School of Science and Engineering

Dan Freedman, Ph.D., Dean

Phone: (845) 257-3728
Location: Mildred and Louis Resnick Engineering Hall
Web Address: www.newpaltz.edu/sse/
**BIOLOGY**
(845) 257-3770
[www.newpaltz.edu/biology/](http://www.newpaltz.edu/biology/)

Professors:
Hon Ho, Ph.D., University of Western Ontario

Associate Professors:
Aaron Haselton (Chair), Ph.D., University of Massachusetts
Maureen Morrow, Ph.D., Columbia University
Thomas Nolen (Associate Dean), Ph.D., Cornell University

Assistant Professors:
Kara Belinsky, Ph.D., University of Massachusetts, Amherst
Eric Keeling, Ph.D., University of Montana
Jeffrey Reinking, Ph.D., Cornell University
David Richardson, Ph.D., University of Maryland
Jennifer Waldo, Ph.D., Cornell University

Lecturers:
Spencer Mass, MD, SUNY Upstate (Syracuse)

**MASTER OF ARTS**
**IN BIOLOGY**

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The Biology Department is not accepting applications to the MA program at this time.

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**COURSES**

**BIO505 Transmission Electron Microscopy (4)**
This course has the format of a research project. Students are taught how to use the transmission electron microscope (TEM) as a research tool in the bio-medical disciplines. Students learn first-hand the procedures associated with biological sample preparation: embedding, sectioning, staining, examination in the TEM and printing of the final electron photomicrographs.

**BIO508 Scanning Electron Microscopy (4)**
The principles of microscopy sciences with emphasis on the use and applications of the scanning electron microscope (SEM). The course examines the theoretical basis of biological scanning electron microscopy and provides a practical introduction to the operation of the SEM.

**BIO509 Advanced Ornithology (4)**
Birds of the world, their taxonomy, anatomy, geographic distribution, ethology, and ecology; laboratory devoted to anatomical studies; methods of photographing birds, recording of bird songs, uses of telemetry, bird behavior, life history studies, identification of local species.

**BIO510 Fungal Biology (4)**
Morphology, development, physiology, and ecology of fungi, their significance in diseases, and their utilization by man.

**BIO511 Advanced Vertebrate Zoology (4)**
Morphology, physiology, geographical distribution, and evolution of vertebrates of the world. Field and laboratory work devoted to studying.

**BIO514 Plant Diseases (4)**
Nature and cause of disease in plants. Special emphasis on fungal diseases of plants.

**BIO516 Molecular Biology (3)**
Basic theory and techniques of molecular biology with the analysis of current molecular advances in diverse fields of study. Class discussions, independent literature research, written and oral presentations required.
**BIO517 Molecular Biology Laboratory (3)**
Current molecular techniques and theory. Cloning, PCR, DNA preparation, RNA preparation, Southern blots, Northern blots and tissue culture techniques will be employed and analyzed within the context of the immune system. Project required.

**BIO519 Wetlands Ecology (4)**
An introduction to the ecology of wetland ecosystems. Structure and function of different types of wetlands will be compared. Alteration and protection will be examined as well as methods used to study them.

**BIO520 Advanced Entomology (4)**
Major orders of insects with emphasis of life histories. Laboratory opportunity for individual studies of life histories and taxonomic studies of selected orders and families.

**BIO525 Animal Communication (3)**
Theory and controversy in the study of animal communication. The various functions, mechanistic, adaptive and evolutionary approaches to communication, information theory, signal transmission, signal reception and human language will be explored. Examples of communication systems will be surveyed across a wide range of taxonomic groups. Examples of hypothesis testing and the analysis of signals will be the focus of class discussions.

**BIO528 Endocrinology (3)**
An introduction to the basic principles of endocrinology followed by a study of the physiology and biological chemistry of endocrine tissue and their secretions.

**BIO530 Human Genetics (2)**
Current status of human genetics, with emphasis on molecular aspects. Topics include pedigree analysis, gene mapping strategies, genome organization, chromosome abnormalities, mutations, genetic basis of cancer and the Human Genome Project.

**BIO540 Immunology (3)**
The genetic, cellular, molecular, developmental and biochemical aspects of the immune system will be covered. These aspects are discussed in relation to the disease process and experimental analysis. Discussions of current research are included.

**BIO545 Cell Development and Differentiation (3)**
Emphasis is placed upon the mechanisms by which cells specialize during embryogenesis, wound healing, regeneration and transformation. Specific attention to the mechanisms of movement, shape acquisition, and biosynthesis as well as certain new ideas regarding their genetic control.

**BIO546 Human Embryonic Development (3)**
Focuses on the embryology and anatomy of human development. In addition the physiological changes in the pregnant woman are discussed with regard to the developing embryo and fetus.

**BIO550 Recent Advances in Biology (1-4 variable)**
Recent developments in a specialized field of biology. May be repeated for credit at five-year intervals for the same special field.

**BIO551 Endangered Species (3)**
Focuses on the conservation of biological diversity: Topics include value of bio-diversity, threats to bio-diversity, vulnerability of species to extinction, conservation of populations and species, and protection of bio-diversity at international, national and local levels.

**BIO561 Biotechnology (3)**
Underlying principles and recombinant DNA methods employed to produce genetically modified organisms for agricultural, environmental, industrial, pharmaceutical and biomedical purposes are covered. Discussions on societal and ethical issues involving biotechnology are included.

**BIO562 Electron Microscopy (5)**
Theory and application of scanning electron microscopy (SEM) and transmission electron microscopy (TEM) are covered. Laboratory includes all aspects of specimen preparation and use of SEM, x-ray diffraction analysis and TEM. This is an advanced course and requires that students have the ability to work individually, taking precautions with hazardous chemicals and delicate equipment.

**BIO590 Thesis in Biology (6)**
Writing and defense of a thesis under guidance of major professor. Required form available in the Records and Registration Office.
CHEMISTRY

(845) 257-3790
www.newpaltz.edu/chemistry

Professor:
Daniel Jelski, Ph.D., Northern Illinois University
Associate Professors:
Preeti Dhar, Ph.D., Indian Institute of Technology
Daniel Freedman (Dean), Ph.D., University of Minnesota
Pamela St. John, Ph.D., (chair), University of California
Assistant Professors:
Megan Ferguson, Ph.D., California Institute of Technology
Frantz Folmer-Andersen, Ph.D., University of Texas
Albert Gawer, Ph.D., Columbia University
Michael Machczynski, Ph.D., California Institute of Technology
Lecturer:
Matthew Pilek, MAT, SUNY New Paltz
Gissel Verdecia Mentore, Ph.D., Rensselaer Polytechnic Institute

■ MASTER OF ARTS IN CHEMISTRY

The Chemistry Department is not accepting applications to the MA program at this time.

COURSES

CHE503 Advanced Organic Chemistry (3)
Topics of current interest in organic research. Prerequisite: CHE319 or 22319.

CHE509 Spectrometric Identification of Organic Compounds (3)
Application of spectrometry (mass, infrared, ultraviolet and nuclear magnetic resonance) to the identification of organic compounds. Prerequisite: CHE319 or 22319 and PHY202 or 75202.

CHE512 Advanced Inorganic Chemistry (3)
Atomic structure, periodicity, ionic and covalent bonding; acid-base and solution chemistry; bonding theories and structure of transition metal complexes. Prerequisite: CHE314 or 22314 and CHE321 or 22321.

CHE531 Separation Methods in Chemistry (3)
A course that applies physical, chemical and equilibrium properties to the problems of isolating components in analytical processes with emphasis on chromatographic procedures. Applications from current literature. Prerequisite: CHE303 or 22303 and CHE321 or 22321.

CHE535 Chemical Engineering for Chemists (3)
Expands skills and techniques acquired in physical chemistry by providing applications to large systems of reaction occurring in flow systems. Introduction to the mass, momentum and energy balances and design concepts familiar to chemical engineers. Not for engineers.

CHE570 Biochemistry (3)
Structure of biomolecules and their assemblies and the chemical reactions of metabolic processes. Molecular aspects of gene replication, transcription and translation. Prerequisite: CHE319 or 22319 and CHE461 or 22461.

CHE572 Biotechnology Laboratory (4)
Methods of modern biotechnology, including molecular cloning, gene isolation, gene amplification, design and creation of recombinant plasmids and phages, site-specific mutagenesis, isolation and sequencing of recombinant DNA. Prerequisite: CHE319 or 22319 and CHE461 or 22461 and BIO320 or 15320 and BIO350 or 15350.
**CHE573 Principles of Physical Chemistry (3)**
Fundamental principles and their application in thermodynamics, solution and phase equilibria, the solid state, and topics such as physical chemistry of surfaces. Not open to undergraduate chemistry majors. Prerequisite: CHE202 or 22202 and MAT252 or 64252.

**CHE574 Principles of Polymer Sciences (3)**
Principles of formation and behavior of large molecules and their relationship to industrial and biochemical applications. Prerequisite: CHE319 or 22319.

**CHE575 Principles of Materials Science (3)**
Understanding of the relation between the properties of materials and composition and structure; electronic structure of the atom, and its relationship to the chemical bonding in solids; atom packing and crystal structures. Relationship of structure, including defects, to mechanical, electrical, and thermal properties of polymers in relation to structure; composite materials; and surface defects: corrosion, friction, adhesion. Prerequisite: CHE319 or 22319 and PHY202 and 75202.

**CHE590 Thesis in Chemistry (1-6)**
An individual research project conducted under the direction of a faculty advisor. Required form available in the Records and Registration Office.
Distinguished Professors:
Lawrence Fialkow (Distinguished Professor), Ph.D., University of Michigan
Keqin Li (Distinguished Professor), Ph.D., University of Houston

Professor:
Chirakkal Easwaran, Ph.D., University of Calgary

Associate Professors:
Anthony J. DosReis, Ph.D., Rensselaer Polytechnic Institute
Hanh Hong Pham, Ph.D., Ukraine
Paul R. Zuckerman (graduate coordinator), Ph.D., New York University, J.D., Yeshiva University

Assistant Professor:
Andrew Pletch, Ph.D. (chair), Carleton University

MASTER OF SCIENCE IN COMPUTER SCIENCE

This program provides students with a foundation for professional work or doctoral level study in Computer Science. Courses include current programming technologies and application areas, and theoretical Computer Science. Students use both Linux and Windows work stations for program development.

Admission Requirements

- One official copy of all undergraduate and graduate course work, including a baccalaureate transcript from a regionally accredited institution, indicating at least a 3.0 cumulative grade point average.
- Three letters of reference.
- Satisfactory TOEFL or IELTS scores for students who have a non-US degree.
- The GRE Aptitude test is required for international students.

Before taking graduate computer sciences courses, all students must first pass a preliminary examination covering the contents of Computer Science I: Foundations (CPS210) and Computer Science II: Data Structures (CPS310). Students who do not achieve a satisfactory score on the preliminary exam may be required to take a preliminary programming course that only partially counts toward the MS degree.

Program Requirements

- File a “plan of study” during the first semester after matriculation.
- Complete prescribed course work within seven years after matriculation.
- Complete course work with a cumulative grade point average of 3.0 or better. No more than two grades below B- will count toward the degree.
- Pass the comprehensive examination or submit a thesis.
- Submit degree application (see the Graduation Information website for due date).

Curriculum Requirements / 30 credits

- Ten Computer Science graduate courses. However, a student may substitute up to three graduate Mathematics or Engineering courses approved by the Graduate Coordinator. Interested students who find a suitable advisor may choose to write a thesis. The thesis counts as two courses, and substitutes for the comprehensive examination as well. Each semester the Department offers a selection of courses from the following list and topics courses that reflect the current interests of individual faculty members.
COURSES

CPS500 Computer Graphics (3)
Graphics software and hardware, representation of points, lines, and surfaces in three dimensions, windowing, clipping, hidden surfaces and lines, shading. Prerequisite: CSPR – minimum score.

CPS501 Computer Systems (3)
A study of computer systems covering both software and hardware. Topics include number systems, machine language, assembly language, linking and loading, digital electronics, microprogramming, and computer architecture. Prerequisite: CSPR – minimum score.

CPS505 Computer Simulation (3)
Use of the computer as a simulation tool, discrete and continuous simulation techniques, simulation languages, selected applications such as queuing theory, financial analysis, and simulation of computer systems. Prerequisite: CSPR – minimum score.

CPS515 Programming Languages (3)
A critical evaluation of the design and implementation of programming languages. Topics include: history of programming languages, syntax and semantics, data and control structures, expressions, subprograms, scope and visibility, data abstraction, and exception handling. Prerequisite: CSPR – minimum score.

CPS520 Concurrent Programming (3)
Mutual exclusion, Dekker’s algorithm, semaphores, languages for concurrent programming, applications in operating systems. Prerequisite: CSPR – minimum score.

CPS522 Operating Systems (3)
A comprehensive investigation of Operating Systems concepts, including the following topics: Process Management, Memory Management, File Management, Input/Output, and Deadlocks. Examples of these concepts will be illustrated using the Unix operating system. Prerequisite: CSPR – minimum score.

CPS524 Parallel Computation (3)
Efficient parallel algorithms on arrays, trees, hypercubes, and PRAMS for a variety of problems. Structural properties of various network architectures and their relationships. Prerequisite: CSPR – minimum score.

CPS526 Advanced Data Structures (3)
In-depth study of methods for organizing, retrieving, and modifying data in digital computers, as well as mathematical analysis of these techniques. Prerequisite: CSPR – minimum score.

CPS528 Algorithms (3)
Algorithms for a variety of applications. Various design and analysis techniques. Probabilistic and approximation algorithms. Prerequisite: CSPR minimum score.

CPS530 Computer Networks (3)
Network topology and communication media, resource sharing, performance analysis, protocols, local networks. Prerequisite: CSPR – minimum score.

CPS532 Theory of Computation (3)
Computability by Turing machines, grammars, and recursive functions. Uncomputability and computational complexity. Prerequisite: CSPR – minimum score.

CPS535 Formal Languages (3)
Phrase-structure languages, automata and their languages, applications of formal languages to pattern recognition. Prerequisite: CSPR – minimum score.

CPS540 Artificial Intelligence (3)
Basic problem solving methods, game playing, knowledge representation using first order logic, knowledge representation using other logics, theorem proving, pattern recognition, symbolic processing. Prerequisite: CSPR – minimum score.

**CPS545 Advanced Operating Systems (3)**
The study of modern operating systems: Process, memory, device, and file management; virtual machines, distributed systems, security, reliability, performance analysis. Prerequisite: CSPR – minimum score.

**CPS550 Software Engineering (3)**
Program development tools, structured design and programming methodologies, software testing and validation, managing software development. Prerequisite: CSPR – minimum score.

**CPS 552 Object Oriented Programming (3)**
The concepts of object oriented programming -- encapsulation, aggregation, inheritance, constructors, destructors, polymorphism, and templates. Various choices for design and implementation. Writing programs is typically a major component of this course. Prerequisite: CSPR – minimum score.

**CPS554 User Interface Programming (3)**
Introduction to methodologies, techniques, libraries, interfaces, and tools to design and implement window-based graphical user interfaces. The course is typically a programming intensive course. Prerequisite: CSPR – minimum score.

**CPS555 Advanced Database Principles (3)**
Recovery, integrity, concurrency, data models, extended relational model, distributed databases, database machines. Prerequisite: CSPR – minimum score.

**CPS560 Cryptography (3)**
Transposition ciphers, substitution ciphers, algebraic systems, block ciphers, public key systems, data encryption standard. Prerequisite: CSPR – minimum score.

**CPS565 Compiler Design (3)**
Compiler design and implementation using top-down and bottom-up parsing. Scanner and parser generators. Prerequisite: CSPR – minimum score.

**CPS567 Compiler Optimizations (3)**
An overview of the evolving field of compiler optimizations. Internal program representations, local and global optimizations, control flow analysis, data flow frameworks, static single assignment form, control dependence analysis, automatic parallelization, interprocedural analysis, pointer alias analysis, loop transformations. Prerequisite: CSPR – minimum score.

**CPS570 Systems Programming (3)**
Systems programming in assembly and/or high-level language. Students will write several systems programs, such as a RAM disk and a virus detection program. Prerequisite: CSPR – minimum score.

**CPS575 Advanced Computer Architecture (3)**
Study of current trends in computer architecture with topics selected by instructor. Among these may be parallel processing, capability-based systems and microprocessor architecture. Prerequisite: CSPR – minimum score.

**CPS580 Functional Programming (3)**
The functional language mode, lambda calculus, functional programming in one or more languages, the design and implementation of an interpreter for a functional programming language. Prerequisite: CSPR – minimum score.

**CPS590 Thesis in Computer Science (6)**
Preparation and writing of a thesis under the guidance of graduate faculty. Required form available in the Records and Registration Office. Prerequisite: CSPR – minimum score.
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

845-257-3720
http://www.engr.newpaltz.edu

Professors
Ghader Eftekhari, Ph.D., PE, University of Nottingham, England
Hassan Kalhor, Ph.D., PE, U.C. Berkeley

Associate Professors
Julio Gonzalez, Ph.D., Colorado State University
Baback Izadi (Chair), Ph.D., The Ohio State University
Damodaran Radhakrishnan, Ph.D., University of Idaho
Kevin Shanley, Ph.D., Clarkson University
Faramarz Vaziri, Ph.D., University of Houston
Mohammad Zunoubi, Ph.D., Mississippi State University

Assistant Professor
Reena Dahle, Ph.D., Waterloo University

Lecturer
Michael Otis, M.Sc., State University of New York, Binghamton

5-YEAR B.S. IN ELECTRICAL ENGINEERING / M.S. IN ELECTRICAL ENGINEERING (267)
Department Chair: Dr. Baback Izadi (845-257-3823) bai@engr.newpaltz.edu
Graduate Coordinator: Dr. Damodaran Radhakrishnan (845-257-3772) damu@engr.newpaltz.edu

This program offers a fast-track Master of Science degree in electrical engineering. The program is open to SUNY New Paltz students who are currently enrolled in their last semester of the junior standing, pursuing a Bachelor of Science in electrical engineering.

Admission Requirements
To apply, students should submit the following documents to the Graduate School:

- A signed application form
- A New Paltz transcript (they are free for NP students)
- One letter of recommendation
- $50.00 graduate application fee

Below is the link to the graduate application form:
BS Electrical Engineering/MS Electrical Engineering (major code 267): http://www.newpaltz.edu/graduate/bs_electrical_engineering-ms_electrical_engineering_application.pdf

- Program Requirements to be eligible, students must have completed the first semester of their junior year in residence at SUNY New Paltz. Moreover, they must have an overall SUNY New Paltz GPA of at least 3.0. The qualified students may apply for admission to the Graduate School directly.

Curriculum Requirements
- Accepted students are permitted to enroll in two 500-level graduate courses (six credits). These courses, in addition to satisfying students’ bachelor’s degree, will count toward their master’s degrees. The remaining 24 credits of the master’s requirement will be taken in the fifth year of study.
- Once admitted to the BS/MS program, students must maintain a 3.0 cumulative GPA in all courses through the senior year. In addition, students must earn a B or better in each of the two graduate courses that they take as undergraduates. Students not satisfying these requirements will be re-evaluated for continuation in the program.
5-YEAR B.S. IN COMPUTER ENGINEERING / M.S. IN ELECTRICAL ENGINEERING (266)

Department Chair: Dr. Baback Izadi (845-257-3823) bai@engr.newpaltz.edu
Graduate Coordinator: Dr. Damodaran Radhakrishnan (845-257-3772) damu@engr.newpaltz.edu

This program offers a fast-track Master of Science degree in electrical engineering. The program is open to SUNY New Paltz students who are currently enrolled in their last semester of the junior standing, pursuing a Bachelor of Science in computer engineering.

Admission Requirements
To apply, students should submit the following documents to The Graduate School:

- A signed application form
- A New Paltz transcript (they are free for NP students)
- One letter of recommendation
- $50.00 graduate application fee

Below is the link to the graduate application form:
BS Computer Engineering/MS Electrical Engineering (major code 266):
http://www.newpaltz.edu/graduate/bs_computer_engineering-ms_electrical_engineering_application.pdf

Program Requirements
- To be eligible, students must have completed the first semester of their junior year in residence at SUNY New Paltz. Moreover, they must have an overall SUNY New Paltz GPA of at least 3.0. The qualified students may apply for admission to the Graduate School directly.

Curriculum Requirements
- Accepted students are permitted to enroll in two 500-level graduate courses (six credits). These courses, in addition to satisfying students’ bachelor’s degree, will count toward their master’s degrees. The remaining 24 credits of the master's requirement will be taken in the fifth year of study.
- Once admitted to the BS/MS program, students must maintain a 3.0 cumulative GPA in all courses through the senior year. In addition, students must earn a B or better in each of the two graduate courses that they take as undergraduates. Students not satisfying these requirements will be re-evaluated for continuation in the program.
The Master of Science in Electrical Engineering provides a quality graduate program offered within a small setting, where students get individual attention. The program can be pursued either full or part-time, and is designed to serve recent graduates and practicing engineers who need in-depth knowledge in the rapidly changing and expanding areas of electrical engineering beyond what can be included in the traditional bachelor’s program. The program offers the following areas of specialization:

- Microelectronics
- Systems
- Energy
- Computer Engineering

The degree can be completed with two options: thesis and non-thesis. The program with thesis option emphasizes research and requires submission of a thesis. This option requires the completion of 30 credits, 24 course credits and 6 thesis credits. The non-thesis option requires completion of 30 course credits and successful passing of a comprehensive examination. Students in non-thesis track usually complete the program in 18 months.

Internship and Co-ops are available to students. Some of the companies that our students have recently interned include IBM, General Electrical, Honda Research, and Central Hudson Gas and Electric.

**Admission Requirements**

- One official copy of all undergraduate and graduate course work. A bachelor’s degree in Electrical Engineering or a closely related field from an ABET-accredited program.
- A minimum undergraduate cumulative grade point average of 3.0.
- Three letters of recommendation attesting to the applicant’s aptitude and promise for graduate study.
- English competency according to College procedures and standards. These include a TOEFL score of 80 on the internet-based exam, or a score of 6.5 on the IELTS exam and satisfactory performance on the campus-designed and administered English proficiency examination.

On a case-by-case basis, applicants who do not meet all of the conditions for admission may be granted conditional admissions status. These students may register as non-matriculated students for courses of a preparatory nature following the guidance of the Department. They can be considered by the Graduate School for matriculation after this prescribed preparatory work is completed.

**Program Requirements**

- File a “plan of study” during the first semester after matriculation.
- Completion of prescribed course work and other requirements within seven years after matriculation.
- Maintain a cumulative average of 3.0 or better, with no more than two grades below B-.

**Curriculum Requirements**

For completion of the program and graduation, students must meet the following requirements:

**Thesis Option / 30 credits**

- Completion of 24 credits (all electives) of graduate courses.
- Completion of research and presentation of a thesis counting as 6 credits.

**Non-Thesis Option / 30 credits**

- Completion of 30 credits (all electives) of graduate courses.
- Successful passing of comprehensive examination.

**Electrical Engineering Electives**

Eight (thesis option) and ten (non-thesis option) courses are elected by the student from a list of the department graduate courses.
in electromagnetic fields and waves, telecommunications, electronics, computer and control systems depending on the students’ needs and interest.

The program does not require specialization in a concentration and the student under guidance of a graduate advisor may select courses of interest that will prepare him/her to pursue thesis or future work. Appropriate courses offered by cognate departments may be used to meet this requirement.

**MS Thesis in Electrical Engineering**
Research, writing and defense of a thesis under the guidance of the major professor. Prerequisite: MS in Electrical Engineering candidate and PI.

**Comprehensive Examination**
Students with non-thesis option must pass a written comprehensive examination after completing their course work. This examination covers four subject matters based on the plan of study.

**COURSES**

**EGE505 Analytical Techniques I (3)**

**EGE506 Analytical Techniques II (3)**

**EGE511 Digital Data and Computer Communication (3)**

**EGE512 Advanced Communications (3)**

**EGE513 Digital Signal Processing (3)**

**EGE521 CMOS Analog Circuit Design (3)**
Analysis and optimized design of analog integrated circuits and systems in CMOS technology. Specific topics include MOS devices, device physics, basic CMOS analog circuit building blocks, single stage amplifiers, differential amplifiers, operational amplifiers, reference sources, distortions and controls, various circuit design techniques, options and trade-offs. Graduate Standing or Permission of the Instructor.

**EGE522 Advanced Analog Circuits (3)**

**EGE523 Wireless Communications (3)**
Overview of wireless systems, propagation characteristics of wireless channels, modems for wireless communications, cells and cellular traffic, fading and multiple access techniques. Prerequisite: EGE312 or 40312 EGE393 or 40393.

**EGE525 Microelectronic Fabrication (3)**
The physics and technology of various steps required to fabricate complicated integrated circuits are explained. The Si and GaAs materials will be covered. The course will cover microelectromechanical systems (MEMS) fabrication as well.

**EGE527 Electronic Properties of Materials (3)**
Introduction to electronic properties of materials through the concepts of classical mechanics and quantum mechanics principles. Topics include fundamentals of quantum mechanics, Shrodinger wave equations, energy bands, free-electron energy, applications of electronic theory upon electrical, thermal, optical and magnetic properties of materials. Graduate Standing or Permission of the Instructor

EGE532 Computer Arithmetic (3) 
Deals with algorithms and architectures used for computer arithmetic. Issues that will be addressed include: number systems and representation, redundant and residue systems. Addition/subtraction circuits. Multiplication, division, square root algorithms, cordic arithmetic system. Floating-point arithmetic systems. Implementation issues -- pipelining, low-power, fault-tolerant designs.

EGE533 Introduction to Parallel Computing (3) 

EGE534 Fault-Tolerant Design of Digital Systems (3) 

EGE535 Low Power VLSI Design (3) 
Deals with the design of digital systems for low power dissipation. Issues that will be addressed include CMOS power dissipation, analysis and design tools used for low power digital circuits, design methodologies for low power CMOS circuits, low power memory system designs and a discussion on future challenges in low power digital design. Builds on the VLSI design course previously covered by students in Electrical Engineering/Computer Engineering/Computer Science areas. Students are expected to have a background in circuit theory, electronics, digital logic fundamentals, and probability theory fundamentals. These courses are all covered under core courses in the undergraduate program.

EGE536 Computer Architecture (3) 
Computer architecture and hardware system organization are examined. Topics include performance issues, CPU organization and instruction set implementation, performance enhancement through pipelining, memory organizations, input/output structure, and an introduction to parallel architectures.

EGE537 VLSI Design (3) 
Introduction to MOS devices and circuits (N-MOS and CMOS), MOS transistor theory, integrated circuit processing technology and design rules (N-MOS and CMOS), circuit characterization and performance estimation, logic design, interfacing, design tools, testability analysis, and discussion of chip design projects.

EGE542 Numerical Methods in Engineering (3) 
Review of electromagnetic theory and analytical methods. Time domain and frequency domain finite difference methods. Moment method application to radiation and scattering problems.

EGE543 Antennas and Wave Propagation (3) 

EGE544 Microwave Circuits (3) 
Review of transmission lines, waveguides, impedance matching and scattering parameters. Microwave resonators, power dividers, directional couplers, and hybrids, microwave filters, microwave defectors, mixers, amplifiers, and oscillators.

EGE545 Satellite Communication (3) 

EGE551 Electromechanical Energy Conversion (3) 
Fundamentals of energy conversion including electric circuits and magnetic circuits. Ideal transformers will be introduced first, and real transformer construction and equivalent circuit will be presented. The equivalent circuit will be solved to determine the transformer efficiency and voltage regulation. Single phase and three phase induction machine construction, equivalent circuit and its analysis under load will be performed to determine motor load characteristics and efficiency. Single phase and three phase
synchronous machine construction, excitation, and load characteristics will be studied in detail, and machine transient characteristics will be covered briefly.

**EGE561 Adaptive Control (3)**

**EGE562 Optimal Control (3)**

**EGE564 Non-Linear Control (3)**

**EGE567 Fiber Optics (3)**
This class will provide an introduction to optical fiber communication systems. Topics to be covered include lasers and other optical transmitters, optical receivers, fiber optic cable design, link budgets and noise sources, and the design of practical fiber networks. Data encoding and standard protocols including SONET, Ethernet, Fibre Channel, and others will be covered, as well as time and wavelength multiplexing, optical amplifiers, and advanced research topics such as optical MEMs, nanofibers and parallel optical links.

**EGE572 Engineering Management (3)**
Prepares engineering students for a career in management. Through class discussions, group projects, role playing, and guest speakers, students find out what a management role will entail. Students learn how to go from being a practicing engineer to being an engineering manager.

**EGE575 Heterostructure Devices (3)**
This course deals with physics of semiconductor devices made using different semiconductors such as bipolar heterojunction transistor and modulation doped field effect transistor. In some cases the thickness of layers are thin enough that electron shows quantum behavior effect such as resonant tunneling transistor and superlattices. Prerequisite: Graduate standing.

**EGE580 Power Electronics (3)**
Covers the fundamentals of power electronics such as steady state modeling of converters in continuous and discontinuous conduction modes, operation of inductor, transformer and semiconductor switches, buck converter topology manipulation, dynamics of converters in continuous conduction mode, control theory in the context of switching converters and design of feedback controllers.

**EGE590 Thesis in Electrical Engineering (6)**
Research, writing and defense of a thesis under the guidance of the major professor. Required form available in the Records and Registration Office. Required each semester after thesis research project is begun.

**EGE593 Engineering Selected Topic (3)**
Selected topic course descriptions may change from semester to semester. Please consult the Schedule of Classes for more information regarding this course.

**EGE594 Fieldwork Engineering (3)**
No description is available for this course.

**EGE595 Indep Study Elec Engineering (1)**
No description is available for this course.

**EGE599 Comprehensive Exam Workshop**
Non-credit workshop for students who wish to devote the semester immediately following the completion of their coursework to prepare for the comprehensive exam.

**EGE790 Thesis Engineering (1)**
No description is available for this course.

**EGE795 Indep Study Elec Engineering**
No description is available for this course.

**EGE799 Continued Registration (1)**
No description is available for this course.
THE GEOLGY
(845) 257-3760
www.newpaltz.edu/geology

Professor:
Martin S. Rutstein, Ph.D., Brown University
Associate Professors:
Alexander Bartholomew, M.S., University of Cincinnati
Shaful Chowdhury, Ph.D., Western Michigan University
Alvin Konigsberg, Ph.D., Syracuse University
John Rayburn, Ph.D., SUNY Binghamton
Frederick W. Vollmer (chair), Ph.D., University of Minnesota
Lecturer:
Kaustubh Patwardhan, Ph.D., Johns Hopkins University

MASTER OF ARTS IN GEOLOGY (205)

The Geology Department is not accepting applications to the MA program at this time.

COURSES

GLG501 Economic Geology (4)
Practical applications of geology. Origin and occurrence of metallic and non-metallic mineral resources such as oil, coal, and uranium and their importance in the world’s economy as "one-crop" deposits. Conservation of such valuable natural resources as oil and water. Field trips. Prerequisite: GLG311 or 50311.

GLG502 Advanced Geomorphology (4)
Fluvial, glacial, volcanic, eolian, and solutional land forms and their interpretation. Relationships of climate, weathering, mass wasting, soil development, rock types, and ground water to landscape. Geologic and geomorphic interpretation of topographic maps. Prerequisite: GLG338 or 50338.

GLG504 Geochemistry (4)
Geochemical knowledge and methods of geochemical research. Geochemistry of the lithosphere. Distribution and mobility of the elements in the earth, their relative abundance, migration, and mode of occurrence, and the geochemical structure of the earth. Detailed study of the applications of the principles of physical chemistry to selected geochemical problems. Prerequisite: GLG314 or 50314.

GLG505 Tectonics (3)
Origin and characteristics of the major structures of the earth’s crust. Emphasis on plate tectonic theory, including the geometry and kinematics of plate motions, and the structural evolution of mountain belts, rifts, transcurrent fault zones and other regions of crustal deformation. Prerequisite: GLG338 or 50338.

GLG507 Introduction to Hydrogeology (4)
Hydrologic cycle, occurrence and movement of ground water, aquifer analysis and ground water hydrology. Water quality and pollution measurement and abatement. Nature of water supplies, ground water exploration, and conservation of ground water. Prerequisite: GLG220 or 50220 and PHY201 or 75201.

GLG519 Geophysics (3)
Introduction to concepts of geophysics and methods used to study earth; its internal structure. Earth temperatures, seismic waves, gravity, isostasy, and magnetism. Phenomena such as earthquakes, continental drift, sea floor spreading, and mountain building considered. Prerequisite: GLG338 or 50338 and MAT252 or 64252.

GLG533 Analysis of Soils and Sediments (3)
Studies of soils, unconsolidated and consolidated sediments. Investigations: soil pH, bulk density, porosity, soil moisture, beneficiation of acid soils by limestone treatment, particle size distribution. Mineral analyses by chemical stains, microscopy, and X-ray powder diffraction. Prerequisite: GLG311 or 50311 and GLG331 or 50331.

**GLG535 Sedimentation (4)**
Analysis of the mode of origin of the sedimentary rocks. Principles of sedimentary processes. Relation between sedimentary processes and the sediments found in the continental, eolian, marginal marine, shallow marine, and deep marine environments. Pertinent papers in the literature discussed. Prerequisite: GLG311 or 50311 or GLG331 or 50331.

**GLG541 Geology and Geophysics of Petroleum (4)**
Origin of petroleum and its mode of occurrence in Earth and the stratigraphic and structural problems involved in the accumulation of petroleum. Principles used in geophysical exploration by the gravitational, magnetic, electric, seismic and radioactive methods. Prerequisite: GLG311 or 50311 or GLG331 or 50331.

**GLG543 Principles of Sedimentary Petrology (3)**
Petrology and classification of sedimentary rocks. Factors governing sediment dispersal, lithification and diagenesis. Mineralogy and texture of terrigenous clastic sediments as a reflection of possible source terrains. Carbonate petrology and petrography; consideration of limestone and dolostone textures as environmental indicators. Prerequisite: GLG331 or 50331.

**GLG545 Advanced Igneous and Metamorphic Petrology (4)**
Origin, classification, distribution and association of igneous and metamorphic rocks. Introduction to the use of microcomputers in petrology. Individual projects emphasizing advanced studies of rocks in thin section and/or computer analysis of petrogenesis. Prerequisite: GLG314 or 50314 and CHE202 or 22202 and PHY201 or 75201.

**GLG575 Geology for Teachers (3)**
Development of life on earth and geological processes that have shaped its surface: glacialation, erosion, mountain building; earth movements and volcanism. Study of minerals, rocks and a few common fossils. One or two field trips to inspect local geological features. Not open to students seeking a graduate degree in geology or earth science, or those who have taken GLG220 or equivalent.

**GLG578 Geology of New York State (3)**
Principles, methods and knowledge from the science of geology pertinent to a study of the geologic history of the eastern United States. Emphasis on the development of New York State geology. Evolution of life as shown by the fossil record. Field trips. Not open to students seeking a graduate degree in geology or earth science. Prerequisite: GLG220 or 50220 and GLG575 or 50575.

**GLG581 Regional Geology (1-3)**
Geology of selected areas of North America. Readings and discussions of the detailed tectonic and petrological evolution of selected classical geological areas. Field excursions to type areas. May be repeated for credit provided listed topic changes.

**GLG583 Computer Applications in Geology (3)**
Use of computers in the geological sciences. Use of drafting, graphing, contouring, and other software. Basic theory of contouring, curve and surface fitting, least squares methods, data analysis, matrix manipulation, and equation solving. Prerequisite: MPL – minimum score.

**GLG585 Geology Seminar (3)**
An integrated consideration of some current problems selected from the various branches of geology. Critical reading and evaluation of primary source materials.

**GLG590 Thesis in Geology (1-3)**
Research, writing and defense of a thesis under the guidance of the major professor. Required form available in the Records and Registration Office. Required each semester after thesis research project is begun.
The Mathematics Department is not accepting applications to the MA program at this time.

The Mathematics Department is not accepting applications to the MA/MAT program at this time.

COURSES

Courses numbered MAT500-MAT509 are provided for the MS in Computer Science, courses MAT511-MAT519 for the MS in Ed. 7-12 Mathematics, and MAT500 and MAT531-MAT590 for the MA in Mathematics. See course descriptions of MAT510 and MAT520 for their prerequisites.

MAT500 Combinatorics and Graph Theory (3)
Combinatorial and graphical techniques for complexity analysis, generating functions, recurrence relations, Polya’s Theory of Counting graph theory, NP-complete problems.

MAT510 Geometry for Elementary and Middle School Teachers (3)
This course provides a geometric experience which clarifies, extends, and unifies geometric topics in Euclidean, analytic, transformational, and projective geometries. This course is open only to students doing graduate course work in elementary or middle school education in the School of Education. Prerequisite: Matriculated (037A, 107A or 206) status students may not register for this course.

MAT511 Theory of Groups (3)
First course in algebraic structures. Basic set theory and number theory. Axioms of groups. Homomorphisms, isomorphisms, and quotient groups. For MS in Education degree students only. Not open to undergraduates. Prerequisite: MAT252 or 64252. Cannot be used toward 206 major.

**MAT512 Real and Complex Number Systems (3)**
Survey and development of number systems from the natural numbers to the complex numbers. Basic theory and properties. Applications to high school mathematics. For MS in Education degree students only. Not open to undergraduates. Prerequisite: MAT252 or 64252. Cannot be used toward 206 major.

**MAT514 Linear Algebra with Applications to Geometry (3)**
Matrices, linear transformations, and quadratic forms. Solutions of linear systems. Applications to analytic geometry of 2, 3, or n dimensions. For MS in Education degree students only. Not open to undergraduates. Prerequisite: MAT 252 or 64252. Cannot be used toward 206 major.

**MAT517 History of Mathematics (3)**
Topics in mathematics from a historical perspective. The course may be a survey of the history of mathematics or it may concentrate on a few specific topics. In either case, students are required to solve problems and to prove theorems. Recommended for MS in Education degree students. Prerequisite: MAT 252 or 64252. Cannot be used toward 206 major.

**MAT518 Theory of Rings and Fields (3)**
Rings, Fields and their extensions. Introduction to Galois Theory. Solutions of equations by radicals. For MS in Education degree students only. Not open to undergraduates. Prerequisite: MAT511 or 64511.

**MAT519 Sequences, Series, and Their Applications (3)**
Sequences of real and complex numbers. Convergence criteria, series, uniform convergence, definition of functions by series and Taylor's theorem. For MS in Education degree students only. Not open to undergraduates. Prerequisite: Cannot be used toward 206 major.

**MAT520 Statistics for Elementary/Middle School Teachers (3)**
Liberal arts course in basic statistical ideas and their application to public policy and education. Emphasis on statistical reasoning and numerical arguments. Focus on drawing conclusions from data taken from diverse settings and contexts. Prerequisite: Cannot be used toward 037A, 107A or 206 major.

**MAT531 Point Set Topology I (3)**
Part of a two-semester sequence covering the fundamental theorems of geometric topology in abstract topological and metric spaces.

**MAT532 Point Set Topology II (3)**
Part of a two-semester sequence covering the fundamental theorems of geometric topology in abstract topological and metric spaces.

**MAT541 Complex Analysis I (3)**
Provides a foundation for advanced work in analysis. Differentiation, Cauchy-Riemann Equations, elementary functions, conformal mapping, expansions, and analytic continuation.

**MAT543 Real Analysis I (3)**
Part of a two-semester sequence covering the following topics: The real number system, topology of Rn, measure theory, and the Lebesque integral. Convergence theorems, differentiation, and Lebesque decompositions. Fubini's theorem, Radon-Nikodym theorem, and other advanced topics.

**MAT544 Real Analysis II (3)**
Part of a two-semester sequence covering the following topics: The real number system, topology of Rn, measure theory, and the Lebesque integral. Convergence theorems, differentiation, and Lebesque decompositions. Fubini's theorem, Radon-Nikodym theorem, and other advanced topics. Prerequisite: MAT543 or 64543.

**MAT561 Abstract Algebra I (3)**
Part of a two-semester sequence covering the following topics: Groups, rings, integral domains, fields, modules, and vector spaces.

**MAT562 Abstract Algebra II (3)**
Part of a two-semester sequence covering the following topics: Groups, rings, integral domains, fields, modules, and vector spaces. Prerequisite: Mat561 or 64561.

**MAT563 Topics in Algebra I (3)**
Topics chosen by the instructor, may include structure theory of Abelian groups, commutative rings and finite fields, lattice theory, universal algebra. Prerequisite: MAT562 or 64562.

**MAT590 Thesis in Mathematics (6)**
Writing and preparation of an expository or original thesis under the guidance of graduate faculty. Required form available in the Records and Registration Office.