# REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE

Accredited by the Computing Accreditation Commission of ABET, [http://www.abet.org](http://www.abet.org)

## COLLEGE OF ENGINEERING

THE UNIVERSITY OF OKLAHOMA

---

### GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit Hours</td>
<td>120-121*</td>
</tr>
<tr>
<td>Minimum Retention/Graduation Grade Point Averages:</td>
<td></td>
</tr>
<tr>
<td>Overall - Combined and OU</td>
<td>2.00</td>
</tr>
<tr>
<td>Major - Combined and OU</td>
<td>2.00</td>
</tr>
<tr>
<td>Curriculum - Combined and OU</td>
<td>2.00</td>
</tr>
</tbody>
</table>

*A minimum grade of C is required for each course in the curriculum.

---

### OU encourages students to complete at least 29 hours of applicable coursework each year to have the opportunity to graduate in four years.

<table>
<thead>
<tr>
<th>Year</th>
<th>FIRST SEMESTER</th>
<th>Hours</th>
<th>SECOND SEMESTER</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRESHMAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 1113, Prin. of English Composition (Core I)</td>
<td>3</td>
<td>CHEM 1315, General Chemistry (Core I, lab)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>MATH 1823, Calculus &amp; Analytic Geometry I (Core I)</td>
<td>3</td>
<td>ENGL 1213, Prin. of English Composition (Core I), or</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PSC 1113, American Federal Government (Core III)</td>
<td>3</td>
<td>EXPO 1213, Expository Writing (Core I)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENGR 1411, Freshman Engineering Experience</td>
<td>1</td>
<td>MATH 2423, Calculus &amp; Analytic Geometry II (Core I)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>†Approved Elective: Artistic Forms (Core IV)</td>
<td>3</td>
<td>MATH 1323, Intro. to Computer Programming</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>†Approved Elective: Social Science (Core III)</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL CREDIT HOURS</strong></td>
<td><strong>16</strong></td>
<td><strong>TOTAL CREDIT HOURS</strong></td>
<td><strong>14</strong></td>
<td></td>
</tr>
</tbody>
</table>

| SOPHOMORE | | | | |
| MATH 2433, Calculus & Analytic Geometry III | 3 | MATH 2443, Calculus & Analytic Geometry IV | 3 |
| C S 2334, Programming Structures & Abstractions | 4 | C S 2813, Discrete Structures | 3 |
| C S 2603, Applied Logic for Hardware & Software | 3 | C S 2413, Data Structures | 3 |
| PHYS 1311, General Physics Lab I (if taking two PHYS) | 0-1 | C S 2613, Computer Organization | 3 |
| PHYS 2514, General Physics for Engineering & Science Majors (Core II) | 4 | CHEM 1415, General Chemistry, or | |
| | | PHYS 2524, General Physics for Engineering & Science Majors, and | |
| | | PHYS 1321, General Physics Lab II | |
| **TOTAL CREDIT HOURS** | **14-15** | **TOTAL CREDIT HOURS** | **17** |

| JUNIOR | | | | |
| MATH 3113, Intro. to Ordinary Differential Equations, or | 3 | ENGL 3153, Technical Writing, or | |
| MATH 3413, Physical Mathematics I | 3 | B C 2813, Business Communication | 3 |
| COMM 2613, Public Speaking | 3 | MATH 3333, Linear Algebra | 3 |
| C S 3053, Human Computer Interaction | 3 | C S 3113, Intro. to Operating Systems | 3 |
| C S 3823, Theory of Computation | 3 | C S 3323, Principles of Programming Languages | 3 |
| ENGR 2002, Professional Development | 2 | 1 of the following 3 courses: | |
| | | MATH 4753, Applied Statistical Methods, or | |
| | | I E 3293, Applied Engineering Statistics, or | |
| | | MATH 4743, Intro. to Mathematical Statistics | |
| **TOTAL CREDIT HOURS** | **14** | **TOTAL CREDIT HOURS** | **15** |

| SENIOR | | | | |
| HSCI 3493, The History of Media (Core IV - WC) | 3 | C S 4273, Software Engineering II (Capstone) | 3 |
| C S 4263, Software Engineering I | 3 | †C S Approved C S Elective | 3 |
| C S 4413, Algorithm Analysis | 3 | †C S Approved C S Elective | 3 |
| †C S Approved C S Elective, or | 3 | HIST 1483, U.S., 1492-1865, or | |
| MATH 4073, Numerical Analysis | 3 | 1493, U.S., 1865-Present (Core IV) | |
| C S 4513, Database Management Systems | 3 | †Approved Elective: Non-Western Culture (Core IV) | 3 |
| **TOTAL CREDIT HOURS** | **15** | **TOTAL CREDIT HOURS** | **15** |

**NOTE:** Engineering transfer students may take ENGR 3511 in place of ENGR 1411.

Courses designated as Core I, II, III, IV or Capstone are part of the General Education curriculum. Students must complete a minimum of 40 hours of General Education courses, chosen from the approved list.

†To be chosen from the University-Wide General Education Approved Course List. Three of these 12 hours must be upper-division (3000-4000). See list in the Class Schedule.

In the College of Engineering, in order to progress in your curriculum, and as a specific graduation requirement, a grade of C or better is required in each course in the curriculum. Please refer to the General Catalog for additional enrollment limitations.

Students should read the College of Engineering Scholastic Regulations which are posted on the WSSC Bulletin Board across from FH 112.

Students must successfully complete prerequisite courses (with a minimum C grade) before proceeding to the next course.

‡Two college-level courses in a single foreign language are required; this may be satisfied by successful completion of 2 years in a single foreign language in high school. Students who must take foreign language at the University will have an additional 6-10 hours of coursework.

‡To be chosen from C S 4013, 4023, 4033, 4053, 4113, 4133, 4233, 4343, 4613, 4743, 4823, and 4973.

§This course fulfills the Computer Literacy Requirement for graduation as required by the Oklahoma State Regents for Higher Education.

**NOTE:** See an adviser in the Arts and Sciences Advising Center (EL 124) about a possible minor in mathematics.
COURSES IN COMPUTER SCIENCE (C S)

1323 Introduction to Computer Programming. Prerequisite: MATH 1523 or placement into MATH 1743 or above, or MATH 1623 as a corequisite. Introduction to the design and implementation of computer software with an emphasis on abstraction and program organization. (F, Sp)

2334 Programming Structures and Abstractions. Prerequisite: 1323 and Mathematics 1823. Application of software engineering principles with examples from central areas of computer science. Use of such concepts as stacks, queues, lists, and recursion. Introduction to ethics in computer science, including philosophical ethics. Discussion of intellectual property rights and privacy. A program design tool will be used. (F, Sp)

2413 Data Structures. Prerequisite: 2334 and 2813 or Mathematics 2513, or concurrent enrollment in 2813 or Mathematics 2513. Representation, analysis and implementation of data structures and the algorithms that employ them. Techniques for expressing algorithms using data structures with analysis. Written communications required in some projects. Discussion of ethical issues including computer crime, abuse, and hacker ethics. Tools such as in-situ, hydra, and debug will also be discussed. Windows operating system will be used. A debugging tool will be used. (F, Sp)

2603 Applied Logic for Hardware and Software. Prerequisite: 1323 and Mathematics 1823 with a C or better. Applications of logic in the analysis of hardware and software components. Topics include propositional and predicate calculus, Boolean algebra, combinational and sequential circuits, numbers systems and circuits for arithmetic, sets, inductive definitions, proof techniques including natural deduction, equational reasoning and mathematical induction. (F, Sp)

2613 Discrete Structures. Prerequisite: 2603 or Electrical and Computer Engineering 2213 or 2214. Introduction to the theory of discrete structures useful in computer science. Topics include combinations, relations, functions, computational complexity, recurrences, and graph theory. (F, Sp)

3053 Human Computer Interaction. Prerequisite: 2413 and 2813 or Mathematics 2513. An introduction to human-computer interaction and graphical user interfaces. Topics include principles of human-computer interaction, human cognitive abilities, interface analysis and design, windowing, navigation, windowing system current interface programming tools will be described and used. Oral presentations are required for some assignments. (F)

3113 Introduction to Operating Systems. Prerequisite: 2413 and 2813 or Mathematics 2513, and either 2613 or Electrical and Computer Engineering 1223. An introduction to the major concepts of operating systems. The focus is on understanding the roles of different components that form the basis of operating system design; introduction to the fundamental programming paradigm. (Sp)

3823 Theory of Computation. Prerequisite: 2813 or Mathematics 2513. Introduction to abstract machine theory and formal language theory. Topics include Turing machines, finite state automata, grammars, and problems such as satisfiability, provability, decidability, and complexity. (F, Sp, Su)

G4013 Artificial Intelligence (Slashlisted with 5013). Prerequisite: 2413 or 4005, and 2813 or 4005 or Mathematics 2513. Study of the methods of search, knowledge representation, reasoning, and other aspects of automating the solution of problems requiring intelligence. No student may earn credit for both 4013 and 5013. (Sp)

4023 Introduction to Intelligent Robotics (Slashlisted with 5023). Prerequisite: 2413, and 2813 or Mathematics 2513. History of intelligent robotics; functional models approach; reactive robots; ethological models; deliberative/reactive robotics; multi-robot systems; navigation; topological path planning; metric path planning; localization and mapping. No student may earn credit for both 4023 and 5023. (Sp)

403 Machine Learning. (Slashlisted with 5033). Prerequisite: 2413 and 2813 or Mathematics 2513, and Mathematics 4753 or Engineering 2933 or Industrial Engineering 3293 or Mathematics 3211 for computer science majors. Concepts and methods that form the basis of programming language design; introduction to the fundamental programming paradigm. (Sp)

4043 Artificial Intelligence I. Prerequisite: 2413 or 4005, and 2813 or 4005 or Mathematics 2513. Study of the methods of search, knowledge representation, reasoning, and other aspects of automating the solution of problems requiring intelligence. No student may earn credit for both 4013 and 5013. (Sp)

4023 Introduction to Intelligent Robotics (Slashlisted with 5023). Prerequisite: 2413, and 2813 or Mathematics 2513. History of intelligent robotics; functional models approach; reactive robots; ethological models; deliberative/reactive robotics; multi-robot systems; navigation; topological path planning; metric path planning; localization and mapping. No student may earn credit for both 4023 and 5023. (Sp)

4743 Scientific Computing I (Slashlisted with 5743). Prerequisite: Mathematics 3333 and Aerospace and Mechanical Engineering 3723 or Mathematics 4073 or Engineering 3723 or computer Science 3723. Interaction between algorithms and computer architectures. Introduction to linear algebra, serial, pipelined vector processors, cluster of processors. Measures of performance of parallel algorithms. Parallel algorithms for the solution of linear systems. No student may earn credit for both 4743 and 5743. (F)

4823 Cryptography (Slashlisted with 5823). Prerequisite: C S 3822 and C S 4413. Elementary number theory, complexity for doing arithmetic, finite fields, RSA, discrete logarithm and Diffie-Hellman, zero-knowledge protocols and oblivious transfer. Basic elliptic curve cryptosystems, elliptic curve factorization and primality proving. No student may earn credit for both 4823 and 5823. (Sp)

4973 Special Topics. Prerequisite: 2413 and permission of instructor. May be repeated with consent of instructor for a maximum of 12 credit hours. Coverage of material not otherwise covered by courses. (F, Sp, Su)

COURSES IN ENGINEERING (ENGR)

1411 Freshman Engineering Experience. Prerequisite: declared major in Engineering or permission of instructor. Required of all entering freshmen with a declared Engineering major. Lecture hours cover a variety of topics including: majors and minors; career planning; advising; and extracurricular activities. Students also work on multi-disciplinary engineering projects in smaller groups during the lab hour. (F)

2002 Professional Development. Prerequisite: sophomore standing. Develop an understanding of engineering ethics, teamwork, leadership, and professional responsibility through the concepts of contemporary, social, and global issues. (F, Sp)

COURSES IN HISTORY OF SCIENCE (HSCI)

3493 The History of Media. Prerequisite: junior standing, or completion of one History of Science course and concurrent or prior permission of instructor. An introduction to the history of information and communication technologies and communications media from the printing press to the internet. Topics will include the print revolution, the advent of electronic communications, the growth of broadcast media, the development of the digital computer, and the internet boom. Course materials include novels and films as well as non-fiction. (Irreg.) (IV-WC)

COURSES IN MATHEMATICS (MATH)

1823 Calculus and Analytic Geometry I. Prerequisite: 1523 at OU, or satisfactory score on the placement test, or, for incoming freshmen, direct from high school, satisfactory score on the ACT/SAT. Topics covered include equations of straight lines; conic sections; functions, limits and continuity; differentiation; maximum-minimum theory and curve sketching. A student may not receive credit for both 1823 and 1113. (F)

2423 Calculus and Analytic Geometry II. Prerequisite: 1823. Integration and its applications; the calculus of transcendental functions; techniques of integration; and the introduction to differential equations. A student may not receive credit for this course and 2123. (F, Sp, Su) [I-M]

3433 Calculus and Analytic Geometry III. Prerequisite: 2423. Polar coordinates, parametric equations, surfaces and curves in space, iterated and triple integrals, sequences, series and their convergence. (F, Sp, Su)

4433 Calculus and Analytic Geometry IV. Prerequisite: 2433. Vector calculus; functions of several variables; partial derivatives; gradients, extreme values and differentials of multivariable functions; multiple integrals; line and surface integrals. (F, Sp, Su)

G3113 Introduction to Ordinary Differential Equations. Prerequisite: MATH 2423 or MATH 2924. Study of first and second order differential equations, linear differential equations with constant coefficients, two-by-two linear systems, Laplace transformations, phase planes and stability. (F, Sp, Su)

G3333 Linear Algebra I. Prerequisite: MATH 2423 or MATH 2924 or permission of instructor. Determinants, eigenvalues and eigenvectors, linear transformations, Euclidean and Hermitian inner product spaces, change of basis, dual spaces, matrices, and characteristic values and vectors. (F, Sp, Su)

G4143 Physical Mathematics I. Prerequisite: MATH 2443 or MATH 2934 or concurrent enrollment. Complex numbers and functions. Fourier series, solution methods for ordinary differential equations and partial differential equations, Laplace transforms, series solutions, special functions, and Weber's equation. (F, Sp, Su)

G4733 Statistical Mechanics I. Prerequisite: 3313 or 3413. Solution of linear and non-linear differential equations, approximation of functions, numerical integration and differentiation, introduction to analysis of convergence and errors, pitfalls in automatic computation, one-step methods in the numerical solution of systems of ordinary differential equations. (F)

4743 Introduction to Mathematical Statistics (Slashlisted with 5743). Prerequisite: 4733. Mathematical development of basic concepts in statistics: estimation, hypothesis testing, sampling from normal and other populations, regression, goodness-of-fit. No student may earn credit for both 4743 and 5743. (F, Sp, Su)

G4753 Applied Statistical Methods. Prerequisite: MATH 2123 or MATH 2423 or MATH 2924 or permission of instructor. Estimation, hypothesis testing, analysis of variance, regression and correlation, goodness-of-fit, other topics as time permits. Emphasis on applications of statistical methods. (F, Sp, Su)