Computer Science and Engineering (CSE)

Courses

CSE 21. Introduction to Computer Science I. 6 Units.
Introduces fundamental concepts related to computer software design and construction. Develops initial design and programming skills using a high-level language. Fundamental concepts of control structures, data structures, and object-oriented programming.

Same as I&C SCI 21.
Overlaps with I&C SCI H21, I&C SCI 31, EECS 10, EECS 12, ENGRMAE 10.

Restriction: CSE 21 or I&C SCI 21 may not be taken for credit if taken after IN4MATX 42.

(II, Vb)

CSE 22. Introduction to Computer Science II. 6 Units.
Abstract behavior of classic data structures (stacks, queues, sorted and unsorted maps), alternative implementations, analysis of time, and space efficiency.

Prerequisite: CSE 21 or I&C SCI 21 or I&C SCI H21. CSE 21 with a grade of C or better. I&C SCI 21 with a grade of C or better. I&C SCI H21 with a grade of C or better.

Same as I&C SCI 22.
Overlaps with I&C SCI H22, CSE 22, CSE 42, I&C SCI 32, CSE 43.

(II, Vb)

CSE 31. Introduction to Digital Systems. 4 Units.
Digital representation of information. Specification, analysis, design and optimization or combinational and sequential logic, register-transfer components and register-transfer systems with datapaths and controllers. Introduction to high-level and algorithmic state-machines and custom processors. Course may be offered online.

(Design units: 2)

Prerequisite: CSE 41 or I&C SCI 31 or EECS 10 or EECS 12 or ENGRMAE 10 or CSE 21 or I&C SCI 21 or I&C SCI H21.

Same as EECS 31.

Restriction: Computer Engineering, Computer Science and Engineering, Electrical Engineering majors have first consideration for enrollment.

CSE 31L. Introduction to Digital Logic Laboratory. 3 Units.
Introduction to common digital integrated circuits: gates, memory circuits, MSI components. Operating characteristics, specifications, applications. Design of simple combinational and sequential digital systems (arithmetic processors game-playing machines). Construction and debugging techniques using hardware description languages and CAD tools. Materials fee. Course may be offered online.

(Design units: 3)

Prerequisite: (EECS 31 or CSE 31) and (EECS 10 or EECS 12 or (CSE 22 or I&C SCI 22) or (CSE 42 or I&C SCI 32)).

Same as EECS 31L.

Restriction: Computer Engineering, Computer Science and Engineering, and Electrical Engineering majors have first consideration for enrollment.

CSE 41. Introduction to Programming. 4 Units.
Introduction to fundamental concepts and techniques for writing software in a high-level programming language. Covers the syntax and semantics of data types, expressions, exceptions, control structures, input/output, methods, classes, and pragmatics of programming.

Same as I&C SCI 31.
Overlaps with I&C SCI 21, CSE 21, I&C SCI H21, EECS 10, EECS 12.

(II, Vb)
CSE 42. Programming with Software Libraries. 4 Units.
Construction of programs for problems and computing environments more varied than in CSE41. Using library modules for applications such as graphics, sound, GUI, database, Web, and network programming. Language features beyond those in CSE41 are introduced as needed.
Prerequisite: I&C SCI 31 or CSE 41. I&C SCI 31 with a grade of C or better. CSE 41 with a grade of C or better.
Same as I&C SCI 32.
Overlaps with I&C SCI 22, CSE 22, I&C SCI H22, IN4MATX 42.
(II and (VA or VB))

CSE 43. Intermediate Programming. 4 Units.
Intermediate-level language features and programming concepts for larger, more complex, higher-quality software. Functional programming, name spaces, modules, class protocols, inheritance, iterators, generators, operator overloading, reflection. Analysis of time and space efficiency.
Prerequisite: I&C SCI 32 or CSE 42. I&C SCI 32 with a grade of C or better. CSE 42 with a grade of C or better.
Same as I&C SCI 33.
Overlaps with I&C SCI 33, I&C SCI 22, CSE 22, I&C SCI H22, IN4MATX 42.
(II, Vb)

CSE 45C. Programming in C/C++ as a Second Language. 4 Units.
Prerequisite: I&C SCI 22 or CSE 22 or IN4MATX 42 or I&C SCI 33 or CSE 43. I&C SCI 22 with a grade of C or better. CSE 22 with a grade of C or better. IN4MATX 42 with a grade of C or better. I&C SCI 33 with a grade of C or better. CSE 43 with a grade of C or better.
Same as I&C SCI 45C.

CSE 46. Data Structure Implementation and Analysis. 4 Units.
Focuses on implementation and mathematical analysis of fundamental data structures and algorithms. Covers storage allocation and memory management techniques.
Prerequisite: CSE 45C or I&C SCI 45C. CSE 45C with a grade of C or better. I&C SCI 45C with a grade of C or better.
Same as I&C SCI 46.
Overlaps with I&C SCI H23.
(Vb)

CSE 50. Discrete-Time Signals and Systems. 4 Units.
Analysis of discrete-time linear-time-invariant (DTLTI) systems in the time domain and using z-transforms. Introduction to techniques based on Discrete-Time, Discrete, and Fast Fourier Transforms. Examples of their application to digital signal processing and digital communications.
(Design units: 0)
Prerequisite: EECS 70A or CSE 70A.
Same as EECS 50.
Restriction: Computer Engineering, Computer Science and Engineering, and Electrical Engineering majors have first consideration for enrollment.

CSE 70A. Network Analysis I. 4 Units.
(Design units: 1)
Corequisite: MATH 3D.
Prerequisite: PHYSICS 7D and (EECS 10 or EECS 12 or ENGRMAE 10 or CSE 41 or I&C SCI 31).
Same as EECS 70A.
Overlaps with ENGRMAE 60.
Restriction: Aerospace Engineering, Biomedical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Environmental Engineering, Materials Science Engineering, and Mechanical Engineering majors have first consideration for enrollment.
CSE 90. Systems Engineering and Technical Communications . 2 Units.
Introduces systems engineering concepts, including specifications and requirements, hardware and software design, integration, testing, and
documentation. Emphasizes organization and writing of reports and effective presentations.
Restriction: Computer Science and Engineering majors have first consideration for enrollment.

CSE 112. Electronic Devices and Circuits. 4 Units.
A first course in the design of Very Large Scale Integrated (VLSI) systems. Introduction to CMOS technology; MOS transistors and CMOS circuits.
Analysis and synthesis of CMOS gates. Layout design techniques for building blocks and systems. Introduction to CAD tools.
(Design units: 4)
Prerequisite: PHYSICS 7D and (CSE 70A or EECS 70A).
Overlaps with EECS 119, EECS 170D.
Restriction: Computer Science and Engineering majors have first consideration for enrollment.

CSE 132. Organization of Digital Computers. 4 Units.
Building blocks and organization of digital computers, the arithmetic, control, and memory units, and input/output devices and interfaces. Microprogramming
and microprocessors.
(Design units: 4)
Prerequisite: EECS 31L or CSE 31L.
Same as EECS 112.
Overlaps with COMPSCI 152.
Restriction: Computer Engineering, Computer Science and Engineering, and Electrical Engineering majors have first consideration for enrollment.

CSE 132L. Organization of Digital Computers Laboratory. 3 Units.
Specification and implementation of a processor-based system using a hardware description language such as VHDL. Hands-on experience with design
tools including simulation, synthesis, and evaluation using testbenches.
(Design units: 3)
Prerequisite: EECS 112 or CSE 132.
Same as EECS 112L.
Restriction: Computer Engineering and Computer Science and Engineering majors have first consideration for enrollment.

CSE 135A. Digital Signal Processing. 3 Units.
Nature of sampled data, sampling theorem, difference equations, data holds, z-transform, w-transform, digital filters, Butterworth and Chebychev filters,
quantization effects.
(Design units: 2)
Prerequisite: EECS 50 or CSE 50.
Same as EECS 152A.
Restriction: Computer Engineering, Electrical Engineering, and Computer Science and Engineering majors have first consideration for enrollment.

CSE 135B. Digital Signal Processing Design and Laboratory. 3 Units.
Design and implementation of algorithms on a DSP processor and using computer simulation. Applications in signal and image processing,
communications, radar, etc. Materials fee.
(Design units: 3)
Prerequisite: EECS 152A or CSE 135A.
Same as EECS 152B.
Restriction: Computer Engineering, Electrical Engineering, and Computer Science and Engineering majors have first consideration for enrollment.
CSE 141. Concepts in Programming Languages I. 4 Units.
In-depth study of several contemporary programming languages stressing variety in data structures, operations, notation, and control. Examination of different programming paradigms, such as logic programming, functional programming and object-oriented programming; implementation strategies, programming environments, and programming style. Course may be offered online.
Prerequisite: (IN4MATX 42 or I&C SCI 51 or CSE 31 or EECS 31) and (IN4MATX 45 or I&C SCI 46 or CSE 46 or I&C SCI 33 or CSE 43). IN4MATX 42 with a grade of C or better. I&C SCI 51 with a grade of C or better. CSE 31 with a grade of C or better. EECS 31 with a grade of C or better. IN4MATX 45 with a grade of C or better. I&C SCI 46 with a grade of C or better. CSE 46 with a grade of C or better. I&C SCI 33 with a grade of C or better. CSE 43 with a grade of C or better.
Same as IN4MATX 101, COMPSCI 141.

CSE 142. Compilers and Interpreters. 4 Units.
Introduction to the theory of programming language processors covering lexical analysis, syntax analysis, semantic analysis, intermediate representations, code generation, optimization, interpretation, and run-time support.
Prerequisite: CSE 141 or COMPSCI 141 or IN4MATX 101.
Same as COMPSCI 142A.

CSE 145A. Embedded Computing Systems. 4 Units.
Principles of embedded computing systems: embedded systems architecture, hardware/software components, system software and interfacing, real-time operating systems, hardware/software co-development, and communication issues. Examples of embedded computing in real-world application domains. Simple programming using an embedded systems development environment.
Corequisite: COMPSCI 145B.
Prerequisite: (CSE 46 or I&C SCI 46 or CSE 23 or I&C SCI 23 or I&C SCI 51 or CSE 31 or EECS 31).
Same as COMPSCI 145A.

CSE 145B. Embedded Computing System Lab. 2 Units.
Laboratory section to accompany CSE 145A or COMPSCI 145A.
(Design units: 0)
Corequisite: CSE145A or COMPSCI 145A.
Same as COMPSCI 145B.

CSE 161. Design and Analysis of Algorithms. 4 Units.
Techniques for efficient algorithm design, including divide-and-conquer and dynamic programming, and time/space analysis. Fast algorithms for problems applicable to networks, computer games, and scientific computing, such as sorting, shortest paths, minimum spanning trees, network flow, and pattern matching.
Prerequisite: (I&C SCI 23 or CSE 23 or I&C SCI 46 or CSE 46) and I&C SCI 6B and I&C SCI 6D and MATH 2B. I&C SCI 23 with a grade of C or better. CSE 23 with a grade of C or better. I&C SCI 46 with a grade of C or better. CSE 46 with a grade of C or better.
Same as COMPSCI 161.

CSE 181A. Senior Design Project. 3 Units.
Teaches problem definition, detailed design, integration and testability with teams of students specifying, designing, building, and testing complex systems. Lectures include engineering values, discussions, and ethical ramifications of engineering decisions. Materials fee.
(Design units: 3)
Corequisite: CSE 135A or EECS 152A.
Prerequisite: (COMPSCI 143A or EECS 111) and (CSE 145A or COMPSCI 145A). CSE 181A-CSE 181B-CSE 181C must be taken in the same academic year.
Restriction: Computer Science and Engineering majors have first consideration for enrollment.
CSE 181B. Senior Design Project. 3 Units.
Teaches problem definition, detailed design, integration and testability with teams of students specifying, designing, building, and testing complex systems. Lectures include engineering values, discussions, and ethical ramifications of engineering decisions. Materials fee.

(Design units: 3)
Prerequisite: CSE 181A.

Restriction: Computer Science and Engineering majors have first consideration for enrollment. CSE 181A-B-C must be taken in the same academic year.

CSE 181CW. Senior Design Project. 3 Units.
Completion, documentation, and presentation of projects started in CSE 181A-CSE 181B. Teaches engineering documentation writing and presentation skills. Students write comprehensive project reports individually. Each student participates in a public presentation of the project's results.

Prerequisite: CSE 181A and CSE 181B. Satisfactory completion of the Lower-Division Writing requirement.

Restriction: Computer Science and Engineering majors have first consideration for enrollment.

(CSE 198. Group Study. 1-4 Units.
Group study of selected topics in computer science and engineering.

(Design units: 0-4)
Prerequisite: Prerequisites vary.

Repeatability: May be repeated for credit unlimited times.

Restriction: Computer Science and Engineering majors only.

CSE H198. Honors Research in CSE. 4 Units.
Directed independent research in computer science and engineering for honors students.

Repeatability: May be repeated for credit unlimited times.

Restriction: Computer Science and Engineering majors only. Upper-division students only. Bren School of ICS Honors Program or Campuswide Honors Program students only.

CSE 199. Individual Study. 1-4 Units.
Supervised independent reading, research, or design for undergraduate Engineering majors. Students taking individual study for design credit are to submit a written paper to the instructor and to the Undergraduate Student Affairs Office in the School of Engineering.

(Design units: 1-4)
Repeatability: May be taken for credit for 8 units.

CSE 199P. Individual Study. 1-4 Units.
Supervised independent reading, research, or design for undergraduate Engineering majors. Students taking individual study for design credit are to submit a written paper to the instructor and to the Undergraduate Student Affairs Office in the School of Engineering.

(Design units: 1-4)
Grading Option: Pass/no pass only.

Repeatability: May be repeated for credit unlimited times.