According to Joe Myers, the credit hours in 1985, 1995 and 2005 can be converted to in-class hours by the following remarks:

3CH means 40 in-class hours over the semester (as per your email)
3.5 CH means 48 in-class hours over the semester

4   64 in class hours (56 are with out of class prep and 8 are "labs" with no prep -- see next line)

4.5   64 in class hours, same as above -- This is probably the nuance I spoke of below --

"Our first semester core math course has the same number of attendances and prep as the following two semesters, but carries 1/2 less CH just for nice rounding purposes -- the CH for the 3 semester sequence is accurate and that's good enough."

9   Is this really a 1-semester course? I bet it is the 2-semester sequence MA104/205, and so would mean 64 in-class hours for each of two semesters, 4.5CH each semester.

Using 1985 Nos:

13.5 in class hrs per CH in core   (see p 7 bottom)
13.3   "   "   elective courses (40 hrs for a 3 cr ...
            Phys Ed.

How credits can convert to hours
... Myers, ...

West Pt. 2008 *attached order for ⁴majors*

Department of Mathematical Sciences
Course Catalog
43 Courses

Puts Course catalog > Math Sciences > course catalog

COURSE	TITLE	CR HRS
MA100 2005-2	PRECALCULUS MATHEMATICS	3.0

SCOPE MA100 prepares cadets with background deficiencies in algebra and trigonometry for the core mathematics program. The course develops fundamental skills in algebra, trigonometry, and functions, through an introduction to mathematical modeling and problem solving. Since this course does not count toward graduation requirements; cadets enrolled in MA100 will forfeit an elective opportunity.

Offerings:
2009 2
2010 1
2010 2
2011 1
2011 2

Pre None
(prerequisites were found elsewhere on line and penciled in here)

COURSE	TITLE	CR HRS
MA101 2005-2	MATH MODELING/INTRO CALCULUS	4.0

SCOPE MA101 continues the study of mathematical modeling and problem solving – using effective problem solving strategies and modeling theory to solve complex and often ill-defined problems. The course exercises mathematical concepts while nurturing creativity, critical thinking, and learning through activities performed in disciplinary, interdisciplinary, and multidisciplinary settings. Special emphasis is placed on introducing calculus using continuous and discrete mathematics through applied settings. The course exploits a variety of technological tools to develop numerical, graphical, and analytical solutions that enhance understanding.

Offerings:
2009 2
2010 2
2011 2

Pre 100

COURSE	TITLE	CR HRS
MA103 2005-2	MATH MODELING/INTRO CALCULUS	4.0

SCOPE MA103 is the first course of the mathematics core curriculum, and it emphasizes applied mathematics through modeling - using effective problem solving strategies and modeling theory to solve complex and often ill-defined problems. The course exercises mathematical concepts while nurturing creativity, critical thinking, and learning through activities performed in disciplinary, interdisciplinary, and multidisciplinary settings. Special emphasis is placed on introducing calculus using continuous and discrete mathematics through applied settings. The course exploits a variety of technological tools to develop numerical, graphical, and analytical solutions that enhance understanding.

Offerings:
2009 2
2010 1
2010 2
2011 1
2011 2

Pre None   *Disqualifier (153)*

COURSE	TITLE	CR HRS
MA104 2005-2	CALCULUS I	4.5

SCOPE This is the second semester of the mathematics core curriculum. This course and Calculus II, the third semester of the mathematics core curriculum, provide a foundation for the continued study of mathematics and for the subsequent study of the physical sciences, the social sciences, and engineering. Combined coverage includes single and multi-variable differential calculus, single and multi-variable integral calculus, and differential equations. Throughout both courses mathematical models motivate the study of topics such as optimization, accumulation, change in one and several variables, differential equations, motion in space, and other topics from the natural sciences, the social sciences, and the decision sciences. MA104 covers single and multi-variable differential calculus including 3-dimensional geometry

Offerings:
2009 2
2009 3
2010 1
2010 2

Pre (101) or (103) or (153)

W. Point 2008-09

and vectors.

MA153 2008-1   ADV MULTIVARIABLE CALCULUS   4.5

SCOPE This is the first course of a two-semester advanced mathematics sequence for selected cadets who have validated single variable calculus and demonstrated strength in the mathematical sciences. It is designed to provide a foundation for the continued study of mathematics, sciences, and engineering. This course consists of an advanced coverage of topics in multivariable calculus. Topics may include a study of infinite sequences and series, vectors and geometry of space, vector functions, partial derivatives, multiple integrals, and vector calculus. An understanding of course material is enhanced through the use of a computer algebra system.

2010 1
2011 1

Pre Perm Disg (103) > (101)

MA205 2005-2   CALCULUS II   4.5

SCOPE This is the third semester of the mathematics core curriculum. This course with Calculus I, the second semester of the mathematics core curriculum, provides a foundation for the continued study of mathematics and for the subsequent study of the physical sciences, the social sciences, and engineering. Combined coverage includes single and multi-variable differential calculus, single and multi-variable integral calculus, and differential equations. Throughout both courses mathematical models motivate the study of topics such as optimization, accumulation, change in one and several variables, differential equations, motion in space, and other topics from the natural sciences, the social sciences, and the decision sciences. MA205 covers single and multi-variable integral calculus and elementary ordinary differential equations. The sequence culminates with an introduction to the mathematics most applicable to each cadet's major or engineering stem.

2009 2
2009 3
2010 1
2010 2
2010 3
2011 1
2011 2
2011 3

Pre (104) Disg (255)

MA206 2005-2   PROBABILITY & STATISTICS   3.0

SCOPE This is the final course in the mathematics core curriculum. It provides a professional development experience upon which cadets can structure their reasoning under conditions of uncertainty and presents fundamental probability and statistical concepts that support the USMA core curriculum. Coverage includes data analysis; modeling, probabilistic models, simulation, random variables and their distributions, hypothesis testing, confidence intervals, and simple linear regression. Applied problems motivate concepts, and technology enhances understanding, problem solving, and communication.

2009 2
2009 3
2010 1
2010 2
2010 3
2011 1
2011 2
2011 3

Pre (205) or (255)

MA255 2008-2   MATH MODELING/INTRO DIF EQ   4.0

W. Point 2008-09

SCOPE This is the second course of a two-semester advanced mathematics sequence for selected cadets who have validated single variable calculus and demonstrated strength in the mathematical sciences. It is designed to provide a foundation for the continued study of mathematics, sciences, and engineering. This course emphasizes the interaction between mathematics and the physical sciences through modeling with differential equations. Topics may include a study of first order differential equations, first order difference equations, second order linear equations, partial differential equations and Fourier series, systems of first order linear equations, numerical methods, and nonlinear equations and stability. An understanding of course material is enhanced through the use of a computer algebra system.

2009 2
2010 1
2010 2
2011 1
2011 2

Pre 153   Dsg 205

MA363 2003-2   VECTOR CALCULUS AND ODE   3.0

SCOPE This course continues the study of vector calculus from MA205 through the remainder of the vector differential operations, line and surface integrals, and the vector integral theorems of Green, Gauss, and Stokes. The focus then turns to series solutions of ordinary differential equations and solving systems of ordinary differential equations. Emphasis is placed upon analyzing a variety of practical applications that give rise to ordinary differential equations. Numerical methods of solution are also studied.

2009 2
2010 2
2011 2

Pre 205 or 255   Dsg 364 or 366

MA364 2003-1   ENGINEERING MATHEMATICS   3.0

SCOPE This course provides additional mathematical techniques and deepens the understanding of concepts in mathematics to support continued study in science and engineering. Emphasis is placed upon using mathematics to gain insight into natural and man-made phenomena that give rise to problems in differential equations and vector calculus. Calculus topics focus on three-dimensional space curves, vector fields and operations, divergence and curl, line and surface integrals. Analytic and numerical solutions to differential equations and systems of differential equations are found using a variety of techniques. Linear algebra topics include solutions to homogeneous and non-homogeneous systems of equations. An introduction to classical partial differential equations is included in the Spring semester.

2009 2
2010 1
2010 2
2011 1
2011 2

Pre 205 or 255   Dsg 363 or 366

MA366 2003-2   VECTOR CALCULUS & INTRO PDES   3.0

SCOPE This course provides additional mathematical techniques and deepens the understanding of concepts in mathematics to support continued study in environmental engineering. Emphasis is placed upon using mathematics to gain insight into natural and man-made phenomena that give rise to problems in differential equations and vector calculus. Calculus study focuses on vector fields, differential operators, and the vector integral theorems. This material is then used to derive the diffusion equation. Solutions of this equation via Fourier series, separation of variables, and numerical methods are then studied.

2009 2
2010 2
2011 2

Pre 205 or 255   Dsg 363 or 364

MA371 2003-1   LINEAR ALGEBRA   3.0

SCOPE This course emphasizes both the computational and theoretical aspects of linear algebra one encounters in many subjects ranging from economics to engineering. The course covers solutions of linear systems of equations and the algebra of matrices. The foundational aspects of vector spaces and linear transformations to include linear dependence and independence, subspaces, bases and dimension, inner products, and orthonormalization are developed. This is rounded out with a detailed investigation of eigenvalues and eigenvectors as they relate to diagonalization, quadratic equations, and systems of differential equations. The Invertible Matrix Theorem is explored as the conceptual/theoretical thread of the course. A computer algebra system is used to explore concepts and compute solutions to problems. Applications of the course material are included in the form of special problems to illustrate its wide scope.

2009 2
2010 1
2010 2
2011 1
2011 2

Pre 205 or 255

West Point 2008-09

| MA372 1987-2 | INTRODUCTION TO DISCRETE MATH | 3.0 |

SCOPE The purpose of this course is to introduce topics in Discrete Mathematics, providing a foundation for further study and application. The topics covered are useful to both the applied mathematician and the computer scientist. They include propositional logic, elements of set theory, combinatorics, relations, functions, partitions, methods of proof, induction and recursion, digraphs, trees, finite state machines, and algebraic systems. Specific applications to computer science are presented.

2010 1
2011 1

Pre 20 ?

| MA376 2003-1 | APPLIED STATISTICS | 3.0 |

SCOPE This course builds on the foundations presented in the core probability and statistics course to provide a broad introduction to some of the most common models and techniques in applied statistics. The mathematical basis for each of the models and techniques is presented with particular emphasis on the development of the required test statistics and their distributions. Topics covered include hypothesis testing, analysis of variance, categorical data analysis, regression analysis, and nonparametric methods.

2010 1
2011 1

Pre 206

| MA381 2003-1 | NONLINEAR OPTIMIZATION | 3.0 |

SCOPE This course provides an undergraduate presentation of nonlinear topics in mathematical programming that builds on multivariable Calculus II. The emphasis of this course is on developing a conceptual understanding of the fundamental topics introduced. These topics include general convexity, convex functions, derivative-based multivariable search techniques, minima and maxima of convex functions, gradients, hessian matrices, Lagrange Multipliers, Fritz-John and Kuhn-Tucker optimality conditions, and constrained and unconstrained optimization. Computer software is used to explore and expose various key ideas throughout the course.

2010 1
2011 1

Pre 205 or 255

| MA383 1992-2 | FOUNDATIONS OF MATH | 3.0 |

SCOPE This course introduces the student to the methods and language of upper division mathematics. It presents formal set theory, and introduces the student to the methods of formulating and writing mathematical proofs. Finally, it provides the student a rigorous introduction to the theory of relations, functions, and infinite sets.

2010 1
2011 1

Pre 205 or 255

| MA385 2003-1 | CHAOS AND FRACTALS | 3.0 |

SCOPE This course introduces topics in fractal geometry and chaotic dynamical systems, providing a foundation for applications and further study. The topics from fractal geometry include the military applications of image analysis and data storage. The chaotic dynamical systems studied in the course are one-, two-, and three-dimensional, nonlinear, discrete and continuous dynamical systems. Topics include the logistics equation, the Henon attractor, the Lorenz equations, bifurcation theory, Julia sets, and the Mandelbrot set. These topics have applications in many fields of science, and examples from biology, meteorology, engineering, and the social sciences are studied. The course integrates concepts introduced in the core mathematics courses.

2009 2
2010 2
2011 2

Pre 205 or 255

| MA386 2003-1 | INTRO TO NUMERICAL ANALYSIS | 3.0 |

SCOPE This course develops an understanding of the methods for solving mathematical problems using a digital

2010 1

205 or
Pre 255 or 1 IT course

W. Point 2008-09

computer. Algorithms leading to solution of mathematical problems will be examined for consistency, stability, and convergence. After a brief review of calculus theory, a study of error analysis and computer arithmetic will provide the framework for the study of the following topics: solutions of equations of one variable, solutions of linear and nonlinear systems of equations, the use of polynomials to approximate discrete data, curve fitting, numerical integration and differentiation, and the approximation of continuous functions. Special problems will incorporate computer graphics and the use of mathematical software libraries to produce numerical solutions of applied problems.

2010 1
2011 1

MA387 1984-2	MATHEMATICAL ANALYSIS I	3.0

SCOPE A one semester course providing a rigorous introduction to the calculus of a single variable. The course is designed to introduce the student to the foundations of the calculus necessary for advanced undergraduate and graduate studies in applied mathematics and engineering. Course coverage includes a treatment of the structure of the real number system, sequences, continuous functions, and differentiation.

2009 2
2010 2
2011 2

Pre 383

MA391 2003-1	MATHEMATICAL MODELING	3.0

SCOPE This course is designed to give cadets the opportunity to develop skills in model construction and model analysis while addressing interesting scenarios with practical applications from a wide variety of fields. This course serves as the entry point for both the Mathematical Sciences major and the Operations Research major. The course addresses the complex process of translating real-world events into mathematical language, solving the resulting mathematical model (iterating as necessary), and interpreting the results in terms of real world issues. Topics include model development from data, regression, general curve fitting strategies, and deterministic and stochastic model development. Interdisciplinary projects based on actual modeling scenarios are used to integrate the various topics into a coherent theme.

2009 2
2010 1
2010 2
2011 1
2011 2

Pre 205 or 255 Co 206

MA396 2003-2	NUM METH SOLUTIONS DIFF EQNS	3.0

SCOPE The focus of this course is to find numerical solutions of differential equations that result when modeling physical phenomena. The numerical solution of both initial value problems and boundary-value problems that arise with ordinary differential equations are covered. Techniques for solving partial differential equations are introduced. Software packages (Mathematica, Maple, Matlab, etc.) have proved to be very useful tools for many numerical techniques and are used to augment an understanding of course material.

2009 2
2010 2
2011 2

Pre 205 or 255 or 1 of 2 IT courses

MA461 2004-1	GRAPH THEORY AND NETWORKS	3.0

Pre 206

SCOPE This course introduces the student to the techniques, algorithms, and structures used in graph theory and network flows in order to solve real world discrete optimization problems. Basic definitions relating to graphs and digraphs, together with a large number of examples and applications are provided. Cadets learn to implement new graph theory techniques in their area of study. Emphasis is on modeling, algorithms, and optimization.

2010 1
2011 1

MA462 2004-2	COMBINATORICS	3.0

SCOPE This course introduces the basic techniques and modes of combinatorial problem-solving important to the field of computer science and mathematical sciences such as operations research. Applications of combinatorics are also related to fields such as genetics, organic chemistry, electrical engineering and political science. Combinatorial enumeration and logical structure are stressed. Applications and examples provide the structure of progression through

2009 2
2010 2

Pre 206

topics which include counting methods, generating functions, recurrence relations, and enumeration techniques.

2011 2

MA464 2003-2   APPLIED ALGEBRA W/ CRYPTOLOGY   3.0

Pre 206

SCOPE We study the underlying algebra of computer science structures as well as sets, set functions, Boolean algebra, finite state machines, groups, and modular arithmetic. We introduce and study mathematical aspects of cryptology with an emphasis on cryptanalysis of encryption ciphers. We study early paper-and-pencil systems through current computer algorithms for encryption. We employ algebraic principles in both design and analysis of encryption systems, be it matrix, linear feedback shift register sequence, or linear congruential random number generator sequence efforts. Further, we investigate the mathematics of breaking machine ciphers and of designing modern public-key crypto systems.

2009 2
2010 2
2011 2

MA466 2004-2   ABSTRACT ALGEBRA   3.0

SCOPE This is an introductory course in modern algebra for cadets who plan to do graduate work in mathematics or theoretical work in the physical sciences or engineering. The emphasis of the course is on group theory, considering such topics as cyclic and abelian groups, normal sub-groups and factor groups, series of groups, and solvable groups. Selected applications are interspersed with the material on group theory. The course concludes with an introduction to rings and fields. One special problem is provided to allow the student to do independent research in an area of the student's interest.

Pre 206

2009 2
2010 2
2011 2

MA476 2003-2   MATHEMATICAL STATISTICS   3.0

Pre 206

SCOPE This course builds on the foundation presented in the core probability and statistics course to provide a mathematical presentation of the important topics in mathematical statistics. The course begins with a review of probability concepts from the core course, adding additional topics such as transformations of random variables and moment generating functions. To provide the mathematical basis for much of statistical practice, certain limit theorems and sampling distributions are proven. The central focus of the course is distribution theory, to include the theory of estimation and the theory of hypothesis testing.

2009 2
2010 2
2011 2

MA481 2003-2   LINEAR OPTIMIZATION   3.0

Pre 371

SCOPE This course emphasizes the applications of optimal solutions to linear algebraic systems using the simplex method of linear programming. This includes an in-depth development of the simplex method, the theory of duality, an analysis of the dual problem, convex hull concepts, integer programming, sensitivity analysis and the revised simplex procedure. Additional computational techniques that are applicable to specific mathematical models such as the transportation problem, assignment problem and network problems are also studied. Problems illustrating applications are emphasized throughout the course. Use of existing computer software to solve problems is also emphasized.

2009 2
2010 2
2011 2

MA484 1973-2   PARTIAL DIFF EQUATIONS   3.0

Pre 205 or 255

SCOPE The course is devoted to the solution of the classical partial differential equations of mathematical physics and most engineering fields. For example, these equations describe such diverse phenomena as the flow of heat in a metal plate, the gravitational field of the solar system, the vibration of a structural beam, and the energy levels of the hydrogen atom. The subject matter has application in many fields and should be of interest to mathematics, science, and engineering concentrators. Specific topics covered are the heat, wave, and potential equations, Fourier series, series solutions to ordinary differential equations, special functions, and boundary value problems.

2010 1
2011 1

MA485 2003-2   APPLIED COMPLEX VARIABLES   3.0

Pre 205 or 255

SCOPE This course presents a logical development of complex variable theory sufficient for the development and solution of a number of interesting and practical problems. Residue theory is developed and applied to problems in integration and in the solution of partial differential equations via transform techniques. Conformal mapping theory is used to solve partial differential equations for which the solution is a harmonic function satisfying prescribed boundary conditions. These classical Dirichlet-Neumann problems model phenomena arising in the study of electrostatic potential, equilibrium thermodynamics, incompressible fluids, elasticity, and other areas of continuum mechanics.

2009 2
2010 2
2011 2

MA487 1971-2   MATHEMATICAL ANALYSIS II   3.0

Pre 387

SCOPE Continuation of MA387. Course coverage includes Riemann and Stieltjes integration, infinite series, sequences and series of functions, uniform convergence, and power series.

2010 1
2011 1

MA488 2004-1   SPECIAL TOPICS IN MATHEMATICS   3.0

Pre None (N/A)

SCOPE This course provides an in-depth study of a special topic in mathematics not offered elsewhere in the USMA curriculum. Course content will be based on the special expertise of the visiting professor or a senior mathematical science faculty member.

2009 2
2010 2
2011 2

MA488A 2004-1   SPECIAL TOPICS IN MATHEMATICS   3.0

Not App
Pre 488

SCOPE This course provides an in-depth study of a special topic in mathematics not offered elsewhere in the USMA curriculum. Course content will be based on the special expertise of the visiting professor or a senior mathematical science faculty member.

2009 2
2011 1

MA489 1974-1   ADV INDIV STUDY IN MATH   3.0

Not App

SCOPE This is essentially a tutorial course or an individual project, offered only to a limited number of highly qualified cadets who have completed available mathematics elective courses and have expressed a wish to pursue advanced study in a field of mathematics. The course work will be tailored to suit the individual needs.

2009 2

MA489D 1974-1   AIS IN DATA ANALYSIS   3.0

NA

SCOPE

No Course Offerings

W. Point 2008-09

MA490 2005-2   APP PROB FROM MATH, SCI & ENGR   3.0

Pre 206

SCOPE This course is intended to serve as an integrative experience for cadets of all majors and FOSs. Cadets having completed the core math program will be given the opportunity to develop skills in model construction and analysis while addressing problems and scenarios with practical applications from science, social sciences, engineering, computer science and/or mathematics. Interdisciplinary projects based on actual modeling scenarios are used to integrate the various topics into a coherent theme

2009 2

2010 2

2011 2

MA491 2003-1   RESEARCH SEMNR-APPLD MATH   3.0

Pre 391

SCOPE The student integrates the mathematical concepts and techniques learned in previous courses with the principles developed throughout the whole USMA Curriculum to solve a current problem of interest to the individual, to the Academy, or to agencies in the Department of the Army. Cadets may select problems from a list of suitable projects provided by the Department of Mathematical Sciences. Cadets choose a faculty advisor who has an interest and background in the problem. Cadets may work individually or in small teams, depending on the nature of the research. Regular workshop sessions will be held. Cadets will be given an opportunity to present their research at the Service Academies Student Mathematics Conference and/or other undergraduate conferences. Research reports will be reviewed, edited, and compiled into the USMA Transactions on Cadet Mathematical Research.

2009 2

2010 1

2010 2

2011 1

2011 2

MA493A 2003-1   OPNL CALC AND TRANSFORMS   3.0

Pre 484 or 485

SCOPE This course is the logical extension and synthesis of MA484 and MA485. It employs the integral calculus of complex functions and the theory of residues to investigate solutions to a number of partial differential equations arising from electrostatics, thermostatics, elasticity, gravitation, and other fields of continuum mechanics. The Poisson-Integral Formula is applied to the solution of boundary-value problems. Fourier and Laplace transforms are studied in detail and are used to develop general techniques for the solution of many ordinary, partial, and integral equations which result from the above applications.

2009 2

2010 1

2010 2

2011 2

MA493B 1995-1   REAL VARIABLE THEORY   3.0

Pre 487

SCOPE Continuation of MA487. Topics include sequences and series of functions, equicontinuity power series, Fourier series, the exponential and logarithmic function, and the Gamma function. The last portion of the course will be devoted to individual research projects.

2009 2

2010 1

2010 2

2011 2

MA493C 2000-1   TOPICS IN NUMERICAL ANLYSIS   3.0

386 or 396

SCOPE A continuation of MA396. Topics include boundary-value problems for ordinary and/or partial differential equations.

2009 2

2010 1

2010 2

W. Point 2008-09

2011 2

MA493D 1980-2   INTRODUCTION TO TOPOLOGY   3.0

Pre 384

SCOPE The course begins with cardinality and the modern definition of a function. Then the basic properties of topological spaces--compactness, connectedness, and continuity--will be emphasized. Special attention will be given to metric topologies on Euclidean spaces. Complete metric spaces and function spaces will be introduced.

2009 2

2010 1

2010 2

2011 1

2011 2

MA493E 1995-1   TOPICS IN ANALYSIS   3.0

Pre 487

SCOPE This course provides cadets the opportunity to pursue in detail subjects of special interest.

2009 2

2010 1

2010 2

2011 2

MA498 2007-1   SR THESIS I: RSCRCH & PROPOSAL   3.0

NA

SCOPE The purpose of the Senior Thesis is to provide cadets with an unique opportunity to create a scholarly product that is academically, professionally, and personally meaningful to them and that reflects their thinking and abilities as developed at West Point and in the Department of Mathematical Sciences. Cadets will choose a faculty advisor with whom they will collaborate over two semesters. Cadets will meet on a regular basis with their advisor to discuss mathematics, progress on their research and thesis, and developmental issues. The objectives of the research are: (1) to synthesize and cohere the cadet's studies; (2) to apply methodological skills of research design, conceptual reasoning, analysis, and research gained to a selected area of substantive interest; (3) to extend the cadet's in-depth study of the selected area of interest beyond the level obtained in the Mathematical Sciences Major; (4) to design and conduct focused research beyond the constrained opportunities in elective courses; and (5) to develop cadet skills in conceptual reasoning, critical analysis, and effective writing.

2010 1

2011 1

MA499 2007-2   SR THESIS II: PAPER & DEFENSE   3.0

NA

SCOPE This course continues the work on the thesis commenced in MA 498. At the end of the course, cadets will submit a written thesis to the Department of Mathematical Sciences. In addition, cadets will defend that thesis before a faculty committee. Cadets will be given an opportunity to present their research at the Service Academies Student Mathematics Conference and/or other undergraduate conferences. Theses will be reviewed, edited, and compiled into the USMA Transactions on Cadet Mathematical Research.

2009 2

2010 2

2011 2

W. Point   2008-09

The Department of Mathematical Sciences provides each cadet the opportunity to gain the mathematical education essential to progressive and continuing development throughout a career as a Regular Army officer. Emphasis is placed on achieving intellectual discipline, mastery of reasoning, understanding of mathematical concepts, skill in practical applications of mathematics and appreciation for the role of mathematics in the military. The core requirement in mathematics is satisfied by successful completion or validation of the standard program. Cadets with weak backgrounds in algebra and trigonometry will be required to complete a course in pre-calculus prior to undertaking the standard program. In addition to the core program, the Department of Mathematical Sciences has responsibility for a major in the mathematical sciences and, in conjunction with the Department of Systems Engineering, a major in operations research.

For additional details go to our **Department Home Page** or **Contact our academic advisors**

MADN-MATH ASTON	Applied Statistics	2011
MADN-MATH MSC0	Mathematical Sciences	2008 , 2009 , 2010 , 2011
MADN-MATH MST0	Mathematical Studies	2008 , 2009 , 2010 , 2011
MADN-MATH ORE0	Operations Research	2008 , 2009 , 2010 , 2011
MADN-MATH ORS0	Operations Research Studies	2008 , 2009 , 2010 , 2011

** These are active Majors that are sponsored by Department of Mathematical Sciences
Click on graduation year to retrieve details associated with that Major offering to a specific graduation year

Course Search | FOS/MAJ Search | Main | Curriculum Catalog Home

2011 Mathematical Sciences Major Curriculum

MSC0 Mathematical Sciences	Mathematical Sciences Major	Mathematical Sciences	13	0

2011 Mathematical Sciences Major Tracks

View Template

Required Courses   Choose 9 of 9

With Department Head permission, MA464 may be substituted for MA466.

MA363	VECTOR CALCULUS AND ODE
MA371	LINEAR ALGEBRA
MA376	APPLIED STATISTICS
MA383	FOUNDATIONS OF MATH
MA386	INTRO TO NUMERICAL ANALYSIS
MA387	MATHEMATICAL ANALYSIS I
MA391	MATHEMATICAL MODELING
MA466	ABSTRACT ALGEBRA
MA491	RESEARCH SEMNR-APPLD MATH

AND

Math Electives   Choose 2 of 26

Only one of the non-Math Department Electives may be selected.

EP333	CULTURAL STUDIES
EV365	GEOGRAPHY OF GLOBAL CULTURES
LW481	INTERNATIONAL LAW
LX300	3RD SEMESTER FOREIGN LANG
MA372	INTRODUCTION TO DISCRETE MATH
MA381	NONLINEAR OPTIMIZATION
MA385	CHAOS AND FRACTALS
MA396	NUM METH SOLUTIONS DIFF EQNS
MA461	GRAPH THEORY AND NETWORKS

W. Point 2008-09

MA462	COMBINATORICS
MA464	APPLIED ALGEBRA W/ CRYPTOLOGY
MA476	MATHEMATICAL STATISTICS
MA481	LINEAR OPTIMIZATION
MA484	PARTIAL DIFF EQUATIONS
MA485	APPLIED COMPLEX VARIABLES
MA487	MATHEMATICAL ANALYSIS II
MA488	SPECIAL TOPICS IN MATHEMATICS
MA489	ADV INDIV STUDY IN MATH
MA493A	OPNL CALC AND TRANSFORMS
MA493B	REAL VARIABLE THEORY
MA493C	TOPICS IN NUMERICAL ANLYSIS
MA493D	INTRODUCTION TO TOPOLOGY
MA493E	TOPICS IN ANALYSIS
MS455	COMPARATIVE MILITARY SYSTEMS
PL371	INTRODUCTORY SOCIOLOGY
SS381	CULTURAL/POLIT ANTHROPOLOGY

AND

IT Course   Choose 1 of 2

IT305	THEORY & PRAC OF MIL IT SYS
IT355	ADV THEORY OF MIL IT SYS

AND

Integrative Experience   Choose 1 of 1

Cadets may take MA490 or any other department's integrative experience.

MA490	APP PROB FROM MATH, SCI & ENGR

2011 Mathematical Sciences Major w/ Honors Curriculum

Sh... ... ...ip 'o...	... ...p... ...	Transcr... Des...	...eq C se O... C...	... ...
MSC0H Mathematical Sciences w/ Honors	Mathematical Sciences Major w/ Honors	Mathematical Sciences w/ Honors	2	0

2011 Mathematical Sciences Major w/ Honors Tracks

View Template

W. Point 2008-09

Required Courses

Choose 2 of 2

The senior research seminar (MA491) is replaced with a two-course thesis option consisting of the following two courses.

MA498   SR THESIS I: RSCRCH & PROPOSAL

MA499   SR THESIS II: PAPER & DEFENSE

AND

Grade Requirements

Complete the requirements of the major (excepting MA491) as shown above, and attain an APSC of at least 3.0 in the core curriculum and an APSC of at least 3.5 in the major.

Course Search I FOS/MAJ Search I Main I Curriculum Catalog Home

2011 Mathematical Studies Major Curriculum

		Transcript	Req Crse Cnt	Opt Crse Cnt
MST0 Mathematical Studies	Mathematical Studies Major	Mathematical Studies	11	0

2011 Mathematical Studies Major Tracks

View Template

Subj Crs Area	Description
Required Courses	Choose 6 of 6
MA363	VECTOR CALCULUS AND ODE
MA371	LINEAR ALGEBRA
MA376	APPLIED STATISTICS
MA383	FOUNDATIONS OF MATH
MA386	INTRO TO NUMERICAL ANALYSIS
MA391	MATHEMATICAL MODELING
AND	
Math Electives	Choose 3 of 29

Only one non-Math Department Elective may be selected.

EP333	CULTURAL STUDIES
EV365	GEOGRAPHY OF GLOBAL CULTURES
LW481	INTERNATIONAL LAW
LX300	3RD SEMESTER FOREIGN LANG
MA372	INTRODUCTION TO DISCRETE MATH
MA381	NONLINEAR OPTIMIZATION
MA385	CHAOS AND FRACTALS
MA387	MATHEMATICAL ANALYSIS I
MA396	NUM METH SOLUTIONS DIFF EQNS
MA461	GRAPH THEORY AND NETWORKS
MA462	COMBINATORICS
MA464	APPLIED ALGEBRA W/ CRYPTOLOGY
MA466	ABSTRACT ALGEBRA

Course	Title
MA476	MATHEMATICAL STATISTICS
MA481	LINEAR OPTIMIZATION
MA484	PARTIAL DIFF EQUATIONS
MA485	APPLIED COMPLEX VARIABLES
MA487	MATHEMATICAL ANALYSIS II
MA488	SPECIAL TOPICS IN MATHEMATICS
MA489	ADV INDIV STUDY IN MATH
MA491	RESEARCH SEMNR-APPLD MATH
MA493A	OPNL CALC AND TRANSFORMS
MA493B	REAL VARIABLE THEORY
MA493C	TOPICS IN NUMERICAL ANLYSIS
MA493D	INTRODUCTION TO TOPOLOGY
MA493E	TOPICS IN ANALYSIS
MS455	COMPARATIVE MILITARY SYSTEMS
PL371	INTRODUCTORY SOCIOLOGY
SS381	CULTURAL/POLIT ANTHROPOLOGY

AND

IT Course Choose 1 of 2

Course	Title
IT305	THEORY & PRAC OF MIL IT SYS
IT355	ADV THEORY OF MIL IT SYS

AND

Integrative Experience Choose 1 of 1

Cadets take MA490 or any other department's integrative experience.

Course	Title
MA490	APP PROB FROM MATH, SCI & ENGR

Course Search | FOS/MAJ Search | Main | Curriculum Catalog Home

2011 Operations Research Major Curriculum

	Description	Track Description	Req Crs	Elective Crs
ORE0 Operations Research	Operations Research Major	Operations Research	16	0

2011 Operations Research Major Tracks

View Template

Subject Area	Description
IT Course	Choose 1 of 2
IT305	THEORY & PRAC OF MIL IT SYS
IT355	ADV THEORY OF MIL IT SYS
AND	
Required Courses	Choose 13 of 13
EM381	ENGINEERING ECONOMY
MA371	LINEAR ALGEBRA
MA376	APPLIED STATISTICS
MA381	NONLINEAR OPTIMIZATION
MA476	MATHEMATICAL STATISTICS
MA481	LINEAR OPTIMIZATION
MA491	RESEARCH SEMNR-APPLD MATH
SE301	FNDTN ENGIN DSGN & SYS MGMT
SE385	DECISION ANALYSIS
SE387	DETERMINISTIC MODELS
SE388	STOCHASTIC MODELS
SE402	SYSTEMS DESIGN I
SE403	SYSTEMS DESIGN II
AND	
Simulation Elective	Choose 1 of 2
SE481	SYSTEMS SIMULATION
SE485	COMBAT MODELING
AND	

W- Point 2008-09

Elective	Choose 1 of 18
CS384	DATA STRUCTURES
CS486	ARTIFICIAL INTELLIGENCE
EM420	PRODUCTION OPERATIONS MGMT
EM484	DYNAMIC SYSTEMS ANALYSIS
IS383	FUND OF INFORMATION SYS
MA386	INTRO TO NUMERICAL ANALYSIS
MA391	MATHEMATICAL MODELING
MA461	GRAPH THEORY AND NETWORKS
MA488	VISITING PROFESSOR'S COURSE
MA489	ADV INDIV STUDY IN MATH
SE481	SYSTEMS SIMULATION
SE485	COMBAT MODELING
SE489	AD IND STY-SYS ENG/ENG MGMT
SE490	AD TOPICS IN SYS ENG/ENG MGMT
SE491	RESEARCH PROJECT IN SYS ENG
SS382	MICROECONOMICS
SS388	MACROECON THEORY & PRACTICE
SS469	ECONOMETRICS II

2011 Operations Research Major w/ Honors Curriculum

	Description	Description	Transcript Description	Req Crse Hr	Opt Crse Hr
ORE0H Operations Research w/ Honors	Operations Research Major w/ Honors	Operations Research w/ Honors	2	0

2011 Operations Research Major w/ Honors Tracks

View Template

	Area	Description
Required Courses	Choose 2 of 2	

The senior research seminar (MA491) is replaced with two-course thesis option consisting of the following courses.

MA498	SR THESIS I: RSCRCH & PROPOSAL
MA499	SR THESIS II: PAPER & DEFENSE

W- Point 2008-09

AND

Grade Requirements

Complete the requirements of the major (excepting MA491) as shown above, and attain an APSC of at least 3.0 in the core curriculum and an APSC of at least 3.5 in the major.

Course Search | FOS/MAJ Search | Main | Curriculum Catalog Home

2011 Operations Research Studies Major Curriculum

	Description	Description			
ORS0 Operations Research Studies	Operations Research Studies Major	Operations Research Studies	14	0

2011 Operations Research Studies Major Tracks

View Template

Object	
IT Course	Choose 1 of 2
IT305	THEORY & PRAC OF MIL IT SYS
IT355	ADV THEORY OF MIL IT SYS
AND	
Required Courses	Choose 11 of 11
EM381	ENGINEERING ECONOMY
MA371	LINEAR ALGEBRA
MA376	APPLIED STATISTICS
MA381	NONLINEAR OPTIMIZATION
MA481	LINEAR OPTIMIZATION
MA491	RESEARCH SEMNR-APPLD MATH
SE301	FNDTN ENGIN DSGN & SYS MGMT
SE385	DECISION ANALYSIS
SE387	DETERMINISTIC MODELS
SE388	STOCHASTIC MODELS
SM401	SYSTEMS MANAGEMENT CAPSTONE
AND	
Simulation Elective	Choose 1 of 2
SE481	SYSTEMS SIMULATION
SE485	COMBAT MODELING
AND	
Elective	Choose 1 of 20
CS384	DATA STRUCTURES

W. Point 2008 - 09

CS486	ARTIFICIAL INTELLIGENCE
EM420	PRODUCTION OPERATIONS MGMT
EM484	DYNAMIC SYSTEMS ANALYSIS
IS383	FUND OF INFORMATION SYS
MA386	INTRO TO NUMERICAL ANALYSIS
MA391	MATHEMATICAL MODELING
MA461	GRAPH THEORY AND NETWORKS
MA476	MATHEMATICAL STATISTICS
MA488	VISITING PROFESSOR'S COURSE
MA489	ADV INDIV STUDY IN MATH
SE370	COMPUTER AIDED SYSTEMS ENG
SE481	SYSTEMS SIMULATION
SE485	COMBAT MODELING
SE489	AD IND STY-SYS ENG/ENG MGMT
SE490	VISITING PROFESSOR'S COURSE
SE491	RESEARCH PROJECT IN SYS ENG
SS382	MICROECONOMICS
SS388	MACROECON THEORY & PRACTICE
SS469	ECONOMETRICS II

West Point 2008 credits and hours. Imported from website
http://www.dean.usma.edu/sebpublic/curriccat/static/AcademicProgram.htm
but with some scrambling. We highlight Physical education and tabulate hours with
and without phys. Ed.
Conversions from credits to hours goes according to memo from Myers and Arney.

Conversion of phys ed is shown 2 ways = by Arney memo and by Germaine memo.

TYPICAL ACADEMIC PROGRAM

FOURTH CLASS
THIRD CLASS
Term 1
Term 2
Term 1

Term 2	Hours (not phys ed)	Phys Ed hours
MA 103 - 4.0 Math Modeling/Intro to Calculus	64	
MA104 - 4.5 Calculus I	64	
MA205 - 4.5 Calculus II	64	
MA206 - 3.0 Prob & Stats	40	
CH101 - 3.5 Chemistry I	48	
CH102 - 3.5 Chemistry II	48	
PH201 - 3.5 Physics I	48	
PH202 - 3.5 Physics II	48	
EN101 - 3.0 English Composition	40	
EN102 - 3.0 Literature	40	
Lx203 - 3.5 Foreign Language	48	
Lx204 - 3.5 Foreign Language	48	
HI10_ - 3.0 History	40	
HI10_ - 3.0 History	40	

SS201 - 3.5 Economics	48
SS202 - 3.5 Political Science	48
PL100 - 3.0 General Psychology	40
IT105 - 3.0 Intro to Computing and Information Technology	40
PY201 - 3.0 Philosophy	40
EV203 - 3.0 Physical Geography	40

PE1__ - 2.5
Physical Education

50

LPA__ - 0.5
Physical Education

10

MS101 - 0.5 Military Science	7
MS103 - 0.5 Military Science	7
MS201 - 0.5 Military Science	7
MS203 - 0.5 Military Science	7

SECOND CLASS
FIRST CLASS
Term 1
Term 2
Term 1
Term 2

*core engineering sequence: or Elective 3.0	40
*core engineering sequence: or Elective 3.0	40
*core engineering sequence: or Elective 3.0	40
Elective 3.0	40

IT305
Theory/Prac Mil IT Sys or
Elective   - 3.0   40
Elective   - 3.0   40
Elective   - 3.0   40
Elective   - 3.0   40

SS307   - 3.5   48
 International Relations

EN302   - 3.0   40
Adv Composition

Elective   - 3.0   40
Elective   - 3.0   40
Elective   - 3.0   40
Elective   - 3.0   40
Elective   - 3.0   40

LW403   - 3.5   48
Constitutional and Military Law

Elective   - 3.0   40
PL300   - 3.0   40
Military Leadership

HI301   - 3.0   40
Military History
HI302   - 3.0   40
Military History

PE320   - 0.5   10
Physical Education

PE350   - 1.5   30
PE460   - 0.5   10
Physical Education

MS301   - 0.5   7
Military Science
MS303   - 0.5   7
Military Science

MS401 - 0.5   7
Military Science
MS403 - 0.5   7
Military Science

Total non-phys ed hours	Total phys ed hours
1808	

110

Germaine
memo says this is
~~150~~ 140 contact hrs.

TYPICAL ACADEMIC PROGRAM

FOURTH CLASS			THIRD CLA
Term 1	**Term 2**	**Term 1**	**Term 2**
MA 103 - 4.0	**MA104 - 4.5**	**MA205 - 4.5**	**MA206**
Math Modeling/Intro to Calculus	Calculus I	Calculus II	Prob &
CH101 - 3.5	**CH102 - 3.5**	**PH201 - 3.5**	**PH202**
Chemistry I	Chemistry II	Physics I	Physics
EN101 - 3.0	**EN102 - 3.0**	**Lx203 - 3.5**	**Lx204**
English Composition	Literature	Foreign Language	Foreign
HI10_ - 3.0	**HI10_ - 3.0**	**SS201 - 3.5**	**SS202**
History	History	Economics	Political
PL100 - 3.0	**IT105 - 3.0**	**PY201 - 3.0**	**EV203**
General Psychology	Intro to Computing and Information Technology	Philosophy	Physica
PE1__ - 2.5		**LPA__ - 0.5**	
Physical Education		Physical Education	
MS101 - 0.5	**MS103 - 0.5**	**MS201 - 0.5**	**MS203**
Military Science	Military Science	Military Science	Military

(handwritten annotations: THIRD CLA 3.0 Cred; Stats; 3.5 cr; 3.5 Lang; 3.5 Sci; 3.0 Geog; 0.5 Sci)

SECOND CLASS		FIRST CLA:	
Term 1	Term 2	Term 1	Term 2
*core engineering sequence: or	*core engineering sequence: or	*core engineering sequence: or	Elective
Elective 3.0	Elective 3.0	Elective 3.0	3.0 cr
IT305 Theory/Prac Mil IT Sys or Elective - 3.0	Elective - 3.0	Elective - 3.0	Elective 3.0 cr
SS307 - 3.5 International Relations	EN302 - 3.0 Adv Composition	Elective - 3.0	Elective 3.0 cr
Elective - 3.0	Elective - 3.0	Elective - 3.0	LW403 Constitu 3.5 cr
Elective - 3.0	PL300 - 3.0 Military Leadership	HI301 - 3.0 Military History	HI302 Military Hist
PE320 - 0.5 Physical Education	PE350 - 1.5	PE460 - 0.5 Physical Education	
MS301 - 0.5 Military Science	MS303 - 0.5 Military Science	MS401 - 0.5 Military Science	MS403 0.5 Military Sci

* Offered in 7 different versions (credit hours will vary):

applies to list of 7 versions on next page

Constitutional and Military Law

Civil   **Nuclear**   **Environmental**
Electrical   **Systems**
Mechanical   **Computer**
Highlighted   *- Courses can be taken either Term 1 or Term 2*

2008 W Pt.

Semester 1	Credits except MilSci and except PhysEd.	Mil Sci	Phys Ed.
Semester 1	16.5	.5	2.5
2	17	.5	0
3	18	.5	.5
4	16.5	.5	0
5	15.5	.5	.5
6	15	.5	1.5
7	15	.5	.5
8	15.5	.5	0
	129.0	4 cr	5.5 cr
	Hrs		

each .5 cr
course is 7 hrs
as far as we can tell.
8×7 = 56 hrs. in 4 yrs.