Techniques of developing safety practices in an industrial and construction environment. Topics include OSHA, current legislation, cost analysis, minimization, depreciation and economic worth, personal protection, employee selection, psychological aspects, product safety, hazard materials and catastrophe control.

525 (2) Manufacturing Value Analysis
A study of the optimal relationship between value and function of products and the cost and availability of resources. Topics include valuation, appraisal and capital budgeting, cost
minimization, depreciation and economics worth, rates and rate bases, original and reproduction costs, engineering economics.

527 (2) Quality Assurance
Organization, methodology, and responsibilities of quality assurance programs, primarily in manufacturing industries. Statistical analysis of quality current topics of quality.

528 (2) Work Measurement
Theoretical principles and practical applications of procedures to utilize time and motion studies in industrial applications to promote quality, quantity, safety, line balancing, and efficiency of production.

529 (2) Production & Inventory Control
A study of the problems involved in maintaining factory production and inventory control including systems for forecasting, controlling quantity, scheduling, storage and retrieval.
Pre: MET 428

532 (3) Project Management
Managing the processes of manufacturing including the design prototype, personnel and staffing, and continuing of the manufacturing of a product. Factors include cost, time, inventory, facility use, scheduling, packaging, shipping, organizational aspects, time constraints, conflict resolution, skills requirements, predicting project success, estimating, and trade-off analysis.

592 (1-4) Manufacturing Seminar
Selected manufacturing topics.

600 (2) Manufacturing Research Methods
Research topics and methods related to manufacturing. The course will look at the current state of manufacturing and explore the research methods and experimental design procedures that are used in the area of manufacturing. Students will evaluate past research and will also design a research project in manufacturing.

Utilization in K-12 classroom. Slide duplication. Computer graphics/Quick take photography. Field trips—making the most of yearbook and other PR formats. Future trends.

624 (2) Digital Production
How to use camcorders, video discs, and xapshot cameras. Learn production techniques including camera shots, sound, lighting. Post-production techniques including logging, editing, dubbing, special effects.

628 (2) Distance Learning
Teaching and learning over distance education systems with the main stress on Instructional Television teaching. Instructional systems approach to the development of coursework will be examined. Proper selection of content will be stressed.

629 (2) Electronic Communications
E-mail, listservs, on-line resources, electronic services, search tools, future services.

645 (1-3) CAD Applications
An advanced graphics course which emphasizes the study of AutoCad® software, related software and their applications. Emphasis is on CAD systems, software customizing and a review of current trends in CAD as used in contemporary industry.

677 (1-4) Individual Study

678 (2) Manufacturing Processes
A study of modern manufacturing processes. The recent developments in manufacturing affect everyone in the factory, from the designers and manufacturing engines to the machine operators. New technologies, automation, the use of the computers in design, process control and inspection create complex industrial or plant environment.

692 (1-4) Seminar: Manufacturing
Selected manufacturing topics.

694 (1-2) Alternate Plan Paper

697 (1-5) Internship: Industrial
Manufacturing work experience in an area pertinent to the student's objective. Registration required prior to beginning employment.

699 (3-6) Thesis

MATHEMATICS MA

MATHEMATICS: COMPUTER SCIENCE MS

MATHEMATICS MS

MATHEMATICS EDUCATION MS
(DISCIPLINE-BASED)

College of Science, Engineering, & Technology
Mathematics and Statistics Department
273 Wissink Building • 507-389-1453

Chair: Larry Pearson, Ph.D.

Graduate Coordinators: Charles Waters, Ph.D.
Mathematics Education: Kil S. Lee, Ed. D.

Ernest Boyd, Ph.D., Maureen H. Fenrick, Ph.D., Francis T. Hannick, Ph.D., Mary Ann Lee, Ph.D., Namyong Lee Ph.D., R. Bruce Mericle, Ph.D., Larry Pearson, Ph.D., Mezbahur Rahman, Ph.D., Malcolm Lee Riddle, Ph.D., Gary Rockswold, Ph.D., Chia-Chi Tung, Ph.D., Mary Wiest, Ph.D.

The Department of Mathematics and Statistics offers five programs leading to a master's degree in Mathematics and Statistics. The Master of Arts programs allow students to study pure mathematics or mathematics for community college teaching. The Master of Science programs allow students to specialize in secondary teaching, statistics or math and computer science.

Fourteen graduate faculty support the graduate programs. Faculty specialties include category theory, differential equations, geometry, group theory, matrix theory, mathematics education, modeling, numerical analysis, real and complex analysis, ring theory, statistics, applied statistics and topology.

The graduate programs are small enough to allow one-on-one interaction between faculty and students. Class sizes are small.

Graduates of the program have found employment in a variety of fields, including software engineering, graphic design, insurance, community college teaching, secondary mathematics teaching and as statisticians. Others have gone on to obtain a Ph.D. in mathematics.

Admission. In addition to completing the general admission requirement for the College of Graduate Studies, applicants with grade point averages below 2.75 may qualify by presenting GRE verbal, quantitative and analytical scores of 500 on any one part or a minimum composite of 1350.

Facilities. The Department of Mathematics and Statistics is housed in Wissink Building. This building is also home to the Academic Computing Center which houses over 500 workstations on both Macintosh and PC platforms that include PowerMac G4, IBM 300PL and 300GL and Dell GX110. Students also have access to MSUSI (DEC 4000/300), Krypton (DEC 3000/600) and Neon (MasPar-MP-1 1102) computers. An abundance of mathematical software is available including Mathematica, the Math/Stat Fortran library from ISML, and various statistical packages such as Minitab and SPSS.

A new addition to the Memorial Library was recently completed. The library has a wide range of mathematical texts and journals. The library also supports MINITEX, a service which provides access to literature not found in the library's collection.

Financial Assistance. Approximately 15 graduate assistantships are available in the department each year. Graduate assistant duties include teaching or research assistantships.

MATHEMATICS MA

(Thesis Plan - 34 cr)
(Alternate Plan Paper - 34 cr)

Required Core Courses (29-31 cr)
Two of the following courses (6-8 cr). The remaining two courses shall be treated as deficiencies if they are not part of the student's academic background.

MATH	517	Real Analysis I (3)
MATH	547	Linear Algebra (3)
MATH	570	Numerical Analysis (4)
STAT	555	Theory of Statistics I (4)
and		
MATH	518	Real Variables II (3)
MATH	605	Graphs and Algorithms (3)
MATH	611	Real Analysis (3)
MATH	620	Applied Mathematics (3)
MATH	641	Topics in Modern Abstract Algebra (3)
STAT	653	Linear Models (3)
MATH	674	Computations in Linear Algebra (2)
MATH	692	Point Set Topology (3)

Required Elective Courses (0-4 credits)
500/600 level courses that must be approved by the student's advisor.

Required Thesis or Alternate Plan Paper

MATH	694	Alternate Plan Paper (1)
MATH	699	Thesis (3)

Additional Requirements:
At least half of the credits applied to the program must be earned in 600 level courses. Each student is assigned an initial advisor. After completing 16 credits the student must select a three-member examining committee and form a program of study. A student may choose to write an alternate plan paper or thesis. This program requires a comprehensive exam, and an oral defense of the alternate plan paper or thesis.

COMMUNITY COLLEGE TRACK
Students interested in teaching at the Community College level should see their advisor about identifying methods courses to strengthen their teaching ability. Licensure is not required to teach at the Community College level, but courses in teaching skills are recommended.

Required Core (27-29 cr)
Two of the following four courses (6-8 cr). The remaining two courses shall be treated as deficiencies if they are not part of the student's academic background.

MATH	517	Real Analysis I (3)
MATH	547	Linear Algebra (3)
MATH	570	Numerical Analysis (4)
STAT	555	Theory of Statistics I (4)
and		
MATH	518	Real Variables II (3)

MATH	611	Real Analysis (3)
MATH	620	Applied Mathematics (3)
MATH	641	Topics in Modern Abstract Algebra (3)
STAT	653	Linear Models (3)
MATH	692	Point Set Topology (3)
EDFN	671	Learning and Teaching in Higher Education (3)

Required Electives (2-6 cr)
500/600 level courses that must be approved by the student's advisor.

Required Thesis or Alternate Plan Paper

MATH	694	Alternate Plan Paper (1)
MATH	699	Thesis (3)

Additional Requirements:
At least half of the credits applied to a program must be earned in 600 level courses. After completing 16 credits the student must select a three-member examining committee and form a program of study. A student may choose to write an alternate plan paper or thesis. This program requires a comprehensive exam, and an oral defense of the alternate plan paper or thesis.

MATHEMATICS MS
(Thesis Plan - 34 cr)
(Alternate Plan Paper - 34 cr)

STATISTICS OPTION
Required Core (27-29 cr)
Two of the following four courses (6-8 cr). The remaining two courses shall be treated as deficiencies if they are not part of the student's academic background.

MATH	517	Real Analysis I (3)
MATH	547	Linear Algebra (3)
MATH	570	Numerical Analysis (4)
STAT	555	Theory of Statistics I (4)
	and	
STAT	550	Regression Analysis (3)
STAT	551	Experimental Designs (3)
STAT	556	Theory of Statistics II (4)
STAT	653	Linear Models (3)
STAT	680	Topics in Statistics (3)
STAT	696	Statistical Inference Packages (3)
MATH	674	Numerical Linear Algebra (2)

Required Electives (2-6 cr)
500/600 level courses that must be approved by the student's advisor.

Required Thesis or Alternate Plan Paper

MATH	694	Alternate Plan Paper (1)
MATH	699	Thesis (3)

Additional Requirements:
At least half of the credits applied to a program must be earned in 600 level courses. After completing 16 credits the student must select a three-member examining committee and form a program of study. A student may choose to write an alternate plan paper or thesis. This program requires a comprehensive exam, and an oral defense of the alternate plan paper or thesis.

MATHEMATICS: COMPUTER SCIENCE MS
(Thesis Plan - 34 cr)
(Alternate Plan Paper - 34 cr)

Required Core (30-32 cr)
Two of the following four courses (6-8 cr). The remaining two courses shall be treated as deficiencies if they are not part of the student's academic background.

MATH	517	Real Analysis I (3)
MATH	547	Linear Algebra (3)
MATH	570	Numerical Analysis (4)
STAT	555	Theory of Statistics I (4)
and		
MATH	605	Graphs and Algorithms (3)
MATH	620	Applied Mathematics (3)
MATH	672	Numerical Solutions of Ordinary Differential Equations (2)
MATH	674	Numerical Linear Algebra (2)
COMS	520	Computer Organization II (4)
COMS	560	Operating Systems (4)
COMS	610	Algorithm Analysis (3)
COMS	611	Theory of Computation (3)

Required Electives (0-4 cr)
500/600 level courses that must be approved by the student's advisor.

Required Thesis or Alternate Plan Paper

MATH	694	Alternate Plan Paper (1)
MATH	699	Thesis (3)

Additional Requirements:
At least half of the credits applied to a program must be earned in 600 level courses. After completing 16 credits the student must select a three-member examining committee and form a program of study. A student may choose to write an alternate plan paper or thesis. This program requires a comprehensive exam, and an oral defense of the alternate plan paper or thesis.

MATHEMATICS EDUCATION MS
(DISCIPLINE-BASED)
(Thesis Plan - 34 cr)
(Alternate Plan Paper - 34 cr)

Teaching licensure is a prerequisite to pursuing this degree which is for teachers interested in a graduate program in teaching mathematics. This degree does not lead to initial teaching licensure. Students who desire initial licensure should consult the Master of Arts in Teaching (MAT) program listed in this bulletin.

Required Core (18 cr)

MATH	517	Real Analysis I (3)
MATH	641	Topics in Modern Abstract Algebra (3)
MATH	661	Mathematical Problem Solving and Modeling for Teachers (3)
MATH	662	Algebraic Structures in School Mathematics (3)
MATH	663	Geometric Structures in School Mathematics (3)

MATH 690 Research in Mathematics Education (3)

Required Professional Education Courses (6 cr)
Any 500/600 level Professional Education courses that must be approved by the student's advisor.

Required Electives (7-9 cr)
Any 500/600 level courses must be approved by student's advisor in order to fulfill the total required hours

Required Thesis or Alternate Plan Paper
MATH 694 Alternate Plan Paper (1)
MATH 699 Thesis (3)

Additional Requirements:
At least half of the credits applied to a program must be earned in 600 level courses. After completing 16 credits the student must select a three-member examining committee and form a program of study. A student may choose to write an alternate plan paper or thesis. This program requires a comprehensive exam, and an oral defense of the alternate plan paper or thesis.

COURSE DESCRIPTIONS

Mathematics

511 (4) Introduction to Complex Variables
Algebra and geometry of complex numbers, analytic functions, power series, Cauchy's theorem and residue theorem.
Pre: MATH 223 and 290

517 (3) Real Analysis I
Limits and continuity, sequences and series, differentiation and integration.
Pre: MATH 223 and 290

518 (3) Real Analysis II
Topology of Euclidean spaces, continuous functions, sequences of functions and differentiable mappings.
Pre: MATH 417

522 (4) Partial Differential Equations
This course presents the theory, computations, and applications of partial differential equations and Fourier series.
Pre: MATH 223 and 321

525 (4) Mathematical Modeling
This course presents topics from mathematical analysis of both discrete and continuous models taken from problems in the natural sciences, economics and resource management.
Pre: MATH 223 and 247

535 (4) Modern Geometry
Geometry of spaces including Euclidean and non-Euclidean and applications of contemporary geometry.
Pre: MATH 332 or CON

542 (4) Theory of Numbers
Euclidean algorithm, primes, composites, number theoretic functions, congruences, Diophantine equations, Euler and Fermat theorems, algebraic number fields.
Pre: MATH 345

546 (4) Abstract Algebra II
A continuation of MATH 345. The course will include topics from groups, rings, and fields.
Pre: MATH 345

547 (3) Linear Algebra II
An in-depth study of linear operators and their related spaces, dimension, rank, matrix representation of linear operators, special matrices, determinants, eigenvectors, and eigenvalues.
Pre: MATH 345 or CON

555 (4) Theory of Statistics I
A mathematical approach to statistics with derivation of theoretical results and of basic techniques used in applications. Includes probability, continuous probability distributions, multivariate distributions, functions of random variables, central limit theorem, and statistical inference. Same as STAT 555
Pre: MATH 223

556 (4) Theory of Statistics II
A mathematical approach to statistics with derivation of theoretical results and of basic techniques used in applications, including sufficient statistics, additional statistical inference, theory of statistical tests, inferences about normal models, and non-parametric methods. Same as STAT 556.
Pre: MATH/STAT 555

570 (4) Numerical Analysis I
This course provides an introduction to techniques and analysis involved with solving mathematical problems using technology. Topics included are errors in computation, solutions of linear and nonlinear equations, numerical differentiation and integration, and interpolation.
Pre: MATH 122, 247, and FORTRAN

571 (4) Numerical Analysis II
This course is a continuation of MATH 470. Topics included are the algebraic eigenvalue problem, least-squares approximation, solutions of systems of nonlinear equations, numerical solutions of ordinary differential equations.
Pre: MATH 470 and 223

580 (3) History of Mathematics
The development of selected topics from before the Hellenistic time period to the late twentieth century. Familiarity with the content of HIST 180 is beneficial.
Pre: MATH 345

584 (2) Technology in Secondary School Mathematics
This course is designed to inform secondary mathematics teachers about effective utilization of

technology in the mathematics curriculum.
Pre: MATH 345 and CI 447

588 (1-3) Seminar
A course of study in which a group of students study a topic by examining results through reports and discussions. May be repeated for credit on each new topic.

590 (1-4) Workshop
A short course devoted to a specific mathematical topic. May be repeated for credit on each new topic.

591 (1-4) In-Service
A course designed to upgrade the qualifications of persons on-the-job. May be repeated on each new topic.

595 (1-4) Selected Topics
A course in an area of mathematics not regularly offered. May be repeated on each new topic.

596 (3) Mathematical Logic
Propositional logic, first and second order logic, completeness, consistency, models of theories, Godel's Incompleteness theorem.
Pre: MATH 345 and PHIL 411

598 (1-12) Internship
Provides a student the opportunity to gain expertise and experience in a special field under the supervision of a qualified person.

605 (3) Graphs and Algorithms
Mathematical concepts of graph theory applied to problems that have algorithmic solutions.
Pre: MATH 417, 375, and 447

606 (3) Topics in Discrete Mathematics
Can be used for any graduate level discrete mathematics course not offered as a regular course. Distinct offerings may be repeated for credit.
Pre: MATH 375 and 447

608 (1-4) Seminar in Elementary Mathematics
An opportunity for a group of elementary teachers to study a mutual problem in mathematics.

611 (3) Real Analysis
Measure theory, integration, metric spaces and Banach spaces.
Pre: MATH 417

613 (3) Topics in Analysis
Can be used for any graduate level analysis course not offered as a regular course. Distinct offerings may be repeated for credit.
Pre: MATH 417, or CON

618 (3) Functional Analysis
An introduction to the basic concepts and principles of functional analysis. Normed spaces. Banach spaces. Hilbert spaces, and approximation theory are studied.
Pre: MATH 417 and 447

620 (3) Applied Mathematics
Applications of discrete and continuous mathematics to deterministic problems in the natural sciences, computer science, engineering and economics. Applied problems will be developed within the mathematical framework of dimensional analysis, asymptotic analysis, perturbation theory, stability and bifurcation.
Pre: MATH 321, 417, and 447

621 (3) Topics in Applied Mathematics
Can be used for any graduate level applied mathematics course not offered as a regular course. Distinct offerings may be repeated for credit.
Pre: MATH 417, 422, and 447

625 (3) Complex Variables
The theory of functions of one complex variable. Complex numbers, contour integration, analytic functions, residues, power series.
Pre: MATH 417

635 (3) Topics in Geometry
This course presents selected topics in projective, transformational, and differential geometry.
Pre: Con

641 (3) Topics in Modern Abstract Algebra
A rigorous excursion through some of the topics of abstract algebra which are essential components of the background of a masters level graduate student.
Pre: MATH 345

645 (3) Topics in Algebra
This course will cover advanced topics such as (but not limited to) free abelian groups, group rings, noetherian/generalized noetherian rings, coherent/generalized coherent rings, homological algebra, homological dimension theory, representation theory of finite fields, galois theory of equations, field theory, valuation theory, semigroups.
Pre: MATH 641 or equivalent

661 (3) Mathematical Problem Solving and Modeling for Teachers
Heuristics in mathematical problem solving and mathematical modeling for teachers.

662 (3) Algebraic Structures in School Mathematics
Algebraic concepts and procedures interpreted and related from the perspectives of abstract algebra, cognitive research on the learning of algebra and professional curriculum and instruction programs.
Pre: MATH 541, or Con

663 (3) Geometric Structures in School Mathematics
The Van Hiele model of the development of geometric thought and recent developments of geometric theory and applications which are related to the school mathematics curriculum.
Pre: MATH 332 and 4/535

672 (2) Numerical Solutions to Differential Equations
This course is an in-depth study of solving ordinary differential equations numerically. Both Runge-Kutta methods and general multi-step methods are discussed. Error control and step size changing for both stiff and nonstiff equations are analyzed.
Pre: MATH 315 and 470

674 (2) Computations in Linear Algebra
This course will be an in-depth study of solving linear systems both directly and iteratively and solving the algebraic eigenvalue problem. Applications may also be included.
Pre: MATH 447 and 470

677 (1-4) Individual Study
Independent individual study under the guidance and direction of a graduate faculty member.
Pre: Con

680 (1-4) Topics in Mathematics
A graduate course in an area of mathematics not regularly offered. May be repeated for credit on each new topic.
Pre: will vary with topic

689 (1-3) Readings in Mathematics
Independent readings in mathematics under the direction of a graduate faculty member.
Pre: Con

690 (3) Research in Mathematics Education
Examination of cognitive theories guiding research in mathematics education; analysis and interpretation of research procedures applied in experimental, qualitative, program evaluation, survey, meta-analysis, theory-generating, and action research studies in mathematics education.
Pre: STAT 550 or 551, or Con

691 (1-4) In-Service
A course designed to upgrade the qualifications of persons on-the-job. May be repeated for credit on each new topic.

692 (3) Point-Set Topology
Topological spaces, continuity, product spaces, connectedness, separation, compactness and metric spaces.
Pre: MATH 417

693 (3) Topics in Topology
Will cover topics at the discretion of the instructor, such as, but not limited to those in the following list: algebraic topology, homotopy theory, homology theory, differential topology, topological groups, topological vector spaces, categorical topology, catastrophe theory, lie Groups, algebras of continuous functions, uniform structures.
Pre: MATH 692

694 (1) Alternate Plan Paper
Research under the supervision of the student's advisor leading to an alternate plan paper.
Pre: Con of advisor

695 (1-4) Workshop
A short course devoted to a specific mathematical topic. May be repeated for credit on each new topic.

698 (1-12) Internship
Provides a student the opportunity to gain expertise and experience in a special field under the supervision of a qualified person.
Pre: Con

699 (1-4) Thesis
Research under the supervision of the student's advisor leading to a thesis.
Pre: Con of advisor

Statistics

550 (3) Regression Analysis
Simple and multiple regression, correlation, analysis of variance and covariance.
Pre: MATH/STAT 354 or 455 or Con

551 (3) Experimental Designs
Completely randomized, randomized block, fractional factorial, incomplete block, split-plot, Latin squares, expected mean squares, response surfaces, confounding, fixed effects and random effects models.
Pre: MATH/STAT 354 or 455 or Con

555 (4) Theory of Statistics I
A mathematical approach to statistics with derivation of theoretical results and of basic techniques used in applications. Includes probability, continuous probability distributions, multivariate distributions, functions of random variables, central limit theorem and statistical inference. Same as MATH 555.
Pre: MATH 223

556 (4) Theory of Statistics II
A mathematical approach to statistics with derivation of theoretical results and of basic techniques used in applications, including sufficient statistics, additional statistical inference, theory of statistical tests, inferences about normal models and nonparametric methods. Same as MATH 556.
Pre: MATH/STAT 455

588 (1-3) Seminar
The study of a particular topic primarily based upon recent literature. May be repeated for credit on each new topic.

598 (1-12) Internship
Provides a student the opportunity to gain expertise and experience in a special field under the supervision of a qualified person.

653 (3) Linear Models
Matrix theory, multivariate normal distribution of quadratic forms, estimation and hypothesis testing in the general linear model and applications of linear

models.
Pre: MATH/STAT 455 or Con

677 (1-4) Individual Study
Independent individual study under the guidance and direction of a graduate faculty member.
Pre: CON

680 (1-4) Selected Topics
A graduate course in a particular area of statistics not regularly offered. May be repeated for credit on each new topic.
Pre: will vary with topic

694 (1) Alternate Plan Paper
Research under the supervision of the student's advisor leading to an alternate plan paper.
Pre: Con of advisor

696 (3) Statistical Inference Packages
Statistical package programs used in data collection, transformation, organization, summarization, interpretation and reporting, statistical description and hypothesis testing with statistical inference, interpreting outputs, chi-square, correlation, regression, analysis of variance, nonparametrics, and other designs, accessing and using large files (U.S. Census data, National Health Survey, etc.) Same as COMS 696
Pre: one statistics course

698 (1-12) Internship
Provides a student the opportunity to gain expertise and experience in a special field under the supervision of a qualified person.
Pre: Con

699 (1-4) Thesis
Research under the supervision of the student's advisor leading to a thesis.
Pre: Con of advisor

MULTIDISCIPLINARY STUDIES MS

College of Graduate Studies
Multidisciplinary Studies Program
125 Administration Building • 507-389-2321

Graduate Coordinator: Chris Mickle, MA

The Multidisciplinary Studies program is designed specifically for the highly motivated, self-directed student whose personal, educational or career goals require a program which has a high degree of individual discretion in design. Multidisciplinary Studies programs offer a flexible format that allows for interdisciplinary coursework across the university curriculum. Students take coursework in 3 separate disciplines. A 30 credit thesis or 34 credit alternate paper plan option is available.

Admission. Successful applicants must complete an application to the College of Graduate Studies, have a baccalaureate degree from a regionally accredited college or university with at least a 3.0 grade point average for the last two years, and complete an application to the Multidisciplinary Studies program which includes a tentative plan of study and a statement of career goals and objectives. Upon receipt of all undergraduate and graduate transcripts verifying degree and GPA, the student's file is reviewed by a three-member graduate faculty committee. Students must complete a plan of study before completing 12 credits. A general transcript evaluation is required for all international transcripts. The department often requires at least 30 days to make an admission recommendation upon receipt of all required materials by the College of Graduate Studies.

MULTIDISCIPLINARY STUDIES MS

(Thesis - 30 cr)
(Alternate Plan Paper - 34 cr)

INDIVIDUALIZED OPTION
Required: Concentrations in 3 Academic Disciplines (24-34 cr)
Select Courses in Academic Discipline 1 (8-12 cr)
Select Courses in Academic Discipline 2 (8-12 cr)
Select Courses in Academic Discipline 3 (8-12 cr)

At least one-half of the coursework must be completed at the 600 level (exclusive of thesis or alternate plan paper credits), and the program cannot include more than 6 independent study credits.

Required Research Course (3 cr)

Required Thesis or Alternate Plan Paper (1-6 cr)
Alternate Plan Paper (1-2 cr)
Thesis (3-6 cr)

PRE-APPROVED OPTIONS
Several pre-designed options are also available in specific disciplines: **Anthropology, Educational Foundations, Ethnic Studies, and Higher Education.** These options are described below.

Students may take up to 20 credits from one of the pre-approved options, plus a minimum of 10 credits from another academic discipline.

Required: Courses in Option Area (16-20 cr)

Required: Courses in Another Academic Discipline (10 cr)

Required Research Course (3 cr)

Required Thesis or Alternate Plan Paper (1-6 cr)
Alternate Plan Paper (1-2 cr)
Thesis (3-6 cr)

At least one-half of the coursework must be completed at the 600 level and the program cannot include more than 4 independent study credits.