GEORGETOWN UNIVERSITY

UNDERGRADUATE BULLETIN 1995 1996

BACHELOR OF ARTS AND BACHELOR OF SCIENCE PROGRAMS

DEGREE REQUIREMENTS

Candidates for the B.A. and B.S. degrees in the College must complete the following graduation requirements:

1. Minimum of 120 semester hours *and* 38 to 40 semester courses. See NOTE below.
2. *General Education* requirements of 12 semester courses:

Literature	2 courses
Math/Science	2 courses
Social Science	2 courses
(except biology, chemistry, and physics majors)	
History	2 courses
Theology	2 courses
Philosophy	2 courses

   Mastery of a foreign language through the intermediate level
3. Selection of a major field of concentration and completion of all requirements of the major as specified by the department.
4. Comprehensive examination (or its equivalent) in the student's major field.
5 A final cumulative academic average of 2.0 or better.

Note: To meet the minimum of 120 credit hours, a student may need as many as 40 courses; Bachelor of Science candidates will exceed the 120 credit minimum by meeting the 38 course minimum. In counting courses, the student should note the following definitions of a course. An intensive language course for six to eight credits counts as one course. A one-credit offering is not computed in the course count. A two-credit science laboratory not related to a lecture or any other course valued at two credits is computed as a half course. A science lecture and accompanying laboratory is counted as one course, even if the lecture and laboratory are listed separately and even if they are taken in separate semesters. Non-credit leisure and recreation courses do not count toward graduation.

GENERAL EDUCATION REQUIREMENTS

The general education requirements are ordinarily fulfilled in the student's first and sophomore years.

Out of the normal course load of ten courses in first year, the student may choose no more than two courses in any one discipline; this regulation holds for sophomore year also. In addition, the student may not take two courses in the same discipline in the same semester during the first two years.

Literature

The literature requirement consists of two one-semester courses. While these courses usually are taken in the English Department, students may fulfill the requirement with literature courses—either in the original or in translation—in another language department, ancient or modern. For non-native speakers of English, the literature requirement must be fulfilled by courses whose readings are in English.

Social Science

All students except those majoring in Biology, Chemistry, or Physics, satisfy their Social Science requirement by taking two courses in one of the following fields: Government, Economics, Psychology or Sociology. Students majoring in Biology, Chemistry, and Physics do not have a Social Science requirement.

History

All students are required to complete the two semester course in European Civilization (HIST-033, 034). Those first-year students with a score of 4 or 5 on the Advanced Placement test in European History will be awarded six credits and will have fulfilled the requirement. First-year students with a score of three on the Advanced Placement test in European History will receive no credit, and must fulfill the history requirement with either the 033, 034 course, or, preferably, with two semesters of history electives numbered 100 to 499. Students who have not taken the European history AP examination, but who have taken an academically rigorous high school course similar to History 033, 034 should communicate before the opening of the fall term with the Director of Undergraduate Studies about possible exemption from the course. They should present a transcript of their record and a full description or syllabus of the course which they have taken. Such students, if approved in advance by the Department of History, will be allowed to substitute an elective course offered by the department. First-year students who receive Advanced Placement credit in American History must complete the two semesters of European Civilization. Students are advised that the History Department does not recognize the SAT Achievement Tests as evidence of a student's knowledge of European or American history.

Math/Science

For the classes of 1996 and 1997 the math/science requirement may be satisfied in any one of three ways: (1) a one-semester math or computer science course coupled with a one-semester science course; (2) two one-semester science courses; (3) a full year sequence of Introductory Biology (BIOL-003, 004), General Chemistry (CHEM-003, 004), Elementary or Fundamental Physics (PHYS-041, 042 or 055, 056), Calculus I and II (MATH-035, 036), or one semester of Calculus I (MATH-035) followed by a semester of Probability and Statistics (MATH-040).

Pre-Calculus (MATH-001) does not count towards fulfillment of the math/science requirement.

For the classes of 1998 and 1999 the Math/Science requirement may be satisfied in either of two ways: (1) any of the two-semester introductory sequences usually taken by science majors in Math (035-036 or 035-040), Biology (003-004), Chemistry (003-004), Computer Science (071-072), Physics (041-042 with labs 031-032, or 055-056 with labs 035-036), or (2) any combination of two math or science or computer science courses provided one of these courses is chosen from among those designated as Core Math/Science Courses.

Philosophy and Theology

Georgetown, with its commitment to the Jesuit tradition, believes that modern men and women should consider reflectively their relationship to the world, their fellow man, and God. All students take a year of Philosophy and a year of Theology.

In Philosophy, Introduction to Philosophy and a second course, in Ethics, are required. The Problem of God course or Introduction to Biblical Literature plus one elective are required for Theology.

Language

All students in the College must achieve proficiency in a language (ancient or modern) through the intermediate level. During First-year Orientation placement exams are offered in most languages. Students who do not place above the intermediate level of a language on these placement exams fulfill the requirement by completing courses in a classical or modern language through the intermediate level.

The following language courses complete the College's language requirement:

Arabic: ARAB-112
Chinese: CHIN-114
French: FREN-102 *or* 012
German: GERM-102 *or* 012
Greek: (Ancient): CLAS-208
Greek: (Modern): GREE-112
Hebrew: HEBR-102
Italian: ITAL-012
Japanese: JAPN-114
Korean: SPPU-114
Latin: CLAS-202
Portuguese: PORT-012
Russian: RUSS-112
Spanish: SPAN-102 *or* 012

Students are strongly urged to complete the language requirement no later than the end of their sophomore year.

Please note the College does not grant credit for language study repeated at the same level of proficiency. Transfer students (including from within the University) should be certain to clear their choice of course level with the Dean's Office before enrollment. Intensive language study may or may not make further language study necessary.

MAJOR CONCENTRATIONS

In Georgetown College, the following major fields of concentration lead to a *Bachelor of Arts* degree:

- American Studies
- Classics
- Economics
- English
- Fine Arts
- Government
- History
- Interdisciplinary Studies
- Modern Languages (French, German, Spanish)
- Philosophy
- Psychology
- Sociology
- Theology

The following major fields lead to a *Bachelor of Science* degree:

- Biology
- Biochemistry
- Chemistry
- Computer Science
- Mathematics
- Physics

At preregistration in the spring before the end of the sophomore year, students following a Bachelor of Arts curriculum are obliged to declare formally their major field for the ensuing two years. Students wishing to study abroad in junior year are expected to declare majors at the time of application for the junior year abroad program. Although every attempt will be made to honor the student's first choice of a major, admission to a particular major shall be by permission of the department concerned and ultimately of the Dean. Students following a Bachelor of Science curriculum in Biology, Chemistry, Computer Science, Mathematics, or Physics normally elect their program prior to registration for their first year. Nonetheless, these students are directed to reconfirm their major in the spring of sophomore year both with their academic department and the Dean.

During the course of the degree, it is generally expected that a student's academic achievement in courses required in the major be at a level of C or better. A student achieving grades in major courses consistently below this standard may be directed by the Dean to elect a different major.

The major program includes the required courses as specified in the curriculum. The student must receive departmental approval for all courses in his or her major field. At the end of the senior year, each candidate for a degree must pass a comprehensive examination (or its equivalent) in his or her major field. This comprehensive may be written or oral, or both, depending on the department.

The major department may require the student to take a maximum of 12 courses, including basic courses in that major. The student, in turn, may elect a maximum of 14 courses in his or her major. It is expected that a science major in junior and senior years will elect one non-science course per semester.

Students are required to complete at least half of the upper division courses required for the major at Georgetown. Credits taken at another institution, including Georgetown approved study abroad programs, which are in excess of half of the upper division courses required in a major will be counted as free electives towards the degree.

Occasionally a student receives approval to pursue two majors. If the fields of study lead to different degrees (e.g., English and Biology), the student elects to graduate with *either* a Bachelor of Arts degree *or* a Bachelor of Science degree. Students are not permitted to major in more than two fields.

MINOR CONCENTRATIONS

Minor areas of concentration (minors) are permitted, but not required, in the College of Arts and Sciences. The following areas are available for minor concentrations:

- Biology
- Chemistry
- Classics
- Computer Science
- Economics
- English
- Fine Arts
- Government
- History
- Mathematics
- Medieval Studies
- Modern Languages (French, German, Spanish)
- Philosophy
- Physics
- Psychology
- Social & Political Thought
- Sociology
- Theology
- Women's Studies

Minor areas of concentration should be declared in the junior year. In order to complete requirements for a minor, the student must take the majority of credits in the minor field at Georgetown. Minor requirements are listed under departmental entries.

When a student has declared a double major, a minor is not permitted. Double minors are also not approved.

REGIONAL STUDIES CERTIFICATES

College students in all majors who wish to establish a multidisciplinary concentration in a world region are invited to join the regional studies certificate programs in African, Arab, Asian, German, Latin American, and Russian Studies. Information on the certificate programs may be obtained in the School of Foreign Service Dean's Office in the Intercultural Center.

ACADEMIC ADVISING PROGRAM

The richness and multiplicity of the College's programs and course offerings may be a source of perplexity to students. The faculty advising program is designed to offer students help in making responsible choices about programs and courses and to ensure that students are aware of all the opportunities Georgetown offers in the undergraduate College curriculum.

Every first-year student is assigned a faculty adviser when he or she enters the College. In the mathematics and science departments students have normally declared their major before admission and therefore advisers assigned in the first year are usually retained until graduation. Upper-class science and mathematics majors also provide assistance to first-year students.

First-year students in the humanities are assigned to advising "groups" consisting of a faculty member, one or two upper-class students and approximately fifteen students. The faculty advisers are normally retained until the second semester of sophomore year when all students must officially declare their majors. At that time, faculty members in the students' major departments become their advisers.

Transfer students report to their major departments to request faculty advisers.

Although faculty and student advisers may help students with problems of a general nature, their primary responsibility is to provide academic advice about courses, fulfillment of requirements, and choice of major. Faculty advisers discuss and give formal approval to students' academic programs at each registration or pre-registration.

The Dean and his staff are also readily available for consultation.

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significant way to heal the fracture of knowledge" that results from the separation and isolation of the work of the disciplines.

The Interdisciplinary Program may be begun in junior year, although students are advised to begin development of their program during the second term of the sophomore year with the aid of faculty from the disciplines to be integrated. The major is restricted to those with a cumulative GPA of 3.3. The program presupposes that all general education requirements of the College must have been fulfilled.

A minimum of fifteen upperdivision credits must be taken in one field, and it is expected that the total upperdivision course work of the interdisciplinary program will exceed the minimum credit requirements for a regular major.

In senior year the student will work on a seminar, research thesis or project suited to his or her area of study and which builds on his or her interdisciplinary studies. As a requirement for the degree, his or her performance in this thesis, project or seminar must be satisfactory to his or her faculty thesis adviser, project adviser, or seminar adviser. Graduation requirements will be based on the written outline of the program, as approved. Normally, the majority of credits for an interdisciplinary program will be taken at Georgetown.

Applications for the Interdisciplinary Program should be made in the spring of sophomore year to the office of the Dean of the College. The student should submit the following: (1) an outline of the program with a brief description, reading lists, etc., (2) the names of faculty advisers in each department and their approvals, and (3) the written approvals of the department chairs.

Samples of such interdisciplinary studies majors as Politics, Philosophy and Economics, The Impact of Relativity on Human Consciousness, Medieval Studies, Women's Studies, and Peace Studies are available in the office of the Associate Dean.

MATHEMATICS

The mathematics major normally takes Calculus I and II (MATH 035-036) and Introduction to Computer Science I and II (Computer Science 071-072) in the first year, Multivariable Calculus (MATH 137), and Linear Algebra (MATH 150) in the sophomore year. Foundations of Mathematics (MATH 208) and Abstract Algebra (MATH 203) in the junior year, and Advanced Calculus I and II (MATH 231-232) in the senior year. Also required are at least four semesters of additional 200 level electives in Mathematics.

In order that each Mathematics major see some significant applications of mathematics from the point of view of another discipline, the department also requires that each major choose one from among the following sequences of courses:

1. Chemistry: 219, 220 Physical Chemistry I and II
2. Computer Science: 375 Algorithm Analysis, and 385 Theoretical Computer Science
3. Economics: 103, 104 Honors Microeconomic and Macroeconomic Theory
4. Physics: Any two of the following five courses: 055, 056 Fundamental Physics I and II, 230 Classical Mechanics, 233, 234 Electricity and Magnetism I and II

Each student should consult with his or her adviser to determine which of these choices is most appropriate, given individual backgrounds and tastes.

For a minor in Mathematics, the student must complete the three semester Calculus sequence (MATH 035-036-137), Linear Algebra (MATH 150), and two semesters of 200 level electives in Mathematics.

Prospective students are encouraged to qualify themselves for advanced placement by taking the Advanced Placement Examination in Mathematics. A student who scores either four or five on the Calculus BC examination may omit MATH 035-036 and take MATH 137 as a first-year student. In this case the student is awarded eight semester hours credit. A student who scores four or five on the Calculus AB examination may omit MATH 035 and is awarded four hours credit. A student scoring three on either examination is awarded three semester hours credit but may not omit MATH 035. Students who have not received credit or advanced placement by means of these examinations, but who believe that their preparation in high school is substantially equivalent to MATH 035-036, may petition the Department for advanced placement. In such cases the Department will administer an examination to determine if such placement is warranted. The examination will be administered during the registration period prior to the beginning of the fall term. Further information may be obtained from the Mathematics Department or from the office of the Dean of the College.

Required Courses
Mathematics courses
2 Calculus
1 Multivariable Calculus
1 Linear Algebra
1 Foundations of Mathematics
1 Abstract Algebra

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2 Advanced Calculus
4 Mathematics electives
Other
General education courses
2 Computer Science
2 Chemistry or Computer Science or Economics or Physics from the choices listed above

MEDIEVAL STUDIES

Georgetown College offers an independent minor in Medieval Studies. It also offers a major concentration in Medieval Studies within the Interdisciplinary Studies major.

The Medieval Studies program encourages the exploration of relationships between phenomena normally studied in separate departments, such as the rise of European cities and the rise of Arthurian romance, the decline of feudalism and the rise of the power of the Papacy, the era of the cathedrals and the era of the crusades, the age of Aquinas and the age of heresy and witchcraft.

For a minor in Medieval Studies, students are required to take "Introduction to Medieval Studies: The Age of Dante" and five additional electives approved by the director. Latin is not a requirement for the minor.

Students who elect the major concentration in Medieval Studies within the Interdisciplinary Studies Program are required to take "Introduction to Medieval Studies: The Age of Dante" in the spring semester of either their sophomore or junior year. In their senior year, they will take a two-semester Senior Seminar that will introduce more advanced methodologies of doing research in Medieval Studies and result in a required Senior Thesis.

The major also requires competence in Latin, normally demonstrated by completing or testing out of Classics 001, 002, and 101, plus a one-semester course in Medieval Latin texts (Classics 203). In addition, each student must complete 8 other electives drawn from disciplines related to the program. These courses should be planned in close consultation with the director of Medieval Studies.

With careful planning begun early in the sophomore year, Medieval Studies students can spend a period of study abroad at one of Georgetown's many programs in European universities or cities with a strong medieval heritage, or at Georgetown's own Villa le Balze program just outside Florence. Students interested in Medieval Studies should talk with the Director of the program, Professor JoAnn Moran, Department of History, 606 I.C.C. Call 687-6189 for an appointment.

Required Courses
General education courses
Introduction to Medieval Studies: The Age of Dante (MVST-201)
Latin I, II, Intermediate Latin (Classics 001, 002, 101 or equivalent)
1 course in Medieval Latin texts (Classics 203)
8 electives in related disciplines
2 semester Senior Seminar (MVST-348, 349) culminating in a Thesis

MODERN LANGUAGES

In cooperation with the School of Languages and Linguistics, the College offers majors in French, German, and Spanish. In addition to a full year of the advanced level of the language, the major field consists of eight upper-division courses chosen with the approval of the Department, as indicated below.

Students must complete a comprehensive exam or essay in the Spring of senior year. The format of the comprehensive is set by the individual departments.

Students interested in a modern language major should also give thought to majoring in their chosen language in the School of Languages and Linguistics .

A minor in French, German, or Spanish in the College consists of eighteen credits: two courses each at the intermediate, advanced and upper-division level.

Required Courses
General education courses

French
The French major consists of the following course requirements.
A. Core courses
   1. Take both
      A. FREN-201, Advanced French I
      B. FREN-202, Advanced French II
   2. Take either
      A. 2 courses of FREN-225-226
      B. 2 courses of FREN-227-228
B. *French major electives:* 6 upper-division courses, including at least one course each from the Literature, Culture and Civilization, and Language options.
C. Comprehensive exam.

German
8 courses beyond Advanced German:
213-214 Composition & Style
261-262 Survey of German Literature or:
261 or 262 Survey of German Literature, and one genre or period literature course
2 area courses
2 electives
Spanish
Advanced Spanish II

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using text analysis tools such as concordances and parsers; and quantitative analysis techniques and methodology. Applications in linguistic and literary computing will be reviewed. Students will select a research topic involving the literary or linguistic analysis of a corpus. Prerequisite: consent of instructor. PROFESSOR BALL

481. Speech Acts (3)
Theory and analysis of how language is used to perform social actions. Starts from philosophical inception and then includes linguistic and sociolinguistic applications, relationship with discourse analysis and pragmatic and implications for linguistic theory. Format is lecture, discussion, and analysis of student data. PROFESSOR SCHIFFRIN

482. Pragmatics (3)
The structure of communicative events. Development of contextual and functional theories of language and linguistic interaction. Comparison to discourse analysis and sociolinguistic approaches to language use in social interaction. PROFESSOR SCHIFFRIN AND STAFF

488. Macrosociolinguistics (3)
An introduction to the social and political issues associated with language. The basic phenomenon addresses is that people use different languages, or different varieties of the same language; and that their use take on social meaning. The course includes topics like the relationships among the uses and speakers of various languages in multilingual societies, the relationship between language and social identity, language maintenance and shift, language policy and planning, and language and education, including bilingual education. Prerequisite: LING-001
PROFESSOR FASOLD

489. Language Planning (3)
The study of organized activity designed to solve social problems involving language. Language planning activity can be as broad as the selection and development of a new national language or as focused as a mother attempting to stop her child from saying "ain't I". Since language planning is more an activity than a body of knowledge, this course emphasizes the examination of cases, both as a class and individually PROFESSOR FASOLD

MATHEMATICS
(MATH/157)

PROFESSORS:
Benke, Engler (Chair), Lagnese, Sandefur, Stokes

ASSOCIATE PROFESSORS:
Bobo, Datko, Teller, Vogt

ASSISTANT PROFESSORS:
Fan, Rosier, Sullivan

001. Pre-Calculus (3)
This course is designed to assist students whose high school mathematics background is insufficient for the standard first-year mathematics courses. It is primarily intended as a preparation for Math. 003. Topics include: algebraic operations, factoring, exponents and logarithms, polynomials, rational functions, and the logarithmic and exponential functions. Graphing and word problems will be stressed. Does not fulfill Math/Science requirement for College students. Fall. STAFF

003. Short Course in Calculus (3)
This one semester course is intended to introduce the principal concepts of differential and integral calculus of functions of one variable. These concepts are presented in a straightforward, intuitive manner, with emphasis on the computational aspects of the calculus. Topics include: differentiation, integration, the logarithmic and exponential functions. Applications to curve sketching, optimization problems, and exponential growth and decay problems will be given. Prerequisite: Math. 001 or equivalent. Fall and Spring. STAFF

004. Advanced Short Course in Calculus (3)
This one semester course is an alternative to Math. 003 intended for those students who have some Calculus background from high school, but whose preparation is not sufficient to exempt them from Math. 003. Topics covered will be similar to those in Math. 003, but with less time devoted to the basics (such as the mechanics of differentiation) and with more emphasis on applications and the development of a deeper understanding of the concepts of calculus. Fall. STAFF

005. Introduction to Statistics (3)
This course provides an introduction to descriptive methods; an elementary development of probability theory including sample spaces, random variables and their distributions; the binomial, normal and related distributions; and an introduction to statistical inference including random sampling, estimation of parameters, tests of hypotheses and simple regression and correlation. Prerequisite: Math. 001 or equivalent. (Not offered 1995-96.) STAFF

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006. Statistics with Exploratory Data Analysis (3)
(Core Math/Science Course)

The primary objective of this beginning course in statistics is to have students learn and understand statistical concepts without being overwhelmed by cumbersome formulae and computations. The emphasis will be on data exploration and graphical techniques. Topics to be covered will include descriptive statistics, measures of center and spread, linear regression, probability theory, sampling, random variables and probability distributions. Uniform, discrete, binomial, normal, t and chi-square distributions will be among those used to introduce statistical inference, including estimation and hypothesis testing. Considerable use will be made of video tapes and computers. One third of the class periods will be held in the computer lab where the statistical software MINITAB will be taught and used to simplify computation and enhance graphical presentations. A computer tutorial will also be used. Minimum computer ability is recommended (but not required). Fall and Spring. PROFESSOR TELLER

007. Introduction to Mathematical Modeling (3)
(Core Math/Science Course)

This course will use mathematics to study problems arising in areas such as Genetics, Finance, Medicine, and Economics. Students will learn how to model a real situation, such as steroid-testing in athletes or environmental cleanup. The model will be analyzed in relationship to the real world, such as making recommendations for optimal steroid testing to avoid cheating or determining the minimum time required to adequately clean up a polluted lake. Often the results will be counterintuitive, such as finding that an increase in the rate of wild-life harvesting may actually decrease the long-term harvest, or that a lottery prize that is paid out over a number of years is worth far less than its advertised value. Students should have taken mathematics through Algebra II, and preferably, Precalculus. This is a SONY-endowed core science course. Fall and Spring. PROFESSORS BOBO, SANDEFUR, STOKES

008. The Role of Mathematics in Modern Technology (3)
(Core Math/Science Course)

This course introduces students to various advanced mathematical topics and their application in modern technology. The aim is to develop a conceptual understanding rather than to learn and perfect specific mathematical skills. To achieve this, the course is taught in a computer equipped classroom, and students are engaged for more than 60% of all class time interacting with a computer. Among the mathematical topics introduced are partial derivatives, and partial differential equations, line integrals, surface integrals, the Fourier and Radon Transform, modular arithmetic and topics from number theory. These topics will be discussed in the context of significant technological applications such as medical imaging, cryptography and digital communications. Previous experience with computers and Calculus is not required. Fall.

PROFESSOR BENKE

035. Calculus I (4)

This is the first part of the four semester calculus sequence (Math. 035-036 and 137-150) for mathematics and science majors. Topics include limits, derivatives, techniques of differentiation, applications of the derivative, the Riemann integral, the trigonometric and inverse trigonometric functions, and the logarithmic and exponential functions. Fall and Spring. STAFF

036. Calculus II (4)

A continuation of Math. 035. Topics include techniques of integration, applications of the definite integral, improper integrals, Newton's method and numerical integration, sequences and series including Taylor's theorem and power series, and elementary separable and first and second order linear differential equations. Fall and Spring. STAFF

040. Probability and Statistics (4)

This is a probability and statistics course for students with a calculus background equivalent to MATH-035. Topics include sample spaces and probability functions, discrete and continuous random variables, probability distributions and densities (especially the Poisson, the binomial, and the normal), joint and marginal distributions, sampling statistics, point and interval estimates, and hypothesis testing. Prerequisite: MATH-035. Spring. STAFF

137. Multivariable Calculus (4)

A continuation of Math. 036. This is a first course in vector analysis and the differential and integral calculus of functions of many variables. Topics include vector analysis in n-space, differentiation of real and vector valued functions of many variables, the chain rule, extrema of real valued functions, constrained extrema and Lagrange multipliers, vector fields in 3-space, the divergence and curl of a vector field, conservative fields, double and triple integrals, change of variables in multiple integrals, path and surface integrals, and the theorems of Green, Gauss, and Stokes. Fall and Spring.

PROFESSOR VOGT

150. Linear Algebra (4)

Normally taken after Math. 137. This course presents the basic theory and methods of finite dimensional vector spaces and linear transformations on them. Topics include: matrices and systems of linear equations; vector spaces, bases, and dimension; linear transformations, kernel, image, matrix representation, basis change, and rank; scalar products and orthogonality; determinants; eigenvalues, eigenvectors, diagonalization of symmetric matrices, positive definite matrices. Fall and Spring. STAFF

203. Abstract Algebra (3)

This is a rigorous introduction to algebraic structures and their homomorphisms with emphasis on proofs. Topics from group theory will include permutation groups and Sylow theory. Topics from ring theory will include integral domains, unique factorization domains, and polynomial rings. Spring. Prerequisite: Math 208 or consent of instructor. PROFESSOR BOBO

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208. Foundations of Mathematics (3)
This course will cover fundamental concepts and methods and is intended to give a background for much of what is often taken for granted in Mathematics. Topics include an introduction to the methods of proof; set theory; proofs by induction; relations and functions; partitions and orderings; development of the number system based on the Peano Axioms; countable and uncountable sets. The equivalence of the axiom of choice, the well-ordering principle, and Zorn's lemma will be discussed as time permits. Fall.
PROFESSOR BOBO

211. Number Theory (3)
Basic properties of the integers: divisibility, primes, unique factorization. Congruences: the theorems of Wilson, Fermat, and Euler. Number theoretic multiplicative functions. Diophantine equations. Distribution of primes. Applications to computer science and modern cryptography. (Not offered 1995-96.) STAFF

212. Numerical Analysis (3)
Development of methods for solving numerical problems on digital computers. Problems discussed include solution of systems of linear and nonlinear equations, interpolation, numerical integration, and solution of ordinary differential equations. Work will include solving practical problems using the computer. (Not offered 1995-96.) STAFF

215. Differential Geometry (3)
This course will concentrate on the differential geometry of curves and surfaces in three dimensional space. Topics include plane and space curves (parametrization and Frenet formulas), the elementary theory of surfaces (fundamental forms, the fundamental equations of Gauss-Weingarten, the Codazzi-Gauss equations), and the geometry of surfaces with emphasis on the geodesics of a surface. Fall. PROFESSOR STOKES

222. Discrete Dynamical Systems (3)
Discrete dynamical systems describe how certain quantities change over time and thus provide models for a wide variety of real world phenomena. They are, for example, used to describe the amortization of loans and to provide insight into the evolution of genetic traits in a population. Most recently, discrete dynamical systems have received much attention because they provide a way of understanding and describing the chaotic behavior which occurs in so many natural phenomena. This course will survey the theory and applications of discrete dynamics, starting with the linear theory, progressing through the study of nonlinear theory, and culminating in the study of Chaos. (Not offered 1995-96.) STAFF

223. Combinatorics (3)
This course will begin with a brief survey of sets, functions, logic, equivalence relations, and partial orders. The principal topics will include permutations and combinations, recurrence relations, generating functions, and inclusion-exclusion principles, with assorted applications. The course will conclude with a brief introduction to graph theory. Spring. PROFESSOR VOGT

224. Graph Theory (3)
This course treats the basic concepts of graph theory, including graphs and digraphs, trees, networks, Eulerian and Hamiltonian graphs, and Ramsey numbers. Applications to packing and scheduling problems, the traveling salesman problem, and map colorings (including the famous four color theorem) will be considered. (Not offered 1995-96.) STAFF

225. Applied Linear Algebra (3)
In this course, techniques from linear algebra will be applied to topics such as equilibria of rigid bodies, graph theory, game theory, linear programming, economic models, optimal harvesting, Markov chains, genetics and population growth, least squares approximation, cryptography, computed tomography, and other areas as time permits. Students will learn to solve problems on the computer. (Not offered 1995-96.) STAFF

226. Topology (3)
Basic concepts of point set topology, Topics include sets and functions, metric spaces, topological spaces, separation axioms, convergence, continuity, completeness, compactness, and connectedness. (Not offered 1995-96.)
STAFF

231. Advanced Calculus I (3)
This is the first part of the two semester advanced calculus sequence (Math 231-232) which provides a rigorous treatment of topics in calculus with the emphasis on proofs of major theorems. Topics include the basic properties of the real numbers and n-dimensional Euclidean space, the basic topology of metric spaces including compactness and connectedness, the theory of numerical sequences and series, and the properties of continuous functions on metric spaces. Fall. PROFESSOR LAGNESE

232. Advanced Calculus II (3)
A continuation of Math 231. Topics include differentiation, integration theory, the fundamental theorem of calculus, and sequences and series of functions. Spring.
PROFESSOR LAGNESE

233. Mathematical Statistics I (3)
This is the first part of the two semester sequence in probability and statistics (Math. 233-234). This first semester provides the background probability theory required for a serious study of statistics. Topics include random variables, an overview of discrete and continuous probability distributions including multivariate distributions, expectations, stochastic independence, joint and conditional distributions, and the central limit theorem. Additional topics, as time permits, will be chosen from among: generating functions and Laplace transforms, random walks and Markov chains, and the Poisson process. Fall. PROFESSOR ENGLER

234. Mathematical Statistics II (3)
A continuation of Math. 233. This semester concentrates on statistics. Topics include descriptive statistics, sam-

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pling theory, statistical inference, construction and properties of point estimators, confidence intervals, hypothesis testing in parametric models, linear regression, analysis of variance, Chi-square tests, simple sequential tests, and distribution-free methods. Spring. PROFESSOR ENGLER

236. Introduction to Complex Variables and Applications (3)

Complex numbers. Analytic functions including exponential, logarithmic and trigonometric functions of a complex variable. Geometric and mapping properties of analytic functions. Contour integration, Cauchy's theorem, the Cauchy integral formula. Power series representations. Residues and poles, with applications to the evaluation of integrals. Conformal mapping and applications as time permits. Spring. PROFESSOR BENKE

241. Fourier Series and Boundary Value Problems (3)

This course deals with methods for solving partial differential equations accompanied by boundary conditions. Special emphasis is given to expressing solutions as series of orthogonal sets of functions. Topics include orthogonal expansions, Fourier series, Bessel functions, Legendre polynomials, and Sturm-Liouville problems. Applications will include vibrating strings, heat conduction, wave motion, and potential functions. (Not offered 1995-96.)

PROFESSOR LAGNESE

245. Chaotic Dynamical Systems (3)

Deterministic dynamical systems whose solutions exhibit chaotic and apparently random behavior have been used in recent years to model the weather, the human heartbeat, and the stock market, to name a few examples. This course will investigate the basic ideas of the subject: periodicity, bifurcation, sensitive dependence on initial conditions, and strange attractors. (Not offered 1995-96.)

PROFESSOR VOGT

251. Ordinary Differential Equations (3)

This course provides an introduction to the theory, techniques, and applications of ordinary differential equations. Topics include first order equations, second order linear equations, series solutions, the method of Laplace transforms, systems of equations, and an introduction to nonlinear equations and stability theory. Fall.

PROFESSOR DATKO

MEDIEVAL STUDIES
(MVST/212)

DIRECTOR:
Moran (History)

FACULTY:
Ambrosio (Philosophy), Ball (Linguistics), Bradley (Philosophy), Dover (French), Everhart (Medieval Studies), Ferguson-O'Meara (Fine Arts), Gerli (Spanish), Glassman (Italian), Goldfrank (History), Hill (History), Hirsh (English), Houlahan (Fine Arts/Music), Irvine (English), Lewis (Philosophy), Moniz (Portuguese), Morris (Russian), Murphy (German), O'Connor (Classics), Pedrick (Classics), Redford (Fine Arts), Ruedy (History), Ryding (Arabic), Schall (Government), Sens (Classics), Shahid (Arabic), Szittya (English), Tacka (Fine Arts/Music), Vakareliyska (Russian), Walsh (Spanish), K. Wickham-Crowley (English)

201. Introduction to Medieval Studies: The Age of Dante (3)

An introduction to a broad range of interdisciplinary topics in medieval culture, also intended as the introductory course for the Medieval Studies Program. The course will deal with the contexts of the *Divine Comedy* in medieval philosophy, theology, cosmology, and political theory, and locate it within currents in medieval history. Ancillary reading will be assigned in the Bible, Augustine, Boethius, Aquinas, as well as certain patristic writers, Vergil, Provençal and Italian poets, including the Sicilian school, as well as Dante's other major works: the *Vita Nuova*, the *De Vulgari Eloquentia*, the *Convivio*, and the *De Monarchia*. Spring.

PROFESSOR MORAN

211. Arthurian Literature: 500-1500 (3)

In this course we will explore the legends of King Arthur, the once and future king who has captured the imagination of authors and visionaries since the early Middle Ages. This course offers an introduction to medieval history, tradition, and literature as well as an analysis of the meanings and uses of Arthurian myths from the sixth through the sixteenth centuries. We will look at the social functions of the various forms in which the Arthurian stories appear — historical chronicle, narrative romance, prose and poetic formats, religious and mythic assimilations, and political allegory — as we search for the reasons behind the appeal of these legends. Analyzing the ambiguous relationship between history and fiction, we will investigate the growth of the legends as they evolved from early historical records and the first written versions of the Arthurian tales. Archaeological evidence and the records of Romano-British life will help us reconstruct the context of the earliest references to an Arthur figure. We will then follow the development of the legends as they were adapted to the political, spiritual, and literary perspectives of later centuries. The last few weeks of the course will be devoted to reading Malory's works in the original Early Modern English, with close analysis of Malory's borrowings from previous versions of the tales. Short writing assignments each week; two longer papers; final exam. Spring.

PROFESSOR EVERHART