

Department of Mathematics (MATH) and Computer Science

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The Department of Mathematics and Computer Science has missions to several different populations, including non-science students in the Hickingbotham School of Business, School of Education, the Jones School of Fine Arts, the School of Humanities, and the School of Social Sciences. Further, the Department has missions to serve the science students in the School of Natural Sciences. The Department strives to serve these populations and their needs in the unique atmosphere of Ouachita Baptist University in a caring and responsible manner.

The mathematics curriculum is designed to meet the needs of students in all disciplines. The non-science student has choices of liberal arts mathematics courses, business mathematics, or college algebra, depending upon the major. Science students may take a variety of mathematics courses and, if desired, may obtain a major or minor in mathematics. One choosing a major in mathematics will receive adequate preparation for a career in the mathematics field, including preparation for graduate school, industrial employment, and teaching in secondary schools.

The Computer Science Program is designed to meet the objectives of service to the community, qualification for professional and industrial careers, and preparation for graduate study. Introductory courses are offered in several programming languages for general computer users. Two different majors and minors are available, namely a curriculum designed to emphasize the study of computer science as a discipline and another to emphasize the applications of computers in specific disciplines. All courses are taught with programming being an integral component.

Credit may not be earned in a departmental course that is a prerequisite for any course already completed. The Interdisciplinary Studies Mathematics requirement must be completed prior to Junior standing or during the first semester for transfer students.

All mathematics courses with the MATH prefix will require the student to have access to a graphing calculator.

Requirements for a major in Mathematics:

B.S. degree: MATH 2014, 2024, 2043, 3034, 3093, 4062; three courses chosen from MATH 3053, 4023, 4043, 4073; one additional course from MATH 3043, 3063, 3073, 4043, 4073; CSCI 1043; PHIL 2043. A minor must be completed in biology, chemistry, computer science, or physics.

B.A. degree: MATH 2014, 2024, 2043, 3034, 3053, 3093, 4023, 4062, six additional Junior-Senior hours in Mathematics; CSCI 1043; PHIL 2043.

Requirements for a teaching field in Mathematics: See page 110.

Requirements for a minor in Mathematics: MATH 2014, 2024, at least ten additional hours in Mathematics including a minimum of six Junior-Senior hours.

- 1003. College Algebra.**
Review of fundamentals, study of quadratic equations, solution of systems of linear equations, and other topics. **Fall, Spring.**
- 1013. Trigonometry.**
Solution of triangles, identities, and equations. Study of graphs. Prerequisite: Plane Geometry. **Spring.**
- 1034. Pre-calculus Mathematics.**
A course covering selected topics from College Algebra and Trigonometry intended for students who will take Calculus. Topics include functions, polynomials, rational functions, exponential and logarithmic functions, circular functions, systems of linear equations and coordinate geometry. Credit for graduation will not be given for this course and MATH 1003 or 1013. **Fall.**
- 1063. Business Calculus.**
Intuitive coverage of calculus emphasizing applications in business. Derivatives, curve sketching, optimization, integrals, techniques and application of integrals. Credit for graduation may not be earned in both MATH 1063 and MATH 2014. Prerequisite: MATH 1003 or consent of instructor. **Fall, Spring.**
- 2014. Calculus I.**
Introductory study of calculus and analytic geometry, including differentiation, application of derivatives, integration, and application of integrals. Prerequisite: MATH 1034 or 1003 and 1013 or consent of instructor. **Fall, Spring.**
- 2024. Calculus II.**
Continuation of MATH 2014. Further study of transcendental functions, techniques of integration, sequences and series. Prerequisite: MATH 2014. **Fall, Spring.**
- 2033. Mathematics for Early Childhood Teachers I.**
An introduction to the mathematical concepts underlying the traditional computational techniques for elementary school mathematics. The course may not be counted on a major or minor in Mathematics or for certification in secondary mathematics. Open only to Education majors. **Fall, Spring.**
- 2043. Discrete Mathematics.**
A study of the basic principles underlying various areas of Mathematics: set theory, number theory, complex numbers, matrix operations, probability and graph theory. Prerequisite: MATH 2014. **Spring.**
- 2053. Mathematics for Middle School Teachers.**
An introduction to the mathematical concepts underlying the traditional computational techniques for middle school Mathematics. The course may not be counted towards a major or minor in Mathematics. **Fall, Spring.**
- 2063. Elementary Statistics.**
A study of statistics appropriate to the teaching of middle school Mathematics. The course may not be counted towards a major or minor in Mathematics. Prerequisite: MATH 1003. **Fall if there is sufficient demand.**

3003. Foundations of Geometry.

A study of the axiomatic bases of geometries, their relation to "real" space; basic concepts of point, line, plane and space; projective and non-Euclidean geometries. Prerequisite: MATH 2014. **Spring.**

3013. Mathematics for Early Childhood Teachers II.

A continuation of the study of the number system: rational and real. Basic ideas of geometry including plane regions and space figures, measurement, relations, functions and graphs, linear equations, probability and logic will be studied. Prerequisite: MATH 2033 or consent of instructor. The course may not be counted on a major or minor in Mathematics or for certification in secondary mathematics. It is open only to Elementary Education students. **Fall, Spring.**

3034. Calculus III.

Continuation of MATH 2024. A study of polar coordinates, vectors, vector-valued functions, function of multiple variables, including partial differentiation and multiple integrals. Prerequisite: MATH 2024. **Fall.**

3043. Differential Equations.

Ordinary differential equations such as occur in geometry, physics, and chemistry. Course covers classical solution techniques including power series solutions and also treats the Laplace Transform Method. Prerequisite: MATH 2024. **Spring of odd-numbered years.**

3053. Abstract Algebra I.

A study of groups: symmetric groups, groups of integers, subgroups, group homomorphisms and isomorphisms, and other group theory topics. Prerequisites: MATH 2024, 2043; PHIL 2043. **Fall of odd-numbered years.**

3063. Probability and Statistics.

Counting techniques, probability, odds, mathematical expectation, distributions, moments, sampling, mathematical models and testing hypotheses. Prerequisites: Math 2014, 2043. **Spring of even-numbered years.**

3073. Numerical Methods.

Provides a computation-oriented introduction to algorithms vital to scientific computing. Includes elementary error analysis and computational methods for roots of equations, linear systems of equations, interpolation, numerical integration, and initial value ordinary differential equations. Prerequisites: CSCI 1043; MATH 2014. Also listed as CSCI 3073. **On Demand.**

3083. History of Mathematics.

A survey of the development of mathematical theories and techniques from the early Egyptians through the eighteenth century. Emphasis is placed upon appreciation, but assignments include representative exercises. **Spring of even-numbered years.**

3093. Linear Algebra.

A study of vectors, vector spaces, matrices and determinants. Prerequisites: MATH 2043, 3034; PHIL 2043; CSCI 1043. **Fall of even-numbered years.**

3103. Geometry for Middle School Teachers.

A study of geometry appropriate for the teaching of middle school mathematics. Topics covered include basic concepts of point, line, plane, and space; constructing proofs; and use of computer software in the classroom. Open only to education majors. Prerequisite: MATH 1063 or MATH 2014. **On Demand.**

3202. Advanced Chemical Calculations.

A study of calculations required to master advanced chemical topics. This course may not be counted towards a major in mathematics. Prerequisite: MATH 2014. Prerequisite or corequisite: CHEM 3015.

Spring.

4013. Methods in Secondary Mathematics.

A modular course for secondary mathematics education students including theories, purposes, activities, curricula and new developments in teaching. Prerequisite: junior or senior standing. **Fall of odd-numbered years.**

4023. Advanced Calculus I.

A more theoretical treatment than is provided by the basic calculus courses. Topics include: limits, continuity, derivatives and the Riemann integral; primarily in one dimension. Prerequisites: MATH 2043, 3034, 3093; PHIL 2043. **Spring of odd-numbered years.**

4033. Advanced Calculus II.

Continuation of MATH 4023. Topics include: series, functions of several variables and integrals other than Riemann-type. Prerequisite: MATH 4023. **On Demand.**

4043. Complex Variables.

Complex number arithmetic, calculus of a complex variable, analyticity, power series representation, Cauchy's integral theorem, and consequences. Prerequisite: MATH 3034 and either MATH 3053 or MATH 4023. **Spring of even-numbered years.**

4053. Abstract Algebra II.

Continuation of MATH 3053. Study of rings, fields, polynomial rings, extension fields, Galois Theory, and other topics. Prerequisites: MATH 2024, 3053; PHIL 2043. **On Demand.**

4062. Senior Seminar.

A course designed to give experience in reading technical literature and to give extensive writing experience. Prerequisite: Senior status or consent of instructor. [WAC] **Fall.**

4073. Introduction to Topology.

A basic course in point-set topology. Topics include abstract topological spaces, topology of lines and planes, connectedness, compact spaces and continuous mappings. Prerequisites: MATH 3053 or 4023; PHIL 2043. **Fall of even-numbered years.**

4801-4893. Special Studies in Mathematics.

For students who wish to do independent work on advanced problems.

Computer Science (CSCI)

CSCI Core: 1043, 1063, 2063, 3033.

Requirements for a major in Computer Science:

B.S. degree: CSCI Core, CSCI 2093, 3043, 4043, 4023 or 4033, 4053, 4083, 4093; PHIL 2043; MATH 2014, 2024; one course from MATH 3034, 3053, 3063, 3093. A minor must be completed in biology, chemistry, physics or mathematics.

B.A. degree: CSCI Core, CSCI 2093, 3043 or 4043, 4033, 4083, 4093, six additional hours in Computer Science including at least three Junior-Senior hours; PHIL 2043; MATH 2014.

For a B.A. with Business applications it is recommended that the student take CSCI 1023, 2023 and select a minor within the School of Business.

Requirements for a minor in Computer Science:

Option I: CSCI Core plus six additional hours in Computer Science including at least three Junior-Senior hours.

Option II: CSCI 1043 and 1063 or CSCI 1023 and 2023. CSCI 3053, 4033, 4083, plus 3 additional hours in computer science.

1003. Information Technology.

A course for non-majors designed to introduce the student to computer history, terminology, and mainstream technology. The course provides hands-on experience in using word processors, spreadsheets, presentation software, e-mail systems, and web browsers. This course may not be counted toward a major or minor in computer science; nor may it be taken after completion of INSY 1033 or any CSCI course. **Fall, Spring.**

1023. COBOL.

An introduction to solving business problems using COBOL, emphasizing structured program design, data organization, control break logic, and elementary file storage and manipulation. Prerequisite: MATH 1003 or equivalent. **Fall of even-numbered years.**

1043. Computer Programming I.

Introduction to computer science and to computer programming with emphasis on top-down design, stepwise refinement, and structured programming techniques. Topics include control structures, subprograms, character-based I/O, sequential file processing, arrays, and elementary sorting and searching techniques. Prerequisite: MATH 1003 or equivalent or consent of instructor. **Fall.**

1063. Computer Programming II.

Continuation of CSCI 1043 in developing a disciplined approach to the design, coding, and testing of computer programs. Includes coverage of linked lists, stacks, queues, recursion, sorting and searching techniques, and binary files. Prerequisite: CSCI 1043 or consent of instructor. **Spring.**

2013. RPG.

An introduction to solving business problems using RPG, emphasizing disk file processing related to generating reports. Prerequisite: MATH 1003 or equivalent. **On Demand.**

- 2023. Advanced COBOL.**
Advanced programming in COBOL including built-in sort, table processing, and indexed and relative file processing. Prerequisite: CSCI 1023. **Spring of odd-numbered years.**
- 2033. FORTRAN.**
Elements of the FORTRAN language will be utilized in solving primarily scientific-oriented problems. Simulation and sorting applications will be included. Prerequisite: At least concurrent enrollment in MATH 2014. **Spring of even-numbered years.**
- 2043. Java.**
An overview of the Java programming language. Emphasis is on features of the language that set it apart from traditional programming languages. Prerequisite: CSCI 1063. **Spring of odd-numbered years.**
- 2063. Discrete Structures.**
Finite and discrete algebraic structures, including finite sets, relations, counting techniques, recurrence relations, algorithmic complexity analysis, Boolean algebra, and elementary graph theory. Emphasis is upon application of these areas to computer science. Prerequisites: CSCI 1063; PHIL 2043. **Fall.**
- 2093. Assembly Language Programming.**
An introduction to assembly language programming that includes binary and hexadecimal number systems, computer structure, internal representation of data, addressing, subroutines, and interfacing with high-level languages. Prerequisite: CSCI 1063. **Fall.**
- 3033. Data Structures.**
Study of the implementation and analysis of classical data structures including arrays, lists, trees, and hash tables. Includes advanced searching and sorting methods as well as an introduction of the application of the object-oriented programming paradigm to the implementation of data structures. Prerequisite: CSCI 2063. **Spring.**
- 3043. Computer Organization and Architecture.**
Examination of architectural concepts such as elementary digital circuits, performance measures, design issues, instruction sets, memory organization, and interrupt handling. Prerequisite: CSCI 2063 and 2093. **Spring of odd-numbered years.**
- 3053. Computer Networks.**
Examination of modern networking terminology, concepts, and methods. Includes examination of modern protocols and network operating systems. Prerequisite: CSCI 1063 or CSCI 2023. **Spring of even-numbered years.**
- 3073. Numerical Methods.**
Provides a computation-oriented introduction to algorithms vital to scientific computing. Includes elementary error analysis and computational methods for roots of equations, linear systems of equations, interpolation, numerical integration, and initial value ordinary differential equations. Prerequisites: CSCI 1043; MATH 2014. **On Demand.**
- 4023. Programming Languages.**
A survey of procedure-oriented languages, emphasizing the syntactic and semantic structures present in the language. Also includes an

introduction to formal languages. Prerequisite: CSCI 3033. **Spring of odd-numbered years.**

4033. Database Management Systems.

Examines the design and implementation of database management systems. Specific assignments will be made utilizing database software packages. Prerequisite: CSCI 1063 or 2023. **Spring of even-numbered years.**

4043. Algorithms.

The design, analysis, and implementation of classical sequential algorithms, including greedy, divide-and-conquer, dynamic programming, and backtracking algorithms. Also includes an introduction to parallel algorithms and algorithmic theory. Prerequisite: CSCI 3033. **Spring of even-numbered years.**

4053. Operating Systems.

Detailed investigation of modern operating systems including process concepts, issues in multiuser and concurrent systems, virtual memory systems, security issues, and an introduction to distributed operating systems. Prerequisite: CSCI 2093. **Fall of odd-numbered years.**

4063. Computer Graphics.

Introduction to elementary topics in interactive computer graphics. Input devices, display devices and techniques for 2-D and 3-D transformations will be explored. Projects will be used to emphasize data structures and applications to various disciplines. Prerequisites: CSCI 1063; MATH 2014. **On Demand.**

4073. Artificial Intelligence.

Fundamental concepts and techniques of intelligent systems including search strategies, representation methods, and interpretation of knowledge. Prerequisite: CSCI 3033. **On Demand.**

4083. Current Topics.

Examination of topics, languages, and tools that have become significant forces in the field and that are not covered by other courses in the curriculum. The course is project-based and, when possible, customized to the individual student's educational or vocational objectives. Prerequisites: Senior status or consent of instructor. **Spring.**

4093. Senior Seminar.

A course designed to help majors draw connections among the various courses they have encountered during their college years. This is accomplished through projects and through selected reading and writing assignments. Prerequisite: Senior status or consent of instructor. [WAC] **Fall.**

4801-4893. Special Studies in Computer Science.

Continuation of courses offered on a regular basis or areas of computer science not covered in the regular curriculum. Prerequisite: consent of instructor. **On Demand.**