MATHEMATICS AND COMPUTER SCIENCE

Mathematics is one of the greatest creations of the human mind and an essential part of human culture. It is also the quantitative language of the social, biological, and physical sciences. CMC offers a strong and versatile program in applied and theoretical mathematics. A solid technical sequence of computer science courses, stressing underlying scientific principles, complements the program. Interdisciplinary open problems arising in industry are the central component of mathematics clinics.

The major is taken by students interested in graduate studies in mathematics or preparing for careers in those areas of business, industry, and government where a sound knowledge and understanding of mathematics is necessary.

Students can combine the study of mathematics with a second field by completing a dual major. The mathematics-economics dual major is popular. Students can also major in mathematics with a computer science option, or complete the computer science sequence. Both choices ensure the attainment of computer skills appropriate for many career goals.

The CMC upper division mathematics curriculum benefits from a strong collaboration with the other Claremont Colleges and with the Claremont Graduate University.

Major Requirements

The major in mathematics requires ten courses in mathematics, distributed as follows:

1. **Basic Requirement: minimum of one course:**
   - **31. Calculus II (prerequisite course; does not count for major)**
   - **32. Calculus III**, or
   - **32H. Honors Seminar in Calculus III**
2. **Core Requirement of five courses***:*
   - **90. Linear Algebra**
   - **111. Differential Equations**
   - **131. Math Analysis I**
   - **151. Probability**
   - **171. Abstract Algebra,** or a proof-based substitute approved by the chair. Typical substitutes would be Number Theory or Group Theory.
3. **Level I Courses: two selected from the following:**
   - **132. Math Analysis II**
   - **135. Complex Variables**
   - **152. Statistical Inference**
   - **172po. Abstract Algebra II**
   - **175. Number Theory**
   - **185. Partial Differential Equations**
4. **Level II Courses: two courses:** Level II courses are all listed mathematics courses having as one of their prerequisites a Core Requirement or a Level I course (see listings above).

   Possible Level II courses include:
   - **109. Mathematics of Finance**
   - **112. Dynamical Systems**
   - **156. Stochastic Processes**
   - **187. Deterministic Operations Research,** and
   - **188. Game Theory**

Note: - *Computer Science 50. Introduction to Computer Science (CS I)*, or *60. Fundamentals of Computer Science (CS II)* are highly recommended.

Senior Thesis in Mathematics

The senior thesis is a general education requirement and should serve as a capstone experience to a student's undergraduate education. Students must complete a senior thesis in at least one of their major areas under supervision of a faculty reader who teaches within that major, unless granted a special exception.

Students interested in doing a two-semester thesis project complete a one-half credit or full credit thesis research course in the first semester and the senior thesis in the second semester. The senior thesis and the thesis research course may not be counted as courses in the major. For further information on the senior thesis, see *Statement of Academic Policy*.

Special Options for Majors

Dual Major

The requirements for the mathematics part of a dual major are a minimum of eight mathematics courses, distributed as follows:

1. Core Requirement of four courses:

- **32. Calculus III**, or **32H. Honors Seminar in Calculus III**
- **90. Linear Algebra**
- **131. Math Analysis I**
- **151. Probability**

2. Four courses selected from the list provided below. At least *two groups* must be represented in the selection.

- ***Group 1 (Applied Mathematics)***
  - 105. Stochastic and Deterministic Modeling
  - 109. Introduction to the Mathematics of Finance
  - 110. Introduction to Engineering Mathematics **or**
    111. Differential Equations
  - 112. Introduction to Dynamical Systems and Chaos
  - 182. Partial Differential Equations
  - 188. Mathematics of Game Theory
- ***Group 2 (Computer Science)***
  - CS 50. Introduction to Computer Science (CS I)
  - CS 60. Fundamentals of Computer Science (CS II)
  - CS 76. Encryption and Encoding
  - CS 78. Numerical Methods
  - CS 81. Computability and Logic
  - CS 105. Computer Systems
  - CS 120. Algorithms
  - CS 135. Distributed Software Architecture
- ***Group 3 (Statistics)***
  - 152. Statistical Inference
  - 153. Advanced Topics in Statistical Inference
  - 158. Applied Statistics
  - 186. Stochastic Methods in Operations Research
  - 187. Deterministic Methods in Operations Research
  - 192. Mathematics Clinic I **or**
    193. Mathematics Clinic II.
- ***Group 4 (Theoretical Mathematics)***
  - 132. Math Analysis II
  - 135. Complex Variables
  - 137. Real Analysis I

- 138. Real Analysis II
- 171. Abstract Algebra
- 175. Number Theory

Only one course can be counted from each of the two pairs: Math 110 **or** Math 111 (see Group 1), Mathematics Clinic I **or** Mathematics Clinic II (see Group 3).

Students with a dual major including mathematics are encouraged to write their *senior thesis* on a topic in mathematics. For further information, see "Senior Thesis in Mathematics" above.

Please note the restrictions on honors in the major for students with a dual major under "Honors in Mathematics" below. For further information on dual majors and the requirements for the other field of study of the dual major, please check the appropriate sections of this catalog.

Honors in Mathematics

To be considered for honors students must meet the College requirements for honors in the major. Students with a *dual major* in mathematics who wish to be considered for *honors* in mathematics will only receive honors if they:

- have completed all requirements for a *full major* in mathematics and are granted honors, or
- qualify and receive honors in *both fields* of their dual major. See "Honors in the Major" for details.

Mathematics Major with Computer Science Option

The requirements for a mathematics major with the Computer Science Option are:

1. **Basic Requirement** for mathematics majors (see above)
2. **Core Requirement** for mathematics majors (see above)
3. **Two courses from Level I Mathematics courses** (see above)
4. **Two upper division Computer Science** courses approved by the Department Chair

Notes: - *Mathematics 50. Discrete Mathematics*, is strongly recommended.

Computer Science Sequence

For information on the Computer Science Sequence, see the appropriate section of this catalog.

Notes: - Candidates for *Phi Beta Kappa* must complete *Mathematics 30. Calculus I*, or higher for eligibility.

Advanced Placement, Credit, and Placement

The Mathematics Department grants placement and some credit for Advanced Placement examinations.

Students who earn a score of *5* on the *Calculus BC* exam are placed in Mathematics 32, and granted credit for Mathematics 30 - which completes the general education requirement in mathematics. Students who receive a score of *4* on the *Calculus BC* exam, or a score of *4 or 5* on the *Calculus AB* exam are placed by the department in an advanced calculus course and are eligible for retroactive credit for a lower level calculus course if they receive a grade of B+ (10.0) or better in the higher course in the freshman year. For further information, see "Academic Policies and Procedures."

Mathematics Placement Exams

All *new* students, except for students who have provided the registrar with official copies of AP test scores in calculus, take a *mathematics placement examination* prior to registration and the beginning of classes. The department offers several different placement exams, and new

students will receive information on these exams during the summer. The placement exam may be taken on line. Through the placement exams students are placed in one of the courses in the calculus sequence. Students who do not pass Exam 1 will be advised to take a pre-calculus course, either in Claremont or off-campus, in preparation for one of the courses meeting the general education requirement.

Study Abroad

All CMC students have the opportunity to apply for study abroad during the junior year. Because there are few programs in which a student can study mathematics abroad, and because many mathematics courses are sequential, students interested in studying mathematics abroad should consult with the chair of the Mathematics department no later than the beginning of their sophomore year to review course selections. The Mathematics department strongly recommends the "Budapest Semesters in Mathematics." This is a program in mathematics and computer science especially designed for American and Canadian undergraduates.

General Education Requirement Information

Courses meeting the college general education requirement in mathematics include: *Mathematics 30. Calculus I*, *Mathematics 31. Calculus II*, *Mathematics 32. Calculus III*, *Mathematics 32H. Honors Seminar in Calculus III*, and *Mathematics 50. Discrete Mathematics.* Several majors, including economics and the sciences, require or recommend completion of several mathematics courses. CMC students not ready to take a calculus course may take a pre-calculus course for credit towards graduation but not for the general education requirement in mathematics. Students who have received credit for a higher calculus course may not enroll for credit in a lower calculus course.

For the general education requirement in the *social sciences* and *the humanities*, CMC students majoring in mathematics must take designated courses in three of the fields of the social sciences (economics, government, history, and psychology), and in two of the four fields of the humanities (literature, philosophy, religious studies, and literature in a foreign language). Mathematics majors with a dual or double major in either the humanities or the social sciences will be required to take an additional course in those categories. For further information, see "Degree Requirements."

Courses in Mathematics and Computer Science offered at The Claremont Colleges

CMC students may take introductory calculus courses, equivalent to CMC's courses, at the other Claremont Colleges for the general education requirement in mathematics. Students placed in pre-calculus courses may take this course for credit at one of the other undergraduate colleges. The faculty of Claremont McKenna College, Harvey Mudd College, and Pomona College coordinate upper the upper division course offerings every year. Information on off-campus listings and descriptions may be obtained from the course schedules and catalogs of the individual colleges. A full major in computer science is available through the cooperative program in computer science of Harvey Mudd College and Pomona College.

The Faculty

Professors: Aksoy, Martelli (chair), Myhre (on leave, AY), and Valenza; Associate Professors: Bradley, A. Lee, O'Neill, and Pinter-Lucke; Assistant Professor: Aarão; Visiting Assistant Professors: Peterson, and Wilson

Courses

Mathematics

30. Calculus I.
Single variable calculus. Differentiation and integration of algebraic and transcendental functions with applications to the social and physical sciences. Prerequisite: Placement. First and second semester. Staff

31. Calculus II.
A continuation of Mathematics 30. Techniques and applications of integration; introduction to differential equations; improper integrals and indeterminate forms; infinite series and power series representation of a function. Applications to problems from the social and physical sciences. Prerequisite: Mathematics 30 or placement. First and second semester. Staff

32. Calculus III.
Multivariable calculus and vector analysis with applications to physical and social sciences. Functions of several variables; polar coordinates and parametric representation of curves; partial differentiation, the method of Lagrange multipliers; multiple integration; calculus of vector functions. Prerequisite: Mathematics 31 or placement. First and second semester. Staff

32H. Honors Seminar in Calculus III.
Open by invitation only to freshmen, this course is an introduction to rigorous mathematics for students having a substantial background and demonstrated interest in mathematics. The topics covered will be those of Calculus III with more emphasis on rigor and deeper understanding of the underlying mathematics. First semester. Aksoy

50. Discrete Mathematics.
Topics include sets, propositional logic, combinatorics, recursion, trees, and graph theory, with emphasis on problems solving and proofs. Possible additional topics include analysis of algorithms, particularly search and ordering algorithms, and matrix theory. Prerequisite: Placement Test 1. Second semester. Valenza

90. Linear Algebra.
An introduction to the methods of linear algebra with applications to the physical and social sciences. Topics will include: Linear equations and matrices, determinants, vector spaces, linear transformations, inner product spaces and quadratic forms, eigenvalues and eigenvectors, and canonical forms. Prerequisite: Mathematics 32. First semester. Aarao. Second semester. Bradley

105. Stochastic and Deterministic Modeling.
Basic modeling, discrete deterministic models, discrete stochastic models, stages, states and classes, empirical modeling, continuous models, continuous stochasticity. Prerequisite: Mathematics 31. Second semester. Martelli

109. Introduction to the Mathematics of Finance.
This course emphasizes the math used in the valuation of derivative securities. Topics will include among others partial differential equations (diffusion equation), mathematical modeling of financial derivatives (calls, puts, etc.), and numerical methods for solving differential equations. These topics will aim at understanding the Black-Scholes Model. Prerequisite: Mathematics 90, or permission of instructor. Second semester. Aarao

110. Introduction to Engineering Mathematics.
Ordinary differential equations, line and surface integrals, elementary linear algebra, systems of different equations, and Fourier analysis. Continuous modeling with applications to mechanics; electricity and magnetism, heat, and sound. Prerequisite: Mathematics 32. (Not offered in 2005-2006.)

111. Differential Equations.
An introduction to the general theory and applications of differential equations. Linear systems, nonlinear systems, and stability. Prerequisite: Mathematics 32. (Students may not receive credit for both Mathematics 110 and 111.) First semester. Bradley. Second semestser. Aarao

112. Introduction to Dynamical Systems and Chaos.
Qualitative analysis of discrete dynamical systems in dimension one and higher is motivated and presented with examples taken from the recent research literature. These include mathematical models of biological processes, such as the 1988 Siphonius fillyreae – ash whitefly – infestation in Southern California and its control with Hymenoptera Aphelinidae, and the Hopfield model of Neural Networks. Quantitative analysis of the systems is performed using the symbolic manipulator Maple. Prerequisite: Mathematics 32. Second semester. Martelli

131. Math Analysis I.
Countable sets, least upper bound, and metric space topology including compactness, completeness, connectivity, and uniform convergence. Related topics as time permits. Prerequisite: Mathematics 90. Offered jointly by CMC and Pomona College. Second semester. Aksoy

132. Math Analysis II.
A rigorous study of calculus in Euclidean Spaces including Riemann Integrals, derivatives of transformations, and the inverse function theorem. Prerequisite: Mathematics 131. Offered jointly by CMC and Pomona College. (Not offered in 2005-2006.)

135. Complex Variables.
An introduction to the theory and application of analytic functions of a complex variable. Prerequisite: Mathematics 90, or permission of the instructor. Offered jointly by CMC and Pomona College. Second semester. Aksoy

137. Real Analysis I.
Abstract measures, Lebesque measure, on Rn, and Lebesgue-Stieljes measure on R. The Lebesgue integral and limit theorems. Product measures and the Fubini Theorem. Additional related topics as time permits. Prerequisites: Mathematics 131, and 132. Offered jointly by CMC, Claremont Graduate University, and Pomona College. First semester. Aksoy

138. Real Analysis II.
Continuation of Mathematics 137. Some of the topics covered will be: Banach and Hilbert spaces, Lp spaces, complex measures and Radon-Nikodym theorem. Prerequisite: Mathematics 137. Offered jointly by CMC, Claremont Graduate University, and Pomona College. (Not offered in 2005-2006.)

144. Fourier Analysis.
Fourier series and integrals. Questions of convergence, divergence and approximation. Applications to differential equations, the Dirichlet problem, moment problems, signal processing, probability and statistics. Prerequisite: Mathematics 131. (Not offered in 2005-2006.)

151. Probability.
Discrete and continuous random variables, conditional and marginal distributions, independence, expectations, generating functions, transformations, central limit theorem. Applications to the social and physical sciences. Pre- or co-requisite: Mathematics 90, or permission of instructor. Offered jointly by CMC and Pomona College. First semester. O'Neill

152. Statistical Inference.
Introduction to statistical inference including practical problems in the social and physical sciences. Estimation of parameters, confidence intervals, and tests of hypothesis. Prerequisite: Mathematics 151. Offered jointly by CMC and Pomona College. Second semester. O'Neill

153. Advanced Topics in Statistical Inference.
Selected topics in statistical inference including Bayesian Inference, sequential procedures, and distribution free methods. Prerequisite: Mathematics 152. Offered jointly by CMC and Pomona College. (Not offered in 2005-2006.)

156. Stochastic Processes and Modeling.
Stochastic processes are ways of mathematically modeling dynamic relationships of sequences of random events. The course covers topics chosen from theory of discrete and continuous Markov chains, second order processes, renewal processes, martingales, Brownian motion, branching processes, random sums, ergodic theory and stationary processes. Stochastic models are basic to understanding many areas of the natural and physical sciences, and to analyzing the uncertainties affecting managerial decisions and the theory of the mathematics of finance. Applications of the theory of stochastic processes to these areas are given. Prerequisite: Mathematics 151. Offered jointly by CMC and Pomona College. First semester. Staff

158. Applied Statistics.
An introduction to basic probability theory and the techniques for statistical inference. The course will be developed from problems and data sets provided by business, industry and government. Data sets will be analyzed in terms of standard techniques including data analysis, point and interval estimation, and tests of hypotheses including goodness of fit tests. In accordance with the requirements of the data sets, further techniques will be selected from the general areas of non-parametric statistics, Bayesian statistics, and analysis of variance. Statistical software packages will be used. Prerequisite: Mathematics 31, or permission of the instructor. (Not offered in 2005-2006.)

171. Abstract Algebra.
An introduction to the fundamental structures of abstract algebra, including groups, rings, fields, vector spaces, and modules; polynomial and field extensions; applications to number theory. Prerequisite:

Mathematics 90. Offered jointly by CMC and Pomona College. First semester. Valenza

175. Number Theory.

Properties of integers, congruences, Diophantine problems, quadratic reciprocity, number theoretic functions, primes. Prerequisite: Mathematics 131, or 171, or permission of instructor. Offered jointly by CMC and Pomona College. (Not offered in 2005-2006)

182. Partial Differential Equations.

Fourier Series, Fourier Transforms, Distributions. Partial Differential Equations: Heat, Wave, Laplace's, Transport, SchrŒdinger, Black-Scholes. Reaction-diffusion equations, solitons, and numerical methods. Prerequisites: Mathematics 90, and 111. First semester. Aarao

186. Stochastic Methods in Operations Research.

Simulation Theory, Stochastic models of inventory, reliability, queuing, sequencing, and transportation. Applications of these models to problems arising in industry, government, and business. Prerequisite: Mathematics 151. Cooperative course, offered jointly by CMC, Claremont Graduate University, Harvey Mudd College, and Pomona College. (Not offered in 2005-2006.)

187. Deterministic Methods in Operations Research.

Linear, integer, nonlinear, and dynamic programming. Applications to problems primarily in the social sciences; transportation problems, inventory analysis, classical optimization problems, and network analysis, including project planning and control. Prerequisites: Mathematics 32 and 90. Cooperative course offered jointly by CMC, Claremont Graduate University, Harvey Mudd College, and Pomona College. Second semester. Staff

188. Mathematics of Game Theory.

Games in extensive form, combinatorial games, strategic equilibrium, matrix games, and minimax theorem, computation of optimal strategies, cooperative and non-cooperative solutions of bi-matrix games, coalitional games and the core, indices of power, bargaining set, nonatomic games. Prerequisite: Mathematics 90; recommended: Mathematics 151. Not open to students who have completed *Economics 129. Game Theory*. (Not offered in 2005-2006.)

192, 193. Mathematics Clinic.

Applied mathematical modeling of current unsolved problems proposed by government and industry. Students will work together in small groups under faculty direction and will have contact with the industry or governmental agency for which the mathematical solution is relevant. Prerequisite: Permission of the instructor. (Not offered in 2005-2006.)

199. Independent Study in Mathematics or Computer Science.

Students who have the necessary qualifications and wish to investigate an area of study not covered in regularly scheduled courses may arrange for independent study under the direction of a faculty reader. (See "Academic Policies and Procedures" for details.) First and second semester. Staff

Computer Science

40. Demystifying Computation and Networks.

This course provides an introductory survey of topics in computer science that are related to the Internet from the user's point of view. Study of effective use of the Internet, the nature of programming, the fundamental concepts underlying the computers both in software and hardware, the limits of computation, some current topics in computing such as search engines, computer security, modern encryption methods. Also some social issues such as privacy, worms and viruses, spam, cookies, etc. The aim is to prepare college graduates to be educated netizens. Intended for students who do not plan to pursue Computer Science Sequence or major. First semester. A. Lee.

50. Introduction to Computer Science (CS I).

First computer science course intended for students planning to start Computer Science Sequence or major in computer science or a related field. Students will learn principles of developing object-oriented programs using the programming language Java. Fundamental concepts covered will include procedural and data abstraction using classes, control structures, elementary data structures (arrays, collections), elementary algorithms (sorting, searching), elementary analysis of algorithms, and files. No previous programming experience assumed. Co-requisite: Mathematics 30 or equivalent. First semester. A. Lee. Second semester. Pinter-Lucke.

60. Fundamentals of Computer Science (CS II).

This course builds on the computing concepts and programming skills acquired in Computer Science 50. Key topics include Java run-time memory representation, classical algorithms (including sorting and searching) and data structures (including stacks, queues, linked lists, trees, hash tables, priority queues,

and files), analysis of program space and time requirements, operating system concepts, and processor organization. Programming exercises that require the application of elementary software engineering techniques. Prerequisite: Computer Science 50. Second semester. A. Lee.

76. Encryption and Encoding.
The theory and practice of data encoding and encryption, with much of the necessary mathematical background developed in the course. Topics include: an introduction to finite algebraic structures; residue arithmetic and the Chinese Remainder Theorem; basic notions of encoding and error correcting capabilities; complexity-theoretic foundations of cryptography; one-way and trapdoor functions; secret key and public key encoding: the Data Encryption Standard, the RSA algorithm; the factorization problem: elementary algorithms and thequadratic sieve method; theory of zero-knowledge protocols. Prerequisite: Mathematics 90; Computer Science 50 or equivalent recommended. (Not offered in 2005-2006)

78. Numerical Methods.
An introduction to numerical algorithms with programming using a high-level language. Topics include computer representation of numbers; an introduction to error analysis; numerical solution to linear and nonlinear equations; interpolation and extrapolation, numerical integration, and numerical solution to differential equations; incorporation of numerical libraries; modeling, and simulation. Prerequisites: Mathematics 31 and Computer Science 50. (Not offered in 2005-2006)

81. Computability and Logic.
An introduction to some of the mathematical foundations of computer science, particularly logic, automata, and computability theory. Develops skill in constructing and writing proofs, and demonstrates the applications of the aforementioned areas to problems of practical significance. Prerequisites: Computer Science 60 and Mathematics 50. (Not offered in 2005-2006)

105. Computer Systems.
Introduction to computer systems from a programmer's point of view. Machine level representations of programs, optimizing program performance, memory hierarchy, linking, exceptional control flow, measuring program performance, virtual memory, concurrent programming with threads, network programming. Prerequisite: Computer Science 60 or instructor's permission. First semester. Pinter-Lucke.

120. Algorithms.
Balanced trees, heaps, hash tables, string matching, graph algorithms, external sorting and searching. Dynamic programming, exhaustive search. Space and time complexity, derivation and solution of recurrence relations, complexity hierarchies, reducibility, NP completeness. Prerequisites: Computer Science 60 and Mathematics 50. (Not offered in 2005-2006)

121. Software Development.
Practical exposure to the process of creating large software systems, including requirements specifications, design, implementation, testing, debugging, and maintenance. Emphasis on software process, software tools (debuggers, profilers, source code repositories, test harnesses), software engineering techniques (time management, code and documentation standards, source code management, object-oriented analysis and design), development methods (pair programming, test first development), and team development practice. Some of the work will be in groups. Prerequisite: Computer Science 60. (Not offered in 2005-2006)

131. Programming Languages.
Ideas behind the design and implementation of programming languages. Syntactic description, scope and lifetime of variables, runtime stack organization, parsing and abstract syntax, semantic issues, type systems, programming paradigms, interpreters and compilers. Prerequisites: Computer Science 60 and Mathematics 50. (Not offered in 2005-2006)

133. Database Systems.
Representing information about real world enterprises using important data models including the entity-relationship, relational and object-oriented approaches. Database design criteria, including normalization and integrity constraints. Implementation techniques using commercial database management system software. Selected advanced Topics such as distributed, temporal, active, and multimedia databases. Prerequisite: Computer Science 81 or instructor's permission.
(Not offered in 2005-2006)

134. Operating Systems.
Characteristics, objectives, and issues concerning computer operating systems. Hardware/ software interactions, process management, memory management, protection, synchronization, resource allocation, file systems, security, and distributed systems. Extensive systems programming. Prerequisite: Computer Science 105. (Not offered in 2005-2006)

135. Distributed Software Architecture.
Software architectures, programming models, and programming environments pertinent to developing web applications. Topics include network protocols, client-server model, multi-tier software architecture, client-side scripting (e.g., JavaScript), server-side programming (e.g., Servlets and JavaServer Pages), component reuse (e.g., JavaBeans), database connectivity (e.g., JDBC), web servers, and developing web applications. Prerequisite: Computer Science 60. Second semester. A. Lee.

181. Special Topics in Computer Science.
Selected topics in computer science. May be repeated for credit. Permission of instructor required. (Not offered in 2005-2006.)

MILITARY SCIENCE AND LEADERSHIP

Military Science and Leadership courses are open to students having an interest in physical and mental challenges, organizational leadership, management, history, and the military as a profession. Military Science and Leadership (MSL) courses are the path to receiving an active or reserve Army commission and a three or four year tour of service as an officer leader. Students may compete for scholarships through the Army ROTC Program. (See "Scholarships" for further information.) Students in the Military Science and Leadership program attend one to three hours of formal instruction and one two-hour leadership laboratory per week. Students also enroll in physical training three times a week.

Participation in the Reserve Officer Training Corps (ROTC) and the signing of an agreement for military service following graduation are not required for taking the freshman and sophomore military science and leadership courses (101a, 101b, and 102a, 102b). These courses are excellent opportunities for students interested in gaining leadership experience. All students interested in attending the Army's Leadership Training Program in the summer are highly encouraged to enroll in MSL 102b.

The Faculty

Professor: Douville (Chair); Assistant Professors: Fitch, Hudick, Kirkland, and Schleuning

Courses

1a. Analysis of Key 20th-Century Battles.
Once a basic understanding of America's current National Security Strategy and doctrinal war fighting principles is established, students will analyze selected battles in World War I, World War II, the Korean Conflict, the Viet Nam Conflict and the Middle East (Operations Desert Storm, Enduring Freedom and Iraqi Freedom). Analysis will focus on the decisions made by commanders, forces employed, strategies used, intelligence available & acted on, materiel & technology employed, and logistics challenges. Extensive student discussion is included in each class. One-half course credit. First and second semester. Douville and Kirkland

89. Riflery and Orienteering.
The purpose of this course is to introduce students to the fundamentals, principles and techniques of safe rifle/pistol marksmanship and to instruct and practice using a map and compass to navigate between checkpoints along an unfamiliar course. This course will give beginners an awareness of firearms safety and an appreciation for the sport of shooting and instruction and application of basic foot navigation skills. Physical education (PE) credit. First and second semester. Staff.

99. Army Physical Training Program.
This course is designed on the Army's current physical fitness training philosophy of cardiorespiratory endurance, muscular strength and endurance, flexibility and body composition training. It includes a wide variety of events to include: unit distance runs and ability groups, circuit training, upper and lower body strength drills, swimming, and road marching. The course helps to instill the fundamentals of conditioning and expose students to a variety of conditioning drills that can be incorporated into an individual fitness program for life. Additionally, the course teaches team building and esprit de corps utilizing standard Army training doctrine. Physical education (PE) credit. First and second semester. Staff