-level language constructs, issues in real-time application software development. (Fall, Spring)
COMPE 224 Fundamentals of Digital Systems Prerequisite: CS 124 Theory, design, and implementation of combinational and sequential logic. Students must design and build a project that uses sequential logic and a programmable logic device. A student presentation is required. Laboratory exercises are included. (Fall, Winter, Spring)	(3.0:2:2)	COMPE 470 Feedback Control of Dynamic Systems (3.0:2:2) Prerequisite: MATH 316 Dynamic modeling, dynamic response, analysis and design of feedback control. (Fall, Winter)
COMPE 250 Electric Circuit Analysis II Prerequisite: COMPE 150, Co-req: Math 316 Analysis and design of DC and AC circuits. Transient analysis using differential equations. Laboratory exercises are included. (Fall, Winter, Spring)	(4.0:3:2)	COMPE 480 Digital Signal Processing (3.0:2:2) Prerequisite: CompE 324, Math 316 Time and frequency domain analysis of discrete time systems subjected to periodic or non-periodic input signals. Digital signal processing, fast Fourier transforms, digital filter design, spectrum analysis and applications. Laboratory exercises are included. (Winter, Spring)
COMPE 305 Principles of Electrical Engineering Prerequisite: PH 220 Introduction to DC and AC circuits, motors, semiconductor devices and circuits, and digital logic circuits. Lab experiments are included. Intended for mechanical engineering majors. (Fall, Winter, Spring)	(3.0:3:1)	COMPE 490 Special Topics (3.0:2:2) Prerequisite: Instructor Permission In-depth study of a topic in computer engineering that interests students and faculty. Laboratory exercises are included where appropriate. (Offered as Needed)
COMPE 324 Computer Architecture Prerequisite: CompE 224 and CS 235 Instruction sets, control unit and data path design, memory hierarchy, pipelining, and I/O. A student presentation is required. Laboratory exercises are included. (Fall, Winter, Spring)	(3.0:2:2)	COMPE 499 Senior Project (3.0:2:2) Prerequisite: Instructor Permission and at least two of: COMPE 440, COMPE 450, COMPE 460, COMPE 470, COMPE 480, COMPE 490 Culminating design experience based on skills learned in advanced technical courses. Students work in teams to plan, design, test and demonstrate a major project. (Fall, Winter, Spring)
COMPE 340 Digital Systems Design Prerequisite: CompE 224 Advanced topics in combinational logic, state machine design, and control structures. VHDL and FPGAs. A student presentation is required. Laboratory exercises are included. (Fall, Spring)	(3.0:2:2)	CS 124 Introduction to Software Development (3.0:3:0) Prerequisite: High School Algebra CS 124, Introduction to Programming, is the first step in the computer science major tract. The goal of this class is that each student will be able to solve problems in C++ and have a solid foundation in software development methodology. (Fall, Winter, Spring)
COMPE 350 Electronic Devices and Circuits Prerequisite: CompE 250 Theory, design and implementation of circuits using diodes, bipolar junction transistors, and field effect transistors. A student presentation is required. Laboratory exercises are included. (Fall, Winter)	(3.0:2:2)	CS 165 Object-Oriented Software Development (3.0:3:0) Prerequisite: CS 124 Software design and development using the object-oriented paradigm. Algorithm formulation and object-oriented programming. (Fall, Winter, Spring)
COMPE 360 Computer Input/Output Prerequisite: CompE 324 Applications, architecture, programming and interfacing of commercial microprocessors and microcontrollers. Laboratory exercises are included. (Fall, Winter)	(3.0:2:2)	CS 202 Ethics (1.0:1:0) Prerequisite: (ENG 111 or ENG 111C or FDENG 101 or FDENG 101C) and CS 165 Survey of issues regarding ethics in Computer Science. Overview of intellectual property rights relative to computing including copyright, patents, trademarks, and piracy. Discussion of current social issues related to computing. (Fall, Winter)
COMPE 398 Internship Prerequisite: Instructor Permission; completion of first four semesters of computer engineering curriculum; must have completed at least three junior-level COMPE courses. Full-time employment as a computer engineering intern for one semester or more. (Fall, Winter, Spring)	(1.0-7.0:0:0)	CS 213 Web Engineering I (3.0:3:0) Prerequisite: CS 165 Internet and Web basics. Web fundamentals - web terminology, web browsers and web servers. This course teaches the concepts behind the fundamental tools used for building client-side web applications. It emphasizes client side programming standards and programming tools used to create dynamic web applications. (Fall, Spring)
COMPE 440 Data and Computer Communications Prerequisite: CompE 250, CompE 324 Fundamentals of data and computer communications focusing on the physical and data link layers of the OSI architecture. Laboratory exercises are included. (Fall, Spring)	(3.0:2:2)	CS 235 Data Structures (3.0:3:0) Prerequisite: CS 165 Builds on the foundation of CS 124 and CS 165 to introduce the fundamental concepts of data structures and the algorithms that proceed from them. (Fall, Winter, Spring)
COMPE 450 Advanced Digital Design and VLSI Prerequisite: CompE 340 and CompE 350 Advanced digital design concepts including multi-clock domain designs, meta-stability, signal integrity and functional verification of HDL models. VLSI concepts including the translation of HDL to gates to transistors and then to functional silicon. CMOS transistor concepts with special attention to the digital CMOS silicon manufacturing process. Formal validation of silicon components. (Fall, Winter)	(3.0:2:2)	CS 237 Discrete Mathematics I (3.0:3:0) Prerequisite: CS 165 and Math 112 Introduces the mathematical topics needed to provide a solid theoretical foundation for computer science and computer engineering. (Fall, Winter, Spring)

CS 238 Discrete Mathematics II Prerequisite: CS 237 Continues the mathematical topics needed to provide a solid theoretical foundation for computer science. (Fall, Winter)	(3.0:3:0)	CS 371 Human-Computer Interaction Prerequisite: CS 246 This class will follow the development lifecycle of a single user interface (UI) intensive project building a new UI for the windows media player. During this process, we will: 1. Identify a target user 2. Build a scenario in which this user will interact with the product. 3. Create a paper prototype of the UI 4. Develop a functional specification 5. Build the project into a workable media player skin 6. Conduct a usability study with people matching the target user (and a few not. . .) 7. Redesign and rebuild the project to account for findings of the study. (Fall, Spring)	(3.0:3:0)
CS 246 Software Design and Development Prerequisite: CS 235 Advanced object-oriented design and software development. (Fall, Winter)	(3.0:3:0)	CS 398 Internship Prerequisite: CS 246 and consent of Department Internship Coordinator. Planned and supervised practical experience in vocational or educational settings. Interns acquire practical skills while applying classroom theory and principles. (Fall, Winter, Spring)	(1.0-4.0:0:0)
CS 290 Special Topics Prerequisite: Consent of Instructor. Faculty/Student consultation will determine an area of study/research that will give an advanced student greater appreciation and experience in this field. Terms of enrollment, credit, etc., will be determined by the instructor. (Fall, Winter, Spring)	(1.0-3.0:0:0)	CS 416 Software Engineering II Prerequisite: CS 364 Software quality engineering including testing and verification and validation. Software metrics. Software cost estimation. (Fall, Winter)	(2.0:2:0)
CS 306 Algorithms and Complexity Prerequisite: CS 235 and CS 238 Introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include asymptotic complexity bounds, techniques of analysis, and algorithmic strategies. (Fall, Spring)	(3.0:3:0)	CS 432 Software Engineering III Prerequisite: CS 364 Software process and project management. (Winter, Spring)	(3.0:3:0)
CS 308 Technical Communication Prerequisite: (ENG 316 or ENG 316C or FDCOM 201) and CS 235 Technical research. Technical writing and presentation to technical audiences. (Fall, Winter, Spring)	(2.0:2:0)	CS 460 Computer Communication & Networks Prerequisite: CS 246 or non-CS major and CS 235 and consent of instructor Introduction to computer networking with an Internet focus, including: applications, protocols, transport services, IP, routing, LANs, and security. (Winter, Spring)	(3.0:3:0)
CS 313 Web Engineering II Prerequisite: CS 213, CS 246 This course builds upon Web Engineering I allowing students to create more advanced web applications and services. The emphasis of this course will be on server-side technologies and n-tier applications using relational database technology. Different server-side technologies will be used for creating dynamic n-tier web applications. Client-side technologies will be enhanced and combined with server-side technologies to create rich web applications. (Winter, Spring)	(3.0:3:0)	CS 470 Computer Security Prerequisite: CS 237, CS 308 CS 470, Computer Security, is essentially a research class. The purpose of this class is to help each student develop the skills necessary to become a security expert in whatever domain of computer security that is important to their job when they enter the work force. (Winter, Spring)	(3.0:3:0)
CS 345 Operating Systems Prerequisite: COMPE 324 Analysis of methods used by operating systems to perform typical system services, including: process control, memory management, scheduling, I/O, file management, and concurrency. (Winter, Spring)	(3.0:3:0)	CS 480 Computational Theory Prerequisite: CS 306 Finite automata, regular expressions, grammars, languages, Turing machines, computability, complexity, P and NP problems. (Winter, Spring)	(3.0:3:0)
CS 356 Database Theory Prerequisite: CS 238 Introduces the mathematical topics needed to provide a solid theoretical foundation for database system analysis, design and optimization. The following topics will be covered: Database Structure Types; Relational; Object; Hierarchical; Network; Relational Database Theory; Sets and Relations; n-ary Relations and the Relational Algebra; The Tuple Relational Calculus; The Domain Relational Calculus; Normalization and Normal Forms; Object Database Theory; Object-Oriented versus Object-Relational; The Object-Relational Impedance Mismatch; Hierarchical Database Theory; Aggregates and Associations; Part-Whole Relationships; Network Database Theory; Graph Theory; Graph Traversal and Search. (Winter, Spring)	(1.0:1:0)	CS 490 Special Topics Prerequisite: Consent of Instructor Current topics in Computer Science. (Taught as needed)	(3.0:3:0)
CS 364 Software Engineering I Prerequisite: CS 246 and CS 308 Software engineering overview. Software requirements engineering including elicitation and specification. Software design. (Fall, Spring)	(4.0:4:1)	CS 498R Internship Prerequisite: CS 246 and consent of Department Internship Coordinator. Planned and supervised practical experience in vocational or educational settings. Interns acquire practical skills while applying classroom theory and principles. (Fall, Winter, Spring)	(1.0-4.0:0:0)
		CS 499 Senior Project Prerequisite: CS 364 Directed individual or group research and study of a topic in computer science not covered by the curriculum. The topic shall be such that the student shall apply material covered by the curriculum to understand a new topic. (Fall, Winter, Spring)	(3.0:1:0)
		CS 499S Senior Project Supplemental Prerequisite: Instructor consent; co-registered in CS 499 An extension of CS 499, Senior Project. Allows the Senior Project student to engage in a more significant project by registering for an extra one or two credits. (Fall, Winter, Spring)	(1.0-2.0:0:0)