Software Engineering Course Descriptions

**ECS 1200** Introduction to Engineering and Computer Science (2 semester hours)
Introduction to the Engineering and Computing professions, professional ethics. Overview of ECS curricula, connections among ECS fields and to the basics of sciences, other fields. Basic study, problem solving and other skills needed to succeed as an ECS major. Engineering design and quantitative methods using MATLAB. Multi-disciplinary team projects designed to replicate decision processes in real-world situations. (1-2) Y

**SE 2V95** Individual Instruction in Computer Science/Software Engineering (1-6 semester hours) Individual study under a faculty member’s direction. May be repeated for credit as topics vary (6 hours maximum). Consent of instructor required. (Same as CS 2V95) ([1-6]-0) R

**SE 3195** Special Topics in Computer Science/Software Engineering (1 semester hour) May be repeated for credit as topics vary (4 hours maximum). Must be taken credit/no credit. Consent of instructor required. (Same as CS 3195) (1-0) R

**SE 3306** Mathematical Foundations of Software Engineering (3 semester hours) Boolean logic, first-order logic, models of first-order logic. Introduction to program verification, applications in Software Engineering. Completeness Theorem. Regular expressions, regular sets, finite-state machines, and applications in Software Engineering. Graph Theory, graph algorithms. Statecharts, Petri Nets and their role in Software Engineering. Prerequisite: CS 2305 or equivalent. (3-0) S

**SE 3340** Computer Architecture (3 semester hours) This course introduces the concepts of computer architecture by going through multiple levels of abstraction, and the numbering systems and their basic computations. It focuses on the instruction-set architecture of the MIPS machine, including MIPS assembly programming, translation between MIPS and C, and between MIPS and machine code. General topics include performance calculation, processor datapath, pipelining, and memory hierarchy. Students who have already completed CS 2310 or CS/SE 4340 cannot receive credit for this course. Students cannot get credit for both CS/SE 3340 and CE/EE 4304. Prerequisite: CS 1337 or equivalent. (Same as CS 3340) (3-0) S

**SE 3341** Probability and Statistics in Computer Science and Software Engineering (3 semester hours) Axiomatic probability theory, independence, conditional probability. Discrete and continuous random variables, special distributions of importance to CS/SE, and expectation. Simulation of random variables and Monte Carlo methods. Central limit theorem. Basic statistical inference, parameter estimation, hypothesis testing, and linear regression. Introduction to stochastic processes. Illustrative examples and simulation exercises from queuing, reliability, and other CS/SE applications. Students cannot get credit for both CS/SE 3341 and ENGR 3341. Prerequisites: MATH 1326, MATH 2414, or MATH 2419, and CS 2305 or equivalent. (Same as CS 3341) (3-0) S

**CS 3345** Data Structures and Introduction to Algorithmic Analysis (3 semester hours) Analysis of algorithms including time complexity and Big-O notation. Analysis of stacks,
queues, and trees, including B-trees. Heaps, hashing, and advanced sorting techniques. Disjoint
sets and graphs. Course emphasizes design and implementation. Students cannot get credit for
both ECS3345 and CE/TE 3346. Prerequisites: CS 2305 and CS 2336 Prerequisite or corequisite:
CS/SE 3341 . (3-0) S

**CS 3354 Software Engineering (3 semester hours)** Introduction to software life cycle models.
Software requirements engineering, formal specification and validation. Techniques for software
design and testing. Cost estimation models. Issues in software quality assurance and software
maintenance. Prerequisites: CS 2336 or CS 3333, and CS 2305 or equivalent. Pre- or corequisite:
CS 3390. (3-0) S

**SE 3376 C/C++ Programming in a UNIX Environment (3 semester hours)** Advanced
programming techniques utilizing procedural and object oriented programming in a UNIX
environment. Topics include file input and output, implementation of strings, stacks, queues,
lists, and trees, and dynamic memory allocation/management. Design and implementation of a
comprehensive programming project is required. Prerequisite: CS 2336 or equivalent. (Same as
CS 3376) (3-0) S

**SE 3V95 Undergraduate Topics in Computer Science/Software Engineering (2-9 semester
hours)** Subject matter will vary from semester to semester. May be repeated for credit as topics
vary (9 hours maximum). (Same as CS 3V95) [(2-9)-0] S

**SE 4347 Database Systems (3 semester hours)** This course emphasizes the concepts and
structures necessary for the design and implementation of database management systems. Topics
include data models, data normalization, data description languages, query facilities, file
organization, index organization, file security, data integrity, and reliability. Prerequisite: CS
3345. (Same as CS 4347) (3-0) Y

**CS 4348 Operating Systems Concepts (3 semester hours)** An introduction to fundamental
concepts in operating systems: their design, implementation, and usage. Topics include process
management, main memory management, virtual memory, I/O and device drivers, file systems,
secondary storage management, and an introduction to critical sections and deadlocks.
Prerequisites: CS/SE 3340 or equivalent, CS 3345, and a working knowledge of C and UNIX.
(3-0) S

**SE 4351 Requirements Engineering (3 semester hours)** Introduction to system and software
requirements engineering. The requirements engineering process, including requirements
elicitation, specification, and validation. Essential words and types of requirements. Structural,
informational, and behavioral requirements. Non-functional requirements. Scenario analysis.
Conventional, object-oriented and goal-oriented methodologies. Prerequisites: SE 3306, CS 3354
or consent of instructor. (3-0) S

**SE 4352 Software Architecture and Design (3 semester hours)** Introduction to software design
with emphasis on architectural design. Models of software architecture. Architecture styles and
patterns, including explicit, event-driven, client-server, and middleware architectures.
Decomposition and composition of architectural components and interactions. Use of non-
functional requirements for tradeoff analysis. Component based software development, deployment and management. Prerequisites: SE 3306, CS 3354 or consent of instructor. (3-0) S

**SE 4367 Software Testing, Verification, Validation and Quality Assurance (3 semester hours)** Methods for evaluating software for correctness, and reliability including code inspections, program proofs and testing methodologies. Formal and informal proofs of correctness. Code inspections and their role in software verification. Unit and system testing techniques, testing tools and limitations of testing. Statistical testing, reliability models. Prerequisites: SE 3306, CS 3354 or consent of instructor. (3-0) S

**SE 4376 Object-Oriented Programming Systems (3 semester hours)** In-depth study of the features/advantages of object-oriented approach to problem solving. Special emphasis on issues of object-oriented analysis, design, implementation, and testing. Review of basic concepts of object-oriented technology (abstraction, inheritance, and polymorphism). Object-oriented programming languages, databases, and productivity tools. Prerequisite: CS 2336 or equivalent. (Same as CS 4376) (3-0) S

**SE 4381 Software Project Planning and Management (3 semester hours)** Planning and managing of software development projects. Software process models, ISO 9000, SEI’s Capability Maturity Model, continuous process improvement. Planning, scheduling, tracking, cost estimation, risk management, configuration management. Prerequisite: CS 3354. (3-0) Y

**SE 4399 Senior Honors in Computer Science/Software Engineering (3 semester hours)** For students conducting independent research for honors theses or projects. (Same as CS 4399) (3-0) R

**SE 4485 Software Engineering Project (4 semester hours)** This course is intended to complement the theory and to provide an in-depth, hands-on experience in all aspects of software engineering. The students will work in teams on projects of interest to industry and will be involved in analysis of requirements, architecture and design, implementation, testing and validation, project management, software process, software maintenance, and software re-engineering. Prerequisites: at least two of SE 4351, SE 4352, SE 4367, SE 4381. (4-1) S

**SE 4V95 Undergraduate Topics in Computer Science/Software Engineering (1-9 semester hours)** Subject matter will vary from semester to semester. May be used as SE Guided Elective on SE degree plans. May be repeated for credit as topics vary (9 hours maximum). (Same as CS 4V95) ([1-9]-0) R

**SE 4V98 Undergraduate Research in Computer Science/Software Engineering (1-9 semester hours)** Topics will vary from semester to semester. May be repeated for credit (9 hours maximum). Consent of instructor required. (Same as CS 4V98) ([1-9]-0) R