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# Mathematics

Mathematics, more than any other human endeavor, relies on deductive reasoning to produce new knowledge from the investigation of natural events, whether they occur in our immediate environment or in the immensity of space. It serves as a universal language which represents, interprets, and integrates all such knowledge. The subject of mathematics is divided into algebra, geometry, analysis, and probability. Some of the concepts of each of these subdivisions are particularly useful in helping to discuss or solve problems in other fields. These concepts are frequently called Applied Mathematics.

**REQUIREMENTS FOR A MATHEMATICS MAJOR** – 38 hours, including the following:

			<i>Hours</i>
MAT	130	Calculus with Analytic Geometry I	4
MAT	140	Calculus with Analytic Geometry II	4
MAT	250	Linear Algebra	3
MAT	255	Calculus with Analytic Geometry III	4
MAT	275	Differential Equations	3
MAT	280	Discrete Mathematics	3
MAT	310W	Probability and Statistics	3
MAT	320	Abstract Algebra	3
MAT	340	Foundations of Geometry	3
MAT	370	Real Analysis	3
S&M	200	Methods of Science and Critical Thinking	2

<i>Plus one of the following courses:</i>			3
CSC	135	Computer Science I	3
CSC	165	Computer Science II	3
<b>TOTAL:</b>			<b>38 hours</b>

### REQUIREMENTS FOR A MATHEMATICS MAJOR WITH TEACHER CERTIFICATION –

- (1) The Mathematics major outlined above.
- (2) Plus Professional Education Course Requirements; the one required laboratory science course for Mathematics majors with teacher certification must be either PHS 110 or any PHY course. (For a list of these courses, please refer to the Education section of the catalog concerning requirements for certification in Secondary Education.)
- (3) To qualify for Student Teaching, a student must have an overall 2.50 GPA and a 2.75 GPA in the Mathematics major outlined above.

**REQUIREMENTS FOR A MAJOR IN ELEMENTARY EDUCATION WITH A MATHEMATICS SPECIALIZATION** – 28 semester hours of coursework. Please refer to the Education section of this catalog for a listing of required courses.

**REQUIREMENTS FOR A MATHEMATICS MINOR** – 20 hours of course work in Mathematics numbered 130 or above with at least 6 hours at the 300 level.

## Mathematics Courses

### **MAT 098R Elementary Algebra** **3 hours**

The first course in a two-semester developmental mathematics sequence. Topics of study include arithmetic, real numbers, order of operations, ratio and proportion, percent, scientific notation, variables, the language of algebra, solving linear equations and inequalities, graphing linear equations, and solving application problems. Mathematical study skills will be studied and applied throughout the course. This course will meet five days a week. (Does not count toward major, minor, general education, or graduation requirements.) Graded pass/fail.

### **MAT 099R Intermediate Algebra** **3 hours**

*Prerequisite: MAT 098R, an ACT Math score of at least 19, or placement by divisionally designated nationally normed placement test. (e.g. COMPASS)*

The second course in a two-semester developmental mathematics sequence, this course builds upon a student's early exposure to algebra in an effort to develop those skills needed in the further study of mathematics, science, or related fields. Topics will include a review of basic algebra, graphs, factoring, polynomials, linear and quadratic equations and inequalities, systems of equations, exponents, roots and radicals, rational expressions, and problem solving. (Students who have already received academic credit

for MAT 121, MAT 130, MAT 260, MAT 262 or other equivalents may not enroll in MAT 099. Does not count toward major, minor, general education or graduation requirements.) Graded pass/fail.

**MAT 121 Precalculus****4 hours**

*Prerequisite: MAT 099R or an ACT Math score of at least 23 or placement by divisionally designated, nationally normed placement test (e.g. COMPASS).*

Study of functions, graphing (with technology), and geometry of Cartesian and polar coordinate plane. Emphasis on function concept as modeling, including polynomial, rational, algebraic, exponential, logarithmic and trigonometric functions. Geometric representations and manipulations as showing richness of marriage of geometric to algebraic. Students who have received academic credit for MAT 130 cannot enroll in MAT 121 for academic credit. (Does not count toward major or minor requirements.)

**MAT 130 Calculus with Analytic Geometry I****4 hours**

*Prerequisite: MAT 121 or by placement (prior knowledge of trigonometry required).*

Study of the limits extended to differentiation and integration of polynomial and trigonometric functions with coordinate geometry interpretations. An introduction to the definite integral. The calculus will be presented in multiple representations: verbal, numerical and symbolic.

**MAT 140 Calculus with Analytic Geometry II****4 hours**

*Prerequisite: MAT 130.*

Extension of differentiation and integration to exponential and logarithmic functions with emphasis on general techniques of integration. The introduction to infinite series and Taylor series. Calculators and computers will be used.

**MAT 161 Finite Math and Statistics for Business****3 hours**

*Prerequisite: MAT 099R, an ACT Math score of at least 23, or placement by divisionally designated, nationally normed placement test (e.g. COMPASS).*

Finite mathematics with business applications. Finite math portion introduces Euler circuits, Hamiltonian circuits, digraphs, linear programming and other mathematical techniques used in solution of optimization problems. Mathematics of finance, including computation of interest rates, amortization of loans, annuities, etc. are also covered. Study of statistical techniques needed in business settings, interpretation of information in graphical formats, and statistical information in graphic form.

**MAT 162 Applied Functions and Calculus for Business****3 hours**

*Prerequisite: MAT 099R, an ACT Math score of at least 23, or placement by divisionally designated, nationally normed placement test (e.g. COMPASS).*

Deals with functions, modeling, and algebra topics with introduction to differential calculus. Topics geared to business applications and problem solving, functions and how they are represented graphically, in tabular forms, in mathematical formulas, and in words. Focus on linear, exponential, and polynomial functions in expressing and solving

business problems, as well as construction of models representing real world business applications. Derivative is introduced and applied in marginal revenue, profit and cost problems, and in optimization.

**MAT 250 Linear Algebra** **3 hours**

*Prerequisite: MAT 140.*

Introductory course in linear and matrix algebra with primary concern for finite real vector spaces. Computer software will be used for various applications.

**MAT 255 Calculus with Analytic Geometry III** **4 hours**

*Prerequisite: MAT 140.*

Discussion of partial differentiation, multiple integrals, line integrals, Green's Theorem, and parametric equations.

**MAT 260 Statistics** **3 hours**

*Prerequisite: MAT 099R, an ACT Math score of at least 23, or placement by divisionally designated, nationally normed placement test (e.g. COMPASS).*

Discussion of fundamental methods of descriptive statistics, statistical inference, and an introduction to non-parametric statistics and to basic probability. (Does not count in any mathematics major.)

**MAT 262 Mathematics for Life and Art** **3 hours**

*Prerequisite: MAT 099R, an ACT Math score of at least 23, or placement by divisionally designated, nationally normed placement test (e.g. COMPASS).*

Exploration of a variety of mathematical topics that mix the concrete and applicable with the aesthetic in order to broaden and deepen the mathematical experience and understanding of the student of the liberal arts and sciences. Topics may include: interest and present value, mathematics of voting, finite probability, statistical significance, game theory, exponential growth models, mathematics of music, fractals, the traveling salesman problem, etc.

**MAT 264 Nature of Mathematics** **3 hours**

*Prerequisite: MAT 099R, an ACT Math score of at least 23, or placement by divisionally designated, nationally normed placement test (e.g. COMPASS).*

Topics may include: Do numbers exist? Are the laws of mathematics arbitrary? Is statistical significance significant? How is research possible in mathematics? How big is infinite? What is a proof? Is illogical knowledge possible? Do androids truly understand their own speech?

**MAT 275 Differential Equations** **3 hours**

*Prerequisite: MAT 140. (Offered in alternate years)*

Discussion of first and second order ordinary differential equations, LaPlace Transforms, eigenvalues of linear systems.

**MAT 280 Discrete Mathematics** **3 hours**

*Prerequisite: MAT 130, with CSC 135 recommended.*

Concepts in discrete mathematics. Sets, logic, mathematical induction, relations, functions and graphs are discussed. Emphasis will be placed on algorithmic processes.

**MAT 310W Probability and Statistics** **3 hours**

*Prerequisite: MAT 255. (Offered in alternate years)*

Study of concepts of probability leading to discussion of the binomial, poisson, and normal distributions, as a foundation for statistical inference.

**MAT 320 Abstract Algebra** **3 hours**

*Prerequisite: MAT 250 or MAT 280. Both courses are recommended. (Offered in alternate years)*

Introduction of the concept of algebraic structures with particular reference to the properties of groups and rings.

**MAT 340W Foundations of Geometry** **3 hours**

*Prerequisite: MAT 140. (Offered in alternate years)*

Systematic treatment of the foundation of Euclidean Geometry with an introduction to several finite and non-Euclidean geometries.

**MAT 370 Real Analysis** **3 hours**

*Prerequisite: MAT 250 or 255. (Offered in alternate years)*

Study of limit processes applied to continuous or differentiable real-valued functions. Careful definitions and rigorous methods of proof are emphasized. Topology is introduced as the proper framework for continuous functions. Advanced calculus techniques are reviewed.

## Music

Courses in music provide opportunities for enrichment through a variety of musical experiences, including classroom study, group and private lessons, and ensemble participation. The major in Music serves as a foundation for further study in graduate school and for careers in performance, composition, and education. The minor, combined with a major in Business Administration or Communication, offers opportunities for careers in arts management, music broadcasting, and music business.

### REQUIREMENTS FOR A MUSIC MAJOR WITH PERFORMANCE

**EMPHASIS** – 35-40 hours consisting of the following:

			<i>Hours</i>
MUS	151	Introduction to Music History	3
MUS	210	Music Theory I	3
MUS	220	Music Theory II	3
MUS	320	Music Theory III	3