

Pre-Engineering/Physical Science

Degree Type

Major

Physics Program Goals

The Physics program at Bethany College is designed to achieve the following goals for its students:

- Have a well-developed understanding of the fundamental principles in
 - Classical Mechanics
 - Kinematics
 - Newton's Laws of Motion
 - Variational Principles (e.g. Lagrangian Dynamics)
 - Electricity and Magnetism
 - Electrical Forces
 - Fields
 - Maxwell's Equations
 - Quantum Mechanics
 - Schrodinger Equation
 - Statistical Mechanics
 - Thermodynamics
 - Laws of Thermodynamics
 - Be able to apply the fundamental principles to particular situations. This includes:
 - Developing a theoretical framework to fit a specific situation.
 - Designing a computational model for intractable considerations and to check analytical results .
 - Physically interpreting the mathematical statements that are derived .
- Have a well-developed ability to gain insight from theoretical and experimental results (physical insight).
- Be able to use standard software to prepare well-written, scientifically sound reports (both theoretical and experimental).
- Have an understanding of the basic tools and experimental apparatti used in research .
- Have a strong command of the scientific method.
- Be able to design an experiment .

- Write and present scientific works.
- Be able to model nonlinear systems and be fluent in the language used to describe chaotic systems.
- Enjoy learning

Requirements for the Major

All students are required to take a minimum of 36 credits within the department:

Item #	Title	Credits
CHEM 101	General Chemistry I	4
CHEM 102	General Chemistry II	4
PHYS 201	General Physics I	4
PHYS 202	General Physics II	4
PHYS 222	Electronics	4
PHYS 241	Mathematical Methods in the Physical Sciences	3
PHYS 300	Modern Physics	3
PHYS 490	Senior Project	2-4
	CHEM 385, 386 or PHYS 318	3

In addition, at least 6 credits from:

Item #	Title	Credits
CHEM 211	Organic Chemistry I	4
CHEM 212	Organic Chemistry II	4
CHEM 285	Data Analysis for Physical Science	3
CHEM 320	Physical Chemistry I with Biological Applications	4
MATH 210	Discrete Mathematics	3
CPSC 152	Computer Science II	4
CPSC 275	Data Structures and Algorithms	3
MATH 354	Linear Algebra	3
PHYS 251	Mechanics	3
PHYS 261	Electricity and Magnetism	3
PHYS 301	Nonlinear Dynamics and Chaotic Systems	3
PHYS 302	Thermodynamics	3
PHYS 303	Plasma Physics	3

Also required are:

Item #	Title	Credits
MATH 201	Calculus I	4
MATH 202	Calculus II	4
MATH 203	Calculus III	4
MATH 341	Differential Equations	3
CPSC 151	Computer Science I	4

Recommended Course:

Item #	Title	Credits
ECON 202	Principles of Macroeconomics	3

Combined Three-Two plans with Case Western Reserve University and Columbia University are available to students interested in various engineering or industrial management degrees .

As each specific engineering program has other course requirements the student will need to consult closely with the pre- engineering advisor about other course selections . A minimum overall and pre-engineering GPA of 3 .30 is required to permit Bethany College students to transfer to the engineering school once requirements are met and students are accepted. No guarantee of acceptance by either engineering school is implied by the relationship .

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