

MEMORANDUM

TO: Deans and Chairs
 FROM: Becky Bitter, Sr. Assistant Registrar
 DATE: September 28, 2016
 SUBJECT: Minor Change Bulletin No. 2

The courses listed below reflect the minor curricular changes approved by the catalog editor since approval of the last Minor Change Bulletin. The column to the far right indicates the date each change becomes effective.

Subject	Course Number	New Revise Drop	Current	Proposed	Effective Date
AG ED	499	Revise	Special Problems V 1-4 May be repeated for credit. Independent study conducted under the jurisdiction of an approving faculty member; may include independent research studies in technical or specialized problems; selection and analysis of specified readings; development of a creative project; or field experiences. Typically offered Fall, Spring, and Summer . S, F grading.	Special Problems V 1-4 May be repeated for credit. Independent study conducted under the jurisdiction of an approving faculty member; may include independent research studies in technical or specialized problems; selection and analysis of specified readings; development of a creative project; or field experiences. Typically offered Fall and Spring. S, F grading.	1-17
AG ED	508	Revise	Foundations of Vocational Education 3 Historical, philosophical, social, political and economic factors that influence education in vocational environments.	Foundations of Vocational Education 3 Historical, philosophical, social, political and economic factors that influence education in vocational environments. <u>Typically offered Summer Session.</u>	1-17
ANIM SCI	464	Revise	[CAPS] [M] Companion Animal Management 3 (2-3) Course Prerequisite: Junior standing . Care and management of companion animal species throughout the life cycle, including nutrition, reproduction, exercise and behavior. Typically offered Fall. Cooperative: Open to UI degree-seeking students.	[CAPS] [M] Companion Animal Management 3 (2-3) Course Prerequisite: <u>ANIM SCI 313; ANIM SCI 330; ANIM SCI 350.</u> Care and management of companion animal species throughout the life cycle, including nutrition, reproduction, exercise and behavior. Typically offered Fall. Cooperative: Open to UI degree-seeking students.	1-17
CE/ BSYSE	555	Revise	Natural Treatment Systems 3 Principles and design procedures of	Natural Treatment Systems 3 Principles and design procedures	8-16

			natural systems for wastewater treatment for agricultural and non-agricultural applications. (Crosslisted course offered as CE 555, BSYSE 555). Typically offered Fall and Spring.	of natural systems for wastewater treatment for agricultural and non-agricultural applications. (Crosslisted course offered as CE 555, BSYSE 555). Typically offered Fall and Spring. <u>Cooperative: Open to UI degree-seeking students.</u>	
CE/ BSYSE/ ENVR SCI	585/ 554/ 585	Revise	Aquatic System Restoration 3 Study of natural, damaged and constructed ecosystems with emphasis on water quality protection and restoration of lakes, rivers, streams and wetlands. (Crosslisted course offered as CE 585, BSYSE 554, ENVR SCI 585). Required preparation must include CHEM 345; MBIOS 101. Required preparation must include CHEM 345; MBIOS 101.	Aquatic System Restoration 3 Study of natural, damaged and constructed ecosystems with emphasis on water quality protection and restoration of lakes, rivers, streams and wetlands. (Crosslisted course offered as CE 585, BSYSE 554, ENVR SCI 585). Required preparation must include CHEM 345; MBIOS 101. <u>Cooperative: Open to UI degree-seeking students.</u>	8-16
CHEM	335	Drop	Physical Chemistry Laboratory for Chemical Engineers 1 (0-3) Course Prerequisite: CHEM 331 with a C or better or concurrent enrollment. Experiments selected to meet the needs of students majoring in chemical engineering.	--N/A--	8-17
CHEM	346	Drop	Organic Chemistry II 3 Lecture-only component of CHEM 348. Advanced concepts in organic chemistry including mechanisms and multistep-synthesis. Credit not granted for both CHEM 346 and 348.	--N/A--	8-17
CHEM	350	Drop	Chemistry in Contemporary Society 4 (3-3) Course Prerequisite: Junior standing. Principles and applications of chemistry in the context of contemporary society.	--N/A--	8-17
CHEM	425	Revise	Quantitative Instrumental Analysis 2 Course Prerequisite: CHEM 332 with a C or better or concurrent enrollment. Computer interfacing applicable to chemical instrumentation; principles and applications of modern chromatography, spectrophotometry and	Quantitative Instrumental Analysis 2 Course Prerequisite: <u>CHEM 220 with a C or better.</u> Computer interfacing applicable to chemical instrumentation; principles and applications of modern chromatography, spectrophotometry and electrochemical techniques.	8-17

			electrochemical techniques.		
CHEM	517	Revise	Chromatography 2 Recommended preparation: CHEM 425 or equivalent.	Chromatography 2 <u>Survey of major forms of chromatography, operating principles of common chromatographic detectors, and current case studies.</u> Recommended preparation: CHEM 425 or equivalent.	8-17
CHEM	518	Revise	Electrochemistry 2 Recommended preparation: CHEM 425 or equivalent.	Electrochemistry 2 <u>Execution and interpretation of a variety of interfacial electroanalytical techniques.</u> Recommended preparation: CHEM 425 or equivalent.	8-17
CHEM	521	Revise	Radiochemistry and Radiotracers 2 Recommended preparation: CHEM 425 or equivalent.	Radiochemistry and Radiotracers 2 <u>Nuclear stability, and decay modes, interactions of radiation with matter, radioanalytical instrumentation, health physics, neutron activation, and tracer level chemistry.</u> Recommended preparation: CHEM 425 or equivalent.	8-17
CHEM	522	Revise	Radiochemistry Laboratory 1 (0-3) Required preparation must include CHEM 222, CHEM 331, and PHYSICS 202 or equivalent.	Radiochemistry Laboratory 1 (0-3) <u>Theory and application of basic radiochemistry instrumentation.</u> Required preparation must include CHEM 222, CHEM 331, and PHYSICS 202 or equivalent.	8-17
CPT S	224	Revise	Programming Tools 2 Course Prerequisite: CPT S 122 with a C or better. Debugging tools, scripting languages, UNIX programming tools. Typically offered Fall.	Programming Tools 2 Course Prerequisite: CPT S 122 with a C or better <u>or CPTS 132 with a C or better.</u> Debugging tools, scripting languages, UNIX programming tools. Typically offered Fall.	1-17
CPT S	260	Revise	Introduction to Computer Architecture 3 Course Prerequisite: CPT S 223 with a C or better or concurrent enrollment. Computer systems architecture; logic, data representation, assembly language, memory organization and trends. Typically offered Fall and Spring.	Introduction to Computer Architecture 3 Course Prerequisite: CPT S 223 with a C or better or concurrent enrollment, <u>or CPT S 233 with a C or better or concurrent enrollment.</u> Computer systems architecture; logic, data representation, assembly language, memory organization and trends. Typically offered Fall and Spring.	1-17

CPT S / E E	302	Revise	Professional Skills in Computing and Engineering 3 Course prerequisite: Certified major in Computer Science, Computer Engineering, or Electrical Engineering; junior standing. Foundation in computing and engineering professional development. (Crosslisted course offered as CPT S 302, E E 302). Credit not granted for both CPT S/E E 302 and CPT S 401.	Professional Skills in Computing and Engineering 3 Course prerequisite: Certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> ; junior standing. Foundation in computing and engineering professional development. (Crosslisted course offered as CPT S 302, E E 302). Credit not granted for both CPT S/E E 302 and CPT S 401.	1-17
CPT S	317	Revise	Automata and Formal Languages 3 Course Prerequisite: CPT S 122 with a C or better; MATH 216 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Finite automata, regular sets, pushdown automata, context-free language, Turing machines and the halting problem. Typically offered Fall and Spring.	Automata and Formal Languages 3 Course Prerequisite: CPT S 122 with a C or better <u>or</u> <u>CPTS 132 with a C or better</u> ; MATH 216 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Finite automata, regular sets, pushdown automata, context-free language, Turing machines and the halting problem. Typically offered Fall and Spring.	1-17
CPT S	321	Revise	Object-Oriented Software Principles 3 Course Prerequisite: CPT S 223 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Object-oriented programming for flexibility, efficiency, and maintainability; logic and UI decoupling; complexity analysis, data structures, and algorithms for industry-quality software.	Object-Oriented Software Principles 3 Course Prerequisite: CPT S 223 with a C or better <u>or</u> <u>CPT S 233 with a C or better</u> ; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Object-oriented programming for flexibility, efficiency, and maintainability; logic and UI decoupling; complexity analysis, data structures, and algorithms for industry-quality software.	1-17
CPT S	322	Revise	[M] Software Engineering Principles I 3 Course Prerequisite: CPT S 223 with a C or better or concurrent enrollment; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Introduction	[M] Software Engineering Principles I 3 Course Prerequisite: CPT S 223 with a C or better or concurrent enrollment, <u>or CPTS 233 with a C or better or concurrent enrollment</u> ; certified major in Computer Science,	1-17

			to software engineering; requirements analysis, definition, specification including formal methods; prototyping; design including object and function oriented design. Typically offered Fall and Spring.	Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Introduction to software engineering; requirements analysis, definition, specification including formal methods; prototyping; design including object and function oriented design. Typically offered Fall and Spring.	
CPT S	323	Revise	Software Design 3 Course Prerequisite: CPT S 223 with a C or better; CPT S 322 with a C or better or concurrent enrollment; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Practical aspects of software design and implementation using object-oriented, aspect-oriented and procedural programming. Typically offered Spring.	Software Design 3 Course Prerequisite: CPT S 223 with a C or better <u>or CPT S 233 with a C or better</u> ; CPT S 322 with a C or better or concurrent enrollment; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Practical aspects of software design and implementation using object-oriented, aspect-oriented and procedural programming. Typically offered Spring.	1-17
CPT S	350	Revise	Design and Analysis of Algorithms 3 Course Prerequisite: CPT S 223 with a C or better; CPT S 317 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Analysis of data structures and algorithms; computational complexity and design of efficient data-handling procedures.	Design and Analysis of Algorithms 3 Course Prerequisite: CPT S 223 with a C or better <u>or CPT S 233 with a C or better</u> ; CPT S 317 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Analysis of data structures and algorithms; computational complexity and design of efficient data-handling procedures.	1-17
CPT S	360	Revise	Systems Programming C/C++ 4 (3-3) Course Prerequisite: CPT S 223 with a C or better; CPT S 260 with a C or better or E E 234 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Implementation of systems programs, concepts of computer operating systems; laboratory experience in using	Systems Programming C/C++ 4 (3-3) Course Prerequisite: CPT S 223 with a C or better; CPT S 260 with a C or better or E E 234 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Implementation of systems programs, concepts of computer operating systems;	1-17

			operating system facilities taught in C/C++ programming language. Typically offered Fall and Spring.	laboratory experience in using operating system facilities taught in C/C++ programming language. Typically offered Fall and Spring.	
CPT S	370	Revise	Systems Programming Java 4 (3-3) Course Prerequisite: CPT S 233 with a C or better; CPT S 260 with a C or better or E E 234 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Implementation of systems programs, concepts of computer operating systems; laboratory experience in using operating system facilities. Taught in Java programming language. Typically offered Fall and Spring.	Systems Programming Java 4 (3-3) Course Prerequisite: CPT S 233 with a C or better; CPT S 260 with a C or better or E E 234 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Implementation of systems programs, concepts of computer operating systems; laboratory experience in using operating system facilities. Taught in Java programming language. Typically offered Fall and Spring.	1-17
CPT S	401	Revise	Computers and Society 3 Course Prerequisite: Junior standing. Skills and literacy course. Ethical and societal issues related to computers and computer networks; computers as enabling technology; computer crime, software theft, privacy, viruses, worms. Credit not granted for both CPT S 401 and CPT S/E E 302.	Computers and Society 3 Course Prerequisite: <u>Certified major in Computer Science, Computer Engineering, Electrical Engineering, or Software Engineering</u> ; junior standing. Skills and literacy course. Ethical and societal issues related to computers and computer networks; computers as enabling technology; computer crime, software theft, privacy, viruses, worms. Credit not granted for both CPT S 401 and CPT S/E E 302.	1-17
CPT S	421	Revise	Software Design Project I 3 (0-9) Course Prerequisite: CPT S 322 with a C or better; CPT S 323 with a C or better or concurrent enrollment ; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Large-scale software development including requirements analysis, estimation, design, verification and project management. Typically offered Fall and Spring.	Software Design Project I 3 (0-9) Course Prerequisite: <u>CPTS 321 with a C or better AND CPT S 322 with a C or better, or CPT S 360 with a C or better, or CPT S 370 with a C or better</u> ; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Large-scale software development including requirements analysis, estimation, design, verification and project management. Typically offered Fall and Spring.	1-17

CPT S	422	Revise	<p>[M] Software Engineering Principles II 3 Course Prerequisite: CPT S 322 with a C or better; CPT S 323 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Dependable software systems; software verification and validation, testing; CASE environments; software management and evolution. Typically offered Fall.</p>	<p>[M] Software Engineering Principles II 3 Course Prerequisite: <u>CPT S 321 with a C or better</u> or CPT S 323 with a C or better; CPT S 322 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u>. Dependable software systems; software verification and validation, testing; CASE environments; software management and evolution. Typically offered Fall.</p>	1-17
CPT S	423	Revise	<p>[CAPS] Software Design Project II 3 (1-6) Course Prerequisite: CPT S 421 with a C or better; CPT S 422 with a C or better or concurrent enrollment; certified major in Computer Science, Computer Engineering, or Electrical Engineering; junior standing. Laboratory/group design project for large-scale software development, requirements analysis, estimation, design, verification techniques. Typically offered Fall and Spring.</p>	<p>[CAPS] Software Design Project II 3 (1-6) Course Prerequisite: CPT S 421 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u>. Laboratory/group design project for large-scale software development, requirements analysis, estimation, design, verification techniques. Typically offered Fall and Spring.</p>	1-17
CPT S	427	Revise	<p>Computer Security 3 Course Prerequisite: CPT S 360 with a C or better; MATH 216 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Examines cyber vulnerabilities and attacks against computer systems and networks; includes security protection mechanisms, cryptography, secure communication protocols, information flow enforcement, network monitoring, and anonymity techniques. Credit not granted for both CPT S 427 and CPT S 527. Offered at 400 and 500 level.</p>	<p>Computer Security 3 Course Prerequisite: CPT S 360 with a C or better <u>or CPT S 370 with a C or better</u>; MATH 216 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u>. Examines cyber vulnerabilities and attacks against computer systems and networks; includes security protection mechanisms, cryptography, secure communication protocols, information flow enforcement, network monitoring, and anonymity techniques. Credit not granted for both CPT S 427 and CPT S 527.</p>	1-17
CPT S	434	Revise	<p>Neural Network Design and Application 3 Course Prerequisite:</p>	<p>Neural Network Design and Application 3 Course</p>	1-17

			CPT S 122 with a C or better; STAT 360 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Hands-on experience with neural network modeling of nonlinear phenomena; application to classification, forecasting, identification and control. Credit not granted for both CPT S 434 and CPT S 534. Offered at 400 and 500 level.	Prerequisite: <u>CPT S 121 with a C or better or CPT S 131 with a C or better or E E 221 with a C or better</u> ; STAT 360 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Hands-on experience with neural network modeling of nonlinear phenomena; application to classification, forecasting, identification and control. Credit not granted for both CPT S 434 and CPT S 534.	
CPT S	438	Revise	Scientific Visualization 3 Course Prerequisite: CPT S 223 with a C or better; CPT S 224 with a C or better; MATH 172 or 182 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Data taxonomy, sampling, plotting, using and extending a visualization package, designing visualization and domain-specific techniques.	Scientific Visualization 3 Course Prerequisite: CPT S 223 with a C or better <u>or CPTS 233 with a C or better</u> ; CPT S 224 with a C or better; MATH 172 with a C or better <u>or MATH 182 with a C or better</u> ; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Data taxonomy, sampling, plotting, using and extending a visualization package, designing visualization and domain-specific techniques.	1-17
CPT S	440	Revise	Artificial Intelligence 3 Course Prerequisite: CPT S 122 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. An introduction to the field of artificial intelligence including heuristic search, knowledge representation, deduction, uncertainty reasoning, learning, and symbolic programming languages. Credit not granted for both CPT S 440 and CPT S 540. Offered at 400 and 500 level. Typically offered Fall.	Artificial Intelligence 3 Course Prerequisite: CPT S 122 with a C or better <u>or CPT S 132 with a C or better</u> ; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . An introduction to the field of artificial intelligence including heuristic search, knowledge representation, deduction, uncertainty reasoning, learning, and symbolic programming languages. Credit not granted for both CPT S 440 and CPT S 540. Typically offered Fall.	1-17
CPT S	442	Revise	Computer Graphics 3 Course Prerequisite: CPT S 223 with a C or better; CPT S 224 with a C or	Computer Graphics 3 Course Prerequisite: CPT S 223 with a C or better; CPT S 224 with a C or	1-17

			better; MATH 220 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Raster operations; transformations and viewing; geometric modeling; visibility and shading; color. Credit not granted for both CPT S 442 and CPT S 542. Offered at 400 and 500 level. Cooperative: Open to UI degree-seeking students.	better; MATH 220 with a C or better; certified major in Computer Science, Computer Engineering, <u>or</u> <u>Software Engineering</u> . Raster operations; transformations and viewing; geometric modeling; visibility and shading; color. Credit not granted for both CPT S 442 and CPT S 542. Cooperative: Open to UI degree-seeking students.	
CPT S	451	Revise	Introduction to Database Systems 3 Course Prerequisite: CPT S 223 with a C or better; CPT S 224 with a C or better ; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Introduction to database concepts, data models, database languages, database design, implementation issues. Typically offered Spring.	Introduction to Database Systems 3 Course Prerequisite: <u>CPT S 215 with a C or better or CPT S 223 with a C or better or CPT S 233 with a C or better</u> ; CPT S 224 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Introduction to database concepts, data models, database languages, database design, implementation issues. Typically offered Spring.	1-17
CPT S	452	Revise	Compiler Design 3 Course Prerequisite: CPT S 317 with a C or better; CPT S 355 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Design of lexical analyzers, syntactic analyzers, intermediate code generators, code optimizers and object code generators.	Compiler Design 3 Course Prerequisite: CPT S 317 with a C or better; CPT S 355 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Design of lexical analyzers, syntactic analyzers, intermediate code generators, code optimizers and object code generators.	1-17
CPT S / E E	455	Revise	Introduction to Computer Networks 3 Course Prerequisite: CPT S 360 with a C or better or E E 234 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Concepts and implementation of computer networks; architectures, protocol layers, internetworking and addressing case studies.	Introduction to Computer Networks 3 Course Prerequisite: CPT S 360 with a C or better or E E 234 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Concepts and implementation of computer networks; architectures, protocol layers, internetworking and	1-17

			(Crosslisted course offered as CPT S 455, E E 455). Typically offered Fall.	addressing case studies. (Crosslisted course offered as CPT S 455, E E 455). Typically offered Fall.	
CPT S	460	Revise	Operating Systems and Computer Architecture 3 Course Prerequisite: CPT S 360 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Operating systems, computer architectures, and their interrelationships in micro, mini, and large computer systems. Typically offered Fall and Spring.	Operating Systems and Computer Architecture 3 Course Prerequisite: CPT S 360 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, or <u>Software Engineering</u> . Operating systems, computer architectures, and their interrelationships in micro, mini, and large computer systems. Typically offered Fall and Spring.	1-17
CPT S	464	Revise	Distributed Systems Concepts and Programming 3 Course Prerequisite: CPT S 360 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Concepts of distributed systems; naming, security, networking, replication, synchronization, quality of service; programming middleware. Credit not granted for both CPT S 464 and CPT S 564. Offered at 400 and 500 level. Typically offered Spring. Cooperative: Open to UI degree-seeking students.	Distributed Systems Concepts and Programming 3 Course Prerequisite: CPT S 360 with a C or better, <u>or CPT S 370 with a C or better, or E E 234 with a C or better</u> ; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . Concepts of distributed systems; naming, security, networking, replication, synchronization, quality of service; programming middleware. Credit not granted for both CPT S 464 and CPT S 564. Typically offered Spring. Cooperative: Open to UI degree-seeking students.	1-17
CPT S	466	Revise	Embedded Systems 3 (2-3) Course Prerequisite: CPT S 360 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. The design and development of real-time and dedicated software systems with an introduction to sensors and actuators. Credit not granted for both CPT S 466 and CPT S 566. Offered at 400 and 500 level. Cooperative: Open to UI degree-seeking students.	Embedded Systems 3 (2-3) Course Prerequisite: CPT S 360 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u> . The design and development of real-time and dedicated software systems with an introduction to sensors and actuators. Credit not granted for both CPT S 466 and CPT S 566. Cooperative: Open to UI degree-seeking students.	1-17

CPT S	471	Revise	<p>Computational Genomics 3 Course Prerequisite: CPT S 450 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Fundamental algorithms, techniques and applications. Credit not granted for both CPT S 471 and CPT S 571. Offered at 400 and 500 level. Typically offered Spring.</p>	<p>Computational Genomics 3 Course Prerequisite: <u>CPT S 223</u> with a C or better or <u>CPT S 233</u> with a C or better; <u>CPT S 350</u> with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u>. Fundamental algorithms, techniques and applications. Credit not granted for both CPT S 471 and CPT S 571. Typically offered Spring.</p>	1-17
CPT S	481	Revise	<p>Python Software Construction 3 Course Prerequisite: CPT S 223 with a C or better; CPT S 224 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Intensive introduction to the python language; user interface, building and using extension modules; C interfacing; construction of a major project.</p>	<p>Python Software Construction 3 Course Prerequisite: CPT S 223 with a C or better; CPT S 224 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u>. Intensive introduction to the python language; user interface, building and using extension modules; C interfacing; construction of a major project.</p>	1-17
CPT S	483	Revise	<p>Topics in Computer Science V 1-4 May be repeated for credit. Course Prerequisite: Certified major in Computer Science, Computer Engineering, or Electrical Engineering. Required background preparation varies with course offering, see instructor. Current topics in computer science or software engineering. Required preparation: Varies with course offering, see instructor.</p>	<p>Topics in Computer Science V 1-4 May be repeated for credit. Course Prerequisite: Certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u>. Required background preparation varies with course offering, see instructor. Current topics in computer science or software engineering. Required preparation: Varies with course offering, see instructor.</p>	1-17
CPT S	484	Revise	<p>Software Requirements 3 Course Prerequisite: CPT S 322 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Elicitation, analysis, specification, and validation of software requirements as well as the management of requirements during the software</p>	<p>Software Requirements 3 Course Prerequisite: CPT S 322 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or Software Engineering</u>. Elicitation, analysis, specification, and validation of software requirements as well as</p>	1-17

			life cycle.	the management of requirements during the software life cycle.	
CPT S	487	Revise	Software Design and Architecture 3 Course Prerequisite: CPT S 321 with a C or better; CPT S 322 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Software design; design principles, patterns, and anti-patterns; design quality attributes and evaluation; architectural styles, architectural patterns and anti-patterns.	Software Design and Architecture 3 Course Prerequisite: CPT S 321 with a C or better; CPT S 322 with a C or better; certified major in Computer Science, Computer Engineering, <u>or</u> <u>Software Engineering</u> . Software design; design principles, patterns, and anti-patterns; design quality attributes and evaluation; architectural styles, architectural patterns and anti-patterns.	1-17
CPT S	489	Revise	Web Development 3 Course Prerequisite: CPT S 322 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering. Web development using markup languages, style sheet language, and scripting languages; developing and consuming web services; testing web applications.	Web Development 3 Course Prerequisite: CPT S 322 with a C or better; certified major in Computer Science, Computer Engineering, <u>or</u> <u>Software Engineering</u> . Web development using markup languages, style sheet language, and scripting languages; developing and consuming web services; testing web applications.	1-17
CROP SCI / PL P	403 / 503	Revise	Advanced Cropping Systems 3 Understanding the management of constraints to crop production and quality; biological, physical, and chemical approaches to crop health management. Field trips required. (Crosslisted course offered as CROP SCI 403, PL P 403). Recommended preparation: CROP SCI 305; PL P 429. Offered at 400 and 500 level. Typically offered Fall. Cooperative: Open to UI degree-seeking students.	Advanced Cropping Systems 3 Understanding the management of constraints to crop production and quality; biological, physical, and chemical approaches to crop health management. Field trips required. (Crosslisted course offered as CROP SCI 403, <u>CROP SCI 503</u> , PL P 403, <u>PL P 503</u> .) <u>Credit not granted for both CROP SCI 403 and 503, or PL P 403 and 503.</u> Recommended preparation: CROP SCI 305; PL P 429. Typically offered Fall. Cooperative: Open to UI degree-seeking students.	1-17
CROP SCI / HORT	445	Revise	[M] Plant Breeding 4 Genetic principles underlying plant breeding and an introduction to the principles and practices of plant breeding. (Crosslisted course	[M] Plant Breeding 4 Genetic principles underlying plant breeding and an introduction to the principles and practices of plant breeding. (Crosslisted course	1-17

			offered as CROP SCI 445, HORT 445).	offered as CROP SCI 445, HORT 445). <u>Typically offered Even Years - Spring.</u>	
CROP SCI / HORT / SOIL SCI	495	Revise	Research Experience V 1-4 May be repeated for credit; cumulative maximum 12 hours. Planned and supervised undergraduate research experience. (Crosslisted course offered as CROP SCI 495, HORT 495, SOIL SCI 495).	Research Experience V 1-4 May be repeated for credit; cumulative maximum 12 hours. Planned and supervised undergraduate research experience. (Crosslisted course offered as CROP SCI 495, HORT 495, SOIL SCI 495). <u>Typically offered Fall, Spring, and Summer.</u>	1-17
CROP SCI	504	Revise	Plant Transmission Genetics 3 Transmission of genes across generations; detailed study of the basic laws of genetics to predict and describe inheritance. Typically offered Even Years - Spring. Cooperative: Open to UI degree-seeking students.	Plant Transmission Genetics 3 Transmission of genes across generations; detailed study of the basic laws of genetics to predict and describe inheritance. Typically offered <u>Odd Years</u> - Spring. Cooperative: Open to UI degree-seeking students.	1-17
CROP SCI	510	Revise	Seminar 1 May be repeated for credit. Literature review; preparation and presentation of reports in crop science. Typically offered Fall, Spring, and Summer.	Seminar 1 May be repeated for credit. Literature review; preparation and presentation of reports in crop science. Typically offered <u>Fall and Spring.</u>	1-17
CS	223	Revise	Advanced Data Structures 3 Course Prerequisite: CS 122 with a C or better; CS 216 with a C or better . Advanced data structures, object oriented programming concepts, concurrency, and program design principles. Typically offered Fall.	Advanced Data Structures 3 Course Prerequisite: CS 122 with a C or better; <u>CS 166 with a C or better</u> . Advanced data structures, object oriented programming concepts, concurrency, and program design principles. Typically offered Fall.	8-17
CS	317	Revise	Automata and Formal Languages 3 Course Prerequisite: CS 122 with a C or better; CS 216 with a C or better ; certified major in Computer Science. Finite automata, regular sets, pushdown automata, context-free language, Turing machines and the halting problem. Typically offered Fall.	Automata and Formal Languages 3 Course Prerequisite: CS 122 with a C or better; <u>CS 166 with a C or better</u> ; certified major in Computer Science. Finite automata, regular sets, pushdown automata, context-free language, Turing machines and the halting problem. Typically offered Fall.	8-17
CS	320	Revise	[M] Fundamentals of Software Engineering 3 Course Prerequisite: CS 224 with a C or better; CS 216 with a C or better ; ENGLISH 402 with a C or better or concurrent enrollment; certified major in	[M] Fundamentals of Software Engineering 3 Course Prerequisite: <u>CS 166 with a C or better</u> ; CS 224 with a C or better; ENGLISH 402 with a C or better or concurrent enrollment; certified	8-17

			Computer Science. Introduction to software engineering; requirements analysis, definition and specification; software process models; prototyping; architecture; object-oriented design with UML. Typically offered Fall.	major in Computer Science. Introduction to software engineering; requirements analysis, definition and specification; software process models; prototyping; architecture; object-oriented design with UML. Typically offered Fall.	
CS	427	Revise	Computer Security 3 Course Prerequisite: CS 216 with a C or better ; CS 360 with a C or better. Computer security concepts, models and mechanism; encryption technology, formal models, policy and ethical implications. Credit not granted for both CS 427 and CS 527. Offered at 400 and 500 level. Typically offered Spring.	Computer Security 3 Course Prerequisite: <u>CS 166 with a C or better</u> ; CS 360 with a C or better. Computer security concepts, models and mechanism; encryption technology, formal models, policy and ethical implications. Credit not granted for both CS 427 and CS 527. Typically offered Spring.	8-17
E E	221	Revise	Numerical Computing for Engineers 2 Course Prerequisite: MATH 172 or 182 with a C or better; MATH 220 or 230 with a C or better. Solutions to engineering problems using modern software tools such as Matlab. Typically offered Fall, Spring, and Summer.	Numerical Computing for Engineers 2 Course Prerequisite: MATH 172 or 182 with a C or better; MATH 220 with a C or better <u>or concurrent enrollment</u> . Solutions to engineering problems using modern software tools such as Matlab. Typically offered Fall, Spring, and Summer.	1-17
E E	466	Revise	VLSI Design 3 (2-3) Course Prerequisite: E E 234 with a C or better; E E 324 with a C or better ; certified major in Electrical Engineering, Computer Science, or Computer Engineering. Very Large Scale Integrated circuit, system and physical design using CAD software; project specification, modeling, implementation, documentation and reporting. Typically offered Fall.	VLSI Design 3 (2-3) Course Prerequisite: E E 234 with a C or better; certified major in Electrical Engineering, Computer Science, Computer Engineering, <u>or Software Engineering</u> . Very Large Scale Integrated circuit, system and physical design using CAD software; project specification, modeling, implementation, documentation and reporting. Typically offered Fall.	1-17
ENTOM	102	Revise	[BSCI] Insects, Infection and Illness: Medical Entomology for Non-Science Majors 4 (3-3) Multidisciplinary aspects of infectious disease caused by insect transmission of pathogens.	[BSCI] Insects, Infection and Illness: Medical Entomology for Non-Science Majors 4 (3-3) Multidisciplinary aspects of infectious disease caused by insect transmission of pathogens. <u>Typically offered Spring.</u>	1-17

ENTOM	401	Revise	Biology and Society, Past and Present 3 Course Prerequisite: BIOLOGY 106. Development of biological ideas and knowledge from antiquity to present with emphasis on major advances achieved through invertebrate models. Recommended preparation: BIOLOGY 150. Cooperative: Open to UI degree-seeking students.	Biology and Society, Past and Present 3 Course Prerequisite: BIOLOGY 106. Development of biological ideas and knowledge from antiquity to present with emphasis on major advances achieved through invertebrate models. Recommended preparation: BIOLOGY 150. <u>Typically offered Fall.</u> Cooperative: Open to UI degree-seeking students.	1-17
ENTOM / ENVR SCI	460	Revise	Biotechnology and the Environment 3 Course Prerequisite: BIOLOGY 106, 107, or 120; 3 credit hours CHEM. Benefits, regulations, and human and environmental impacts of biotechnology used for crop protection, agricultural and energy production, and environmental remediation and management. (Crosslisted course offered as ENTOM 460, ENVR SCI 460).	Biotechnology and the Environment 3 Course Prerequisite: BIOLOGY 106, 107, or 120; 3 credit hours CHEM. Benefits, regulations, and human and environmental impacts of biotechnology used for crop protection, agricultural and energy production, and environmental remediation and management. (Crosslisted course offered as ENTOM 460, ENVR SCI 460). <u>Typically offered Fall.</u>	1-17
ENTOM	539	Revise	Taxonomic Entomology 4 (2-6) Survey of approximately 200 major families; collecting and preservation techniques. Typically offered Spring. Cooperative: Open to UI degree-seeking students.	Taxonomic Entomology 4 (2-6) Survey of approximately 200 major families; collecting and preservation techniques. Typically offered <u>Even Years - Spring.</u> Cooperative: Open to UI degree-seeking students.	1-17
ENTOM	555	Revise	Agricultural Chemical Technology for Crop Protection & Production 3 Mechanistic examination of agricultural chemical technology; synthetic and biological pesticides and fertilizers; mechanism of biological activity; deployment; management. Typically offered Spring.	Agricultural Chemical Technology for Crop Protection & Production 3 Mechanistic examination of agricultural chemical technology; synthetic and biological pesticides and fertilizers; mechanism of biological activity; deployment; management. Typically offered <u>Fall and Spring.</u>	1-17
HBM	101	Revise	(182) Introduction to Industry Experience 1 Preparation for work in hospitality/business organizations; resume writing, interview skills, use of Career Services, career dress. Typically	Professional Development 1 Preparation for <u>employment</u> in hospitality <u>and other</u> organizations; resume writing, interview skills, career services, <u>professional attire/demeanor,</u>	8-17

			offered Fall and Spring.	<u>networking, and etiquette.</u>	
HBM	401	Revise	(320) Industry Experience 1 Course Prerequisite: Certified major in the College of Business, or certified minor in Hospitality Business Management. Final employment preparation to include mock traditional/panel interviews, resume/cover letter critiques, etiquette dinner, and networking. Typically offered Fall and Spring.	Career Management 1 Course Prerequisite: Certified major or minor in the Carson College of Business. <u>Career management preparation including</u> mock/traditional/panel interviews, resume/cover letter critiques, <u>offer evaluations, negotiation</u> and networking.	8-17
HORT	310	Revise	Pomology 3 Course Prerequisite: BIOLOGY 106, BIOLOGY 107, BIOLOGY 120, or HORT 202. Botany, history, production, and uses of temperate-zone tree and small fruit crops. Typically offered Odd Years – Cooperative: Open to UI degree-seeking students.	Pomology 3 Course Prerequisite: BIOLOGY 106, BIOLOGY 107, BIOLOGY 120, or HORT 202. Botany, history, production, and uses of temperate-zone tree and small fruit crops. Typically offered <u>Fall</u> . Cooperative: Open to UI degree-seeking students.	1-17
HORT / VIT ENOL	326	Revise	Vineyard and Winery Equipment Systems 3 (2-3) Course Prerequisite: HORT 313. Overview of machinery systems used in vineyards and wineries. Field trip required. (Crosslisted course offered as HORT 326, VIT ENOL 326). Typically offered Fall.	Vineyard and Winery Equipment Systems 3 (2-3) Course Prerequisite: HORT 313. Overview of machinery systems used in vineyards and wineries. Field trip required. (Crosslisted course offered as HORT 326, VIT ENOL 326). Typically offered <u>Fall and Spring</u> .	1-17
HORT / CROP SCI	480	Revise	Plant Genomics and Biotechnology 3 Course Prerequisite: BIOLOGY 420. Advanced concepts in plant genomics and biotechnology with emphasis on approaches, techniques, and application. (Crosslisted course offered as HORT 480 and CROP SCI 480). Recommended preparation: MBIOS 301 or CROP SCI 444.	Plant Genomics and Biotechnology 3 Course Prerequisite: BIOLOGY 420. Advanced concepts in plant genomics and biotechnology with emphasis on approaches, techniques, and application. (Crosslisted course offered as HORT 480 and CROP SCI 480). Recommended preparation: MBIOS 301 or CROP SCI 444. <u>Typically offered Even Years - Fall.</u>	1-17
HORT	550	Revise	Bioinformatics for Research 4 (3-3) Foundational knowledge about advanced bioinformatics analyses of next-generation sequencing data. Recommended preparation: Molecular Biology and/or Genetics. Typically offered Fall .	Bioinformatics for Research 4 (3-3) Foundational knowledge about advanced bioinformatics analyses of next-generation sequencing data. Recommended preparation: Molecular Biology and/or Genetics. Typically offered	1-17

				Spring.	
MBIOS	504	Drop	Advanced Molecular Biology II 3 Gene expression and regulation in prokaryotes and eukaryotes, including transcription, RNA processing, and translation; chromatin structure; DNA repair. Recommended preparation: Introductory genetics and biochemistry coursework. Typically offered Fall, Spring, and Summer.	--N/A--	8-17
MBIOS	507	Drop	Critical Analysis of Scientific Literature 2 Course Prerequisite: MBIOS 503; MBIOS 513 or concurrent enrollment. Dissection and discussion of current molecular bioscience papers to foster development of critical reading of primary literature. Typically offered Fall.	--N/A--	8-17
MBIOS	508	Drop	Quantitative Approaches in Molecular Biosciences 2 Quantitative methods and techniques using examples from the current molecular biosciences primary literature. Recommended preparation: One semester of calculus. Typically offered Even Years - Fall.	--N/A--	8-17
MECH	467	Revise	Automation 3 (2-3) Course Prerequisite: MECH 304 or ECE 260; MECH 348 . Design of automation systems, motion control, programmable logic. Credit not granted for both MECH 467 and MECH 567. Offered at 400 and 500 level. Typically offered Fall.	Automation 3 (2-3) Course Prerequisite: MECH <u>304 and 348, OR ECE 260</u> . Design of automation systems, motion control, programmable logic. Credit not granted for both MECH 467 and MECH 567. Typically offered Fall.	8-17
MECH	468	Revise	Robotics 3 Course Prerequisite: MECH 304 or ECE 260; MECH 348 . Industrial robots, kinematics, control, robot programming, interfacing, sensors, actuators, vision systems and mobile robots. Credit not granted for both MECH 468 and MECH 568. Offered at 400 and 500 level. Typically offered Spring.	Robotics 3 Course Prerequisite: MECH 304 <u>and 348, OR ECE 260</u> . Industrial robots, kinematics, control, robot programming, interfacing, sensors, actuators, vision systems and mobile robots. Credit not granted for both MECH 468 and MECH 568. Typically offered Spring.	8-17

MUS	220	Revise	Guitar 2 May be repeated for credit. Guitar. Typically offered Fall and Spring.	Guitar 2 May be repeated for credit. <u>Course Prerequisite: MUS 120. Reading and interpreting music on the guitar.</u> Typically offered Fall and Spring.	1-17
PHIL	420	Revise	Contemporary Continental Philosophy 3 Selected movements, figures, and issues in recent continental philosophy. Recommended preparation: PHIL 320, 321 or 322. Cooperative: Open to UI degree-seeking students.	Existentialism and Continental Philosophy 3 Selected movements, figures, and issues in recent continental philosophy. Recommended preparation: PHIL 320, 321 or 322. Cooperative: Open to UI degree-seeking students.	8-17
PL P	501	Revise	Biology and Control of Plant Diseases 3 (2-3) Introduction to the biology and control of plant diseases covering disorders caused by fungi, viruses, bacteria, and nematodes.	Biology and Control of Plant Diseases 3 (2-3) Introduction to the biology and control of plant diseases covering disorders caused by fungi, viruses, bacteria, and nematodes. <u>Typically offered Spring.</u>	1-17
PL P	512	Revise	Topics in Plant Pathology V 1-3 May be repeated for credit; cumulative maximum 6 hours. Concepts of plant pathogen interactions and disease management.	Topics in Plant Pathology V 1-3 May be repeated for credit; cumulative maximum 6 hours. Concepts of plant pathogen interactions and disease management. <u>Typically offered Fall and Spring.</u>	1-17
PL P	525	Revise	Field Plant Pathology and Mycology 3 Diverse plant diseases, disease diagnosis and management in fields, orchards, nurseries; interact directly with diverse agricultural stakeholders. Field trip required. Recommended preparation: PL P 429 or PL P 521.	Field Plant Pathology and Mycology 3 Diverse plant diseases, disease diagnosis and management in fields, orchards, nurseries; interact directly with diverse agricultural stakeholders. Field trip required. Recommended preparation: PL P 429 or PL P 521. <u>Typically offered Even Years – Summer Session.</u>	1-17
POL S / PHIL	333	Revise	Development of Marxist Thought 3 Marxist theory from the original writing of Marx and Engels to contemporary developments.	Development of Marxist Thought 3 Marxist theory from the original writing of Marx and Engels to contemporary developments. <u>(Crosslisted course offered as POL S 333, PHIL 333).</u>	8-17
POL S / PHIL	437	Revise	[M] Classical Political Thought 3 The development of political philosophy from the pre-Socratics to Machiavelli.	[M] Classical Political Thought 3 The development of political philosophy from the pre-Socratics to Machiavelli. <u>(Crosslisted course</u>	8-17

				offered as POL S 437, PHIL 437).	
POL S / PHIL	438	Revise	[M] Recent Political Thought 3 The development of political thought since Machiavelli.	[M] Contemporary Political Theory 3 The development of political thought since Machiavelli. (Crosslisted course offered as POL S 438, PHIL 438).	8-17
SDC	350	Revise	[M] Global History of Design II 3 Course Prerequisite: Certified major in Architectural Studies, Interior Design, or Landscape Architecture. Global developments in design from the seventeenth century CE to the present day. Typically offered Spring.	[M] Global History of Design II 3 Course Prerequisite: <u>SDC 250.</u> Global developments in design from the seventeenth century CE to the present day. Typically offered Spring.	1-17
SOIL SCI	501	Revise	Seminar 1 May be repeated for credit. Presentation of research information. Typically offered Fall, Spring, and Summer.	Seminar 1 May be repeated for credit. Presentation of research information. Typically offered Fall <u>and Spring.</u>	1-17
SOIL SCI	574	Drop	Remote Sensing and Geospatial Analysis 3 (1-4) Digital image processing theory and geographic information systems applied to landscape analysis. Cooperative: Open to UI degree-seeking students.	--N/A--	1-17