BACCALAUREATE DEGREES

The Bachelor of Arts Degree will be awarded to those who satisfactorily complete 120 semester hours or work in the required distribution of courses. The number of quality points earned must be at least twice the number of credits pursued at the University. This degree is granted to those completing a major in the following:

African-Afro American Studies
Economics
English
Fine Arts
French
Geography
History
International Studies
Music

Philosophy
Political Science
Religious Studies
Sociology
Spanish
Speech Communication
Telecommunication
Theatre Arts

The Bachelor of Science Degree will be awarded to those who satisfactorily complete 120 semester hours of work in the required distribution of courses. The number of quality points earned must be at least twice the number of credits pursued at the University. This degree is granted to those completing a major in the following:

Accounting
Art
Education
Biology
Business Administration
Business Education
Chemistry
Chemistry (Pre-Professional)
Computer Science
Economics
Elementary Education
Health Education
Human Ecology
Information Systems

Management
Marketing
Mathematics
Medical Technology
Mental Health
Music Education
Physical Education
Physics
Psychology
Recreation
Secretarial Science
Science Education
Social Work
Urban Studies

SECOND DEGREE OPTION

A student who satisfies the major requirements for the baccalaureate degree in two majors will have the privilege of receiving the two degrees if desired.

Morgan

1984-86

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*REQUIREMENTS FOR GRADUATION
I. GENERAL EDUCATION REQUIREMENTS

	CREDITS
Basic Skills Courses	(43-44)
Humanities	10
Natural Sciences	9
Social Science	8/9
Health and Physical Education	9
Philosophy 402	4
Freshman Orientation	2
School Requirements	1
Departmental Major Requirements	(6)
Free Electives	(54)
	(16/17)
Total Credits for Graduation (with no corrective courses)	
Corrective Courses	(120)
Total Credits for Graduation (with corrective courses)	2-8
	(122-128)

NOTE: Passing a test determining proficiency in any of the courses in general education curriculum may be used to satisfy requirements in that course. All credits earned will count as part of the 120 credits required for graduation.

A. Basic Skills Courses
1. English (1501.101) ... 10 credits
2. English (1501.102) ... 3 credits
3. Mathematics (1701.109) ... 3 credits
The requirement in basic college mathematics may be met by the student's passing 4 credits of mathematics in courses numbered higher than Mathematics 1701.109. ... 4 credits

B. Humanities Courses
1. Humanities 4903.201 and 4903.202 ... 9 credits
2. Humanities Electives ... 6 credits
... 3 credits
The student must select courses from one (1) of the areas listed below. If the student selects foreign language on the 100 level, the 6 credits must be taken in the same foreign language, in sequence. Only three of which will count toward the humanities electives.

a. Art (0831.308, 1001.309, 1001.310, and other lecture and studio courses for which the student meets prerequisites)
b. English (1501.312)
c. Foreign Language (6 credits)
d. Humanities (4903.301)
e. Music (1005.267, 1005.268, 1005.391)
f. Philosophy (1509.300, 1509.303)
g. Religious Studies (1510.115)
h. Theatre Arts (1007.101, 1007.102)

C. Natural Science Courses
8/9 Credits
The 8/9 credits shall include at least one (1) laboratory course in a biological science and one (1) laboratory course in a physical science for which the prerequisites have been met.

1. Biological Science
a. Biology (0401.101) or
b. Comprehensive Science and Science Education. Biological Science (0834.107 or 108 or any recommended catalogue substitution).

*General Education Requirements cannot be used to satisfy major requirements.

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Sheet O

DEPARTMENT OF
MATHEMATICS AND
COMPUTER SCIENCE

Chairperson of Department: ASSOCIATE PROFESSOR NATHANIEL KNOX; *Professors:*
E. O. EMBREE, S. J. GERWIRTZ, O. C. PARCHMENT; *Associate Professors:* K. W. KIM;
Assistant Professors: C. C. HARVEY, W. LIN, N. T. SEELY, JR.; *Instructors:* C. W. HSU,
S. L. MILES.

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OBJECTIVES OF THE DEPARTMENT

It is the aim of the Department of Mathematics and Computer Science to assist students in gaining an appreciation for the power and orderliness of logical thought, precision of expression and the explanatory role of mathematics in the study of other subjects.

The Department of Mathematics and Computer Science seeks to provide:

1. Courses basic for those students who plan to:
   a. work in mathematics related activities in government, business, and industry;
   b. work with computers in government, business, and industry;
   c. study mathematics or computer science at the graduate level;
   d. teach mathematics or computer science.

2. Courses that service other departments in the University in their quest toward meeting their goals.

3. A basic curriculum that will assist students toward:
   a. developing the skills necessary for learning mathematics and computer science;
   b. appreciation of mathematics as an art, a science and a philosophy;
   c. recognition of the powerful tools mathematics and computers are for learning other sciences and arts.

4. Modes of teaching that will help students to:
   a. order their thinking;
   b. make precise statements;
   c. solve problems;
   d. learn logical structure;
   e. form proper mental habits.

5. Programs that will aid students in:
   a. doing research in mathematics and computer science;
   b. competing with students in other colleges and universities for prizes;
   c. finding recreation in mathematics and computer science;
   d. strengthening their weaknesses as they proceed in their mathematics and computer science courses.

6. At atmosphere which is unbiased, relative to race, color, religion, sex, or physical handicaps, where students are free to learn mathematics and computer science.

7. A flexible program:
   a. one that is subject to change if the need arises due to changes in technology and demands of society;
   b. one in which the Department can experiment with new learning and teaching techniques so as to evaluate the learning process.

REQUIREMENTS FOR A MAJOR IN MATHEMATICS: 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 1701.113-114. Some less prepared students will begin with 1701.106, followed by 1701.113-114. A few better prepared students will begin with 1701.241.

All mathematics majors are required to pass the three semester calculus sequence (1701.241, 242, 243) and the first semester of advanced calculus (1701.341). In addition, each student must pass the requirements listed under the option he/she has selected.

Pure Mathematics Option: 1701.312; 413; 342, or 343; 322 or 421 or 479; 450 or 451 or 452; a total of 24 semester credits in mathematics/computer science courses numbered 300 or above; physics 1902.205-206.

COMPUTER SCIENCE OPTION: 1701.312; 431; 432; the following computer science courses: 0701.151; 152; 253; 254; 351, 352; one of the following one year courses: physics 1902.205-206 or chemistry 1905.101-102 or chemistry 195.111-112 or accounting 0502.151-152.

MATHEMATICS EDUCATION OPTION: 1701.215; 341; 342 or 343; 312 or 413; 421, 450 or 451 or 452; Physics 1902.205-206; the following professional Education courses: 0801.199; 202; 0803.301; 302; 420; 428; 456; 490.

REQUIREMENTS FOR A MAJOR IN COMPUTER SCIENCE: Computer Science: 0701.152; 255; 351; 353; 355; Information Systems: 0702.153; 253; Mathematics: 1701.241; 242; 215; 312; 340 or 352; 431; 432; Physics: 1902.206 or Chemistry: 1905.102 or 112; Two additional courses chosen from the following: 1) any MATH or COSC course numbered above 300; 2) 0702.313; 364; 480; 3) 1902.306; 412 (1902.404 may be substituted for 1902.412).

MATHEMATICS AND COMPUTER SCIENCE HONORS PROGRAM: 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 or computer science courses completed.

Mathematics: After a student has completed Mathematics 1701.215 and 1701.242 he/she may be invited to study for honors in mathematics. The following mathematics courses must be completed with high distinction: 1701.312; 322 or 421; 341; 342; 343; 413; 451 or 452.

Computer Science: After a student has completed 0701.253 and 0701.255 he/she may be invited to study for honors in computer science. The following computer science courses must be completed with high distinction: 0701.351; 352; 353; 355; 451; 452.

COMPUTER SCIENCE COURSE OFFERINGS

0701.101, 020.030, 040 COOPERATIVE WORK PROGRAM—*0 credit.*

0701.151 INTRODUCTION TO COMPUTING—*Four hours; 3 credits.* This course is designed to cover the following topics: organization and characteristics of digital computer; problem solving and algorithm development; use of a high level language such as "BASIC", including design, coding, debugging and documentation. (Formerly 1701.151)

0701.152 COMPUTERS AND PROGRAMMING—*Four hours; 3 credits.* This is a first course in computer programming for students who plan to take additional courses in computer science and/or information systems. Students will learn to develop algorithms and to program in a structured, high level language. The emphasis will be on developing good programming habits. (Formerly 1701.152).

0701.201 FORTRAN PROGRAMMING—*Three hours; 3 credits.* This course teaches the FORTRAN programming language to students who already know a programming language other than FORTRAN. Prerequisite: 0702.153 or permission of the Department.

0701.255 THE LANGUAGE AND STRUCTURE OF COMPUTERS—*Four hours, 3 credits.* This course covers the basic concepts of computer systems, and is a first course in computer architecture and assembly language programming. Prerequisite: 0702.153.

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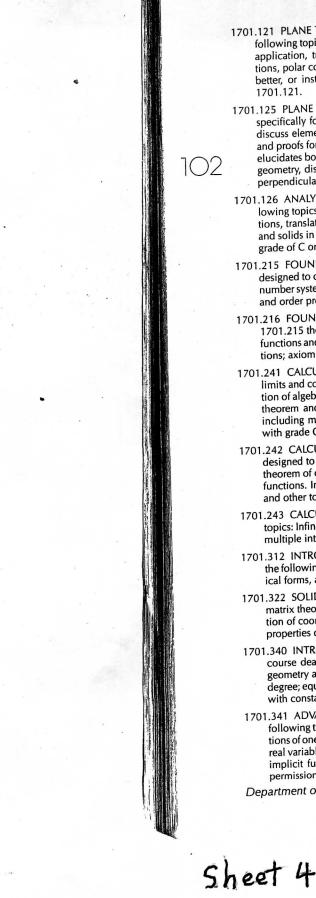
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0701.351 ORGANIZATION OF PROGRAMMING LANGUAGES—*Three hours; 3 credits.* This course is designed to include the following topics: syntax and basic characteristics of grammars, constructs for specifying and manipulating data types, control structures and data flow, and run-time considerations. Examples will be drawn from languages such as FORTRAN, PL/1, ALGOL, SNOBOL 4 and APL. Prerequisite: 0701.253 or 0702.253 with "C" or better.

0701.352 THEORY OF PROGRAMMING LANGUAGES—*Three hours; 3 credits.* This course discusses the algorithms used to build a compiler for a programming language. Prerequisite: 0701.351.

0701.353 OPERATING SYSTEM AND COMPUTER ARCHITECTURE I—*Four hours; 3 credits.* This course involves the study of the hardware associated with an operating system and the services such a system provides. Topics include resource management, processing, multi-programming, interrupt handling, and synchronization. Students will write programs in a high level language to illustrate some of the concepts. Prerequisites: 0702.253, 0701.255.

0701.354 OPERATING SYSTEMS AND COMPUTER ARCHITECTURE II—*Four hours; 3 credits.* This course discusses in greater detail several topics of 0701.353, including concurrent processes, name management, resource allocation, scheduling, protection, architecture for speeding up execution, and distributed systems. Prerequisite: 0701.353, Corequisite: 1701.431.

0701.355 DATA STRUCTURES AND ALGORITHM ANALYSIS—*Three hours; 3 credits.* This course examines the data structures and algorithms required for efficient file access in the context of a database management system. Topics include algorithms for memory management and an analysis of algorithms for sorting, searching and merging. Prerequisite: 0702.253.

0701.451 CONFERENCE COURSE—*Three hours; 3 credits.* A student electing this course will study an advanced topic in computer science individually under the guidance of a member of the Department. Prerequisite: Permission of the Department.

0701.452 CONFERENCE COURSE—*Three hours; 3 credits.* This course is the same type as 0701.451 and operates independently of 0701.451.

MATHEMATICS COURSE OFFERINGS

1701.010, 020, 030, 040 COOPERATIVE WORK PROGRAM—*0 credit.*

1701.106 FUNDAMENTALS OF MATHEMATICS—*Three hours; 3 credits.* This course is designed for those students with limited mathematical background. Emphasis is placed upon teaching students how to study mathematics. Elementary mathematics will be reviewed from a modern point of view in which there will be a discussion of sets with application of geometry, number system and algebraic structures. A student cannot receive credit for 1701.106 if he/she has previously received college credit for any course in mathematics. High school deficiencies may be removed by passing mathematics 1706.106. In this case no college credit will be given.

1701.109 COLLEGE MATHEMATICS—*Four 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 and logic, numbers, algebra, geometry, statistics, and consumer mathematics. Optional topics are probability and computers.

1701.111 COLLEGE ALGEBRA—*Three hours; 3 credits.* This course is designed to cover the following topics: algebraic properties of the 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 received credit for 1701.113 may not receive credit for this course.

1701.113 INTRODUCTION TO MATHEMATICAL ANALYSIS I—*Four hours; 4 credits.* This is the first half of a unified course in modern college algebra, analytic trigonometry and analytic geometry. Students may not receive credit for both 1701.121 and 1701.113.

1701.114 INTRODUCTION TO MATHEMATICAL ANALYSIS II—*Four hours; 4 credits.* This course is a continuation of Mathematics 1701.113. Prerequisite: Mathematics 1701.113 with C or better. Students may not receive credit for 1701.126 and 1701.114.

1701.117 MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS—*Three 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 1701.109. Topics to be discussed include systems of numeration, mathematical systems, topics in geometry, the real number system, statistics, and computers and calculators.

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1701.121 PLANE TRIGONOMETRY—*Three hours; 3 credits.* This course is designed to cover the following topics: definitions and relations of trigonometric functions, solutions of triangles and application, trigonometric identities and equations, logarithms, inverse trigonometric functions, polar coordinates and complex numbers. Prerequisite: 1701.111 with the grade of C or better, or instructor's permission. Students may not receive credit for both 1701.113 and 1701.121.

1701.125 PLANE GEOMETRY FOR TEACHERS—*Three hours, 3 credits.* This course is designed specifically for pre-service 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 cone 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.

1701.126 ANALYTIC GEOMETRY—*Four hours; 4 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, polar equations of loci, surfaces and solids in 3-dimensional system. Prerequisite: 1701.121 or instructor's permission with the grade of C or better. Students may not receive credit for both 1701.114 and 1701.126.

1701.215 FOUNDATIONS OF ANALYSIS AND SETS I—*Three hours; 3 credits.* This course is designed to cover the following topics: Elementary calculus of sets, axiomatic treatment of the number system and a brief introduction to the concepts of groups, rings, integral domains, fields and order properties. Taken concurrently with or after 1701.241 with C or better.

1701.216 FOUNDATIONS OF ANALYSIS AND SETS II—*Three hours; 3 credits.* As a continuation of 1701.215 the following topics will be included: Dedekind cuts; graphs and correspondences; functions and mappings; union, intersection and product of families of sets; coverings and partitions; axiom of choice and Zorn's lemma. Prerequisites: 1701.215 or permission of instructor.

1701.241 CALCULUS I—*Four hours; 4 credits.* This course is designed to cover the following topics: limits and continuities of real functions of one real variable. Differentiation and antidifferentiation of algebraic functions, exponential functions and logarithmic functions, chain rule, Rolle's theorem and mean value theorem. Simple applications of derivatives to various problems including max-min problems and graphing techniques. Prerequisite: 1701.114 or 1701.126 with grade C or better or instructor's permission.

1701.242 CALCULUS II—*Four hours; 4 credits.* This course is the continuation of 1701.241 and designed to cover the following topics: definite integrals and their applications. Fundamental theorem of calculus, techniques of integration derivatives and antiderivatives of trigonometric functions. Integrals yielding inverse trigonometric functions, Simpson's rule, Trapezoidal rule and other topics. Prerequisite: 1701.241 with the grade of C or better.

1701.243 CALCULUS III—*Three hours; 3 credits.* This course is designed to cover the following topics: Infinite series, partial differentiation, directional derivatives, gradients and line integrals, multiple integrals, and applications. Prerequisite: 1701.242 with grade C or better.

1701.312 INTRODUCTION TO MATRICES—*Three hours; 3 credits.* This course is designed to cover the following topics: linear transformations and matrices, vector spaces, eigenvalues and canonical forms, and other topics as time permits. Prerequisite: 1701.241.

1701.322 SOLID ANALYTIC GEOMETRY—*Three 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: 1701.242 with a grade of C or better.

1701.340 INTRODUCTION TO DIFFERENTIAL EQUATIONS—*Three hours, 3 credits.* This is a first course dealing with methods of solving ordinary differential equations with application to geometry and physics. The following topics are included: equations of the first order and first degree; equations of the first order but not of the first degree; singular solutions; linear equations with constant and variable coefficients. Prerequisite: 1701.242.

1701.341 ADVANCED CALCULUS I—*Three hours; 3 credits.* This course is designed to cover the following topics: elements of point-set theory in Euclidean spaces, limits and continuity of functions of one and several real variables, differentiation of functions of one real variable and several real variables, applications of partial differentiation including the inverse function theorem and implicit function theorem. Prerequisite: 1701.243 with grade C or better, or Departmental permission.

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1701.342 ADVANCED CALCULUS II—*Three hours; 3 credits.* This course is designed to cover the following topics: functions of bounded variation, Reimann-Stieltjes' integration, infinite series and infinite product, sequence of functions and convergence, some special functions, introduction to measure theory. Prerequisite: 1701.341 with grade C or better.

1701.343 COMPLEX VARIABLES—*Three hours, 3 credits.* This course is designed as a study of elementary functions of a complex variable, Cauchy's intergral theorem and formula, residues and poles, power series, introductions to the solutions of differential equations by series. Prerequisite: 1701.341 with grade of C or better.

1701.352 NUMERICAL METHODS AND PROGRAMMING—*Three 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: 1701.242 with grade C or better.

1701.413 INTRODUCTION TO MODERN ALGEBRA—*Three hours; 3 credits.* This course is designed to cover the following topics: number system and elementary theory of groups, rings, integral domains, fields and ideals as well as an introduction to polynomials and matrices over a field will be considered. Prerequisite: 1701.215 or 1701.312 or permission of the instructor.

1701.417 AUTOMATA, COMPUTABILITY, AND FORMAL LANGUAGES—*Three hours; 3 credits.* This course discusses formal languages and the formal machines which recognize them. Prerequisite: 1701.215.

1701.421 HIGHER GEOMETRY—*Three hours; 3 credits.* This course introduces the student to projective, advanced Euclidean and non-Euclidean geometrics. Some topics discussed are transformation theory, projective theory of conics, Desarsgues' theorem, duality, projectivities; parabolic, hyperbolic and elliptic geometries. Prerequisite: 1701.242 with a grade of C or better or by permission of the instructor.

1701.431 MATHEMATICAL THEORY OF STATISTICS I—*Three 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: 1701.242 with a grade of C or better.

1701.432 MATHEMATICAL THEORY OF STATISTICS II—*Three hours; 3 credits.* This course is a continuation of Mathematics 1701.431. 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: 1701.431 with grade C or better.
The two courses in Mathematical Theory of Statistics are not a duplication of Psychology 2001.316-317 or Economics 2204.311, 2204.312, since Mathematics 1701.431-31 emphasize the mathematical theory of statistics and require a knowledge of calculus as a prerequisite.

1701.450 SENIOR SEMINAR—*Three hours; 3 credits.* This course is designed to aid the student in integrating his knowledge of mathematics and in developing to a higher level his problem-solving ability. Materials will be selected from a number of sources including courses required for a major and topics which are not part of any regular course. This course is required of senior mathematics majors who do not present credit in the conference course. Prerequisite: A grade of C or better in four (4) mathematics courses numbered above 300.

1701.451 CONFERENCE COURSE—*Three hours; 3 credits.* This course is designed for seniors in the Honors Programs and others admitted by the chairperson and is devoted to one or more topics in advanced mathematics. Much of the work is done through independent study with timely conferences with the instructor.

1701.452 CONFERENCE COURSE—*Three hours; 3 credits.* This course is the same type as 1701.451 and operates independently of 1701.451.

1701.479 POINT SET TOPOLOGY—*Three hours; 3 credits.* This course is designed to cover the following topics: point set theory of the line and plane, topological spaces and properties and mappings. Prerequisite: 1701.341 with a grade of C or better.

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