GENERAL STUDIES, PHYSICS/PRE-ENGINEERING PATHWAY

Associate of Science

Students completing the associates of science degree in physics/pre-engineering at Dalton State College may transfer to one of the five REPP (Regents Engineering Pathway Program) institutions within the university system of Georgia. These institutions are as follows: Georgia Institute of Technology, Kennesaw State University, Georgia Southern University, Mercer University and the University of Georgia. Each student must complete all required courses as specified by the institution before successfully transferring. REPP students will complete the first two years of the engineering degree at Dalton State College before transferring to one of the REPP institutions to complete the Bachelor of Science Degree in Engineering.

This degree requires proof of computer literacy. REPP (Regent’s Engineering Pathway Program) should follow this program of study. For more information about the REPP program, see /programs/#regentsengineeringtransferprogram.

Area A: Essential Skills

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2253</td>
<td>Calculus and Analytic Geom I</td>
<td>4</td>
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Area B: Institutional Options

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COMM 1110</td>
<td>Fundamentals of Speech</td>
<td>3</td>
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<tr>
<td>One of the following electives:</td>
<td></td>
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<tr>
<td>COMM 1120</td>
<td>Argumentation and Advocacy</td>
<td></td>
</tr>
<tr>
<td>ENGL 1105</td>
<td>Intro to Greek Mythology</td>
<td></td>
</tr>
<tr>
<td>ENGL 1110</td>
<td>Creative Writing</td>
<td></td>
</tr>
<tr>
<td>GEOL 1000</td>
<td>Natural Hazards</td>
<td></td>
</tr>
<tr>
<td>HIST 1050</td>
<td>Appalachian Hist-Special Topic</td>
<td></td>
</tr>
<tr>
<td>HIST 1051</td>
<td>Sports Hist &amp; Amer Character</td>
<td></td>
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<tr>
<td>HLTH 1030</td>
<td>Health and Wellness Concepts</td>
<td></td>
</tr>
<tr>
<td>HUMN 1000</td>
<td>Mystery Fiction in Pop Culture</td>
<td></td>
</tr>
<tr>
<td>HUMN 1100</td>
<td>Political and Social Rhetoric</td>
<td></td>
</tr>
<tr>
<td>HUMN 1300</td>
<td>Christian Fiction/Pop Culture</td>
<td></td>
</tr>
<tr>
<td>SOCI 1000</td>
<td>Race and Ethnicity in America</td>
<td></td>
</tr>
<tr>
<td>PRSP Elective (See advisor)</td>
<td></td>
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Area C: Humanities/Fine Arts

Choose one to two ENGL course(s): 3-6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENGL 2000</td>
<td>Topics in Literature &amp; Culture</td>
<td></td>
</tr>
<tr>
<td>ENGL 2111</td>
<td>World Literature I</td>
<td></td>
</tr>
<tr>
<td>ENGL 2112</td>
<td>World Literature II</td>
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</tr>
<tr>
<td>ENGL 2120</td>
<td>British Literature I</td>
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</tr>
<tr>
<td>ENGL 2121</td>
<td>British Literature II</td>
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</tr>
<tr>
<td>ENGL 2130</td>
<td>American Literature I</td>
<td></td>
</tr>
<tr>
<td>ENGL 2131</td>
<td>American Literature II</td>
<td></td>
</tr>
<tr>
<td>ENGL 2201</td>
<td>Intro to Film as Literature</td>
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If only one ENGL course chosen, add one of the following: 0-3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTS 1100</td>
<td>Art Appreciation</td>
<td></td>
</tr>
<tr>
<td>HUMN 1201</td>
<td>Expressions of Culture I</td>
<td></td>
</tr>
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</table>

Area D: Science/Mathematics/Technology

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CHEM 1211K</td>
<td>Principles of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1212K</td>
<td>Principles of Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2254</td>
<td>Calculus and Analytic Geom II</td>
<td>4</td>
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Area E: Social Sciences

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>HIST 2111</td>
<td>United States History to 1877</td>
<td>3</td>
</tr>
<tr>
<td>or HIST 2112</td>
<td>United States Hist since 1877</td>
<td></td>
</tr>
<tr>
<td>POLS 1101</td>
<td>American Government</td>
<td>3</td>
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Two of the following electives: 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ANTH 1103</td>
<td>Intro to Cultural Anthropology</td>
<td></td>
</tr>
<tr>
<td>ECON 2105</td>
<td>Principles of Macroeconomics</td>
<td></td>
</tr>
<tr>
<td>ECON 2106</td>
<td>Principles of Microeconomics</td>
<td></td>
</tr>
<tr>
<td>GEOL 1100</td>
<td>Introduction to Geography</td>
<td></td>
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<tr>
<td>GEOL 1101</td>
<td>Intro to Human Geography</td>
<td></td>
</tr>
<tr>
<td>GEOL 1111</td>
<td>Intro to Physical Geography</td>
<td></td>
</tr>
<tr>
<td>HIST 1111</td>
<td>World Civilization to 1500 CE</td>
<td></td>
</tr>
<tr>
<td>HIST 1112</td>
<td>World Civilization since 1500</td>
<td></td>
</tr>
<tr>
<td>HIST 2111</td>
<td>United States History to 1877</td>
<td></td>
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<tr>
<td>PHIL 1103</td>
<td>Intro to World Religions</td>
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<tr>
<td>PHIL 2010</td>
<td>Intro to Philosophical Issues</td>
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<tr>
<td>PHIL 2020</td>
<td>Logic and Critical Thinking</td>
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<tr>
<td>POLS 2101</td>
<td>Intro to Political Science</td>
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<tr>
<td>POLS 2201</td>
<td>State and Local Government</td>
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<tr>
<td>POLS 2301</td>
<td>Comparative Politics</td>
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<tr>
<td>POLS 2401</td>
<td>International Relations</td>
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<tr>
<td>PSYC 1101</td>
<td>Introduction to Psychology</td>
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<tr>
<td>PSYC 2101</td>
<td>Psychology of Adjustment</td>
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<tr>
<td>PSYC 2103</td>
<td>Human Development</td>
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<tr>
<td>SOCI 1101</td>
<td>Introduction to Sociology</td>
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<tr>
<td>SOCI 1160</td>
<td>Social Problems</td>
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Area F: Major Related

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 2255</td>
<td>Calculus and Analytic Geom III</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2211K</td>
<td>Principles of Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212K</td>
<td>Principles of Physics II</td>
<td>4</td>
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</table>

Six hours of elective credit: 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ASTR 1010</td>
<td>Astronomy of the Solar System &amp; Astronomy of Solar Sys. Lab</td>
<td>4</td>
</tr>
<tr>
<td>ASTR 1010</td>
<td>Astronomy of the Solar System</td>
<td></td>
</tr>
<tr>
<td>ASTR 1020</td>
<td>Stellar and Galactic Astronomy &amp; Stellar &amp; Galac. Astronomy Lab</td>
<td>4</td>
</tr>
<tr>
<td>ASTR 1020</td>
<td>Stellar and Galactic Astronomy</td>
<td></td>
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<tr>
<td>CMPS 1301</td>
<td>Principles of Programming I</td>
<td></td>
</tr>
<tr>
<td>CMPS 1302</td>
<td>Principles of Programming II</td>
<td></td>
</tr>
<tr>
<td>CMPS 1371</td>
<td>Computing for Scien &amp; Engineer</td>
<td></td>
</tr>
<tr>
<td>ENGR 1105</td>
<td>Introduction to Engineering</td>
<td></td>
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<tr>
<td>ENGR 1108K</td>
<td>Engineering Graphics</td>
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<tr>
<td>ENGR 2205</td>
<td>Statics</td>
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<td>Course Code</td>
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<td>Hours</td>
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<tr>
<td>ENGR 2240</td>
<td>Dynamics</td>
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<tr>
<td>MATH 2256</td>
<td>Introduction to Linear Algebra</td>
<td>3-0-3</td>
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<tr>
<td>MATH 2403</td>
<td>Differential Equations</td>
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<tr>
<td>MATH 2602</td>
<td>Linear &amp; Discrete Mathematics</td>
<td>3-0-3</td>
</tr>
<tr>
<td>MATH 2770</td>
<td>Statistics and Applications</td>
<td>3-0-3</td>
</tr>
</tbody>
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**Computer Science Courses**

**CMPS 1130. Computer Concepts/Programming. 2-2-3 Units.**
Introduces the concepts of computer hardware, operating systems, and programming. Programming topics require creating well designed interfaces and well written code using simple data types, control structures, and loops. Students will gain hands on experience using a modern programming language.(F,S,M)

**CMPS 1300. Principles of Programming I. 3-0-3 Units.**
Introduces the principles of computer programming. Emphasis is on the design and teaching of correct well-structured algorithms using appropriately written code with simple data types and data structures.(F)
Prerequisites: MATH 1111.

**CMPS 1302. Principles of Programming II. 3-0-3 Units.**
This course continues the development of program design using a modern object-oriented language.(S)
Prerequisites: CMPS 1301.

**CMPS 1371. Computing for Scien & Engineer. 3-0-3 Units.**
Introduces skills and concepts which are needed to use the computer in scientific and engineering work. Topics include design and analysis of algorithms, methods and techniques of scientific computation, and the organization of software.(F,S)
Corequisites: MATH 2253.

**CMPS 2313. Intro to Software Engineering. 3-0-3 Units.**
This course will develop students’ ability to apply a systematic, engineering approach to the development of software systems. Software development process will explore software development life cycles, requirements elicitation, architectural design, design decomposition, implementation, and testing. The course teaches students about modern techniques available for performing activities in each of these areas.(S)
Prerequisites: CMPS 1302.

**CMPS 2720. Data Structures. 3-0-3 Units.**
The design, analysis, implementation and evaluation of the fundamental structures for representing and manipulating data. Structures include collections, lists, linked lists, stacks, queues, trees, heaps, tables.(F)
Prerequisites: CMPS 1301.

**CMPS 2900. Special Topics in Comp Science. 0-0-1-3 Unit.**
Variable 1-3 hours. Special topics in computer science are presented, the content varies with the topic. This course may be repeated for credit when topic differs. (Offered As Needed) Prerequisite: Permission of Instructor

**Mathematics Courses**

**MATH 0990. Certif Preparatory Mathematics. 3-0-3 Units.**
Presents the fundamentals of mathematics: addition, subtraction, multiplication, and division of whole numbers, fractions, decimals and percentages. Prospective students will be required to score at or above 35 on the Pre-Algebra COMPASS exam to be exempt from this course. (Institutional Credit)(F,S,M)
Prerequisites: Must be enrolled in a certificate program.

**MATH 0989. Foundations College Algebra. 4-0-4 Units.**
Topics include signed numbers, linear equations and inequalities, graphs of linear equations, laws of exponents, operations on polynomials, factoring polynomials, square roots, quadratic equations, and quadratic functions. Prospective students will be required to score at or above 1165 on the MPI to be exempt from this course. (Institutional Credit)(F,S)

**MATH 0997. Support Quantitative Skill/Rea. 2-0-2 Units.**
This Learning Support course provides corequisite support in mathematics for students enrolled in MATH 1001 – Quantitative Reasoning. Topics will parallel topics being studied in MATH 1001 and the course will provide support for the essential quantitative skills needed to be successful in MATH 1001. Taken with MATH 1001, topics to be covered will include logic, basic probability, data analysis and modeling from data.(F,S)
Corequisites: MATH 1001 Quantitative Reasoning.

**MATH 0998. Support for Math Modeling. 2-0-2 Units.**
This Learning Support course provides corequisite support in mathematics for students enrolled in MATH 1101 – Introduction to Mathematical Modeling. Topics will parallel topics being studied in MATH 1101 and the course will provide support for essential quantitative skills needed to be successful in MATH 1101. Taken with MATH 1101, this course is an introduction to mathematical modeling using graphical, numerical, symbolic, and verbal techniques to describe and explore real-world data and phenomena. Emphasis is on the use of elementary functions to investigate and analyze applied problems and questions, supported by the use of appropriate technology, and on effective communication of quantitative concepts and results.(F,S,M)
Corequisites: MATH 1101 Introduction to Mathematical Modeling.

**MATH 0999. Support for College Algebra. 2-0-2 Units.**
This Learning Support course provides corequisite support in mathematics for students enrolled in MATH 1111 – College Algebra. Topics will parallel topics being studied in MATH 1111 and the course will provide support for the essential quantitative skills needed to be successful in MATH 1111. Taken with MATH 1111, this course provides an in-depth study of the properties of algebraic, exponential and logarithmic functions as needed for calculus. Emphasis is on using algebraic and graphical techniques for solving problems involving linear, quadratic, piece-wise defined, rational, polynomial, exponential and logarithmic functions. (F,S,M) MATH 1111 College Algebra.

**MATH 1001. Quantitative Skills/Reasoning. 3-0-3 Units.**
This course is an alternative in Area A of the Core Curriculum and is not intended to supply sufficient algebraic background for students who intend to take precalculus or the calculus sequences for mathematics and science majors. This course places quantitative skills and reasoning in the context of experiences that students will be likely to encounter. It emphasizes processing information in context from a variety of representations, understanding of both the information and the processing, and understanding which conclusions can be reasonably determined.(F,S)
Prerequisites: Placement into corequisite Learning Support mathematics, unless exempt.
MATH 1101. Intro to Mathematical Modeling. 3-0-3 Units.
This course is not intended to supply sufficient algebraic background
for students who intend to take precalculus or the calculus sequence
for mathematics and science majors. This course is an introduction to
mathematical modeling using graphical, numerical, symbolic, and verbal
techniques to describe and explore real-world data and phenomena.
Emphasis is on the use of linear, polynomial, exponential, and logarithmic
functions to investigate and analyze applied problems and questions,
supported by the use of appropriate technology, and on effective
communication of quantitative concepts and results. (F,S,M)
Prerequisites: Placement into corequisite Learning Support mathematics,
unless exempt.

MATH 1104. Applied Mathematics. 3-0-3 Units.
Topics include arithmetic, elementary algebra, geometry, measurement,
and elementary trigonometry. (Career Course) (F,S,M)
Prerequisites: MATH 0090 unless exempt for learning support
mathematics.

MATH 1111. College Algebra. 3-0-3 Units.
Presents topics in algebra, including the number system, polynomials,
algebraic functions, exponents, radicals, linear and quadratic equations,
inequalities, lines in the plane, linear modeling, conics, algebra of
functions, exponential and logarithmic functions and systems of
equations and inequalities. (F,S,M)
Prerequisites: MATH 0998 and MATH 1101 if not eligible for MATH 0999.
Corequisites: MATH 0999 unless exempt from learning support.

MATH 1113. Precalculus Mathematics. 3-0-3 Units.
Provides immediate transition from high school algebra into calculus
and physics. Material goes beyond that normally covered in Mathematics 1111. Algebra topics include linear, quadratic equations, functions and
graphing, exponential, and logarithmic functions. Trigonometry topics
include trigonometric functions and inverse, law of sines, law of cosines
and identities. For students planning to take calculus and/or physics.
(F,S,M)
Prerequisites: MATH 1111.

MATH 1401. Elementary Statistics. 3-0-3 Units.
This is a non-calculus based introduction to statistics. Course content
includes descriptive statistics, probability theory, confidence intervals,
hypothesis testing, and other selected statistical topics.
Prerequisites: MATH 1001, MATH 1101, or MATH 1111.

MATH 1501. Calculus I. 4-0-4 Units.
This course includes material on functions, limits, continuity, the
derivative, anti-differentiation, the definite integral, and techniques of
integration.
Prerequisites: MATH 1113.

MATH 2008. Found of Numbers & Operations. 3-0-3 Units.
This course will emphasize the understanding and use of the major
concepts of number and operations. Topics include problem-solving
strategies; inductive and deductive reasoning; number systems and
place value; operations and algorithms; identity elements and inverse
operations; rational and irrational numbers; integers and number theory;
special sets of numbers; exponents and decimals; ratios, percent’s, and
proportional reasoning. (F,S)
Prerequisites: MATH 1101, MATH 1111, or MATH 1113.

MATH 2181. Applied Calculus. 3-0-3 Units.
Surveys differential and integral calculus of polynomial, rational,
exponential and logarithmic functions. Detailed applications to problems
and concepts from business, economics, and life science are covered.
(F,S,M)
Prerequisites: MATH 1111, MATH 1101, or MATH 1113 with a grade of C
or better.

MATH 2200. Introduction to Statistics. 3-0-3 Units.
Surveys descriptive and inferential statistics. Topics include organizing
and graphing data, measures of central tendency, dispersion, probability,
normal distribution, sampling, confidence intervals, hypothesis tests,
significance tests, correlation and regression. (F,S,M)
Prerequisites: MATH 1001, MATH 1101, MATH 1111, or MATH 1113.

MATH 2253. Calculus and Analytic Geom I. 4-0-4 Units.
Includes topics limits and continuity, derivatives and their applications
and an introduction to the concept of the integral. The first in a four
course sequence in Calculus. Prerequisite: MATH 1113 or satisfactory
mathematics scores of SAT 600/ACT 26 and one year of high school
trigonometry. (F,S,M)
Prerequisites: MATH 1113.

MATH 2254. Calculus and Analytic Geom II. 4-0-4 Units.
Emphasizes the definite integral and its applications, the calculus of
trigonometric, exponential, logarithmic, hyperbolic and inverse functions,
techniques of integration, improper integrals, L’Hopital’s Rule, infinite
series and conic sections. The second course in the Calculus sequence.
(F,S,M)
Prerequisites: MATH 2253.

MATH 2255. Calculus and Analytic Geom III. 4-0-4 Units.
Emphasizes calculus in three dimensions. Topics include vectors,
parametric equations, partial derivatives, multiple integrals and their
applications and topics in vector calculus. The third course in the
Calculus sequence. (F,S,M)
Prerequisites: MATH 2254.

MATH 2256. Introduction to Linear Algebra. 3-0-3 Units.
Introduces low-dimensional linear algebra through eigenvalues and
eigenvectors. Applications to linear systems, least-square problems, and
the calculus, including elementary differential equations. (F,S,M)
Prerequisites: MATH 2253.
Corequisites: MATH 2254.

MATH 2403. Differential Equations. 3-2-4 Units.
A study of differential equations, including first and higher order
equations, linear and nonlinear systems of equations, numerical methods
to approximate solutions, using Laplace transforms to determine
solutions, and methods that yield infinite series solutions. (F,S,M)
Prerequisites: MATH 2254 and co-requisite: MATH 2256.

MATH 2602. Linear & Discrete Mathematics. 3-2-4 Units.
Explores topics in linear algebra, induction, combinatorics, difference
equations, and multivariate optimization with an emphasis on discrete
and recursive methods. (F,S)
Prerequisites: MATH 2255.

MATH 2770. Statistics and Applications. 3-0-3 Units.
Introduces the student to topics in probability, probability distributions,
point estimation, confidence intervals hypothesis testing, linear
regression and analysis of variance. (F,S,M)
Prerequisites: MATH 2255.
MATH 3050. Biological Statistics. 3-0-3 Units.
Advanced concepts in statistics are introduced. Topics include experimental design, hypothesis testing, t-test, z-test, chi-squared test, regression, ANOVA, and non-parametric methods. (F) Pre-requisite: MATH 2200 or 1401.

MATH 3101. Intro to Advanced Mathematics. 3-0-3 Units.
Preparation in mathematical reasoning and proof-writing necessary for upper division course work in mathematics. Topics include logic, integers and induction, sets and relations, equivalence relations and partitions, and functions. (S) Pre-requisites: MATH 2254.

MATH 3201. Geometry. 3-0-3 Units.
An introduction to Euclidean and non-Euclidean geometries developed with the study of constructions, transformations, applications, and the rigorous proving of theorems. (F) Prerequisites: MATH 3101.

MATH 3301. Combinatorics. 3-0-3 Units.
Basic counting principles: permutations, combinations, probability, occupancy problems, and binomial coefficients. More sophisticated methods include generating functions, recurrence relations, inclusion/exclusion principles, and the pigeonhole principle. Additional topics include asymptotic enumeration, Polya counting theory, combinatorial designs, coding theory, and combinatorial optimization. (Spring Odd Years) Prerequisites: MATH 2256.

MATH 3401. Linear Algebra. 3-0-3 Units.
Theory and applications of matrix algebra, vector spaces, and linear transformations; topics include characteristic values, the spectral theorem, and orthogonality. (Spring Even Years) Prerequisites: MATH 3101.

MATH 3703. Geometry for P-8 Teachers. 3-0-3 Units.
Continues MATH 2008, with emphasis for teachers of grades P-8. Logic; real numbers; basic and transformational geometry; measurement, including the metric system; problem solving; methods and materials for teaching mathematics at the P-8 level. (S,M) Prerequisites: MATH 2256.

MATH 3803. Algebra for P-8 Teachers. 3-0-3 Units.
Provides special emphasis for teachers of grades P-8 on understanding the fundamental concepts of algebra with particular attention to specific methods and materials of instruction. (F,S) Prerequisites: MATH 2256.

MATH 3900. Special Topics in Mathematics. 0-0-1-3 Unit.
Variable 1–3 hours. Advanced concepts in mathematics are presented, the content varies with the topic. Course may be repeated for credit when topic differs. Pre-requisite: MATH 2253 Calculus and Analytic Geometry I and Permission of Instructor. (Offered As Needed).

MATH 4001. History of Mathematics. 3-0-3 Units.
Examines major developments, central themes, and important issues in mathematics throughout history. Undertakes an overview of the historical development of the discipline by focusing on specific theories, problems, and results. (F) Prerequisites: MATH 2254.

MATH 4101. Abstract Algebra I. 3-0-3 Units.
An axiomatic approach to algebraic structures. Topics include groups, permutations, homomorphisms, and factor groups. (F) Prerequisites: MATH 3101.

MATH 4102. Abstract Algebra II. 3-0-3 Units.
Examines the central concepts of ring theory and field theory. Topics include modules, Galois theory, integral domains, and advanced linear algebra. Strongly recommended for students intending to complete a graduate degree in mathematics. (S) Prerequisites: MATH 4101.

MATH 4201. Number Theory. 3-0-3 Units.
A study of elementary problems in number theory with topics from divisibility, congruences, residues, special functions, Diophantine equations, and continued fractions. (S) Prerequisites: MATH 3101.

MATH 4301. Graph Theory. 3-0-3 Units.
Elementary theory of graphs and digraphs. Topics include connectivity, reconstructions, trees, Euler's problem, hamiltonicity, network flows, planarity, node and edge colorings, tournaments, matchings, and extremal graphs. A number of algorithms and applications are included. (F) Prerequisites: MATH 3101.

MATH 4401. Operations Research. 3-0-3 Units.
Linear programming, the simplex method, network theory, game theory, Markov analysis, and other topics such as inventory analysis, queuing theory, integer programming. (S) Prerequisites: MATH 2256.

MATH 4502. Statistics for Process Control. 3-0-3 Units.
Introduces application techniques used in quality/process control with particular application to area industries. Topics include probability, sampling distributions, control charts for variables and attributes, lot-by-lot sampling plans, acceptance sampling for variables, elementary reliability calculations, and an introduction to the concept of quality costs. (Spring Even Years As Needed) Prerequisites: MATH 2181 or MATH 2253 and MATH 1401 or MATH 2200 or MATH 4701 or BUSA 2850.

MATH 4511. Numerical Analysis I. 3-0-3 Units.
Numerical solution of equations, polynomial approximation, numerical differentiation and integration, numerical solutions of ordinary differential equations, error analysis. Written programs using algorithms. (F) Co-requisite: MATH 2403. Prerequisites: CMPS 1301 or CMPS 1371.

MATH 4512. Numerical Analysis II. 3-0-3 Units.
Numerical solutions of systems of linear equations, numerical computations of eigenvalues and eigenvectors, error analysis. Written programs using the algorithms. (S) Prerequisites: MATH 2256 and CMPS 1301 or CMPS 1371.

MATH 4601. Real Analysis I. 3-2-4 Units.
Develops a rigorous approach to functions of a real variable. Topics include limits, continuous functions, differentiation, and Riemann integration. (F) Prerequisites: MATH 2255 and MATH 3101.

MATH 4602. Real Analysis II. 3-0-3 Units.
Continuous and rigorous approach to functions with an emphasis on functions in higher dimensions, including derivatives and integrals in n-dimensional Euclidean space. (S) Prerequisites: MATH 4601.

MATH 4611. Complex Analysis. 3-0-3 Units.
Complex numbers, analytic functions, complex series, Cauchy theory, residue calculus, conformal mapping. (Summer) Prerequisites: MATH 2255.
MATH 4701. Probability and Statistics I. 3-0-3 Units.
Sampling distributions, Normal, t, chi-square and F distributions. Moment generating function methods, Bayesian estimation and introduction to hypothesis testing. (F)
Prerequisites: MATH 2255.

MATH 4702. Probability and Statistics II. 3-0-3 Units.
Hypothesis testing, likelihood ration tests, nonparametric tests, bivariate and multivariate normal distributions. (S)
Prerequisites: MATH 4701.

MATH 4713. Prob & Stat for P-8 Teachers. 3-0-3 Units.
Provides special emphasis for teachers of grades P-8 on the fundamental concepts of probability and statistics with particular attention to specific methods and materials of instruction. (F,S,M)
Prerequisites: MATH 2008.

MATH 4800. Topology. 3-0-3 Units.
This course develops the concepts of open and closed sets, topological spaces, bases, subspaces, continuous functions, homeomorphisms, connected spaces and compact spaces. (F)
Prerequisites: MATH 3101.

MATH 4850. Mathematical Finance. 3-0-3 Units.
Topics include mathematical theory of compound interest, annuities, equations of value, yield rates, amortization, sinking funds, bonds, depreciation, asset/liability management, and other topics in finance. The concepts and models that will be discussed are a key part of modern actuarial science.

MATH 4860. Internship In Mathematics. 0-0-1-4 Unit.
A supervised, credit-earning work experience of one academic semester with a previously approved business firm, private agency or government agency. Repeatable for a maximum of 4 credit hours. (F,S,M).
Prerequisites: Permission of department chair.

MATH 4900. Special Topics in Mathematics. 0-0-1-3 Unit.
Variable 1–3 hours. Advanced concepts in mathematics are presented, the content varies with the topic. The course may be repeated for credit when topic differs. Pre-requisite: MATH 3101 Intro to Advanced Mathematics and 2 additional upper level Mathematics courses excluding MATH 3703, 3803, and 4713. Approval of the Instructor is required before registration. (As Available)

MATH 4960. Research in Mathematics. 0-0-1-3 Unit.
Students will select a research topic, complete a written research proposal, and in association with a faculty mentor, execute the research plan. This course affords interested junior and senior students an opportunity to participate in a basic research experience with a member of the department faculty. The student will prepare both written and oral presentations of the work, and where appropriate, will be encouraged to make presentations at professional meetings or submit work to a journal for publication. (Dept. Chair Approval)(F,S,M as available)
Prerequisites: Permission of the faculty mentor.