

Muhlenberg Pre-Engineering Course Descriptions

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ACT 101 Financial Accounting

The course will provide the student with a fundamental understanding of accounting as a means for decision making by integrating preparation of financial information and written reports for a variety of users with case discussions and oral presentations. Students will participate in analysis of a company using financial data. Further analysis of the industry with interfirm comparisons will be done in teams.
Prerequisite: ECN 101 Principles of Macroeconomics or ECN 102 Principles of Microeconomics

BIO 151 - Principles of Biology II: Cells & Organisms

Prerequisite(s): BIO 150 Principles of Biology I: Organisms & Populations.

*Meets general academic requirement S or SC.***CHM 103 General Chemistry I**

Designed as a basic course for students majoring in the physical or biological sciences. A study of the fundamental principles of chemistry and of the important elements and their compounds. Lecture-demonstrations and computer-assisted instruction are employed to illustrate concepts. Weekly recitations provide a small group setting for discussions and problem-solving. A laboratory component introduces students to a variety of fundamental techniques with emphasis on volumetric analysis, chemical equilibrium, and descriptive chemistry of selected elements. Three hours of lecture, one hour of recitation, and one three-hour laboratory per week.

Prerequisite: High School Chemistry.

BIO 152 - Principles of Biology III: Molecules & Cells

The third course in the introductory biology sequence is a study of the relationship of structure and function at the molecular and cellular level, molecular and Mendelian genetics, and microbiology. Three class hours and three laboratory hours per week.

Prerequisite(s): BIO 151 Principles of Biology II: Cells & Organisms and CHM 104 General Chemistry II .

CHM 104 General Chemistry II

A continuation of Chemistry 103. One Chemistry 104 lab section is reserved for a small number of students, enrolled by invitation. This group engages in project work designed as an introduction to methods of scientific research. Three hours of lecture, one hour of recitation, and one three hour laboratory per week.

Prerequisite: CHM 103 General Chemistry I

CHM 201 Organic Chemistry I

Designed for students majoring in biology and natural science. Structure, preparation, and properties of organic compounds with an emphasis on stereoisomerism, synthetic methods, and reaction mechanisms. Laboratory work involves an introduction to preparative and analytical techniques. Weekly recitations provide a setting for discussions and problem solving. Three hours of lecture, one hour of recitation, and one three hour laboratory per week.

Prerequisite: CHM 104 General Chemistry II

CSI 106 - Computer Science I: Introduction to Multimedia Computing

An introduction to Computer Science through multimedia computing. Students will learn to create and use software to manipulate multimedia, including images, sounds, and web sites. Topics also include algorithm design and development, control structures, data types, and testing. Topics may vary from

year to year depending on student interests, but will likely include filtering (e.g. color shifting, posterizing, and pitch shifting), music synthesis techniques, reading and writing files, and developing simple graphical user interfaces (GUI's). This course is intended for those with no prior experience in computer science but with a desire to hone problem solving and computing skills with a focus on multimedia. *Meets general academic requirement G or RG.*

CSI 111 Computer Science II

Reviews basic programming language features, and introduces advanced features such as inheritance, interfaces, exceptions, and recursion. Explores fundamental data structures and algorithms, including vectors, linked lists, stacks, and queues, as well as algorithms for searching and sorting. Students will study, design, and develop programs with multiple files, classes, and objects.

Prerequisite: Computer Science I.

CSI 220 Data Structures & Algorithms

A study of data structures and algorithms, their practical applications, and key techniques for designing, analyzing, and reasoning about them. Topics include lists, hash tables, trees, and graphs. Students will study, design, and develop programs that use, implement, and extend classic and novel data structures and algorithms.

Prerequisite: CSI 111 Computer Science II

ECN 101 Principles of Macroeconomics

The fundamental determinants of economic activity, inflation, depression, international finance, and development. Monetary, banking, and fiscal institutions are considered in relation to their role in contemporary public policies designed to cope with these problems.

ECN 102 Principles of Microeconomics

The operation of the price mechanism in modern enterprise economies. Allocation of resources and distribution of income in competitive and monopolistic markets for products, labor, and other resources. Contemporary issues in microeconomic theory and policy are examined.

ESC 201 - Environmental Geology

Organisms are inextricably bound to their physical environments. An understanding of the interactions between the earth's geology and biology is therefore fundamental to a study of environmental science. This course examines earth's physical environments as they relate to environmental science. Topics will include the basic principles of geology, natural hazards such as volcanoes, earthquakes, mass wasting, flooding, and the global hydrologic cycle. Global water resources will be examined with an emphasis placed on groundwater supply, movement, and pollution. Three hours of lecture/discussion and three hours of laboratory per week. Offered alternate years. *Meets general academic requirements S and W or SC and W.*

FIN 237, 238 Corporation Finance

This course develops the major propositions of modern financial theory and the guidance that they provide to the corporate financial manager. The focus is primarily, but not exclusively, on two major areas of decision-making: the investment decision and the financing decision. The exposition of these two areas requires that the following topics be covered: Present value, valuation, portfolio theory, the Capital Asset Pricing Model, capital budgeting techniques, the cost of capital, capital structure, leverage, management of working capital, and ratio analysis. *Prerequisite: ECN 101 Principles of Macroeconomics*

and ECN 102 Principles of Microeconomics and MTH 119 Statistical Analysis or MTH 104 Statistical Methods

Meets general academic requirement W when offered as 238

FYS XYZ

First-Year Seminars are small, discussion-oriented courses that provide entering students with the opportunity to work closely with a faculty member. Required of all first-year students and normally limited to an enrollment of 15, First-Year Seminars promote intellectual discussion and critical thinking, reading, and writing skills. Offered by faculty members from departments throughout the College, the seminars vary in their subjects and aims. Some examine a topic from an interdisciplinary perspective; others focus on particular issues or questions within a discipline. What all of the First-Year Seminars share is an emphasis on thinking critically about the values and assumptions underlying various approaches to knowledge.

Because they are primarily concerned with developing critical thinking, reading, and writing, First-Year Seminars are writing-intensive. Evaluation will be based on students' writing rather than on examinations. The seminars will teach participants how to formulate a thesis, how to collect, evaluate, and cite evidence that supports and qualifies this thesis, and what an argument, analysis, or interpretation is and how to construct and evaluate sound ones. Students will also learn how to revise their work, rethinking their ideas with the help of the instructor's comments on preliminary drafts. In sum, First-Year Seminars introduce students to the life of the mind—to what it means to think deeply and to talk and write critically about ideas; seminars model and encourage students to participate in thoughtful, critical and intellectual reflection and conversation.

MTH 121 Calculus I

Differentiation of algebraic and transcendental functions, application of the derivative to related rates, max-min problems, and graphing. Introduction to integration, the Fundamental Theorem of Calculus. Four meetings per week.

MTH 122 Calculus II

A continuation of MTH 121 Calculus I. Applications of the integral, integration techniques, infinite sequences and series, L'Hopital's Rule, and improper integrals. Four meetings per week. *Prerequisite: MTH 121 Calculus I*

MTH 210 Transition to Abstract Mathematics

An introduction to abstract mathematical thought with emphasis on understanding and applying definitions, writing arguments to prove valid statements, and providing counterexamples to disprove invalid ones. Topics may include logic, introductory set theory, and elementary number theory, but the focus is on the process of reasoning rather than any particular subject or subdiscipline. It is strongly recommended that mathematics majors complete this course by the end of the sophomore year.

Prerequisite: MTH 122 Calculus II Meets general academic requirement W

MTH 223 Calculus III

Geometry of the plane and space including vectors and surfaces. Multivariable calculus, including partial derivatives, Taylor's Theorem in two variables, line and surface integrals, and Green's Theorem. Four meetings per week. *Prerequisite: MTH 122 Calculus II*

MTH 226 Linear Algebra

Matrices and systems of linear equations, determinants, real vector spaces and inner product spaces, linear transformations, eigenvalue problems, and applications.

Prerequisite: MTH 122 Calculus II

MTH 227 Differential Equations

A study of the theory, methods of solution, and applications of differential equations and systems of differential equations. Topics will include the Laplace Transform, some numerical methods, and applications from the physical sciences and geometry.

Prerequisite: MTH 122 Calculus II

MTH 331 Mathematical Statistics I

A study of probability, discrete and continuous random variables, the binomial, normal, Poisson, chi-square, t , and F distribution. Offered in alternate years.

Prerequisite: MTH 122 Calculus II

MTH 332 Mathematical Statistics II

A continuation of MTH 331 Mathematical Statistics I. Topics will include estimation, hypothesis testing, regression, correlation, and analysis of variance.

Prerequisite: MTH 331 Mathematical Statistics I.

MTH 345 Combinatorics & Graph Theory

An advanced course in discrete mathematics emphasizing counting and finite structures. Topics include fundamental laws of counting, generating functions, recursion, partitions, existence and optimization problems, graphs and digraphs, networks, the relationships between graphical invariants, lattices, Latin squares, design and coding theory, and Ramsey Theory. *Prerequisite: MTH 210 Transition to Abstract Mathematics*

PHY 121 General Physics I

An introductory, calculus-based physics course. This activity-based course meets for two two-hour sessions in the laboratory where concepts are introduced through experimentation and other hands-on activities. Follow-up discussions, demonstrations, and problem solving are emphasized during lecture periods. Topics covered include one- and two- dimensional kinematics and dynamics, momentum, energy, rotational kinematics and dynamics. *Prerequisite: MTH 121 Calculus I should be previously completed or enrolled concurrently.*

PHY 122 General Physics II

Topics covered are electrostatics, dc circuits, magnetism and electromagnetic induction, wave optics, ray optics, and some topics from modern physics. This course follows the same weekly format as General Physics I. *Prerequisite: PHY 121 General Physics I*

PHY 213 Modern Physics

An introduction to twentieth century developments in physics with an emphasis on the special theory of relativity, Rutherford scattering, introduction to quantum theory, atomic structure, and nuclear energy.

Prerequisite: PHY 122 General Physics II

PHY 216 Analog & Digital Circuits

Through a mix of laboratory and classroom work students will build and analyze analog and digital circuits found in many scientific and computer applications. Specific topics include passive and active filters, electronic feedback, operational amplifiers, oscillators, A/D and D/A conversion, digital waveshaping, and instrumentation. This course meets in the laboratory and will be offered in alternate years. *Prerequisite: PHY 122 General Physics II*

PHY241 OR PHY 242 Thermal and Statistical Physics

The laws of thermodynamics, their consequences, and applications. Kinetic theory of an ideal gas and an introduction to statistical mechanics. *Prerequisite: PHY 122 General Physics II*
Meets [general academic requirement](#) W when offered as PHY 242

PHY 319 Analytical Mechanics

A detailed study of the kinematics and dynamics of particles, systems of particles, and rigid bodies. Newtonian, Lagrangian, and Hamiltonian formulations of classical mechanics will be considered with applications to oscillators, gravitation, projectile motion in the presence of frictional forces, and motion in electromagnetic fields. Einstein's theory of special relativity will also be studied. *Prerequisites: PHY 122 General Physics II and MTH 122 Calculus II*