M E M O R A N D U M

Faculty Senate Approved October 6, 2016

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**

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CE/ BSYSE	**555**	**Revise**	**Natural Treatment Systems** 3 Principles and design procedures 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.	**Natural Treatment Systems** 3 Principles and design procedures 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>	**8-16**
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	**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,	**8-17**

			chromatography, spectrophotometry and electrochemical techniques.	spectrophotometry and 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.	**1-17**

				Typically offered Fall and Spring.	
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, or Software 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.	**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 or CPTS 132 with a C or better; MATH 216 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, or Software Engineering. 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 or CPT S 233 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, or Software Engineering. 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,	**[M] Software Engineering Principles I** 3 Course Prerequisite: CPT S 223 with a C or better or concurrent enrollment, or CPTS 233 with a C or better or	**1-17**

			Computer Engineering, ~~or~~ Electrical Engineering. Introduction to software engineering; requirements analysis, definition, specification including formal methods; prototyping; design including object and function oriented design. Typically offered Fall and Spring.	concurrent enrollment; certified major in Computer Science, 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 sys-tems programs, concepts of	**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	**1-17**

			computer operating systems; laboratory experience in using operating system facilities taught in C/C++ programming language. Typically offered Fall and Spring.	sys-tems programs, concepts of computer operating systems; 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</u> CPT S 322 with a C or better, <u>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	**1-17**

				management. Typically offered Fall and Spring.	
CPT S	**422**	**Revise**	**[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.	**[M] Software Engineering Principles II** 3 Course Prerequisite: <u>CPT S 321 with a C or better or</u> 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.	**1-17**
CPT S	**423**	**Revise**	**[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.	**[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.	**1-17**
CPT S	**427**	**Revise**	**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.~~	**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.	**1-17**

CPT S	434	Revise	**Neural Network Design and Application** 3 Course Prerequisite: ~~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.~~	**Neural Network Design and Application** 3 Course 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.	**1-17**
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 <u>or better 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 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.	**Computer Graphics** 3 Course Prerequisite: CPT S 223 with a C or better; CPT S 224 with a C or better; MATH 220 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, <u>or 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.	**1-17**
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</u> CPT S 223 with a C or better <u>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	**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	**1-17**

			networks; architectures, protocol layers, internetworking and addressing case studies. (Crosslisted course offered as CPT S 455, E E 455). Typically offered Fall.	implementation of computer networks; architectures, protocol layers, internetworking and 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; <u>or 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-	**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.	**1-17**

			seeking students.	Cooperative: Open to UI degree-seeking students.	
CPT S	**471**	**Revise**	**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.	**Computational Genomics** 3 Course Prerequisite: <u>CPT S 223 with a C or better or CPT S 233 with a C or better; CPT S 350 with a C or better</u>; 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.	**1-17**
CPT S	**481**	**Revise**	**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.	**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.	**1-17**
CPT S	**483**	**Revise**	**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.	**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.	**1-17**
CPT S	**484**	**Revise**	**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	**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</u>	**1-17**

			validation of software requirements as well as the management of requirements during the software life cycle.	Engineering. Elicitation, analysis, specification, and validation of software requirements as well as 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, Electrical Engineering, <u>or 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, Electrical Engineering, <u>or 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 /	**445**	**Revise**	**[M] Plant Breeding** 4 Genetic principles underlying plant	**[M] Plant Breeding** 4 Genetic principles underlying plant	**1-17**

HORT			breeding and an introduction to the principles and practices of plant breeding. (Crosslisted course offered as CROP SCI 445, HORT 445).	breeding and an introduction to the principles and practices of plant breeding. (Crosslisted course offered as CROP SCI 445, HORT 445). Typically offered Even Years - Spring.	
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). Typically offered Fall, Spring, and Summer.	**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 Odd Years - 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 Fall and Spring.	**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; CS 166 with a C or better. 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; CS 166 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.	**8-17**
CS	**320**	**Revise**	**[M] Fundamentals of Software Engineering** 3 Course Prerequisite: CS 224 with a C or better; ~~CS 216~~	**[M] Fundamentals of Software Engineering** 3 Course Prerequisite: CS 166 with a C or	**8-17**

				with a C or better; ENGLISH 402 with a C or better or concurrent enrollment; certified 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.	better; CS 224 with a C or better; ENGLISH 402 with a C or better or concurrent enrollment; certified 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: CS 166 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. 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 or concurrent enrollment. 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, or Software Engineering. 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 -</u> Spring. 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	**1-17**

				Fall and Spring.	
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 offered Fall and Spring.~~	**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, networking, and etiquette.</u>	**8-17**
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 Fall <u>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 <u>Spring</u>.	**1-17**
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,	**Robotics** 3 Course Prerequisite: MECH 304 <u>and 348, OR ECE 260</u>. Industrial robots, kinematics,	**8-17**

			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.	control, robot programming, interfacing, sensors, actuators, vision systems and mobile robots. Credit not granted for both MECH 468 and MECH 568. Typically offered Spring.	
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.	<u>**Existentialism and**</u> **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	**Development of Marxist Thought** 3 Marxist theory from the original writing of Marx and	**8-17**

			contemporary developments.	Engels to contemporary developments. (Crosslisted course offered as POL S 333, PHIL 333).	
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. (Crosslisted course offered as POL S 437, PHIL 437).	8-17
POL S / PHIL	438	Revise	[M] ~~Recent~~ Political ~~Thought~~ 3 The development of political thought since Machiavelli.	[M] <u>Contemporary</u> Political <u>Theory</u> 3 The development of political thought since Machiavelli. <u>(Crosslisted course offered as POL S 438, PHIL 438).</u>	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