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Morgan State 2003-2006

MATHEMATICS

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PHILOSOPHY OF THE DEPARTMENT

Mathematical methods have become indispensable to
the proper functioning of our increasingly technological
society. In view of this, the Department aims to assist
students to develop an appreciation for the power and
orderliness of logical thought, precision of expression,
and the utility of mathematics. By properly selecting a
major and supporting courses, the student can prepare
for careers in a variety of fields including research, business,
government, and teaching. Recognizing the symbiosis
among academic disciplines, the Department
provides courses designed to meet the mathematical
needs prescribed for majors in other departments.

School-wide Requirements: In addition to meeting
the requirements in General Education and in the
major, students must also complete six (6) credits in the
Liberal Arts Core required of all majors in the College
of Arts an Sciences. Options for satisfying this requirement
are outlined under the section on the College of
Arts and Sciences. Also, in order to qualify for graduation,
students must pass the Senior Departmental
Comprehensive Examination;must have taken all of the
junior- and senior-level requirements in the major at
Morgan (unless granted prior written permission by the
Dean to take courses elsewhere); and must have earned a
cumulative average of 2.0 or better and a major average

of 2.0 or better, with no outstanding grades below "C"
in the major (which includes all courses required for the
major and required supporting courses).

THE MAJOR IN MATHEMATICS
REQUIRED COURSES FOR A MAJOR
IN MATHEMATICS (PURE)

Entering students should select a mathematics course in
consultation with an advisor. Qualified students intending
to major in mathematics are generally advised to
begin with MATH 215 and MATH 241. Some less prepared
students will begin with MATH 141, followed by
MATH 215 and MATH 241. All required courses must
be completed with a final grade of "C" or better.
Students majoring in Mathematics (Pure) must take the
following courses:

Course Description Credits

FOR GENERAL EDUCATION*
MATH 215 Foundations for Advanced
Mathematics I 3   3

FOR THE MAJOR
MATH 216 Foundations for Advanced
Mathematics II 3
MATH 241 Calculus I 4
MATH 242 Calculus II 4
MATH 243 Calculus III 4
MATH 312 Linear Algebra 3
MATH 340 Introduction To Differential Equations 3
MATH 341 Advanced Calculus 3
MATH 343 Complex Variables 3
MATH 413 Algebraic Structures I 3
MATH 431 Mathematical Theory of Statistics I 3

$3 \times 4 + 7 \times 3 = 12 + 21 = 33$

MATH 45X
(CHOOSE ONE COURSE) 3
MATH 450 Senior Seminar
MATH 451 Honors Conference
Course
MATH 452 Conference Course
MATH 479 Point Set Topology 3
MATH XXX Mathematics Electives numbered 300> 3
MATH XXX Mathematics Electives numbered 300> 3
MATH XXX Mathematics Electives numbered 300> 3
PHYS 206 University Physics 5

$5 \times 3 + 5$
$= 20$

TOTAL: 56

*Mathematics majors must select this course to fulfill the
Mathematics requirements under General Education.

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*actually 59 with
Math 215*

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REQUIRED COURSES FOR A MAJOR
IN MATHEMATICS (STATISTICS
CONCENTRATION)
Course Description Credits
FOR GENERAL EDUCATION*

MATH 215 Foundations for Advanced
Mathematics I 3
FOR THE MAJOR
MATH 216 Foundations for Advanced
Mathematics II 3
MATH 241 Calculus I 4
MATH 242 Calculus II 4
MATH 243 Calculus III 4
MATH 312 Linear Algebra I 3
MATH 331 Applied Probability and Statistics 3
MATH 333 Applied Regression and Correlation
Analysis 3
MATH 337 Nonparametric Statistical Methods 3
MATH 340 Introduction To Differential Equations 3
MATH 341 Advanced Calculus I 3
MATH 343 Complex Variables 3
MATH 413 Algebraic Structures I 3
MATH 431 Mathematical Theory of Statistics I 3
MATH 432 Mathematical Theory of Statistics II 3
MATH 45X
(CHOOSE ONE COURSE) 3
MATH 450 Senior Seminar
MATH 451 Honors Conference
Course
MATH 452 Conference Course
MATH 479 Point Set Topology 3
MATH XXX
(CHOOSE ONE COURSE) 3
MATH 334 Applied Analysis of Variance
MATH 339 Survey Sampling Techniques
MATH 345 Mathematics for Insurance,
Business and Investment
MATH 435 Design and Analysis of Experiments
MATH 436 Quality Control
PHYS 206 University Physics 5
TOTAL: 62
· * Mathematics majors must select this course to fulfill the
Mathematics requirements under General Education.
THE MAJOR IN MATHEMATICS
WITH TEACHER CERTIFICATION
To attain certification to teach mathematics, students
must complete the Mathematics major in one of the
concentrations above and complete the following
courses:
Course Description Credits
*MATH 361 Introduction to
Mathematical Modeling 3
*MATH 371 History of Mathematics 3
*MATH 421 Higher Geometry 3
COSC 111 Introduction to Computer Science 4
TOTAL 13
See the School of Education and Urban Studies
for additional courses required for teacher certification.
MINOR IN MATHEMATICS (PURE)

(For Non-Science and Non-Engineering Majors)
Students who minor in Mathematics (Pure) for Non-Science and Non-Engineering majors must complete the following courses:

Course Description Credits
MATH 215 Foundations for Advanced
Mathematics 3
MATH 241 Calculus I 4
MATH 242 Calculus II 4
MATH 243 Calculus III 4
MATH 312 Linear Algebra 3
TOTAL 18

MINOR IN MATHEMATICS (PURE)
(For Science and Engineering Majors)
Students who minor in Mathematics (Pure) for Science and Engineering majors must complete the following courses:

Course Description Credits
MATH 341 Advanced Calculus 3
MATH 343 Complex Variables 3
MATH 413 Algebraic Structures 3
MATH 431 Mathematical Theory of Statistics I 3
MATH 450 Senior Seminar 3
MATH 479 Point Set Topology 3
TOTAL 18

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MINOR IN MATHEMATICS
(STATISTICS CONCENTRATION)
Course Description Credits
*MATH 242 Calculus II 4
*MATH 312 Linear Algebra I 3
*MATH 331 Applied Probability and Statistics 3
MATH 333 Applied Regression and Correlation
Analysis 3
MATH 337 Nonparametric Statistical Methods 3
MATH XXX Mathematics Elective
(CHOOSE ONE COURSE) 3
MATH 334 Applied Analysis
of Variance
MATH 339 Survey Sampling
MATH 345 Mathematics for
Insurance, Business
and Investment
MATH 435 Design and Analysis
MATH 436 Quality Control
TOTAL 19
*See Department Chair for substitution.

HONORS PROGRAM
After a student has completed MATH 215 and MATH 242, he/she may be invited by the Department of Mathematics to study for honors. In order to be eligible

for participation in this program, a student's scholastic
standing in terms of grade or honor points shall not be
less than 3.0 in general average and not less than 3.0 in
all mathematics courses completed. The following
mathematics courses on the upper level must be completed
with a "B" or better by the time recommended
on the curriculum sequence: MATH 312; 341; 342;
343; 413; 451 or 452; 479. It is recommended that both
MATH 298 and MATH 299 be completed.

MATHEMATICS HONOR SOCIETY

Pi Mu Epsilon is the mathematics honor society. To be eligible,
one must be a junior having a 3.00 GPA overall with
a 3.00 GPA in mathematics, or a sophomore who has
maintained at least a 4.00 GPA in at least fifteen (15) hours
of mathematics courses, as well as having an overall GPA
of at least 3.00. MATH 215 is the lowest numbered course
which may be used in the GPA computation.

MATHEMATICS COURSE OFFERINGS

MATH 010, 020, 030, 040 Cooperative Work Program
0 credit.

MATH 106 FUNDAMENTALS OF MATHEMATICS
- 4 hours; 3 credits This is a beginning algebra
course. Topics include numbers, expressions, polynomials,
exponents, radicals, linear equations and quadratic equations.
High school deficiencies may be removed by passing MATH
106. This course does not count towards graduation. Freshman
studies sections meet five hours. Term Given: Both

MATH 107 THE NUMBER SYSTEMS - *3 hours; 3 credits*
This is a concept-building course. It covers the structure of
the following number systems: The counting numbers; the
whole numbers; the integers; the rational numbers; i.e. the
meanings of the various types of numbers and of addition, subtraction,
multiplication, division and less than, together with
their interrelationships. Methods for transmitting these concepts
to children are also discussed. This course is restricted to
elementary education majors unless departmental permission is
given. Term Given: Both

MATH 108 GEOMETRY AND MEASUREMENT- *3
hours; 3 credits* This is a concept-building course. It covers the
following concepts: Parallelism, perpendicularly, congruence,
basic ruler-and-compass constructions, basic geometric transformations,
similarity and proportion, and an introduction to
geometric proof. Also discussed are linear, area, volume and
angular measurement; approximation, precision and accuracy;
and the derivation of certain formulas for area and volume.
Methods for transmitting these concepts to children are also
discussed. **Prerequisite:** MATH 107 with a grade of "C" or
better. **Co-requisite:** PHIL 109. This course is restricted to
elementary education majors unless departmental permission is
given. Term Given: Both

**MATH 109 MATHEMATICS FOR THE LIBERAL
ARTS** - *4 hours; 4 credits* A course designed to help students
develop an understanding of the role of mathematics in modern

society. It also provides practice in the application of elementary mathematical skills and concepts to real life problems. Topics to be discussed include sets, logic, numbers, algebra, geometry, statistics, and consumer mathematics. Optional topics are probability and computers. (Term Given: Both)

Semesters

MATH 110 ALGEBRA, FUNCTIONS, AND ANALYTIC GEOMETRY - *3 hours; 3 credits* This is a concept-building course. Topics discussed include algebra as an abstraction from arithmetic; equations and functions and their relationships and differences; inequalities; the Cartesian coordinate system as a link between algebra and geometry; the linkage between certain geometric objects and their algebraic counterparts. Methods for transmitting these concepts to children are also discussed. **Prerequisite:** Math 108 with a grade of "C" or better. This course is restricted to elementary education majors unless departmental permission is given. Term Given: Both

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MATH 111 COLLEGE ALGEBRA - *3 hours; 3 credits* This course is designed to cover the following topics: Algebraic properties of real numbers, equations and inequalities, functions, relations and graphs, systems of equations, matrices and determinants, sequences and series and other topics as time permits. Students who have previously received credit for MATH 113 may not receive credit for this course.

MATH 112 HONORS MATHEMATICS FOR THE LIBERAL ARTS - *4 hours, 4 credits* This course is designed to help students develop an understanding of the role of mathematics in modern society. It also provides practice in the application of elementary mathematical skills and concept to real-life problems. Topics to be discussed include sets and logic, numbers, algebra, geometry, statistics, and consumer mathematics. Other topics include probability and computers. Students may not receive credit for both MATH 109 and MATH 112.

MATH 113 INTRODUCTION TO MATHEMATICAL ANALYSIS I - *4 hours; 4 credits* This is the first half of a unified course in algebra, trigonometry, and analytic geometry. Students may not receive credit for both MATH 121 and MATH 113. Term Given: Both

MATH 114 INTRODUCTION TO MATHEMATICAL ANALYSIS II - *4 hours; 4 credits* This course is a continuation of Mathematics 113. **Prerequisite:** MATH 113 with "C" or better. Students may not receive credit for both MATH 126 and MATH 114. Term Given: Both

MATH 117 MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS - *3 hours; 3 credits* This course is designed specifically for elementary education majors. Prospective elementary school teachers are encouraged to enroll in this course immediately following successful completion of MATH 109. Topics to be discussed include systems of

numeration, mathematical systems, topics in geometry, the real
number system, statistics, and computers and calculators.
Prerequisite:MATH 109 Term Given: Both
MATH 118 FINITE MATHEMATICS - *3 hours;3 credits*
Statement calculus, set operations, counting principles, probability,
statistics,matrices,systems of linear equations and inequalities,
and linear programming with applications involving
optimization utilizing the simplex method are studied.
Prerequisite: MATH 111 or MATH 113. Term Given:
Both
MATH 121 PLANE TRIGONOMETRY- *3 hours;3 credits*
This course is designed to cover the following topics:definitions
and relations of trigonometric functions, solutions of
triangles and applications, trigonometric identities and equations,
logarithms,inverse trigonometric functions,polar coordinates
and complex numbers. **Prerequisite:**MATH 111 with
the grade of "C" or better, or instructor's permission. Students
may not receive credit for both MATH 113 and MATH 121.
MATH 125 PLANE GEOMETRY FOR TEACHERS
- *3 hours; 3 credits* This course is designed specifically for preservice
and in-service high school mathematics teachers. Its
purpose is to discuss elementary geometry from an advanced
standpoint.That is,provide valid definitions and proofs for concepts
and theorems which may already be known.Thus,in this
course one elucidates both elementary geometry and its history.
Topics to be discussed include incidence geometry, distance
and congruence, inequalities, similarity, areas and volumes, parallel
and perpendicular lines, circles and spheres, and non-
Euclidean geometries.
MATH 126 ANALYTIC GEOMETRY - *4 hours; 3 credits*
This course is designed to cover the following topics:Two and
three dimensional rectangular coordinate systems, lines and
conic sections, translations and rotation of axes, parametric
equations of loci, surfaces and solids in 3-dimensions.
Prerequisite: MATH 121 or instructor's permission with the
grade "C" or better. Students may not receive credit for both
MATH 114 and MATH 126.
MATH 141 PRECALCULUS - *4 hours;4 credits* Review of
algebra, trigonometry, and analytic geometry. It covers equations
and inequalities; sequences and series; functions and relations
including algebraic, logarithmic, exponential, and
trigonometric functions; analytic geometry including conic
sections and parametric equations are also studied.
Prerequisites: Departmental Permission. Term Given: Both
**MATH 201 CALCULUS FOR NON-SCIENCE
MAJORS**- *3 hours;3 credits* Basic concepts of calculus including
functions,limits,continuity,the techniques of differentiation
with applications to the managerial, life, and social sciences.
Also includes an introduction to the techniques of integration
with applications. A brief introduction to multivariable calculus
is also given. **Prerequisite:**MATH 111 or MATH 113.Term
Given: Both
**MATH 205 PROBABILITY, STATISTICS AND
DISCRETE MATHEMATICS** - *3 hours; 3 credits* Basic

counting techniques, basic probability and statistics, basic logic, and set theory and an introduction to algorithms.
Prerequisite:MATH110 with a grade of "C" or better. This course is restricted to elementary education majors unless departmental permission is given. Term Given: Both
MATH 215 FOUNDATIONS FOR ADVANCED
MATHEMATICS-I-3 hours; 3 credits Basic logic, axiomatic treatment of sets, and construction of the real number system from the Zermelo-Frankel axioms of set theory.
Prerequisites: MATH 114 or MATH 141 with a grade of "C" or better or departmental permission is given. Term Given: Fall
MATH 216 FOUNDATIONS FOR ADVANCED
MATHEMATICS-II - 3 hours; 3 credits Topics to be discussed include graph theory, techniques for proving algorithm and program correctness, formal languages and formal machines, complexity of algorithms, coding theory, Boolean algebra and logic networks. **Prerequisite:** MATH 215 with grade "C"or better. Term Given: Spring
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MATH 241 CALCULUS I - 4 hours; 4credits Topics to be discussed include limits and continuities of real functions of one real variable. It covers differentiation and anti-differentiation of algebraic functions,exponential functions and logarithmic functions, chain rule, Rolle's Theorem and mean value theorem. Included are simple applications of derivatives to various problems including max-min problems and graphing techniques. **Prerequisite:** MATH 114 or MATH 141 with grade "C"or better or departmental permission. Term Given: Both
MATH 242 CALCULUS II - 4 hours;4credits This course is the continuation of Math 241 and designed to cover the following topics: definite integrals and their applications; the Fundamental Theorem of Calculus; techniques of integration; derivatives and anti-derivatives of trigonometric functions; Integrals yielding inverse trigonometric functions; Simpson's Rule; the Trapezoidal Rule; L' Hospital's Rule; sequences and series; and other topics. **Prerequisite:** MATH 241 with the grade of "C"or better. Term Given: Both
MATH 243 CALCULUS III - 4 hours;4credits Topics to be discussed include partial differentiation, directional derivatives, gradients and line integrals,multiple integrals,and applications.
Prerequisite: MATH 242 with grade "C" or better. Term Given: Both
MATH 298 HONORS SEMINAR I - 1 hour,1 credit This course is designed to introduce the student to deductive reasoning. The seminar will feature a mix of outside speakers,faculty speakers and student presentations. These talks and presentations will highlight the use of deductive reasoning in mathematics. The student will write a paper that illustrates the

use of deductive reasoning in elementary setting.

MATH 299 HONORS SEMINAR II - *1 hour, 1 credit*
This course is designed as a continuation of MATH 298;
therefore it continues the process of introducing the student to
deductive reasoning. The seminar will feature a mix of outside
speakers,faculty speakers and student presentations. These talks
and presentations will highlight the use of deductive reasoning
in mathematics. The student will write a paper that illustrates
the use of deductive reasoning in an elementary setting and
will be required to give an oral presentation to the class in
MATH 298 when both seminar courses are offered in the
same semester.

MATH 300 INDEPENDENT STUDY IN MATHEMATICS
I - *3 hours; 3 credits* Under this heading, a student
may agree to a course with a particular faculty member on a
topic not covered in the regular curriculum. The arrangements
must be made with the faculty member and approved
by the department chair before the student registers for the
course.

MATH 312 LINEAR ALGEBRA I - *3 hours;3 credits* This
course is designed to cover the following topics:A study of linear
transformations and matrices, vector spaces, Eigen values
and canonical forms and other topics as time permits.
Prerequisite:MATH 241. Term Given: Both

MATH 313 LINEAR ALGEBRA II - *3 hours; 3 credits.*
This is a follow-up course to MATH 312. Special topics,
applied and abstract, are studied. These topics include
Hermitian Matrices, Quadratic Forms, Positive Definite
Matrices,Canonical Forms,and other applications as time permits.
Prerequisite:MATH 312.

MATH 322 SOLID ANALYTIC GEOMETRY - *3
hours;3 credits.* This course is designed to use matrix theory and
vector algebra to discuss the following topics:Lines,Planes and
transformation of coordinates in space; quadric surfaces, the
general equation of the second degree, and properties of
quadrics.**Prerequisite:**MATH 242 with grade "C"or better.

MATH 331 APPLIED PROBABILITY AND
STATISTICS - *3 hours; 3 credits.* This course is designed for
students with one year of differential and integral calculus who
wish to study the theory of probability and its applications.
Topics include the following: Combinatorial analysis, foundations
of probability, random variables and their distributions,
and applications. **Prerequisite:** MATH 242. Term Given:
Both

MATH 333 APPLIED REGRESSION AND CORRELATION
ANALYSIS - *3 hours;3 credits.*This course represents
a study of relationships among variables, including
linear regression with one or more independent variables,
methods of estimating parameters and testing hypothesis,selection
of independent variables, time series, and other topics.
Students are required to complete computer projects using statistical
software systems. **Prerequisite:** MATH 331 or
Departmental Permission.

MATH 334 APPLIED ANALYSIS OF VARIANCE –

3 hours; 3 credits. This course is designed to cover a study of relation between a dependent variable and one or more independent variables. It will study quantitative or qualitative attributes of data without requiring assumption about the nature of the statistical relation. The course will emphasize single and multifactor models analysis, analysis of factor effects, implementation of models, analysis of variance, and analysis of covariance. Students are required to complete computer projects using statistical software systems. **Prerequisite:** MATH 331 or departmental permission.

MATH 337 NONPARAMETRIC STATISTICAL METHODS - *3 hours; 3 credits.* This course emphasizes an applied study of many of the popular nonparametric tests that do not require the knowledge of the population in question. It emphasizes procedures that utilize data from single sample, or two or more independent and related samples. The course will also cover Chi-square tests of independence, homogeneity, goodness-of-fit, rank correlation, and other measures of association, including exposure to loglinear-logit analysis of categorical data. Students are required to complete computer projects using statistical software systems. **Prerequisite:** MATH 331 or departmental permission.

MATH 339 SURVEY SAMPLING TECHNIQUES - *3 hours; 3 credits.* This course will cover methods of designing
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and interpreting survey investigations with emphasis on simple random, stratified, systematic, cluster and double sampling from populations to determine uncertainties. In addition, it will cover construction of sample frames, sampling for estimating proportions, means and variances, sample size determination, computer scoring, and analysis of questionnaire data. Students are required to complete computer projects using statistical software systems. **Prerequisite:** MATH 331 or departmental permission.

MATH 340 INTRODUCTION TO DIFFERENTIAL EQUATIONS - *3 hours; 3 credits.* This is a first course dealing with methods of solving ordinary differential equations (ODE) with application to geometry and physics. The following topics are included: first order ordinary differential equations, second and higher order linear ordinary differential equations, (homogeneous and non-homogeneous), Laplace Transforms, systems of linear ordinary differential equations. **Prerequisite:** MATH 242 or with a grade of "C" or better. Term Given: Both

MATH 341 ADVANCED CALCULUS I - *3 hours; 3 credits.* This course is designed to cover the following topics: topology of the real line, theory of limits, theory of differentiation and integration of functions of one variable, infinite series. **Prerequisite:** MATH 216 with a grade of "C" or better or departmental permission and MATH 242 with a grade of

"C"or better or departmental permission. Term Given: Fall

MATH 342 ADVANCED CALCULUS II - *3 hours;*
3 credits. This course is a continuation of MATH 341. The following
topics will be covered: sequences of functions,improper
integrals, functions of several variables. **Prerequisite:**
MATH 341 with a grade of "C" or better or departmental
permission.

MATH 343 COMPLEX VARIABLES - *3 hours; 3 credits.*
This course is designed as a study of elementary functions of a
complex variable, Cauchy's integral theorem and formula,
residues and poles, power series, introduction to the solutions
of differential equations by series. **Prerequisite:** MATH 341
with grade "C"or better. Term Given: Spring

**MATH 345 MATHEMATICS FOR INSURANCE
AND INVESTMENT -** *3 hours; 3 credits.* This course is
designed to cover the following topics:theory of life insurance,
life annuities, and related fields, with emphasis on applications
of current insurance and investment principles. Exposure
to health, disability, long-term care and property/casualty
insurance is presented too.**Prerequisite:** Math 331 or departmental
permission.

MATH 352 NUMERICAL ANALYSIS - *3 hours;3 credits.*
This course is designed to cover the following topics:Methods
of deriving numerical results for mathematical procedures
with attention given to the precision of the results.Computer
programming techniques will also be included.**Prerequisite:**
MATH 242 with grade "C"or better. Term Given: Both

**MATH 361 INTRODUCTION TO MATHEMATICAL
MODELING -** *3 hours; 3 credits.* An introduction to
the basic principles of formulation, analysis, and simulation of
mathematical models. Deterministic, dynamic, and stochastic
models will be discussed. **Prerequisite:** MATH 242. Term
Given: Spring

MATH 371 HISTORY OF MATHEMATICS - *3
hours; 3 credits.* Topics include the origins of the concepts of
numbers,algebra,geometry,applied arithmetic. The contributions
of famous 19th and 20th century mathematicians will
also be discussed. **Prerequisite:** Departmental permission.
Term Given: Fall

**MATH 390 SPECIAL TOPICS IN MATHEMATICS
I -** *3 hours; 3 credits.* Under this heading,courses on topics and
applications not covered in the regular curriculum or that span
several areas of mathematics will be offered.

**MATH 399 MATHEMATICS IN AFRICAN
CULTURE -** *3 hours;3 credits.* This course is an introductory
look at the relationship between mathematics and culture.
Specific attention will be given to the African expression and
development of certain mathematical ideas.

**MATH 400 INDEPENDENT STUDY IN MATHEMATICS
II -** *3 hours; 3 credits.* Under this heading, a student
may agree to a course with a particular faculty member on a
topic not covered in the regular curriculum. The arrangements
must be made with the faculty member and approved
by the department chair before the student registers for

the course.

MATH 413 ALGEBRAIC STRUCTURES I - *3 hours;*
3 credits. This course is designed to cover the following topics:
elementary theory of groups,rings,integral domains,fields and
ideals. An introduction to polynomials and matrices over a
field will be considered. **Prerequisite:** MATH 215 with a
grade of "C"or better or MATH 312 with a grade of "C"or
better or permission of the department. Term Given: Fall

MATH 414 ALGEBRAIC STRUCTURES II - *3 hours;*
3 credits. A continuation of MATH 413. Topics drawn from
Galois theory, Sylow theory, finite abelian groups, and applications.
Prerequisites:MATH 413.

**MATH 419 COMBINATORICS AND GRAPH
THEORY** - *3 hours;3 credits.* General enumeration methods,
difference equations, and generating functions. Elements of
graph theory including transport networks, matching theory,
and graph algorithms. **Prerequisite:** MATH 215 with a
grade of "C"or better.

MATH 421 HIGHER GEOMETRY - *3 hours; 3 credits.*
This course introduces the student to projective, advanced
Euclidean and non-Euclidean geometries and is designed to
cover the following topics: transformation theory, projective
theory of conics, Desargues'Theorem,duality, projective, parabolic,
hyperbolic, and elliptic geometries. **Prerequisite:**
MATH 242 with a grade of "C" or better, or departmental
permission. Term Given: Spring

**MATH 425 INTRODUCTION TO NUMBER
THEORY** - *3 hours; 3 credits.* Divisibility and primes, con-

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gruences, quadratic reciprocity, arithmetic functions, and
arithmetic in quadratic fields.Prerequisite: MATH 242.

**MATH 431 MATHEMATICAL THEORY OF
STATISTICS I** - *3 hours; 3 credits* This course is designed
to cover the following:An introduction to the probability
theory necessary to serve as a basis for the study of statistics,
graphical representation of frequency distributions, various
probability functions,various probability densities,mathematical
expectation including moments and various moment
generating functions. **Prerequisite:** MATH 242 with grade
"C"or better. Term Given: Fall

**MATH 432 MATHEMATICAL THEORY OF
STATISTICS II** - *3 hours;3 credits* This course is a continuation
of MATH 431. It is designed to cover the following
topics: sums of random variables, the normal distribution,
student's distribution, the F- distribution and the Chi-Square
distribution, principles of testing hypotheses and estimation,
linear and multiple correlation and regression,analysis of variance
and other topics as time permits. **Prerequisite:**MATH
431 with grade "C" or better. The two courses in
Mathematical Theory of Statistics are not a duplication of

Psychology 316 -317 or Economics 311-312, since MATH 431-432 emphasize the mathematical theory of statistics and require a knowledge of calculus as a prerequisite.

MATH 435 DESIGN AND ANALYSIS OF EXPERIMENTS - *3 hours; 3 credits* Principles of experimental design, and other topics chosen from completely randomized designs, block designs, Latin-square and factorial experiments, response surface exploration, and others as time permits. **Prerequisites:** MATH 432.

MATH 436 QUALITY CONTROL - *4 hours; 4 credits* Topics chosen from the following: Lot acceptance, sampling by attribute and by variables,theory of control charts,sequential sampling plans, and life testing and reliability. **Prerequisite:** MATH 432.

MATH 440 INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS - *3 hours; 3 credits* Quasilinear and nonlinear first order equations, calculus of variations, linear second order equations and their classification, self-adjoint operators. Strum-Lioville problems and eigenfunction expansions, fundamental solutions and Green's functions, distributions, boundary and initial value problem for potential,wave and heat equations, integral transforms, and asymptotic expansions. **Prerequisites:** MATH 243, MATH 312,and MATH 340.

MATH 450 Senior Seminar - *3 hours; 3 credits* Under the direction of a faculty member, the student must write an acceptable mathematics paper. In addition, an oral presentation based on the paper must be made to a departmental audience. **Prerequisite:** Departmental permission. Term Given: Spring

MATH 451 CONFERENCE COURSE - *3 hours;3 credits* This course is designed for seniors in the Honors Program and others admitted by the chairperson and is devoted to one or more topics in advanced mathematics. Much of this work is done through independent study with timely conferences with the instructor.

MATH 452 CONFERENCE COURSE - *3 hours;3 credits* This course is the same type as MATH 451 and operates independently of MATH 451.

MATH 461 OPERATIONS RESEARCH I - *3 hours; 3 credits* Linear programming including the simplex method. Transportation, assignment, and transhipment problems. Network problems, sensitivity analysis, and a brief introduction to dynamic programming. **Prerequisites:** MATH 312 and MATH 331 or MATH 431.

MATH 462 OPERATIONS RESEARCH II - *3 hours; 3 credits* Integer programming, game theory, dynamic programming. Introduction to nonlinear programming. **Prerequisites:** MATH 461.

MATH 479 POINT SET TOPOLOGY - *3 hours;3 credits*This course is designed to cover the following topics: point set theory of the line and plane, topological spaces and properties, mappings. **Prerequisite:** MATH 341 with grade "C" or better. Term Given: Fall

MATH 490 SPECIAL TOPICS IN MATHEMATICS

II - *3 hours; 3 credits* Under this heading, courses on topics
and applications not covered in the regular curriculum or that
span several areas of mathematics will be offered.

A SUGGESTED COURSE SEQUENCE
FOR MATHEMATICS MAJORS

Advisors will help you select courses for your first year, They
will use the record of courses taken previosly, test scores, and
your expressed interests. The outline is a guide not a rigid pattern.
As you become better informed of the opportunities
that exist for graduate study and/or employement after graduation
consult advisors on how adaptations might be made in
your plan of studies.

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MATHEMATICS 271

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MORGAN STATE UNIVERSITY
DEPARTMENT OF MATHEMATICS
MATHEMATICS MAJOR
CURRICULUM SEQUENCE

FRESHMAN YEAR (FIRST SEMESTER) FRESHMAN YEAR (SECOND SEMESTER)
ENGL 101 FRESHMAN COMP I 3 ENGL 102 FRESHMAN COMP II 3
HIST 101/105 WORLD CIV.I OR US HIST I 3 HEED 100 HEALTHFUL LIVING 2
MATH 215 FOUN.ADVANCED MATH I 3 HIST 102/106 WORLD CIV. II OR US HIST II 3
MATH 241 CALCULUS I 4 MATH 216 FOUN.ADVANCED MATH II 3
ORIE 106 FRESHMAN ORIENTATION 1 MATH 242 CALCULUS II 4
PHEC XXX PHYSICAL ED. ELECTIVE 1
14 16

SOPHOMORE YEAR (FIRST SEMESTER) SOPHOMORE YEAR (SECOND SEMESTER)
HUMA 201 INTRO.TO HUMANITIES I 3 BIOL 101/102 INTRO. BIOLOGY I OR II 4
MATH 243 CALCULUS III 4 HUMA 202 INTRO.TO HUMANITIES II 3
PHIL 109 INTRO.TO LOGIC 3 MATH 312 LINEAR ALGEBRA I 3
PHYS 205 UNIV. PHYSICS I 5 PHYS 206 UNIV. PHYSICS II 5
15 15

JUNIOR YEAR (FIRST SEMESTER) JUNIOR YEAR (SECOND SEMESTER)
MATH 340 DIFFERENTIAL EQUATIONS 3 HIST 350 INTRO.TO AFRICAN DIASPORA3
MATH 341 ADVANCED CALCULUS 3 MATH 343 COMPLEX VARIABLES 3
MATH 413 ALGEBRAIC STRUCTURES 3 MATH 479 POINT SET TOPOLOGY 3
MATH 431 MATH.THER. OF STATISTICS I 3 XXX FREE ELECTIVE 3
XXX SOCIAL SCIENCE ELECTIVE 3 XXX HUMANITIES ELECTIVE 3
15 15

SENIOR YEAR (FIRST SEMESTER) SENIOR YEAR (SECOND SEMESTER)
MATH XXX MATH ELECTIVE 3 MATH 450 SENIOR SEMINAR 3
MATH XXX MATH ELECTIVE 3 XXX FREE ELECTIVES 6
XXX FREE ELECTIVE 6 XXX COMPLIMEN. STUDIES PROG. 3
XXX COMPLIMEN. STUDIES PROG. 3 MATH XXX MATH ELECTIVE 3
15 15
TOTAL CREDIT HOURS 120

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MORGAN STATE UNIVERSITY
DEPARTMENT OF MATHEMATICS

MATHEMATICS MAJOR (WITH TEACHER CERTIFICATION)
CURRICULUM SEQUENCE

FRESHMAN YEAR (FIRST SEMESTER) FRESHMAN YEAR (SECOND SEMESTER)

ENGL 101 FRESHMAN COMP I 3 BIOL 101/102 INTRO. BIOLOGY I OR II 4
HEED 100 HEALTHFUL LIVING 2 EDUC 200 FOUN. OF EDUC. & TEACHING 4
HIST 101/105 WORLD CIV. I OR US HIST I 3 ENGL 102 FRESHMAN COMP II 3
MATH 215 FOUN.ADVANCED MATH I 3 MATH 216 FOUND.ADVANCED MATH II 3
MATH 241 CALCULUS I 4 MATH 242 CALCULUS II 4
ORIE 106 FRESHMAN ORIENTATION 1 PHEC XXX PHYSICAL ED. ELECTIVE 1
16 19
SOPHOMORE YEAR (FIRST SEMESTER) SOPHOMORE YEAR (SECOND SEMESTER)
COSC 111 INTRO TO COMPUTER SCI. I 4 HUMA 202 INTRO.TO HUMANITIES II 3
HIST 102/106 WORLD CIV. II OR US HIST II 3 MATH 243 CALCULUS III 4
HUMA 201 INTRO.TO HUMANITIES I 3 PHIL 109 INTRO.TO LOGIC 3
MATH 312 LINEAR ALGEBRA I 3 PHYS 206 UNIV. PHYSICS II 5
PHYS 205 UNIV. PHYSICS I 5 SCED 302 PRIN. OF TEACH. SEC. SCH. 3
18 18
JUNIOR YEAR (FIRST SEMESTER) JUNIOR YEAR (SECOND SEMESTER)
MATH 341 ADVANCED CALCULUS 3 MATH 479 POINT SET TOPOLOGY 3
SOCI XXX SOCIAL SCIENCE ELECTIVE 3 MATH 340 DIFFERENTIAL EQUATIONS 3
SCED 301 EDUCATIONAL PSYCHOLOGY 3 SCED 429 METH.TEACH. READING II 3
MATH 413 ALGEBRAIC STRUCTURES 3 HIST 350 INTRO.TO AFRICAN DIASPORA 3
MATH 431 MATH.THER. OF STATISTICS I 3 HUMA XXX HUMANITIES ELECTIVE 3
EDUC 303 ELECT. INSTRUC.MATERIALS 3 SCED 307 ADOLESCENT PSYCHOLOGY 3
18 18
SENIOR YEAR (FIRST SEMESTER) SENIOR YEAR (SECOND SEMESTER)
MATH 371 HISTORY OF MATHEMATICS 3 MATH 343 COMPLEX VARIABLES 3
MATH 421 HIGHER GEOMETRY 3 MATH 361 INTRO.MATH MODELING 3
EDUC 334 INTRO TO SPECIAL ED. 3 MATH 450 SENIOR SEMINAR 3
EDUC 414 ASSESSMENT OF STUDENTS 3 SCED 430 METH.TEACH. READING II 3
EDUC 415 CULT. INF., DIVER. & SCHOOL 3 SCED 456 METH.TEACH.MATH 3
XXX COMPLIMENTARY STUDIES 3 XXX COMPLIMENTARY STUDIES 3
18 18
ADDL.REQ. SCED 490 STUDENT TEACHING 12
TOTAL CREDIT HOURS 155
272 MATHEMATICS

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MORGAN STATE UNIVERSITY
DEPARTMENT OF MATHEMATICS
MATHEMATICS MAJOR (WITH A CONCENTRATION IN STATISTICS)
CURRICULUM SEQUENCE
FRESHMAN YEAR (FIRST SEMESTER) FRESHMAN YEAR (SECOND SEMESTER)
ENGL 101 ENGLISH COMP I 3 ENGL 102 ENGLISH COMP II 3
HEED 100 HEALTHFUL LIVING 2 HIST 102/106 WORLD CIV. II or U.S. HIST II 3
HIST 101/105 WORLD CIV.I or U.S. HIST I 3 MATH 216 FOUN.ADVANCED MATH II 3
MATH 215 FOUN.ADVANCED MATH I 3 MATH 242 CALCULUS II 4
MATH 241 CALCULUS I 4 PHEC XXX PHYSICAL ED. ELECTIVE 1
ORIE 106 FRESHMAN ORIENTATION 1
16 14
SOPHOMORE YEAR (FIRST SEMESTER) SOPHOMORE YEAR (SECOND SEMESTER)
HUMA 201 INTRO.TO HUMANITIES I 3 BIOL 105 INTRO.TO BIOLOGY 4
MATH 243 CALCULUS III 4 HUMA 202 INTRO.TO HUMANITIES II 3
PHIL 109 INRO.TO LOGIC 3 MATH 312 LINEAR ALGEBRA I 3
PHYS 205 UNIV. PHYSICS I 5 PHYS 206 UNIV. PHYSICS II 5

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2003-06

15 15

JUNIOR YEAR (FIRST SEMESTER) JUNIOR YEAR (SECOND SEMESTER)

MATH 331 APP.PROBABILITY & STAT. 3 HIST 350 INTRO.TO AFRICAN DIASP. 3

MATH 340 DIFFERENTIAL EQUATIONS 3 HUMA XXX HUMÁNITIES ELECTIVE 3

MATH 341 ADVANCED CALCULUS 3 MATH 333 APP. REGRESS. & COR.ANA. 3

MATH 431 MATH THEORY STATIS. I 3 MATH 432 MATH.THEORY STATIS. II 3

SOCI XXX SOCIAL SCIENCE ELECTIVE 3 MATH 479 POINT SET TOPOLOGY 3

15 15

SENIOR YEAR (FIRST SEMESTER) SENIOR YEAR (SECOND SEMESTER)

MATH 337 NONPARA. STAT.METHOD 3 MATH 334 or 339 or 345 or 435 or 436 3

MATH 413 ALGEBRAIC STRUCTURES 3 APPL.ANAL.VARIANCE

XXX FREE ELECTIVES 6 SURVEY SAMP.TECHNIQUES

XXX COMPLIMENTARY STUDIES 3 MATH. INSUR., BUS. & INVEST.

DESIGN & ANAL. OF EXPER.

QUALITY CONTROL

MATH 343 COMPLEX VARIABLES 3

MATH 450 SENIOR SEMINAR 3

XXX FREE ELECTIVE 3

XXX COMPLIMENTARY STUDIES 3

15 15

TOTAL CREDIT HOURS 120

MORGAN STATE UNIVERSITY
DEPARTMENT OF MATHEMATICS

MATHEMATICS MAJOR
CURRICULUM SEQUENCE

FRESHMAN YEAR (FIRST SEMESTER)

ENGL 101	FRESHMAN COMP I	3
HIST 101/105	WORLD CIV.I OR US HIST I	3
MATH 215	FOUN. ADVANCED MATH I	3
MATH 241	CALCULUS I	4
ORIE 106	FRESHMAN ORIENTATION	1
		14

FRESHMAN YEAR (SECOND SEMESTER)

ENGL 102	FRESHMAN COMP II	3
HEED 100	HEALTHFUL LIVING	2
HIST 102/106	WORLD CIV. II OR US HIST II	3
MATH 216	FOUN. ADVANCED MATH II	3
MATH 242	CALCULUS II	4
PHEC XXX	PHYSICAL ED. ELECTIVE	1
		16

SOPHOMORE YEAR (FIRST SEMESTER)

HUMA 201	INTRO. TO HUMANITIES I	3
MATH 243	CALCULUS III	4
PHIL 109	INTRO. TO LOGIC	3
PHYS 205	UNIV. PHYSICS I	5
		15

SOPHOMORE YEAR (SECOND SEMESTER)

BIOL 101/102	INTRO. BIOLOGY I OR II	4
HUMA 202	INTRO. TO HUMANITIES II	3
MATH 312	LINEAR ALGEBRA I	3
PHYS 206	UNIV. PHYSICS II	5
		15

JUNIOR YEAR (FIRST SEMESTER)

MATH 340	DIFFERENTIAL EQUATIONS	3
MATH 341	ADVANCED CALCULUS	3
MATH 413	ALGEBRAIC STRUCTURES	3
MATH 431	MATH. THER. OF STATISTICS I	3
XXX	SOCIAL SCIENCE ELECTIVE	3
		15

JUNIOR YEAR (SECOND SEMESTER)

HIST 350	INTRO. TO AFRICAN DIASPORA	3
MATH 343	COMPLEX VARIABLES	3
MATH 479	POINT SET TOPOLOGY	3
XXX	FREE ELECTIVE	3
XXX	HUMANITIES ELECTIVE	3
		15

SENIOR YEAR (FIRST SEMESTER)

MATH XXX	MATH ELECTIVE	3
MATH XXX	MATH ELECTIVE	3
XXX	FREE ELECTIVE	6
XXX	COMPLIMEN. STUDIES PROG.	3
		15

SENIOR YEAR (SECOND SEMESTER)

MATH 450	SENIOR SEMINAR	3
XXX	FREE ELECTIVES	6
XXX	COMPLIMEN. STUDIES PROG.	3
MATH XXX	MATH ELECTIVE	3
		15

TOTAL CREDIT HOURS   120

2003-06

2003-2006

MORGAN STATE UNIVERSITY
DEPARTMENT OF MATHEMATICS

MATHEMATICS MAJOR (WITH TEACHER CERTIFICATION)
CURRICULUM SEQUENCE

FRESHMAN YEAR (FIRST SEMESTER)
ENGL 101	FRESHMAN COMP I	3
HEED 100	HEALTHFUL LIVING	2
HIST 101/105	WORLD CIV. I OR US HIST I	3
MATH 215	FOUN. ADVANCED MATH I	3
MATH 241	CALCULUS I	4
ORIE 106	FRESHMAN ORIENTATION	1
		16

FRESHMAN YEAR (SECOND SEMESTER)
BIOL 101/102	INTRO. BIOLOGY I OR II	4
EDUC 200	FOUN. OF EDUC. & TEACHING	4
ENGL 102	FRESHMAN COMP II	3
MATH 216	FOUND. ADVANCED MATH II	3
MATH 242	CALCULUS II	4
PHEC XXX	PHYSICAL ED. ELECTIVE	1
		19

SOPHOMORE YEAR (FIRST SEMESTER)
COSC 111	INTRO TO COMPUTER SCI. I	4
HIST 102/106	WORLD CIV. II OR US HIST II	3
HUMA 201	INTRO. TO HUMANITIES I	3
MATH 312	LINEAR ALGEBRA I	3
PHYS 205	UNIV. PHYSICS I	5
		18

SOPHOMORE YEAR (SECOND SEMESTER)
HUMA 202	INTRO. TO HUMANITIES II	3
MATH 243	CALCULUS III	4
PHIL 109	INTRO. TO LOGIC	3
PHYS 206	UNIV. PHYSICS II	5
SCED 302	PRIN. OF TEACH. SEC. SCH.	3
		18

JUNIOR YEAR (FIRST SEMESTER)
MATH 341	ADVANCED CALCULUS	3
SOCI XXX	SOCIAL SCIENCE ELECTIVE	3
SCED 301	EDUCATIONAL PSYCHOLOGY	3
MATH 413	ALGEBRAIC STRUCTURES	3
MATH 431	MATH. THER. OF STATISTICS I	3
EDUC 303	ELECT. INSTRUC. MATERIALS	3
		18

JUNIOR YEAR (SECOND SEMESTER)
MATH 479	POINT SET TOPOLOGY	3
MATH 340	DIFFERENTIAL EQUATIONS	3
SCED 429	METH. TEACH. READING II	3
HIST 350	INTRO. TO AFRICAN DIASPORA	3
HUMA XXX	HUMANITIES ELECTIVE	3
SCED 307	ADOLESCENT PSYCHOLOGY	3
		18

SENIOR YEAR (FIRST SEMESTER)
MATH 371	HISTORY OF MATHEMATICS	3
MATH 421	HIGHER GEOMETRY	3
EDUC 334	INTRO TO SPECIAL ED.	3
EDUC 414	ASSESSMENT OF STUDENTS	3
EDUC 415	CULT. INF, DIVER. & SCHOOL	3
XXX	COMPLIMENTARY STUDIES	3
		18

SENIOR YEAR (SECOND SEMESTER)
MATH 343	COMPLEX VARIABLES	3
MATH 361	INTRO. MATH MODELING	3
MATH 450	SENIOR SEMINAR	3
SCED 430	METH. TEACH. READING II	3
SCED 456	METH. TEACH. MATH	3
XXX	COMPLIMENTARY STUDIES	3
		18

ADDL. REQ. SCED 490 STUDENT TEACHING   12

TOTAL CREDIT HOURS   155

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MORGAN STATE UNIVERSITY
DEPARTMENT OF MATHEMATICS

MATHEMATICS MAJOR (WITH A CONCENTRATION IN STATISTICS) CURRICULUM SEQUENCE

FRESHMAN YEAR (FIRST SEMESTER)

ENGL 101	ENGLISH COMP I	3
HEED 100	HEALTHFUL LIVING	2
HIST 101/105	WORLD CIV.I or U.S. HIST I	3
MATH 215	FOUN. ADVANCED MATH I	3
MATH 241	CALCULUS I	4
ORIE 106	FRESHMAN ORIENTATION	1
		16

FRESHMAN YEAR (SECOND SEMESTER)

ENGL 102	ENGLISH COMP II	3
HIST 102/106	WORLD CIV. II or U.S. HIST II	3
MATH 216	FOUN. ADVANCED MATH II	3
MATH 242	CALCULUS II	4
PHEC XXX	PHYSICAL ED. ELECTIVE	1
		14

SOPHOMORE YEAR (FIRST SEMESTER)

HUMA 201	INTRO. TO HUMANITIES I	3
MATH 243	CALCULUS III	4
PHIL 109	INRO. TO LOGIC	3
PHYS 205	UNIV. PHYSICS I	5
		15

SOPHOMORE YEAR (SECOND SEMESTER)

BIOL 105	INTRO. TO BIOLOGY	4
HUMA 202	INTRO. TO HUMANITIES II	3
MATH 312	LINEAR ALGEBRA I	3
PHYS 206	UNIV. PHYSICS II	5
		15

JUNIOR YEAR (FIRST SEMESTER)

MATH 331	APP. PROBABILITY & STAT.	3
MATH 340	DIFFERENTIAL EQUATIONS	3
MATH 341	ADVANCED CALCULUS	3
MATH 431	MATH THEORY STATIS. I	3
SOCI XXX	SOCIAL SCIENCE ELECTIVE	3
		15

JUNIOR YEAR (SECOND SEMESTER)

HIST 350	INTRO. TO AFRICAN DIASP.	3
HUMA XXX	HUMANITIES ELECTIVE	3
MATH 333	APP. REGRESS. & COR. ANA.	3
MATH 432	MATH. THEORY STATIS. II	3
MATH 479	POINT SET TOPOLOGY	3
		15

SENIOR YEAR (FIRST SEMESTER)

MATH 337	NONPARA. STAT. METHOD	3
MATH 413	ALGEBRAIC STRUCTURES	3
XXX	FREE ELECTIVES	6
XXX	COMPLIMENTARY STUDIES	3
		15

SENIOR YEAR (SECOND SEMESTER)

MATH 334 or 339 or 345 or 435 or 436		3
	APPL. ANAL. VARIANCE	
	SURVEY SAMP. TECHNIQUES	
	MATH. INSUR., BUS. & INVEST.	
	DESIGN & ANAL. OF EXPER.	
	QUALITY CONTROL	
MATH 343	COMPLEX VARIABLES	3
MATH 450	SENIOR SEMINAR	3
XXX	FREE ELECTIVE	3
XXX	COMPLIMENTARY STUDIES	3
		15

TOTAL CREDIT HOURS   120

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