

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE COURSE DESCRIPTIONS

Computer Science (CSCI)

CSCI 191, 192. Freshman Seminar I and II.

Weekly sessions designed to introduce freshman Computer Science students to the world of computer technology, including career options, curricula options, departmental requirements, college requirements, study habits, test-taking strategies, library searches and critical thinking skills. Discussion and study groups will be formed among students and faculty. Final grades will be based on attendance and completion of assignments. One hour per week. One-half hour per course.

CSCI 215. Basic Algorithmic Design.

Co-requisite: MATH 201. Problem-solving, algorithmic design and computer programs. Windows and UNIX operating systems will be used. Two lecture hours and two lab hours per week. Four hours.

CSCI 220. Introduction to Object-Oriented Design and Analysis.

Prerequisite: A grade of "C" or better in CSCI 215 or its equivalent.
Co-requisite: CSCI 240. Introduction to object-oriented concepts and techniques; multiple inheritance; memory management; operator overloading; polymorphism; performance issues. Three hours.

CSCI 225. Introduction to Digital Logic Design.

Co-requisites: MATH 207. Emphasis on digital computer hardware and software, fundamentals of boolean algebra, switching and switching functions, applications to logic design, minimization of boolean function, logic design with arrays, finite state model for sequential state minimization. Three hours.

CSCI 226. Introduction to Programming Using C Language.

Prerequisite: A grade of "C" or better in MATH 111 or its equivalent.
An introduction to the syntax, semantics and application of C programming language. Covers topics in declaration, variables, input, output, loops, functions, recursion, arrays, strings, pointers, programming style and documentation. Three hours.

CSCI 227. Introduction to Programming Using C++ Language.

Prerequisite: A grade of "C" or better in CSCI 220 or its equivalent.
Program design and implementation in the C++ programming language. Programming using object-oriented concepts including objects, class structure and behavior, inheritance and reuse, polymor-

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phism, dynamic binding and object identity. The UNIX operating system is used. Three hours.

CSCI 230. Business Application Software.

Prerequisite: A grade of "C" or better in CSCI 200 or its equivalent.
Hands-on application of database management software and spreadsheet software for solution of business problems. Emphasis in the course will be on the development of skill in the use of advanced program features of microcomputer software packages using spreadsheet macros and a database programming language. A project will be required. Three hours.

CSCI 242. Introduction to Data Structures and Algorithm.

Prerequisite: A grade of “C” or better in CSCI 227 or its equivalent.
Design and analysis of algorithms with an emphasis on data structures. Classical algorithm design techniques, including one/two-dimensional arrays, stack, queues, linked-lists, trees, graphs, etc., different sorting and searching techniques. Concepts on algorithm complexity. Three hours.

CSCI 245. Introduction to COBOL Programming Language.

Prerequisite: A grade of “C” or better in CSCI 215 or its equivalent.
An introduction to data processing using COBOL programming language and business-related applications. Structured programming and proper programming style are emphasized. Three hours.

CSCI 325. Computer Organization and Assembly Language Programming.

Prerequisite: A grade of “C” or better in CSCI 227 or its equivalent.
Memory organization, input-output organization. Digital logic circuits, digital components, data representation, register transfer and micro operations. Basic computer organization, design, and development of the basic computer. Central processing unit, hard-wired control, and micro-program control, memory organization, input/output organization. Three hours.

CSCI 335. Numerical Methods.

Prerequisites: A grade of “C” or better in CSCI 227, MATH 202 and MATH 212. Errors and their propagation in numerical computation; concepts of convergence and stability of an algorithm. Solution of non-linear equations – iterative methods, acceleration of convergence, Newton’s method of polynomials, quotient difference of linear questions, computation of inverse and eigen values of a matrix. Solution of ordinary differential equations. Three hours.

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CSCI 340. Operating Systems.

Prerequisite: A grade of “C” or better in CSCI 346 or its equivalent.
Basic concepts and terminology of operating systems: interrupt programming, machine structure, memory management and virtual memory resource management. Three hours.

CSCI 341. Data Communications and Networking.

Prerequisite: A grade of “C” or better in CSCI 225 and CSCI 227 or their equivalents. OSI Communication model, data communications, protocol and protocol architecture, data transmission, transmission media, data, data communication interface, data link control, multiplexing. Three hours.

CSCI 346. Introduction to Computer Architecture.

Prerequisite: A grade of “C” or better in CSCI 325 or its equivalent.
Architectural classification (Von Neuman architecture, parallel architecture, etc.), various terminologies, parallelism in uniprocessor system, memory interleaving. Pipelining and vector processing, multiprocessor architectures. Three hours.

CSCI 391, 392, 491, 492. Junior/Senior Seminars.

Prerequisite: Acceptance as departmental major as prescribed by the program requirements in the beginning of the section. This seminar is designed to help prepare students for the successful completion of

their senior thesis project and for transition into graduate/professional school or workplace within their major discipline. Lectures and exercises in areas such as technical writing will be conducted. Students will present a minimum of two briefings; each student will make a brief presentation of his/her thesis proposal during CSCI 391 and a final thesis presentation during CSCI 491. The seminar will also serve as a student-faculty informal forum for communication and exchange of ideas and discussion of topics in the areas of mathematics and computer science. Occasional presentations by invited guests. One hour per week. One hour per course.

CSCI 401. Senior Design Project.

Prerequisite: Completion of all required CSCI courses. Students work in teams to conceive, specify, design, implement, test and document a major project of current relevance. Students make oral and written reports throughout the semester in addition to a final report and demonstration of the finished project. The course should be taken during the semester in which graduation is projected. Three hours.

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CSCI 402. Introduction to Internet Technologies.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. An introductory course in developing applications for the Internet and the WWW. Website development, client-server paradigm, scripting languages, e-commerce, and Internet security. Syntax and semantics of a string manipulation languages. Discussion of string processing languages such as PERL, VBScript, JavaScript, and ASP.

CSCI 403. Introduction to Java Language.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. Program design and implementation in the Java programming language. Programming using object-oriented concepts including objects, class structure and behavior, inheritance and reuse, polymorphism, dynamic binding and object identity. The Windows operating system and the Microsoft Visual Studio will be used. A major project is required. Three hours.

CSCI 404. Introduction to Artificial Intelligence.

Prerequisite: A grade of "C" or better in CSCI 227 and MATH 207 or their equivalent. Overview and definitions of Artificial Intelligence (AI). Search, including depth-first and breadth-first techniques with backtracking. Knowledge representation with emphasis on logical methods, Horn databases, resolution, quantification, unification, skolemization and control issues; non-monotonic reasoning; frames; semantic nets. AI systems, including planning, learning, natural language and expert systems. An AI programming language may be taught at the instructor's discretion. Three hours.

CSCI 405. Introduction to Computer Security.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. Basic concepts in information security and management such as risks and vulnerabilities, encryption practices, program security, operating system security, trusted operating system design, database security, distributed system security, security administration, and legal issues. Coverage of high-level concepts such as confidentiality, integrity, and availability applied to hardware, software, and data. Case

studies of actual program threats and secure operating systems followed up with secure programming practices. Textbook augmented by readings and class discussions of current events. Three hours.

CSCI 406. Introduction to Graphical Application Development in a Visual Environment.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. Programming in Windows 95/NT using the Visual Studio (C++/J++/Basic) and tools. The focus is on using the Microsoft Foundation - 335 -

Classes (MFC) to develop graphical user interfaces, understanding the Win32 API, and modern operating systems concepts. Three hours.

CSCI 415. Introduction to Database System Design & Analysis.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. Database systems. File structures for database search, including indexing and hashing. The relational data model and the SQL language. Conceptual database design and normalization. Overview of other data models. Three hours.

CSCI 425. Introduction to Theoretical Concepts in Computer Science.

Prerequisite: A grade of "C" or better in MATH 207 or its equivalent. Selected theoretical concepts including automata and formal languages, computability, reducibility, and complexity using Turing Machines and Automaton. Three hours.

CSCI 436. Computer Network Design and Analysis.

Prerequisite: A grade of "C" or better in CSCI 227 and CSCI 225 or their equivalent. Design and analysis of computer networks. Emphasis on the OSI architecture but discusses other schemes (e.g., ARPAnet). Data link control, local networks, protocols/architectures, network access protocols, internetworking and ISDN. Three hours.

CSCI 437. Fundamentals of Software Engineering.

Prerequisites: CSCI 242 and CSCI 325. Software engineering principles, process and techniques; software development approaches focusing on functional analysis and functional design methods. Configuration management, implementation strategies and testing. Three hours.

CSCI 438. Multimedia Systems Design.

Prerequisite: Senior standing. A hands-on approach to the study of principles underlying multimedia systems. Topics include multimedia systems design, multimedia hardware and software, issues in effective representation, processing and communication of multimedia data such as text, graphics, audio, images and video. Three hours.

CSCI 445. Computer Systems.

(Prerequisite: A grade of "C" or better in CSCI 225 and CSCI 325) Design of microcomputer based systems, microcomputer programming, component and system architectures, memory interfacing, parallel and serial I/O interfacing, A/D and D/A conversion, and typical applications. Three hours.

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CSCI 455. Special Topics.

Prerequisite: Consent of instructor. Departmental approval required in advance to use for degree credit. New developments in the field of

computer science and engineering. Topic may vary from semester to semester. May be repeated for credit when topic changes. Three hours.

Pre-Engineering (ENGR)

ENGR 101. Engineering Graphics.

Prerequisite: A grade of “C” or better in MATH 112 or its equivalent. An introductory course in engineering graphics, which includes beginning drawing techniques, lettering and dimensioning, multi-view drawings, sectional and auxiliary views and principles and practices of graphing representations using modern computer-aided design tools. One hour of lecture and two hours of laboratory per week. Three hours.

ENGR 102. Introduction to Engineering.

Prerequisite: A grade of “C” or better in MATH 112. Students are introduced to the engineering profession and engineering disciplines. Professional ethics, computers in engineering practice, word processing, spreadsheet, mathcad and technical communication. Problems from different disciplines of engineering, analytical and problemsolving techniques, such as estimation and approximation, solution by graphing and computation methods. Three hours.

ENGR 215. Statics.

Prerequisites: A grade of “C” or better in MATH 201 and PHYS 203. For all engineering majors. Introduction to principles of mechanics, equilibrium of particles and rigid bodies in two and three dimensions, components, resultants and moments. Distributed forces, centroids, friction and virtual work. Analysis with vector methods. Three hours.

ENGR 218. Dynamics.

Prerequisite: A grade of “C” or better in ENGR 215. For Civil and Mechanical Engineering majors. Kinematics of particles and rigid bodies, with emphasis on Newton’s laws: work, energy, momentum and impulse methods for the solution of problems. Three hours.

ENGR 310. Engineering Computing.

See CSCI 226 or CSCI 227.

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ENGR 321, Systems and Signals.

(Prerequisite: A grade of “C” or better in ENGR 230 and MATH 302) Introduction to signal processing and linear systems. Concepts of signal and system analysis in time and frequency domains as applied to electric circuits. Laplace transform, Fourier series, and Fourier techniques are stressed. Three hours.

ENGR 322, Digital Signal Processing.

(Prerequisite: A grade of “C” or better in ENGR 321). An introduction to digital signal processing. Signal processing of discrete-time systems. Sampling, z-transform, discrete and fast Fourier transforms, flow graphs, design techniques for digital filters, effects of finite word length, and applications. Three hours.

Engineering Technology (ENGT)

ENGT 150. Engineering Graphics.

Prerequisite: A grade of “C” or better in MATH 112 or its equivalent. An introductory course in engineering graphics, which includes beginning

drawing techniques, lettering and dimensioning, multi-view drawings, sectional and auxiliary views, principles and practices of graphing representations using modern computer- aided design tools. One hour of lecture and two hours of laboratory per week. Three hours.

ENGT 170. Introduction to Engineering Technology.

Prerequisite: A grade of “C” or better in MATH 112. Students are introduced to the role that engineering and technology play in society. Professional ethics, computers in engineering practice and various tools used for solving technical problems. Problems drawn from different disciplines of engineering technology, analytical and problem-solving techniques, such as estimation and approximation, solution by graphing and computation methods. Three hours.

ENGT 212. Statics.

Prerequisites: A grade of “C” or better in MATH 201 and PHYS 203. For all engineering majors. Introduction to principles of mechanics, equilibrium of particles and rigid bodies in two and three dimensions, components, resultants and moments. Distributed forces, centroids, friction and virtual work. Analysis with vector methods. Three hours.

ENGT 213. Strength of Materials.

Prerequisite: A grade of “C” or better in ENGR 212. Concepts of stress and strain. Axial loading, torsions, bending and shear. Stress - 338 -

transformations. Bending moments, beam deflection, Mohr’s cycle and columns. Three hours.

ENGT 230. Circuit Analysis.

Prerequisite: A grade of “C” or better in MATH 201. Basic DC electricity: voltage, current, resistance and Ohm’s Law; series, parallel and composite circuits. Analysis using Kirchoff’s Laws and basic current theorems; analysis of DC circuits. Introduction to AC. Three hours.

ENGT 310. Engineering Computing.

See CSCI 226 or CSCI 227.

Honors Thesis (HNTH)

HNTH 391. Honors Junior Seminar I.

Prerequisites: Junior status, Honors College membership, and acceptance as departmental major as prescribed by the program requirements in the beginning of this section. A two-semester sequence designed to initiate the thesis process required for graduation from the Honors College. The first semester concerns an introduction to research, technical writing, and problem solving. Students will collect and review scientific literature related to an area of interest and select a thesis topic in addition to meeting other course requirements described above. One hour.

HNTH 392. Honors Junior Seminar II.

Prerequisites: A grade of “C” or better in HNTH 391. During the second semester. Students will write a research prospectus outlining the goals and methodology for their thesis projects. The student must take the initiative in seeking a mentor to help in the design and supervision of the project. The deadline for submission of the prospectus

to the Department will fall on October 15 (for December graduation) or March 15 (for May graduation). Final grades will be based upon attendance and acceptance of the prospectus by the Department. One hour.

HNTH 491. Honors Thesis Seminar III.

Prerequisites: Senior status and a grade of “C” or better in HNTH 392. This seminar centers on a year-long writing project to be completed during the senior year under the supervision of a mentor from the appropriate department. Lectures and exercises in areas of mathematics and computer science will be conducted to improve the technical writing. The seminar will also serve as a student-faculty informal forum for communication and exchange of ideas in the areas of mathematics and computer science. Two hours.

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Mathematics (MATH)

MATH 112. Pre-Calculus.

Prerequisite: A grade of “C” or better in MATH 111 or its equivalent. Angles and measurements, trigonometric functions and their graphs, period, amplitude and phase shift, inverse trig functions, right triangle trigonometry, trigonometric identities and equations, the laws of sine and cosine. Vectors, partial fractions, systems of equations in two or three variables, solving linear systems using matrices, Cramer’s Rule. Five contact hours. Four hours.

MATH 191, 192. Freshman Seminars.

Weekly sessions designed to introduce freshman Math students to the current trends in the area of mathematics and mathematical research, including career options, curricula options, departmental requirements, college requirements, study habits, test-taking strategies, library searches and critical thinking skills. Discussion and study groups will be formed among students and faculty. Final grades will be based on attendance and completion of assignments. One hour per week. One-half hour per course.

MATH 200. Integrated Mathematics.

Prerequisite: A grade of “C” or better in MATH 111 or its equivalent. This course features concepts from number and operations, algebra, geometry, measurement, and data analysis. Test-taking strategies will be infused into the assessment of the application of the concepts. Students will apply the usefulness of the concepts to physical science, aerospace technology, biological science and other disciplines. Reasoning and proof, communication, representation, connections, and problem solving skills will be enhanced as the students explore, discuss and write about different concepts using graphing calculators, MS Excel, Maple and manipulatives. This course is recommended for prospective education majors before taking Praxis I. Three hours.

MATH 201. Calculus I.

Prerequisite: A grade of “C” or better in MATH 112 or its equivalent. Piece-wise functions, limits and continuity, intermediate value theorem, derivatives using limit definition. Power Rule, sum and difference rule, scalar multiple rule, derivatives of polynomials, exponential functions, product and quotient rule, Chain rule, derivatives of

logarithmic functions and trigonometric functions, higher-order derivatives, implicit differentiation, related rates, Newton's method, curve sketching, maximum and minimum problems. Four hours.

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MATH 202. Calculus II.

Prerequisite: A grade of "C" or better in MATH 201 or its equivalent. Indefinite integrals, the definite integral as area and as the limit of a sum, numerical integration, trapezoidal and Simpson's rule, Fundamental theorem of calculus, indefinite integrals of trigonometric functions, methods of integration, substitution, trigonometric substitution, integration by parts, convergence and divergence of improper integrals. Four hours.

MATH 203. College Geometry.

Prerequisite: A grade of "C" or better in MATH 201 or its equivalent. Basic concepts of Euclidean and non-Euclidean geometries are studied. Perspectives on synthetics, coordinates, transformation and vectors. This course examines visual thinking, inductive reasoning along with geometric constructions, analysis of geometric figures, informal deduction, formal deduction, simple algebraic and paragraph proofs, properties and applications of right-triangle trigonometry, tessellations, and fractals. Three hours.

MATH 205. Introduction to Discrete Mathematics.

Prerequisite: A grade of "C" or better in MATH 111 or its equivalent. Truth tables, logical equivalence, necessary and sufficient conditions, valid and invalid arguments, binary and decimal representation of numbers, universal and existential quantifiers, direct proof and counter example, elementary number theory, mathematical induction, basic set theory, probability, permutations and combinations, one-to-one and inverse functions. Three hours.

MATH 207. Applied Discrete Mathematics for Computer Scientists.

Prerequisite: A grade of "C" or better in MATH 111 or its equivalent. Propositional logic and the predicate calculus. Logic gates and circuits. Methods of proof. Elementary set theory. Mathematical induction. Recursive definitions and algorithms. Solving recurrences. The analysis of algorithms and asymptotic growth of functions. Elementary combinatorics. Introduction to graph theory. Ordered sets, including posets and equivalence relations. Introduction to formal languages and automata. Three hours.

MATH 212. Linear Algebra.

Prerequisite: Prerequisite: A grade of "C" or better in MATH 201 or its equivalent. Systems of linear equations. Gaussuian elimination, inverses of matrices and elementary matrices. Properties of determinants, cofactor expansion, Cramer's Rule, applications, vectors in two and three spaces, general vector spaces, subspaces, span, null space dimension, rank of matrix, matrices as linear transformations,

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orthogonal bases and Gram-Schmidt Process, Eigen values and Eigen vectors. Three hours.

MATH 301. Calculus III.

Prerequisite: A grade of "C" or better in MATH 202 or its equivalent.

Sequences and series. Vectors in three dimensions, dot product and cross product, limits and derivatives of functions of several variables, tangent, normal and binomial vectors, curvature and radius of curvature of curves in three dimensions. Three hours.

MATH 302. Differential Equations.

Prerequisite: A grade of “C” or better in MATH 202 or its equivalent. Initial value problems, separable variables, exact equations, linear first-order equations, modeling with first-order equations, systems of linear and nonlinear equations, boundary values problems, homogenous linear equations with constant coefficients, method of undetermined coefficients, superposition principle, variation of parameters, modeling with higher-order equations. Three hours.

MATH 306. Vector Analysis.

Prerequisite: A grade of “C” or better in MATH 301 or its equivalent. Functions of several variables and their limits and continuity. Partial and directional derivatives and their applications to tangent planes and normal lines. Extrema of functions of several variables. LaGrange multipliers. Multiple integrals with cylindrical and spherical coordinates. Vector fields, Green’s divergence and Stokes theorems are introduced. Three hours.

MATH 310. Applied Algebra and Geometry.

Prerequisite: A grade of “C” or better in MATH 301 or its equivalent. This course employs an interactive, workplace-centered approach to the teaching of algebra and geometry. It emphasizes the use of mathematics in the workplace, covering five occupational areas: agribusiness and agriculture, business and marketing, family and consumer science, health occupations and industrial technology. Interactive discovery occurs through hands-on “math labs.” Students will be able to integrate geometry with ideas from algebra, probability, statistics, discrete mathematics and trigonometry. Technology will serve as a tool in the development of concepts. This course is required for prospective high school mathematics teachers. Three hours.

MATH 336. Linear Programming.

Prerequisite: A grade of “C” or better in MATH 212 or its equivalent. Review of vectors and matrices, linear independence and span of vectors, systems of equations, inverse of a matrix, simplex method, - 342 -

slack variables, feasible solutions and extreme points, the dual of linear problem, transportation problems, critical path and shortest path, convexity and location of extreme in two variables and the nvariable case. Three hours.

MATH 391, 392, 491, 492. Junior/Senior Seminar I, II, III, IV.

Prerequisite: Acceptance as departmental major as prescribed by the program requirements in the beginning of this section. This seminar is designed to help prepare students for the successful completion of their senior thesis project and for transition into graduate/professional school or work place within their major discipline. Lectures and exercises in areas such as technical writing will be conducted. Students will present a minimum of two briefings; each student will present his/her thesis proposal during MATH 391 and make a final thesis presentation during MATH 491. The seminar will also serve as a

student-faculty informal forum for communication and exchange of ideas and discussion of topics in the area of mathematics and computer science. Occasional presentations by invited guests. (A “Z” grade will be awarded for successful completion of MATH 391, MATH 392 and MATH 491, with an overall grade awarded for all four courses at the completion of the senior thesis and MATH 492.) One hour per week. One hour per course.

MATH 401. Modern Algebra.

Prerequisite: A grade of “C” or better in MATH 212 or its equivalent. Sets, composition of mappings, binary operations, matrices, mathematical induction, divisibility, prime factors and greatest common divisor, congruence of integers and congruence classes, groups, subgroups, cyclic groups, isomorphism and homomorphism, permutation groups, normal groups, quotient groups, definition of ring, integral domains and fields. Three hours.

MATH 403. Real Analysis.

Prerequisite: A grade of “C” or better in MATH 301 or its equivalent. Properties of real numbers, supremum and infimum of sets of real numbers, limits of sequences, series, convergence and divergence of series. Tests for convergence of series, comparison test, quotient test, integral test, and alternating series test. Three hours.

MATH 405. Complex Variables.

Prerequisite: A grade of “C” or better in MATH 403 or its equivalent. The algebra of complex numbers, analytic functions, Cauchy-Reimann conditions, geometry of elementary functions, power series and contour integration. Three hours.

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MATH 407. History of Mathematics.

Prerequisite: A grade of “C” or better in MATH 301 or its equivalent. This course emphasizes the intellectual, historical and philosophical nature of mathematics, the development of technology, Mandelbrot’s fractals and methods of applying mathematical principles to fine arts, science, philosophy and other disciplines. Students will recognize the multiculturalism of mathematics from a global perspective. This course is required for prospective high school mathematics teachers. One hour.

MATH 409. Applied Mathematics.

Prerequisite: A grade of “C” or better in MATH 302 and MATH 306. Fourier series and integrals, Fourier transforms and applications, power series solutions of differential equations, Laplace transforms and applications, partial differential equations, Bessel’s Equation and Legendre’s Equations. Three hours.

Physics (PHYS)

PHYS 201. College Physics I.

Prerequisite: A grade of “C” or better in MATH 112 or its equivalent. This is a non-calculus based introductory physics course. It is offered to students in the life sciences and pre-professional health fields whose mathematical preparation has not gone beyond a pre-calculus course. The class work is complemented by laboratory experiments in mechanics, properties of matter and sound. Three one-hour lectures and one two-hour laboratory per week. Four hours.

PHYS 202. College Physics II.

Prerequisite: A grade of “C” or better in PHYS 201 or its equivalent. This is a continuation of PHYS 201. Subject matter includes heat and thermodynamics and electricity and magnetism, optics and modern physics. Three one-hour lectures and one two-hour laboratory per week. Four hours.

PHYS 203. Principles of Physics I.

Prerequisites: Satisfactory completion of or concurrent enrollment in MATH 201. A calculus-based introduction to the principles of physics. This course is required for mathematics, physical sciences/engineering technology majors who enroll in a calculus course. Mathematical formulation of physics problems. Subject matter includes mechanics, sound waves and thermal physics. Three one-hour lectures and one two-hour laboratory per week. Four hours.

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PHYS 204. Principles of Physics II.

Prerequisite: A grade of “C” or better in PHYS 203 or its equivalent. This is a continuation of PHYS 203. Subject matter includes electricity and magnetism and optics and modern physics. Three onehour lectures and one two-hour laboratory per week. Four hours.

PHYS 310. Mechanics.

Prerequisites: A grade of “C” or better in PHYS 204 and MATH 202 or its equivalent. Kinematics and dynamics of motion in one, two and three dimensions, vector analysis, harmonic motion, motion of systems of particles, rigid body motion. Three hours.

PHYS 311. Classical Laboratory.

Prerequisites: A grade of “C” or better in PHYS 202, PHYS 204 and MATH 202 or their equivalent. Experiments in gravitation, optics, electromagnetism, mechanics and heat. Error analysis. One one-hour lecture and four hours of laboratory per week. Three hours.

PHYS 322. Electricity and Magnetism.

Prerequisites: A grade of “C” or better in PHYS 204 and MATH 202 or their equivalent. Electrostatics, current, magnetostatics, properties of electric and magnetic fields, Maxwell’s equations and vector calculus. Three hours.

PHYS 352. Modern Physics.

Prerequisites: A grade of “C” or better in PHYS 202, PHYS 204 and MATH 202 or their equivalent. Special relativity, introductory quantum mechanics, atomic and nuclear physics and the solid state. Three hours of lecture and four hours of laboratory per week. Four hours.

Statistics (STAT)**STAT 311. Elements of Statistical Methods.**

Prerequisite: A grade of “C” or better in MATH 111. Discrete and continuous data, data displays, Ogives and histograms, measures of central tendency, dispersion, linear regression, elementary concepts of probability, permutations, combinations, binomial and normal distributions, basic concepts of hypothesis testing, estimation and confidence intervals, t-tests and chi-square tests. Three hours.

STAT 341. Introduction to Probability and Statistics:**Inference I.**

Prerequisites: A grade of “C” or better in MATH 202 or its equivalent.

Basic probability, conditional probability and independent events,
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random variables, discrete and continuous probability distributions,
mathematical expectation and analysis of variance. Three hours.

**STAT 342. Introduction to Probability and Statistics:
Inference II.**

Prerequisite: A grade of “C” or better in STAT 341 or its equivalent.
Moment generation functions, sufficient statistics, points and intervals
estimation and testing of hypothesis. Three hours.

STAT 394. Probability I.

Prerequisite: A grade of “C” or better in MATH 301 or its equivalent.
Sample spaces, basic axioms of probability, combination probability,
conditional probability and independence, binomial, Poisson and
normal distributions. Three hours.

STAT 401. Data Analysis.

Prerequisite: A grade of “C” or better in STAT341 or its equivalent
displaying and describing distributions, normal distributions, scatter
plots, correlation, multiple comparison, least square regression, sampling
design, analysis of variance, use of computer statistical package.
Three hours.

STAT 421. Applied Statistics and Experimental Design.

Prerequisites: A grade of “C” or better in STAT 342 or its equivalent.
Computer-aided data analysis using comparisons between batches,
analysis of variance and regression. Evaluation of assumptions, data
transformation and reliability of statistical measures (Jackknife, bootstrap).
Fisher-Gosset controversy. Three hours.

STAT 423. Applied Regression and Analysis of Variance.

Prerequisite: A grade of “C” or better in STAT 342 or STAT 421.
Regression analysis, problems in interpreting regression coefficients,
estimation, including two-stage least squares, guided regression,
building linear models, selecting carriers, regression residuals, analysis
of variance, non-parametric regression, factorial designs and response
surface methods. Three hours.

STAT 427. Introduction to Categorical Data Analysis.

Prerequisite: A grade of “C” or better in STAT 421. Introduction to
topics in the analysis of categorical data, indices of association,
loglinear models, ordered response categories, discriminant analysis
and factor analysis of polychotomous observation. Computational
techniques will be emphasized, illustrated primarily by social, behavioral
and biological science examples. Three hours.