

MATHEMATICS AND COMPUTER SCIENCE

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Mathematics

Mission Statement:

The mission of the Bachelor of Science program in mathematics is to impart the knowledge, practice, and communication of mathematics to our students.

Requirements for the Bachelor of Science Degree in Mathematics

The Department of Mathematics and Computer Science offers three programs of study leading to Bachelor of Science degree mathematics: traditional, teacher licensure, and applied mathematics. The Department also offers a minor in mathematics. The courses in mathematics are designed to meet the needs and interests of students who plan to teach mathematics in elementary, middle and secondary schools, to give students a strong foundation or graduate study, and to prepare students for employment in business and industry. Mathematics courses are designed to provide cultural benefits to all students by improving reasoning and problem-solving skills, as well as providing the necessary mathematical foundation for students in business, pre-engineering and science.

Candidates for this degree must meet all academic requirements stated in the catalog under which they were admitted to the University. In addition to the courses listed below for a Bachelor of Science degree in Mathematics, all students must complete the Liberal Arts Core requirements as specified by the University.

To take any course in mathematics or computer science listing a prerequisite, the prerequisite must be passed with a grade of C or better, or the student must have departmental approval. Students must have a grade of C or better in all courses in major and minor fields and also in the courses listed as “additional requirements.”

Traditional Program of Study

Mathematics Core	Hours				
MTH 1295	Calculus I	5			
MTH 1261	Intro to Math Computing	1			
MTH 2045	Calculus II	5			
MTH 2283	Discrete Mathematics I	3			
MTH 3103	Calculus III	3	MTH 4133	Algebraic Structures I	3
MTH 3163	Probability and Statistics	3			
MTH 3113	Linear Algebra	3			
MTH 4903	Capstone Course-Mathematics	3			
	Junior-Senior MTH elective or MTH 2323	3			
	Junior-Senior MTH electives	9			

Additional Requirements

CSC 1104	Foundations of Computer Science I
CHM 1014 1024	University Chemistry I and II
PHY 2034 2044	General Physics I and II <i>or</i>
PHY 2234 2244	University Physics I and II

Teacher Licensure Track

Mathematics Core

MTH 1295	Calculus I	5			
MTH 1261	Intro to Math Computing	1			
MTH 2045	Calculus II	5			
MTH 2323	Statistical Methods	3			
MTH 2283	Discrete Mathematics I	3			
MTH 3503	Discrete Mathematics II	3			
MTH 3023	Systems of Geometry I	3			
MTH 3103	Calculus III	3			
MTH 3163	Probability and Statistics I	3			
MTH 3383	Math for Secondary Teachers	3			
MTH 3113	Linear Algebra	3			

MTH	4133	Algebraic Structures I	3
MTH	4893	Special Methods - Mathematics	3
MTH	4903	Capstone Course - Mathematics	3

Additional Requirements

CSC 1104 Foundations of Computer Science I
Professional Education Curriculum for 7-12 teachers.

*Students in the 7-12 mathematics teacher licensure track do not have to complete a minor.

Applied Mathematics Program of Study

Mathematics Core

MTH	1295	Calculus I	5
MTH	1261	Intro to Math Computing	1
MTH	2283	Discrete Math	3
MTH	2045	Calculus II	5
MTH	2323	Statistical Methods	3
MTH	3103	Calculus III	3
MTH	3113	Linear Algebra	3
MTH	4123	Differential Equations	3
MTH	3163	Probability & Statistics I	3
MTH	4373	Numerical Analysis	3
MTH	4903	Capstone Course - Mathematics	3

Additional Requirements

CSC	1104	Foundations of Computer Science I
CSC	1114	Foundations of Computer Science II
CSC	2203	Data Structures
CSC	3223	Algorithm Analysis
CSC	4213	Simulation Theory
ENG	3613	Technical Writing
CHM	1014 1024	University Chemistry I and II
PHY	2034 2044	General Physics I and II <i>or</i>
PHY	2234 2244	University Physics I and II

A minor in biology, chemistry or physics

Mathematics Minor Requirements - 17 Hours

The minor in mathematics requires 17 hours of mathematics at or above MTH 1295 - Calculus I. It must include at least 3 hours that are 3000 or above and these courses must be exclusive of mathematics courses specifically designed for elementary or middle level education. For students who wish to minor in mathematics with the goal of adding mathematics as a second area of licensure, the following program of study is recommended:

MTH	1295	Calculus I
MTH	2161	Intro to Math Computing
MTH	2323	Statistical Methods
MTH	2283	Discrete Mathematics I
MTH	3383	Math for Secondary Education
MTH	4393	Special Methods- Mathematics

Recommended above the minimal minor requirements:

MTH	2045	Calculus II
MTH	3023	Systems of Geometry I

Middle School Mathematics

The program and degree for Middle Level Math/Science Licensure are through Teachers College, Henderson. However, the mathematics courses required for this program are taught in the Department of Mathematics and Computer Science.

MTH	1053	Number Operations & Number Sense
MTH	1213	Algebra for Elementary & Middle Grades
MTH	2483	Geometry 1 for Elementary & Middle Grades
MTH	2543	Geometry 1 for Elementary & Middle Grades

MTH	2543	Data Analysis & Prob-Elem & Middle Grades
MTH	3523	Discrete Math for Middle Grades
MTH	3553	Foundations of Calculus for Middle Grades
MTH	4563	Math Modeling & Appl for Middle Grades

Courses in Mathematics

MTH 0003. Elementary Algebra. This course is designed for students who desire or need a stronger understanding of the numeration system and how to operate within that system. It is designed to enhance students' understanding of algebraic expressions and equations. Students will analyze functions using graphical and algebraic techniques. Students with a mathematics ACT score below 16 (or equivalent score from admission exams approved by HSU) are required to complete the course with a grade of C or better before enrolling in MTH 0013, MTH 1033 or MTH 1083. This course cannot be used for degree requirements.

MTH 0013. Intermediate Algebra. This course is designed to strengthen basic algebraic manipulation skills. The course develops the characteristics of linear and quadratic functions to solve equations, systems of equations and inequalities. Prerequisite: MTH 0003 (with a grade of C or better), or a mathematics ACT score of at least 16 (or equivalent score from an admission exam approved by HSU). This course cannot be used for degree requirements.

MTH 1033. Mathematics for Liberal Arts. A course designed to meet the general education needs of students majoring in programs that do not require college algebra or more advanced courses. This course consists of units dealing with logic, proportional reasoning, the mathematics of finance, exponential growth and decay, geometry (plane and solid), voting theory, applications of mathematics to music and art, and probability and statistics. Prerequisite: MTH 0003 (with a grade of C or better), or a mathematics ACT score of at least 19 (or equivalent score from an admission exam approved by HSU).

MTH 1053. Number Operations and Number Sense. This is the entry level course for P-8 education majors. Numeration systems from natural numbers through real numbers will be covered. The operations and properties with applications within each system will be developed as appropriate to the P-8 teacher. Prerequisite: MTH 0013 (with a grade of C or better), or a mathematics ACT score of at least 19 (or equivalent math score from an admission exam approved by HSU).

MTH 1083. Mathematics through Practical Applications. The course looks at percentages, calculating and using statistics, unit conversions, mathematical modeling, physics of motion, probability, geometry, estimation, data collection and other applications. The motivation for coverage of the topics will come from various areas chosen by the instructor such as sports, music, art, physics, acoustics, etc. Applications of these topics will be made to everyday life. Prerequisite: MTH 0003 (with a grade of C or better), or a mathematics ACT score of at least 19 (or equivalent score from an admission exam approved by HSU).

MTH 1213. Algebra for Elementary and Middle Grades. A course designed to meet the needs of students preparing for elementary and/or middle school licensure. Topics include: sequences and series, linear and non-linear equations, linear inequalities; inverse, polynomial, rational, exponential and logarithmic functions. Concepts will be developed using appropriate manipulatives and technology. Prerequisite: MTH 1053 with a grade of C or better.

MTH 1243. College Algebra. A course designed to meet the general education needs of students in business, sciences, and other programs outside of mathematics. Topics include: linear, non-linear, inverse, polynomial, rational, exponential and logarithmic functions; systems of linear equations, linear and quadratic inequalities. Problem-solving techniques will be discussed with and without the use of technology. Prerequisite: MTH 0013 (with a grade of C or better), or a mathematics ACT score of at least 19 (or equivalent math score from an admission exam approved by HSU). An ACT math score of 22 or above is recommended.

MTH 1253. Plane Trigonometry. Topics to include angular measurement, trigonometric functions, identities, graphing, Law of Sines, Law of Cosines, Heron's formula, polar coordinates, complex numbers, vectors, and parametric equations. Prerequisite or co-requisite: MTH 1243 or MTH 1273.

MTH 1261. Introduction to Mathematical Computing. This course serves as an introduction to mathematical computing with computer algebra software, geometry software and spreadsheets. Prerequisites: Same as for MTH 1295. Co-requisite: MTH 1295.

MTH1273. Precalculus Mathematics. This course is designed to prepare students for MTH 1295. Course includes a study of linear and non-linear equations, systems of equations, and inequalities, an introduction to matrices, sequences and series, as well as conics. Prerequisite: Two units of high school algebra. An ACT math score of 25 or above is strongly recommended.

MTH 1295. Calculus I. Topics include limits, derivatives, and integrals of algebraic and transcendental functions. Theory, computation and applications are emphasized. Prerequisites: MTH 1253, MTH 1273; or consent of the department. Corequisite: MTH 1261.

MTH 2045. Calculus II. This course is a continuation of MTH 1295-Calculus I. Additional topics will include integration techniques, improper integrals, infinite series, parametric equations and polar coordinates. Prerequisite: MTH 1295 or consent of the department.

MTH 2283. Discrete Mathematics I. A study of mathematical structures that are fundamentally discrete rather than continuous in nature. The course includes a study of logic, mathematical writing and proofs, an introduction to sets, relations, and counting methods. Prerequisites:

MTH 1243 or MTH 1273; MTH 1295 Recommended.

MTH 2323. Statistical Methods. Topics include descriptive statistics, correlation and regression, introduction to probability, basic probability distributions, confidence intervals, hypothesis testing, 1-way analysis of variance. Prerequisite: MTH 1213, MTH 1243 or MTH 1273.

MTH 2323. Statistical Methods. Basic experimental statistics; introduction to probability; basic probability distribution; confidence limits; analysis of variance. Prerequisite: MTH 1033, MTH 1243 or MTH 1273.

MTH 2483. Geometry I for the Elementary and Middle Grades. Geometry concepts appropriate for P-8 grade levels will be developed. Topics will include appropriate geometric terminology, lines, angles, plane curves, polygons and other plane regions, polyhedra and other space figures, measure, constructions, transformations, congruence, similarity and geometric reasoning. Prerequisite: MTH 1053 with a C or better and either MTH 1213 or MTH 1243 with a C or better.

MTH 2543. Data Analysis, Statistics and Probability for the Elementary and Middle Grades. Concepts of data analysis, statistics and probability appropriate for P-8 grade levels will be developed. Topics to be included are: univariate and bivariate graphical techniques, measures of center and dispersion, normal distribution, discrete probability with applications, geometric probability with applications, and simulation. Prerequisites: MTH 1053 with a C or better and either MTH 1213 or MTH 1243 with a C or better.

MTH 3023, 5023. (WI) Systems of Geometry I. The course introduces the concept of an axiomatic mathematical system through the development of neutral and Euclidean geometries with an emphasis on valid arguments. Non-Euclidean geometry will also be investigated. Prerequisite: MTH 1295 and MTH 2283.

MTH 3063, 5063. Advanced Algebra for the Elementary and Middle Grades. Reviews the basic concepts of algebra, use of manipulatives, and the use of technology. Prerequisite: MTH 2483.

MTH 3073, 5073. Geometry II for the Middle Grades (4-8). An informal study of the concepts of position, shape, size, construction with straightedge and compass, structure of geometry, and measurement. Prerequisite: MTH 2483.

MTH 3093, 5093. Systems of Geometry II. Continuation of MTH 3023. Prerequisite: MTH 3023.

MTH 3103, 5103 Calculus III. A study of 2-D and 3-D vectors and geometry, vector functions, partial differentiation, multiple integration, Lagrange multipliers, and vector calculus. Prerequisite: MTH 2045.

MTH 3113, 5113. (WI) Linear Algebra. Vector spaces, linear transformations and matrices, sets of linear transformations and matrices, eigenvalues and eigenvectors of linear transformations, and similar matrices. Prerequisites: MTH 1295 and MTH 2283.

MTH 3163, 5163. Probability and Statistics I. The mathematical theory of probability and application of this theory to statistical inference. Topics include descriptive statistics, independence, conditional probability, expectation, variance, discrete and continuous distributions, moment generating functions, and the central limit theorem. Prerequisites: MTH 2283 and MTH 2045.

MTH 3383. Mathematics for Secondary Teachers. This course develops problem-solving strategies and proofs in a variety of mathematical contexts, emphasizing the connections between algebra and geometry. The historical development of mathematics and how it affects mathematics today will be explored. Prerequisites: MTH 1243 or MTH 1273, MTH 1253, MTH 2283.

MTH 3503. Discrete Mathematics II. A continuation of MTH 2283-Discrete Mathematics I. Topics included number theory, probability, algebraic functions and algorithms, graphs and trees, and finite automata. Prerequisite: MTH 2283.

MTH 3523. Discrete Math for Middle Grades. Basic logic, set theory, elementary number theory, counting techniques, patterns, sequences, deductive and inductive mathematical proofs and functions as appropriate for middle school mathematics will be developed. Technology will be used appropriately. Prerequisite: MTH 2483.

MTH 3553. Foundations of Calculus and Technology for the Middle Grades. An intuitive understanding of limits, derivatives with applications, and integration with applications, as appropriate for middle level mathematics teachers. Appropriate use of technology will be incorporated. Prerequisite: MTH 2483.

MTH 4123, 5123. Differential Equations. Analytic, approximate, and graphical solutions to ordinary differential equations, the theory of the existence and uniqueness of solutions, and applications of these ideas to the physical sciences. Prerequisite: MTH 2045.

MTH 4133, 5133. (WI) Algebraic Structures I. An introduction to the fundamental algebraic structures: groups, rings and fields. Emphasis is placed on developing mathematical sophistication and rigor of proof. Prerequisite: MTH 1295 and MTH 2283.

MTH 4143, 5143. Algebraic Structures II. Continuation of MTH 4133; advanced group theory and Galois theory. Prerequisite: MTH 4133.

MTH 4153, 5153. History of Mathematics. This course is an overview of the development of elementary mathematics from primitive counting to modern accomplishments in algebra, geometry, and calculus. Prerequisite: MTH 2045.

MTH 4223, 5223. Introduction to Topology. An introduction to topological spaces, homeomorphism, compactness, separations, and connectedness. Prerequisite: MTH 4133.

MTH 4233, 5233. Advanced Calculus I. A rigorous development of calculus of one and of several variables. Topics include sequences, series, continuous and differentiable functions, integration theory, and series of functions. Prerequisites: MTH 2045, 4133.

MTH 4303, 5303. Advanced Calculus II. Continuation of MTH 4233. Prerequisite: MTH 4233.

MTH 4331-3, 5331-3. Independent Study. Independent study in an area of mathematics selected by the student and faculty advisor. Credit will vary from one (1) to three (3) hours. May be repeated. Prerequisite: consent of faculty advisor.

MTH 4373, 5373. Numerical Analysis. An introduction to numerical methods of problem solving to include error analysis, approximate solutions to equations of one variable, interpolation and polynomial approximation, numerical differentiation and integration, numerical solutions of differential equations, linear systems, and approximation of functions. Prerequisites: MTH 2045 and CSC 1104.

MTH 4433, 5433. Probability and Statistics II. The mathematical theory of probability and application of this theory to statistical inference. Topics include multivariable distributions, confidence intervals, tests of statistical hypotheses, linear models, 1-way analysis of variance, and quality control through statistical methods. Prerequisite: MTH 3163.

MTH 4473, 5473. Simulation Theory. See CSC 4213.

MTH 4491-3, 5491-3. Special Topics in Mathematics Education. A broad range of topics in mathematics content that will include, but not be limited to, algebra, geometry, probability, statistics and data representation, and the use of technology. Topics will be addressed to middle school and/or high school teachers. Students will be able to repeat the course for credit when different topics are being presented than when the student previously took the class. A designation of the topics covered will be recorded on the transcript. Prerequisites: Secondary - MTH 1243, MTH 1295, or consent of the instructor. Middle School - MTH 1053, MTH 2483 or departmental consent.

MTH 4563. Math Modeling and Applications for the Middle Grades. This course will serve as the capstone course for students pursuing licensure in Middle School Mathematics and Science. Connections between other mathematics courses in the program will be broadened and explored using appropriate materials through laboratory experiences. The use of technology, including the Internet as an instructional source, as is appropriate for the middle grades will be incorporated to enhance problem solving, communication and reasoning skills. Prerequisite: MTH 3553 or departmental consent.

MTH 4893. (WI) Special Methods/Math. This course emphasizes the strategies of teaching mathematics, the planning for teaching mathematics, and mathematical assessment programs. Topics include developing objectives, creating lessons, building units, designing an assessment plan, and appropriate use of manipulatives and technology. Prerequisite: MTH 3383 or departmental consent.

MTH 4903. (WI) Capstone Course - Mathematics. The course consists a survey of a variety of topics in upper level mathematics, including, but not limited to, courses in the students' undergraduate program. It considers various topics in mathematics history and includes of a student research project under the direction of a member of the department. The project will be consistent with the student's degree track (BS, BS-licensure, or BS-applied mathematics). The student will present the research at a departmental colloquium or an appropriate conference. The student will also take a departmentally designated exit exam. Prerequisites: Departmental consent or completion of at least three of the following: MTH 4133, MTH 3163, MTH 3113, MTH 4123, MTH 4233.

MTH 4961-3, 5961-3. Special Topics in Mathematics. Topics selected from the areas of analysis, algebra, geometry, topology, logic, statistics, or other areas according to student needs and the instructor's specialization. The student's transcript will indicate the specific topic covered. Because course content will vary, students may repeat the course for a maximum of six hours credit. Prerequisite: Departmental consent.

Computer Science

The Department of Mathematics and Computer Science offers programs of study leading to a Bachelor of Science degree in computer science and a minor in computer science. The program is based upon guidelines as specified in the latest report by The Joint Task Force on Computing Curricula of the IEEE Computer Society and The Association for Computing Machinery. The department regularly reviews and adapts the program to ensure that it continues to satisfy these guidelines, but also meets the needs of the students and the organizations of which they will be part. By staying abreast of changes in the industry, the faculty is able to incorporate new technologies and ideas into the program and to provide students with a solid foundation on which they can build during their careers. Throughout the program, the theoretical concepts of computer science as well as the practical issues of implementation are stressed. Emphasis is placed on the "complete" problem-solving process.

The intent of the program is to educate future leaders and innovators in information technology by providing excellent instruction and educational opportunities. The program strives to:

- emphasize a strong background in the fundamentals of computer science in order to foster intellectual maturity in the discipline;
- provide students with a broad and durable technical foundation in an environment of rapid change; and
- prepare students to enter the workforce and for life-long learning in the discipline as well as for advanced studies.

Successful computer science graduates find themselves faced with a variety of career paths. These include application/system programmers, systems analysts, software engineers, database management administrators, and network administrators to name a few. Students receive a solid foundation preparing them for these choices through the computer science core courses. This core consists of courses in programming concepts, data structures, algorithms, software engineering, database management systems, architecture, operating systems, formal languages and programming languages.

A student’s knowledge of the computing discipline is also supplemented with additional elective course work. This can include courses in communication and networking, interfacing and machine control, machine intelligence, visual programming, graphics, electronics, compiler theory, and client/server programming among others. Other requirements for the degree include a number mathematics and science courses as well as the liberal arts core. Additional hours are also required in the areas of written and verbal communication. Collectively, these courses provide a computer science graduate with the necessary foundation to either enter the job market or to pursue an advance degree.

Requirements for a Bachelor of Science Degree in Computer Science

To obtain a Bachelor of Science degree in computer science students must complete at least 124 semester hours of college-level academic work. Students who enter the program adequately prepared can complete degree requirements over the course of eight semesters. Others, however, may require additional time. This is usually the case for students needing preparatory courses or for those taking course loads lighter than that listed here. Consultation with academic advisors assists students in preparing a plan of study that will enable the student to obtain the degree within the confines of the academic requirements as well as their own personal objectives.

In addition to the courses listed below for a Bachelor of Science degree in Computer Science, all students must complete the Liberal Arts Core requirements as specified by the University. Note that the courses specified below for mathematics and science can be counted as meeting the Liberal Arts Core requirements for courses in their respective areas. Students completing the requirements for the Bachelor of Science degree in Computer Science will have earned enough hours to obtain a minor in mathematics and will not be required to complete an additional minor.

Computer Science Core:

CSC	1104	Foundations of Computer Science I	4
CSC	1114	Foundations of Computer Science II	4
CSC	2173	Assembler Language	3
CSC	2203	Data Structures	3
CSC	3223	Algorithm Analysis	3
CSC	3443	Computer Organization	3
CSC	3453	Programming Languages	3
CSC	3193	Operating Systems	3
CSC	3133	Database Theory	3
CSC	3463	Software Engineering	3
CSC	3433	Computational Complexity	3
CSC	3472	Technology and Society	2
CSC	4483	Capstone3	

Computer Science Electives:

Jr/Sr Computer Science Courses 9

Mathematics:

MTH	2283	Discrete Math I	3
MTH	1295	Calculus I	5
MTH	2045	Calculus II	5
MTH	3163	Probability & Statistics*	3

Jr/Sr Mathematics 3

*May substitute MTH 2323 – Statistical Methods

Science:

CHM	1014/1024	University Chemistry I/II	or
PHY	2034/2044	General Physics I/II	or
PHY	2234/2244	University Physics I/II	

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Other:

ENG	3613	Technical Writing	3		
COM	3813	Business and Professional Communication	3		

Listed below is a suggested curriculum for obtaining the Bachelor of Science degree in Computer Science. Of particular importance in the listing is the sequence of computer science and mathematics courses. Students deviating from the suggested listing should be aware of course prerequisites and that all courses are not conducted each semester. Consultation with an academic advisor in computer science is strongly recommended prior to making changes to the suggested course sequence.

Freshman Year (First Semester)

CSC	1104	Foundations of Computer Science I	4		
CSC	1104L	Foundations of Computer Science I Lab	0		
ENG	1463	Freshman English A	3		
GEN	1031	Henderson Seminar	1		
		Physical Education	1	Social Science	3
		Elective	3		
		Total Hours	15		

Freshman Year (Second Semester)

CSC	1114	Foundations of Computer Science II	4		
CSC	1114L	Foundations of Computer Science II Lab	0		
ENG	1473	Freshman English B	3		
COM	2013	Oral Communications	3		
		Social Science	3		
		Elective	3		
		Total Hours	16		

Sophomore Year (First Semester)

CSC	2173	Assembler Language	3		
CSC	2203	Data Structures	3		
MTH	1261	Introduction to Mathematical Computing	1		
MTH	1295	Calculus I	5		
		Literature	3	Total Hours	15

Sophomore Year (Second Semester)

CSC	3223	Algorithm Analysis	3		
CSC	3443	Computer Organization	3		
MTH	2045	Calculus II	5		
		Humanities	3		
		Social Science	3	Total Hours	17

Junior Year (First Semester)

CSC	3193	Operating Systems	3		
CSC	3463	Software Engineering	3		
MTH	2283	Discrete Mathematics I	3		
ENG	3613	Technical Writing	3	Biological or Life Science	4
				Total Hours	16

Junior Year (Second Semester)

CSC	3133	Database Theory	3		
CSC	3453	Programming Languages	3		
CSC		Jr/Sr Computer Science	3		
MTH	2323	Statistical Methods	3		
		Elective	3	Total Hours	15

Senior Year (First Semester)

CSC	3433	Computational Complexity	3		
CSC		Jr/Sr Computer Science	3		
MTH		Jr/Sr Mathematics	3		
COM	3813	Business and Prof. Comm.	3		

Science Sequence I	4
Total Hours	16

Senior Year (Second Semester)

CSC	3472	Technology and Society	2
CSC	4483	Capstone3	
CSC		Jr/Sr Computer Science	3
		Non-Western Cultures	3
		Science Sequence II	4
		Total Hours	15

Overall Total Hours 125

Requirements for a Minor in Computer Science

In addition to the Bachelor of Science in Computer Science degree, the Department also offers a minor in computer science. The minor is structured to provide the student with a basic foundation of computer programming and supplies exposure to more advanced computing concepts through elective courses. Students seeking a minor in computer science are encouraged to consult with the academic advisors in the Department to customize the program to satisfy their needs.

Computer Science Core:

CSC	1104	Foundations of Computer Science I	4
CSC	1114	Foundations of Computer Science II	4
CSC	2203	Data Structures	3

Computer Science Electives:

Jr/Sr Computer Science	6
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Mathematics:

MTH	2283	Discrete Math I	3
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Courses in Computer Science

CSC 1104. Foundations of Computer Science I. A study of programming, concepts and techniques. Topics included are: binary representation of numbers and characters, data types of constants and variables, arithmetic expressions and the hierarchy of arithmetic operations, assignment statements, logical expressions, branching, loops, arrays, sub-programs, input/output, linear and binary searches, and basic sorts. Programming style is introduced through pseudocode. Meets for three-hours lecture and two-hours laboratory each week. Prerequisite: MTH 0013 – Intermediate Algebra, with a grade of C or better; or required math test score. An ACT math score of 21 or above is recommended.

CSC 1114. Foundations of Computer Science II. A continuation of Foundations of Computer Science I. Good programming style is stressed. Topics included are: documentation of programs, step-wise refinement, structuring programs, top-down design of programs, internal sorts, and linear data structures. Meets for three-hours lecture and two-hours laboratory each week. Prerequisite: CSC 1104 – Foundations of Computer Science I.

CSC 2003. Introduction to Computers. A computer literacy course introducing the novice to the use of the computer. Topics included are: problems having practical computer solutions, available software, computer terminology. Examples from business, education, political science and the social sciences are included. This does not count toward a computer science major or minor.

CSC 2163. Computer Applications. A theoretical and practical study of current computer application software. Applications covered will vary by semester. May be repeated with change in content. This does not count toward a computer science major or minor.

CSC 2173. Assembler Language. A study of the basic concepts of computer systems and an introduction to an assembler language. Topics included are: computer structure and machine language, assembler language, addressing techniques, macros, and I/O routines. Prerequisite: CSC 1104 – Foundations of Computer Science I.

CSC 2203. Data Structures. The objective of this course is to apply analysis and design techniques to non-numeric algorithms that act on data structures. Topics will include linked lists, queues, stacks, trees, AVL trees, and string handling algorithms. Prerequisite: CSC 1114 – Foundations of Computer Science II.

CSC 3133/CSC 5133. Introduction to Database Theory. An introduction to database management systems. Topics covered include: structures, indexing, E-R model, relational model, relational algebra and calculus, query languages, SQL, constraints and normalizations, transaction management, integrity and security issues. Prerequisite: CSC 2203 – Data Structures.

CSC 3144. Digital Electronics. Topics covered include binary and hex arithmetic, boolean algebra, logic gates, transistors and diodes, logic families, flip-flops, counters, power supplies, comparators, A-D, D-A converters, digital instruments. Meets for three lecture periods and a two-hour laboratory period each week. Prerequisite: PHY 2234 – University Physics I and PHY 2244 – University Physics II.

CSC 3153/CSC 5153. Introduction to Compiler Theory. An introduction to the formal study of languages and compiler construction: Topics included are: programming language basics, finite automata and lexical analysis, grammars, top-down and bottom-up parsers, syntax-directed translation, code generation, and code optimization. Prerequisite: CSC 2173 – Assembler Language and CSC 3433 – Computational Complexity.

CSC 3193/CSC 5193. Operating Systems. A study of the principles of operating systems and the interrelationships between operating systems and computer architecture. Topics included are: system structure, memory management, process management, and recovery procedures. Prerequisite: CSC 3443 – Computer Organization.

CSC 3223. Algorithm Analysis. An introduction to the analysis and design of algorithms, and to techniques for measuring their complexity. Prerequisites: CSC 2203 – Data Structures and MTH 1295 – Calculus I or consent of Department.

CSC 3433 – Computational Complexity. A study of basic theoretical computer science concepts. Topics will include formal language theory and results, non-determinism, grammars, Turing machines, halting problem, and undecidability among others. Prerequisite: CSC 3223 – Algorithm Analysis.

CSC 3443 – Computer Organization. An introductory course in computer organization and architecture. Topics included are: machine level representation of data, memory system organization and architecture, I/O fundamentals, buses, pipelining, multiprocessing, and system performance enhancements. Prerequisite: CSC 2173 – Assembler Language.

CSC 3453 – Programming Languages. Comparison of the organization and structure of procedural, object-oriented, functional, declarative, and scripting languages. Additional topics will include language translation, abstraction mechanisms, language design and semantics. Prerequisite: CSC 2203 – Data Structures.

CSC 3463 – Software Engineering. A study of the methods used in the design, development, implementation, testing and maintenance of software systems. Students will utilize the team approach in the development and management of software projects and will make use of modern tools to achieve these tasks. Prerequisite: CSC 3223 – Algorithm Analysis.

CSC 3472 – Technology and Society. A course that allows the student to explore and develop an understanding of the social and professional context in which computing is done. Topics included are: computing history, professional responsibilities, risks and liabilities, intellectual property, privacy, computer crime, and economic issues. Prerequisite: CSC 3463 – Software Engineering.

CSC 4184/CSC 5184 – Interfacing and Machine Control. A study of hardware interfacing components and techniques. Topics covered include: embedded controllers, communication controllers, PCBs, embedded logic, debugging strategies, interrupts, multitasking, and networking. Prerequisite: CSC 3443 – Computer Organization.

CSC 4213/CSC 5213. Simulation Theory. A study of the fundamental principles involved in the construction of computer simulation models. Topics included are: random number generators, model construction, queuing models, and inventory models. Prerequisite: MTH 2323 – Statistical Methods or MTH 3163 – Probability & Statistics, and CSC 1114 – Foundations of Computer Science II or consent of department.

CSC 4263/CSC 5263. Client/Server Programming. A study of the principles governing client/server programming. Topics included are: client/server model, concurrency, protocols and interfaces, issues in software design, connectionless vs. connection-oriented servers, iterative vs. concurrent servers, RPCs, and selected case studies. Prerequisite: CSC 2203 – Data Structures.

CSC 4273/CSC 5273. Introduction to Data Communication. A study of the fundamental principles involved in data communication and a general overview of various data communication systems. Topics included are baud rates, modem controls, protocols, error detection and correction, communication line characteristics, synchronous and asynchronous communication, application interface software, network systems, analysis of communication systems. Prerequisite: CSC 3443 – Computer Organization.

CSC 4283/CSC 5283. Introduction to Networking. A study of Local Area Network Standards and an implementation of a LAN. Topics covered are: LAN topologies, transmission media, access methods, OSI layer implementations, NOS installation, management, print servers, network management software. Prerequisites: CSC 3443 – Computer Organization or consent of Department.

CSC 4293/CSC 5293. Numerical Analysis. An introduction to numerical methods of problem solving to include error analysis, interpolation procedures, differentiation, integration, solutions of non-linear and differential equations, and approximation of functions. Prerequisites: MTH 2045 – Calculus II and CSC 1104 – Foundations of Computer Science I.

CSC 4331-3. Independent Study. Independent study in an area of computer science selected by the student and faculty advisor. Credit will vary from one to three hours. May be repeated. Prerequisite: consent of Department.

CSC 4421-3/CSC 5421-3. Special Topics in Computer Science. Variable content course covering current and advanced topics in computer science. May be repeated with change in content. Prerequisite: consent of Department.

CSC 4483 – Computer Science Capstone. A project course requiring the computer science student to develop and implement a capstone project requiring the integration of software, hardware components, and human factors. Software engineering methodologies along with good written and verbal communications skills will be required. Program assessment tools will be administered. Prerequisites: CSC 3463 – Software Engineering, CSC 3113 – Database Theory, and CSC 3193 – Operating Systems.

CSC 4493 – Artificial Intelligence. An introduction to machine intelligence. Topics covered include: AI languages, problem solving strategies, searching, knowledge representations, natural language processing, machine learning, expert systems, neural networks, and robotics. Prerequisite: CSC 3223 – Algorithm Analysis.

CSC 4503 – Computer Graphics. A course that provides an introduction to basic 3D computer graphics programming techniques. Topics included are: OpenGL library, user interface design, projection and transformations, basic animation, etc. Prerequisite: CSC 3223 – Algorithm Analysis.

CSC 4513 – Visual Programming. An introduction to visual programming. Topics covered include: interface design, object oriented concepts, Internet programming, data reporting, error handling, help file creation, linkages, etc. Prerequisite: CSC 3223 – Algorithm Analysis.