GROUP III: ASIA, AFRICA AND LATIN AMERICA

HIST 4320. United States-Latin American Relations 3 sem. hrs.
Analyzes the symbiotic relationship between the United States and Latin America from 1776 to the present, focusing on the key themes of race, colonialism, resistance, transnationalism, decolonization, revolution, the drug trade and immigration. Students will examine how the United States’ changing global status has affected its political, economic and cultural relationships with other countries in the Americas. Prereq: Soph. stndg.; HIST 1001 and HIST 1002 recommended.

HIST 4350. The Caribbean 3 sem. hrs.
This course focuses on the contours of Caribbean history, 1400 to present. It examines Native American cultures, colonization, slavery, international trade, the politics of independence, economic development, national identity, and ethnicity. Prereq: Soph. stndg.; HIST 1001 and HIST 1002 recommended.

HIST 4355. History of Mexico 3 sem. hrs.
Mexico from pre-Columbian times to the present, with emphasis on major civilizations, the conquest, colonial society, independence, nineteenth-century development, Porfirian dictatorship, the Revolution of 1910, and modern society since 1920. Prereq: Soph. stndg.; HIST 1001 and HIST 1002 recommended.

North Africa from the 7th century to the present, emphasizing Islamic and European influences. Prereq: Soph. stndg.; HIST 1001 and HIST 1002 recommended.

HIST 4500. Modern Japan 3 sem. hrs.
Major events, people, and debates in Japanese history from 1800 to the present. Includes examinations of the “margins” of Japanese history: the countryside, the common people, ethnic minorities, marginal identities, etc., in order to understand how individuals dealt with changes in Japan from its early modernity to the present day. Prereq: Soph. stndg.

HIST 4550. Medieval East Asia 3 sem. hrs.
Examines the tremendous flourishing of Chinese and Japanese cultures between the 7th and 14th centuries and the influence Mongol conquests played on the diffusion of these cultures to the west. Prereq: Soph. stndg.

HIST 4555. Modern China 3 sem. hrs.
The history of China from 1800-1976, emphasizing national responses to imperial decline, western intervention, civil wars, foreign occupation, and political turmoil. Offered biennially. Prereq: Soph. stndg.

HIST 4600. Comparative Twentieth-Century Genocides 3 sem. hrs.
Examines the emergence, development, underlying causes and uses of genocide, ethnic cleansing and the other crimes against humanity in the twentieth-century. Case studies include colonial genocides; the Armenian genocide; the Holocaust; the Cambodian genocide; the Rwandan genocide; and the ethnic cleansings in the former Yugoslavia. Explores responses to these crimes, denial and memory, justice and redress, and strategies of prevention and intervention will be explored. Prereq: Soph. stndg.; HIST 1001 and HIST 1002 recommended.

SPECIAL COURSES

HIST 4931. Topics in History 3 sem. hrs.
A lecture course on various areas and themes. The specific topics of 4931 courses will be designated in the Schedule of Classes. Prereq: Soph. stndg.

HIST 4952. Readings in History 2 sem. hrs.
Readings and discussion course designed to introduce a small group of undergraduates to topics, problems and methodologies in history which are not taught in the regular lecture courses. The topics will be designated in the Schedule of Classes. Offered annually. Prereq: Jr. stndg.

HIST 4955. Undergraduate Seminar in History 3 sem. hrs.
Designed to initiate a small group of undergraduates in the techniques of scholarly historical study by concentrated work in a specialized field. Prereq: Jr. stndg.

HIST 4986. Internship in Public and Applied History 3 sem. hrs.
Offers history majors, minors, and interdisciplinary minors in public history an opportunity to have a work experience outside of the classroom in such venues as archives, art museums, historical societies, and museums. Students must arrange the internship in consultation with the public history advisor and complete an internship agreement. Undergraduate students work 10-12 hours per week and graduate students work 10-12 hours per week during the term. Students complete a written assignment in conjunction with the work experience as part of the course requirements. Completion or concurrent enrollment in HIST 4100 is strongly recommended. S/U grade assessment. Prereq: Cons. of public history advisor.

HIST 4995. Independent Study in History 1-3 sem. hrs.
Prereq: Jr. stndg., cons. of instr., and cons. of dept. ch.

HIST 4999. Senior Experience in History 3 sem. hrs.
The Senior Experience requirement applies to all students who are seeking a BA degree in the Klingler College of Arts and Sciences. The goals of the Senior Experience requirement are 1) to provide an opportunity to apply one’s accrued educational experience to a mature study of a given theme informed by the University’s Mission; 2) to apply the skills of generating new knowledge within the standards of one’s disciplinary training, and 3) to promote an appreciation for social and individual complexity, an awareness and appreciation of diversity in all its forms, and an appreciation of faith in the human experience through fully engaging a chosen topic. Topics vary annually; course descriptions are available in department offices. Prereq: Sr. stndg.

HIST 4999. Senior Thesis 3 sem. hrs.
Offered annually. Prereq: 3.500 MU GPA and cons. of dept. ch.

MATHEMATICS, STATISTICS AND COMPUTER SCIENCE (MATH AND COSC)

Chairperson and Professor: B. Krenz
Assistant Chairperson and Adjunct Instructor: Manyo
Professor: Bankston, Bansal, Braunsschweiger (Emeritus), Clough, Hamedani, Hannenek (Emeritus), Harris, Jones, Krenz, Lawrence (Emeritus), Merrill, Moyer, Pastijn, Ruitenb
Associate Professor: Ahamed, Brookshear (Emeritus), Byleen, Factor, Runow, Strubble
Assistant Professor: Brylow, G, Adiraju, Magiera, Sanders, Scott, Spiller
Research Associate Professor: Tonelliato
Adjunct Instructor: Schwem, Utzerath

Lecturer: Boell, Chmielinski, Hughes, Miller, Walker

MAJOR IN MATHEMATICS:
Thirty-nine hours of mathematics courses, including MATH 1450, 1451, 2350, 2450, 3100; one of the following sequences: MATH 4120/4121, MATH 4200/4201, MATH 4200/4450, MATH 4420/4030, MATH 4500/4510, MATH 4670/4650, MATH 4700/4710; at least one additional course from each of the three groups listed below:

Group 1 Pure Courses 4120, 4121, 4200, 4201, 4202, 4230, 4420, 4450,

Group 2 Applied Courses 3500, 4500, 4510, 4540, 4630, 4650, 4670

Group 3 Statistics Courses 4700, 4710, 4715, 4720, 4740, 4770, 4780

and six additional hours of upper division MATH courses. (Occasionally MATH 4901 may be approved as a substitute within a student’s program of study for an above listed course.) In addition, each student must complete COSC 1010.

Students enrolled in the College of Education must fulfill the requirements of a MATH major by following the program below.

Thirty-nine hours of mathematics courses, including MATH 1450, 1451, 2450, 2350, 3100; the sequence MATH 4420/4030; and the electives below:

Group 1 Pure MATH 4120

Group 2 Applied MATH 4630

Group 3 Statistics MATH 4720

Electives MATH 4670 or 4700, and MATH 4040

In addition each student must complete MATH 3030 and COSC 1010.

Note that MATH 3030 is required as part of the state certification program and must be completed before student teaching. From the beginning of their work toward a degree, students should consult with both the department advisor for Mathematics Education and the Director of Teacher Education in the College of Education about the appropriate sequence of courses.

MINOR IN MATHEMATICS:

Twenty-four hours of mathematics courses, including MATH 1450, 1451, 2450, either 2350 or 2451, and at least nine additional hours of upper-division MATH courses.

To pursue Department of Public Instruction certification, College of Education students should follow the mathematics minor by selecting the following courses. Twenty-six hours of mathematics courses consisting of MATH 1450, 1451, 2350, 3100, 4040, 4120, 4420, and 4720. MATH 3030 must be completed before student teaching.
MAJOR IN COMPUTER SCIENCE:
Forty-one hours of computer science courses, including COSC 1010, 1020, 2100, 2200, 3100, 3250, 3410, 4997, 4998 and twelve additional hours of upper-division COSC courses. In addition, each student must complete MATH 1400, 2100, and three additional hours of upper-division MATH courses.

MINOR IN COMPUTER SCIENCE:
Twenty hours of computer science courses, including COSC 1010, 1020, 2100, 2200 and six additional hours of upper-division COSC courses. In addition, each student must complete MATH 2100.

MINOR IN SOFTWARE DEVELOPMENT:
Twenty hours of computer science courses, including COSC 1010, 1020, 2100, 4860 and six additional hours of upper-division COSC courses. In addition, each student must complete MATH 2100.

MAJOR IN MATHEMATICS:
Fifty hours of mathematics and computer science courses, including MATH 1450, 1451, 2350, 2450, 3100, 4630, 4760; either 4710 or 4720; COSC 1010, 1020, 2100, 2200; two of MATH 4200, 4500, 4510, 4650, 4700, 4740; and one of COSC 2350, 3410.

MAJOR IN MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS:
Students in this major must concurrently be enrolled in the middle childhood/early adolescence teacher education program (grades 1-8) within the College of Education. Thirty-one hours of mathematics courses, including MATH 1400, 2030, 2031, 2032, 2930, 3100, 4300, 4320, 4420, 4500 and 4720. From the beginning of their work toward a degree, students should consult with both a department adviser and the director of teacher education in the College of Education about the appropriate sequence of courses. University and state requirements for teacher certification are described in the College of Education section of this bulletin.

Mathematics Courses (MATH)

MATH 105. Intermediate Algebra 2 sem. hrs.
Designed for students with deficient mathematical backgrounds. Basic arithmetic and algebraic operations on integers, polynomials, rational numbers and expressions. Linear equations and inequalities, quadratic equations. Relations and functions. Not applicable to the total number of hours required for graduation. Prereq: Cons. of dept. ch.

MATH 1100. College Algebra 3 sem. hrs.
Precalculus mathematics including basic algebraic operations, equations, inequalities, complex numbers, graphs, functions, zeros of polynomials, systems of equations, and matrices. Offered every term. Prereq: Two years of college preparatory mathematics including a year each of algebra and geometry. Does not count toward Math-Logic-Computer requirement in the Arts and Sciences College Curriculum.

MATH 1101. Trigonometry and Analytic Geometry 3 sem. hrs.
A continuation of MATH 1100 covering precalculus mathematics including trigonometric functions and their properties, trigonometric identities and equations, applications of trigonometry, vectors, polar coordinates, exponential and logarithmic functions, and conic sections. Offered spring term. Prereq: MATH 1100 or equivalent. Equivalent is one year of high school geometry and the equivalent of MATH 1100 in high school courses. Does not count toward the Math-Logic-Computer requirement in the Arts and Sciences College Curriculum.

MATH 1200. First Year Seminar 1 sem. hrs.
Concepts of mathematics for liberal arts students. Emphasis on understanding and appreciating concepts rather than developing computational skills. For example, such topics as the historical development of ideas, role of abstraction, and relationship between different areas of mathematics is given precedence over performance of arithmetic and algebraic manipulations. Prereq: Two years of college preparatory mathematics.

MATH 1300. The Nature of Mathematics 3 sem. hrs.
Concepts of mathematics for liberal arts students. Emphasis on understanding and appreciating concepts rather than developing computational skills. For example, such topics as the historical development of ideas, role of abstraction, and relationship between different areas of mathematics is given precedence over performance of arithmetic and algebraic manipulations. Prereq: Two years of college preparatory mathematics.

MATH 1400. Elements of Calculus 1 3 sem. hrs.
The basic concepts and techniques of differential and integral calculus. Applications and examples chosen primarily from economics, biology, the social and behavioral sciences and business. Offered every term. Prereq: MATH 1100 or equivalent. Equivalent is three years of college preparatory mathematics.

MATH 1410. Calculus for the Biological Sciences 3 sem. hrs.
Fundamental concepts and techniques of differential and integral calculus, logarithmic, exponential and trigonometric functions, examples and applications from biology and medicine. Prereq: MATH 1100 or equivalent. Equivalent is three years of college preparatory mathematics.

MATH 1450. Calculus 1 4 sem. hrs.
Functions of one variable, limits and continuity. The derivative and the definite integral with applications. Offered every term. Prereq: MATH 1100 or equiv. Equivalent is three to four years of college preparatory mathematics including topics listed in description of MATH 1101.

MATH 1451. Calculus 2 4 sem. hrs.

MATH 1455. Calculus 2 for Biomedical Engineers Techniques of Integration 4 sem. hrs.
Techniques of integration, including numerical methods, infinite sequences and series, including Taylor Series. Analytic-Geometry including parametric equations, vectors and vector functions. The differential and integral calculus of functions of several variables. Restricted to students in BIEN. Offered spring term. Prereq: MATH 1450.

MATH 1700. Modern Elementary Statistics 3 sem. hrs.
Fundamental theory and methods of statistics without calculus. Descriptive statistics, elements of probability theory, estimation, tests of hypotheses, regression, correlation, introduction to computer methods of statistical tabulation and analysis. This course is recommended for students seeking a general introduction to statistical concepts and is not intended to be a final course in statistics for students who need a thorough understanding of statistical methods. Prereq: MATH 105 or equivalent. Equivalent is two years of college preparatory mathematics. May not be taken for credit by students who have received college credit for another probability or statistics course.

MATH 2030. Number Systems and Operations for Elementary Teachers 2 sem. hrs.
Mathematical content and processes for teachers. Mathematical techniques and ways of thinking are used to enhance mathematical power. Multiple ways of organizing and analyzing data, reasoning and communication skills, and multiple problem-solving strategies are used to solve nonroutine problems. In the process, elementary mathematical ideas are expanded and deepened. Restricted to students in the teacher preparation program. Prereq: Two years of college preparatory mathematics.

MATH 2031. Number Systems and Operations for Elementary Teachers 2 sem. hrs.
Mathematical content and processes for elementary teachers. Uses a problem solving approach. Integrates mathematics content with teaching methods and learning theory. In-depth study of whole and rational number systems including analyses of algorithms for addition, subtraction, multiplication, and division. Provides a framework for the meaningful teaching of place value, whole numbers, exponents, fractions, decimals, percents, ratios, proportions, probability, and data analysis. Restricted to students in the elementary teacher preparation program. Prereq: EDUC 1964, which must be taken concurrently, and MATH 2030.

MATH 2032. Algebra and Geometry for Teachers 2 sem. hrs.
Mathematical content and processes for teachers. Uses a problem solving approach. Integrates mathematics content with teaching methods and learning theory. In-depth study of the growth of algebraic and geometric reasoning. Provides a framework for the meaningful teaching of integers, patterns, algebraic expressions, functions, equations, graphs, spatial visualization, polygons and polyhedra, similarity and congruence, conjectures and deductions in geometry, and mathematical modeling. Restricted to students in the teacher preparation program. Prereq: EDUC 2964, which must be taken concurrently, and MATH 2031.

MATH 2100. Discrete Mathematics 3 sem. hrs.
Introduction to set theory, logic, mathematics induction, finite state machines, graph theory, modular arithmetic, Boolean algebra, and coding theory. Applications in computer science are emphasized. Offered spring term. Two years of college preparatory mathematics required. May not be taken for credit by those who have completed MATH 2150.
MATH 2105. Discrete Mathematics for Engineers 3 sem. hrs.
Counting methods. The algebra of sequences, generating functions, and recurrences. The algebra of finite state machines and semigroups. Relations, graphs, posets, and trees. Path and flow problems. Offered spring term. Prereq: MATH 2451. Credit will not be given for both MATH 2105 and either MATH 2100 or MATH 2250.

MATH 2350. Foundations of Mathematics 3 sem. hrs.
Introduction to set theory, logic, mathematical induction, graph theory, modular arithmetic, and higher mathematical thinking through proof and applications. Mathematical proof is emphasized. Prereq: MATH 1400, MATH 1410 or MATH 1450.

MATH 2450. Calculus 3 4 sem. hrs.
Three-dimensional analytic geometry including parametric equations, vectors and vector functions. The differential and integral calculus of functions of several variables. Prereq: MATH 1451.

MATH 2451. Differential Equations 4 sem. hrs.
Methods and techniques applicable to first order, nth order, and systems of first order differential equations. Eigenvalues, eigenvectors, the Wronskian, Laplace transforms, linearization, and phase portraits. Prereq: MATH 2450.

MATH 2455. Differential Equations for Biomedical Engineers 3 sem. hrs.
Methods and techniques for solving differential equations and systems of differential equations, with applications to biomedical engineering. Offered spring term. Prereq: MATH 2450 or MATH 1455.

MATH 3030. The Teaching of Mathematics 3 sem. hrs.
Historical background, problems, curricular materials, and teaching procedures in the various areas of mathematics pertinent to the needs of a secondary school mathematics teacher. In addition, a three-hour time block on one day each week between 8 a.m. and 3 p.m. must be kept free for clinical experience. Offered alternate fall terms. Prereq: EDUC 2227 and either MATH 4120 or MATH 4420, which may be taken concurrently. Admission to the College of Education.

MATH 3100. Linear Algebra and Matrix Theory 3 sem. hrs.
N-dimensional vector spaces, bases and coordinate systems, linear transformations and matrices, systems of equations, characteristic values, applications to differential equations and geometry. Prereq: MATH 2451 or MATH 2350.

MATH 3250. Operational Methods in Physics and Engineering 3 sem. hrs.
Functions of a complex variable, Laplace and Fourier transforms and applications. Introduction to the calculus of variations. Prereq: MATH 2450.

MATH 3977. Problem Solving: Putnam Competition 1 sem. hr.
Students will study mathematical problems, examine their solutions and formulate general problem solving methods and techniques. The course is a preparation for the Putnam Mathematical Competition. S/U grade assessment. Offered fall term. Prereq: Cons. of instr.

MATH 4030. Concepts in Geometry and Calculus from an Advanced Standpoint 3 sem. hrs.
Topics closely related to the high school mathematics curriculum, chosen primarily from algebra and number theory, taught from an advanced standpoint to enrich and deepen the student's understanding. Emphasis on alternative approaches, generalizations, historical contexts and connections with prior mathematical studies. Offered alternate spring terms. Prereq: MATH 4420 and six additional hrs. of upper division MATH courses and cons. of dept. ch.

MATH 4040. Concepts in High School Algebra and Number Theory from an Advance Standpoint 3 sem. hrs.
Topics closely related to the high school mathematics curriculum, chosen primarily from algebra and number theory, taught from an advanced standpoint to enrich and deepen the student's understanding. Emphasis on alternative approaches, generalizations, historical contexts and connections with prior mathematical studies. Offered alternate spring terms. Course is offered for graduate credit only to students enrolled in MSST.

MATH 4120. Abstract Algebra 1 3 sem. hrs.
Sets, mappings, operations on sets, relations and partitions. A postulational approach to algebraic systems including semigroups, groups, rings and fields. Homomorphisms of groups and rings, number systems, polynomial rings. Offered fall term. Prereq: MATH 2350.

MATH 4121. Abstract Algebra 2 3 sem. hrs.
A continuation of MATH 4120 with emphasis on groups, rings, fields, and modules. Prereq: MATH 4120.

MATH 4200. Intermediate Analysis 1 3 sem. hrs.
Limits and continuity, differentiability, Riemann integration. Topology of N-dimensional spaces. Offered alternate fall terms. Prereq: MATH 2451 or MATH 1450.

MATH 4201. Intermediate Analysis 2 3 sem. hrs.
Transformations of N-spaces, line and surface integrals, sequences and series, uniform convergence. Prereq: MATH 4200.

MATH 4210. Complex Variables 3 sem. hrs.
Complex numbers, analytic functions, differentiation, series expansion, line integrals, singularities, and residues. Offered alternate spring terms. Prereq: MATH 2450.

MATH 4300. History of Mathematical Ideas 3 sem. hrs.
Topics selected from the following: development of the number system (need for irrational and complex numbers); development of geometry including the effects of the discovery of non-Euclidean geometry; limit concept; need for axiomatic structures; twentieth-century problems. Current mathematics research and place of mathematics in today's world. Offered alternate spring terms. Prereq: Jr. stand. or cons. of dept. ch.

MATH 4320. Theory of Numbers 3 sem. hrs.
Integers, unique factorization theorems, arithmetic functions, theory of congruences, quadratic residues, partition theory. Offered alternate spring terms. Prereq: MATH 2350.

MATH 4420. Foundations of Geometry 3 sem. hrs.
Modern postulational development of Euclidean and non-Euclidean geometries. Offered fall term. Prereq: MATH 2350.

MATH 4450. Topology 3 sem. hrs.

Existence and uniqueness theorems, linear and non-linear systems, numerical techniques, stability. Offered alternate fall terms. Prereq: MATH 2451 or MATH 3100.

MATH 4510. Elementary Partial Differential Equations 3 sem. hrs.
Fourier series, method of separation of variables, eigenfunction expansions, application of eigenfunctions to partial differential equations, Green's functions and transform methods. Prereq: MATH 2451 or MATH 3100.

MATH 4540. Numerical Analysis 3 sem. hrs.
Numerical solution of algebraic and transcendental equations, linear systems and the algebraic eigenvalue problem, interpolation and approximation, numerical integration, difference equations, numerical solution of differential equations, and finite difference methods. Offered fall term. Prereq: COSC 2200, COSC 2100 and either MATH 1400 or MATH 1451; or COSC 2010 and MATH 1451; or COEN 1610 and MATH 1451.

MATH 4560. Mathematical Modeling and Analysis 3 sem. hrs.
Construction and analysis of mathematical models from biological, behavioral, and physical sciences. Offered spring term. Prereq: MATH 2451 or MATH 3100.

MATH 4650. Theory of Optimization 3 sem. hrs.
Fundamental theorems describing the solution of linear programs and matrix games. Minimax, duality, saddle point property, simplex and specialized algorithms. Zero sum games, transportation and assignment problems, applications to economics. Prereq: MATH 2451 or MATH 3100.

MATH 4670. Applied Combinatorial Mathematics 3 sem. hrs.
Permutations and combinations, recurrence relations, inclusion and exclusion, Polya's theory of counting, graph theory, transport networks, matching theory. Prereq: MATH 2100 or MATH 2350.

MATH 4700. Theory of Probability 3 sem. hrs.
Random variables, distributions, moment generating functions of random variables, various derived probabilistic models and applications. Recommended, with MATH 4710, for students in mathematics, engineering, and the physical and behavioral sciences. Offered fall term. Prereq: MATH 2450.

MATH 4710. Mathematical Statistics 3 sem. hrs.
Sampling theory and distributions, estimation and hypothesis testing, regression, correlation, analysis of variance, non-parametric methods, Bayesian statistics. Offered alternate spring term. Prereq: MATH 4700.
MATH 4720. Statistical Methods 3 sem. hrs.
Probability, discrete and continuous distributions.
Treatment of data, point and interval estimation,
hyphenation testing. Large and small sample method,
regression, non-parametric methods. An introd-
cutory applications-oriented course recommended
for students who wish to acquire a basic understanding
of statistical methods. Prereq: MATH 1400, MATH
1410 or MATH 1450. May not be taken for credit by
those who have completed MATH 4710.

MATH 4740. Biostatistical Methods and
Models 3 sem. hrs.
Introduction to the statistics of life science and the
use of mathematical models in biology. Data analysis
and presentation, regression, analysis of variance,
correlation, parameter estimation and curve fitting.
Biological sequence analysis, discrete and continu-
ous mathematical models and simulation. Credit will
not be given for both MATH 4720 and MATH 4740.
Offered fall term. Prereq: One semester of calculus.

MATH 4760. Time Series Analysis 3 sem. hrs.
Basic concepts of probability. Stationary time series.
Autocorrelation and spectrum. Descriptive methods
for time series data. ARIMA and ARIMA models. esti-
maton and forecasting. Identification and diagnostic
techniques. Periodogram and spectral analysis. Use
of softwares for time series analysis. Offered alter-
native spring terms. Prereq: MATH 2450 or equivalent.

MATH 4780. Regression Analysis 3 sem. hrs.
Basic concepts of statistical inference, simple linear
regression, multiple linear regression, diagnostic
analysis, selecting the best equation, stepwise meth-
ods, nonlinear regression, use of statistical software.
Offered alternate spring terms. Prereq: MATH 4720 or equivalent.

MATH 4931. Topics in Mathematics or
Statistics 1-3 sem. hrs.
Topics selected from one of the various branches
of mathematics or statistics. Specific topics to be
announced in the Schedule of Classes.

MATH 4953. Undergraduate Seminar
3 sem. hrs.
Designed to initiate a selected group of qualified
undergraduates into the techniques and discipline
of scholarly research by concentrated work in
a restricted field. Emphasis on critical reading
and analysis of sources. Specific subjects to be
announced in the Schedule of Classes.
Prereq: Cons. of dept. ch.

MATH 4987. Co-op Work Period 0 sem. hrs.
Students work full-time during fall or spring terms
in a cooperative education program work assign-
ment approved in advance by the department.
Responsibilities include relevant academic content.
Grading and credits are accomplished by registering
for MATH 4987 during the following term. Offered
every term. Fee. Prereq: Jr. stad. SNC/UNC grade assessment.

MATH 4988. Co-op Grading Period 1 sem. hr.
Grading for preceding co-op work assignment is
accomplished by completing a report on the work
assignment, a report on academic material related
to the work assignment, and other materials as
required. Grading is completed during the school
term following the work assignment. May be taken
more than once, but a maximum of two credits
may be counted toward a major in the department.
Offered every term. Prereq: Jr. stad. and MATH 4987.

MATH 4995. Independent Study in
Mathematics 1-3 sem. hrs.
Directed reading and/or research in Mathematics
under a member of the staff. Prereq: Cons. of dept. ch.

MATH 4999. Senior Thesis 2 sem. hrs.
Preparation of a thesis by approved students under
the direction of an adviser from the staff. Offered
every term. Prereq: Cons. of dept. ch.

Computer Science (COSC)

COSC 1000. Introduction to Computer Science 3 sem. hrs.
Introduction to the science behind today's comput-
erized society. Emphasis placed on understanding
the breadth and current status of computer science
rather than the development of skills. Topics include
machine architectures, operating systems, network-
ing, algorithms and their development, programming
languages, artificial intelligence, and data represen-
tation systems. (Previous computer experience is not required.) Prereq: Two years of college preparatory
mathematics. This course satisfies the computer option in the Arts and Sciences core curriculum.

COSC 1010. Introduction to Computer Programming 4 sem. hrs.
Introduction to abstraction, algorithmic thinking,
simulation and testing for computer-based problem
solving. Students will learn a high-level program-
ning language and use tools developed by computer
scientists and software engineers to solve problems.
No prior programming experience is assumed. 3 hrs.
lecture, 2 hrs. lab. Two years of college preparatory
mathematics required.

COSC 1020. Object-Oriented Software Design 4 sem. hrs.
Software development using Java. Topics include
classes and interfaces as design patterns, the Java
API, current object-oriented design methodologies,
an introduction to the Internet and the development
of Web applications. Projects involve the develop-
ment of graphical interfaces and net-centric applica-
tions. 3 hrs. lecture, 2 hrs. lab. Prereq: COSC 1010 or advanced placement.

COSC 2010. Data Structures for Engineers 3 sem. hrs.
The study of popular data structures such as lists,
stacks, queues and trees and their related algo-
rithms. Prereq: COSC 1010 or ECE 1610; knowledge of JAVA. Credit will not be given for both COSC 2010 and COSC 2100.

COSC 2100. Data Structures and Algorithms 3 1/2 sem. hrs.
Introduction to algorithm analysis and complexity
theory presented in the context of data structures and
the algorithms used to manipulate them. Includes
introduction to traditional data structures, indexing, hashing, and time and space complexity. Offered fall term. Prereq: COSC 1020 and MATH 2100.

COSC 2200. Hardware Systems 3 sem. hrs.
Introduction to computer architecture and machine
level programming. Topics include combinational
and sequential binary logic, assembly languages,
memory management, caching, pipelining, bus archi-
tecture, interrupts and I/O processing. Course may
consist of a 3 hr. lecture or a 2 hr. lecture and 2 hr.
lab. Prereq: COSC 1020 and MATH 2100.

COSC 3100. Data Structures and Algorithms 2 3 sem. hrs.
Types of algorithms such as divide-and-conquer,
greedy, probabilistic, graph traversal, heuristic,
and parallel algorithms. Computational complexity
including time and space complexity, and the P=NP
problem. Offered spring term. Prereq: COSC 2100 or COSC 2100.

COSC 3250. Operating Systems 3 sem. hrs.
Fundamental concepts of operating systems includ-
ing process control and scheduling, synchronization,
memory management, file systems, device control,
and the boot process. Course may consist of a 3 hr.
lecture or a 2 hr. lecture and 2 hr. lab. Prereq: COSC 2200 and COSC 2100 or COSC 2100.

COSC 3300. Networks and Internets 3 sem. hrs.
Fundamentals of popular network technologies,
internet organization and underlying protocols,
domain administration, support of internet applica-
tions and distributed systems, domain and internet-
wide security. Course may consist of a 3 hr. lec or
a 2 hr. lec and 2 hr. lab. Offered fall term.
Prereq: COSC 2100 or COSC 2100.

COSC 3410. Programming Languages 3 sem. hrs.
A comparative study of programming paradigms and
representative programming languages. Topics include
binding times, control of data, control of execu-
tion, execution environment, the role of language
as an organizational tool, modularization, and the
concept and significance of universal programming
languages. Offered fall term. Prereq: COSC 2100 or COSC 2100.

COSC 3550. Programming Computer Games 3 sem. hrs.
Algorithms, data structures, and tricks used to
program arcade-style video games written in Java.
Topics include 2D animation, sprites, interaction,
music/sound, 3D worlds, network games. Underlying
issues include graphical user interfaces, multi-
threaded applications, real-time concerns, use
of APIs, and client-server applications. Offered
annually. Prereq: COSC 2200 and COSC 2100 or COSC 2100.

COSC 3810. Software Design and Analysis 3 sem. hrs.
Issues involved in the design and implementation
of large software systems. Software lifecycle, software
design methodologies, human factors analysis, proj-
ection management. Prereq: COSC 2100 or COSC 2100.

COSC 3977. Problem Solving — Programming 1 sem. hr.
Students will study and implement computing
problems, examine their solutions, apply classical
algorithms, and formulate strategies for teamwork
and problem solving in a programming contest envi-
ronment. This course is a preparation for the ACM
International Collegiate Programming Contest. S/U
grade assessment. Prereq: Cons. of instr.

COSC 4110. Formal Languages and
Computability 3 sem. hrs.
Regular languages, finite state automata, and lexi-
cal analysis; context free languages, push-down
automata, parsing, and the rudiments of LL and LR
parsers; general phrase-structure languages, Turing
machines, the Church-Turing thesis, the halting
problem, universal programming languages. Offered
alternate years. Prereq: COSC 3100.
COSC 4400. Compiler Construction 3 sem. hrs.  
Lexical analysis, parsing, code generation, and optimization. Includes theoretical foundations and the practical concerns of implementation. Offered alternate years. Prereq: COSC 2200 and COSC 3410, or COSC 3410 and COSC 2100.

COSC 4600. Fundamentals of Artificial Intelligence 3 sem. hrs.  
An introduction to the broad field of artificial intelligence. Topics include problem solving by searching, knowledge representation, reasoning, planning, decision making, learning, perception, and language processing. Offered alternate fall terms.  
Prereq: COSC 2100 or COSC 2109, and COSC 2200.

COSC 4610. Data Mining 3 sem. hrs.  
Techniques for extracting and evaluating patterns from large databases. Introduction to knowledge discovery process. Fundamental tasks including classification, prediction, clustering, association analysis, summarization, and discrimination. Basic techniques including decision trees, neural networks, statistics, partitional clustering, and hierarchical clustering. Offered alternate spring terms.  
Prereq: COSC 4600 or CSEN 4600; and COSC 4800.

Topics include database concepts and architecture, data modeling, formal query languages such as relational algebra, commercial query language SQL, database access from application programs and a brief examination of advanced concepts including transactions, distributed databases, security and XML. Prereq: COSC 2100 or COSC 2109.

COSC 4860. Component-Based Software Construction 3 sem. hrs.  
Introduction to software components in the context of the object-oriented paradigm. Component development, component selection and adaptation/ customization, component deployment and assembly/integration, and system architecture. Industry standards such as JavaBeans, CORBA Component Model, and Microsoft COM/COM+. Offered fall term.  
Prereq: COSC 1020 or COSC 2109, and MATH 2100.

Fundamentals of structured software design and development applied in a multi-disciplinary, team-based project environment. Teams create project definition and specification based on user needs. Activities focus on software life cycle, design methodology, human factor analysis, teamwork, customer interaction, project management and effective communication. Work culminates in a technically and economically viable proposal for future development. (This course specifies and designs a project for implementation in COSC 4998.)  
Prereq: MATH 1400 or 1451; MATH 2100 or 2350; COSC 3250; COSC 3100; and Sr. stndg.

COSC 4931. Topics in Computer Science 1-3 sem. hrs.  
Topics selected from one of the various branches of computer science. Specific topics to be announced in the Schedule of Classes.  
Prereq: Cons. of dept. ch.

COSC 4987. Co-op Work Period 0 sem. hrs.  
Students work full-time during fall or spring terms in a cooperative education program work assignment approved in advance by the department. Responsibilities include relevant academic content. Grading and credits are accomplished by registering for COSC 4898 during the following term. Fee.  
Prereq: Jr. stndg. SNC/UNC grade assessment.

COSC 4988. Co-op Grading Period 1 sem. hr.  
Grading for preceding co-op work assignment is accomplished by completing a report on the work assignment, a report on academic material related to the work assignment, and other materials as required. Grading is completed during the school term following the work assignment. May be taken more than once, but a maximum of 2 credits may be counted toward a major in the department.  
Prereq: Jr. stndg. and COSC 4987.

COSC 4995. Independent Study in Computer Science 1-3 sem. hrs.  
Directed reading and/or research in computer science under a member of the staff.  
Prereq: Cons. of dept. ch.

COSC 4998. Senior Design Project 3 sem. hrs.  
Given initial design and project specification, focus is on detailed software design, prototyping and testing of design concepts in a realistic multi-disciplinary team environment. “Team-based activities” result in implementation of a software system in support of a project and culminate in a working prototype satisfying user needs and software specification. Final report documents prototype details and verifying project meets needs and specifications. (This course implements project specified and designed in COSC 4929.)  
Prereq: MATH 1400 or 1451; MATH 2100 or 2350; COSC 3250; COSC 3100; and Sr. stndg.

COSC 4999. Senior Thesis 2 sem. hrs.  
Preparation of a thesis by approved students under the direction of an adviser from the staff.  
Prereq: Cons. of dept. ch.

PHILOSOPHY (PHIL)
Chairperson and Associate Professor: South Assistant Chairperson and Associate Professor: Foster Professor: Anderson (Emeritus), Ashmore (Emeritus), Carter, J. Jones, Kainz (Emeritus), Talion, Taylor, Teske (Emeritus), Vandevelde, Wreen  
Associate Professor: Adams, Gibson, Goldin, Harrison, Iñáquez-Noé, Krettek, Luft, Monahan, Nolan, Peressini, Prendergast (Emeritus), Rice (Emeritus), Rousseau (Emeritus), C. Schmidt, Snow, Starr, Tweten  
Assistant Professor: Crockett, Fiaherty, Tobin, Trivigno  
Adjunct Associate Professor: Stohrer Visiting Assistant Professor: Ang, Shew

MAJOR IN PHILOSOPHY:  
All Majors take: Thirty hours, including either PHIL 1000 or 4000 (4000 recommended), PHIL 1001, PHIL 2310, and PHIL 3410 or 3430, and three courses in an area of concentration:  
History of Philosophy: 3610, 3620, 3625, 3630, 3640, 3650, 3660, 3665, 3670, (one course must be 3610 or 3650).

Social, Political and Legal Philosophy: 3660, 3710, 3730, 3740, 3750, 3751, 3770, 3780.  
Ethics and Values: 3350, 3370, 3380, 3760, 4320, 4330, 4335.  
Plus three philosophy electives.

MINOR IN PHILOSOPHY:  
Twenty-one hours, including either PHIL 1000 or 4000, 1001, 2310, and 3410 or 3450.

INTRODUCTORY COURSES
PHIL 1000. Logic 3 sem. hrs.  
The goal of the course is to provide the student with an understanding of correct reasoning as it is employed in ordinary discourse. The course will study topics such as: terms and propositions, definition, opposition, induction and deduction, reasoning and argumentation, fallacies in argument. Offered every term. Sr. stndg recommended.  
▲PHIL 1001. Philosophy of Human Nature 3 sem. hrs.  
Investigation into the meaning of rational life. The course deals with the following four problem areas: human choice, human cognition, the affective, social and spiritual dimensions of the human person, and the unity of the human being. A substantive treatment of classical and Christian philosophical approaches will be included. Offered every term. May not be taken by first semester freshmen.

▲PHIL 2310. Theory of Ethics 3 sem. hrs.  
An investigation into the moral dimension of human life. Among the topics to be considered are the norms of morality and the general process of moral decision-making. Traditional natural law will be one of the points of view included. Offered every term.  
Prereq: Soph. stndg. and PHIL 1001.

UPPER DIVISION COURSES
PHIL 3350. Philosophy of the Environment 3 sem. hrs.  
Philosophical inquiry into nature and our impact on it. Moral, scientific, and social problems posed by global environmental crises. Selected issues in value theory, ethics and aesthetics such as: the status of natural objects and systems, the morality of trade-offs between species, and the ethics of limiting consumption and population.  
Prereq: Soph. stndg., and PHIL 1001 and PHIL 2310.

PHIL 3370. Philosophy of Art 3 sem. hrs.  
Philosophical examination of art and its place in human life. Among possible topics are: cognitive aspects of art, art and cultural understanding, the contribution of philosophy to the understanding and appreciation of art, the definition of art, art and morality, the objectivity of judgements of aesthetic value, the nature of aesthetic experience, the ontology of art, art as vehicle of social change, and the role of the artists’ intentions in interpreting and evaluating works of art.  
Prereq: Soph. stndg. and PHIL 1001.

▲PHIL 3380. Asian Philosophy 3 sem. hrs.  
The major systems of philosophy of India and China; early Vedic and Upanishadic systems, Buddhism including Chan/Zen, Brahmanism, Hinduism, Confucianism, and Daoism. Emphasis on the key ideas in Eastern philosophy.  
Prereq: Soph. stndg. and PHIL 1001.