

# **Physics** at Benedictine University

#### Why study physics at Benedictine?

At Benedictine University, you have the opportunity to learn from a group of dedicated and knowledgeable faculty in an established program with small class sizes. The Physics program offers three concentrations: Physics, Biophysics and Physics Education. These concentrations are designed to provide paths to different careers and opportunities. Each concentration emphasizes research and involvement in activities that will develop skills that can be used for a lifetime. On-campus opportunities include independent and summer research projects, and work as a laboratory or teaching assistant in introductory courses. The Chicago area also offers numerous opportunities for research internships. Many of our students have worked off campus at Argonne National Laboratory, BP Amoco Research Center and Fermi National Accelerator Laboratory, all located within 13 miles of campus. Others have gone to prestigious programs out of state and even out of the country.

The Department of Physics and Engineering is located in the Birck Hall of Science. Several physics labs are dedicated to specific types of study. One lab is dedicated to introductory physics courses, another to physics education, another to optics, and a fourth to advanced physics and research. Students have access to a technology-rich environment with a wide array of computing resources that are available on or off campus. One of the newest additions is a high-speed parallel processing cluster that is available for student research and advanced computational activities. The Benedictine Library in Kindlon Hall contains a collection of physics journals and serves as an access point for electronic materials pertinent to physics.

The Benedictine chapter of the Society of Physics Students conducts a multifaceted program to stimulate interest in science and engineering. Students also have the opportunity to attend lectures and presentations at nearby universities and research facilities.

Physics students also have the opportunity to make presentations about research or other independent projects. These include the annual student meetings hosted by Argonne and the Associated Colleges of the Chicago Area, as well as various campus and local outreach activities.

#### What does a degree in Physics at Benedictine offer?

As a Physics major or minor at Benedictine, you will combine knowledge of the physical sciences with the broader background of a liberal education to gain scientific expertise, problem-solving and critical-thinking skills, and an awareness of the impact of pure and applied science on social issues.

"The approach to knowledge and truth exemplified by the discipline of physics continually prompts one to seek a deeper understanding of physical phenomena. As is generally true in life, there is more to a situation than what at first may appear. In the process (scientific method) of continually seeking a deeper understanding of physical observations through the study of physics, one is able to develop analytical skills to a significantly higher degree than is likely in other academic disciplines. These skills and the approach to truth encouraged by the study of physics have incredibly wide applications outside the field of physics. This is of singular importance and of inestimable value."

John Spokas, Ph.D., Professor Emeritus of Physics, Benedictine University

# Physics

#### How does the program work?

There are three different concentrations in Physics: Physics, Biophysics, and Physics Education. In each concentration, you must complete a minimum of 30 semester hours of physics courses, at least nine of which must be upper-division (300 level) courses. You must also complete the three-course sequence of Calculus with Analytic Geometry and a course in Differential Equations. The Physics program gives each individual student the freedom to choose courses that are consistent with their goals and aspirations in consultation with a faculty advisor. Students who are contemplating graduate studies in physics are advised to complete either the Physics or Biophysics concentrations as well as additional courses in applied mathematics.

Physics Concentration: Intended for students who are interested in graduate school or other professional opportunities. The focus is on traditional physics concepts with an emphasis on experimental work.

Biophysics Concentration: Intended for students who are interested in graduate school or medical school. The focus is on biophysical concepts and computational methods. In this concentration, students take additional courses in the biological sciences.

Physics Education Concentration: The Physics Education Program is a physics degree combined with a teacher certification in secondary education for physics. This concentration includes a minor in education. The focus is on fundamental physics combined with educational theory.

Physics majors must also complete a research project and give a presentation on this work. The projects may be done in association with a faculty member in areas such as simulation techniques in molecular dynamics, particle physics, physics education, and physical, chemical and biological detection using micromechanical sensors. Summer research projects off site, for example at Argonne National Laboratory, can also be used to complete the research requirement.

#### What careers are available with a degree in Physics?

A degree in Physics can be your first step to pursuing a career in a variety of exciting science and non-science fields. Typical career paths in physics include education and pure and applied research positions in industry and government.

Some of the sub-fields in physics include:

- Astrophysics
- Biophysics
- Computational physics
- Engineering
- Environmental physics

- Fiber optics
- High-energy physics
- Hydrodynamics
- Industrial physics
- Medical physics

- Photonics
- Plasma physics
- Quantum electronics
- Solid state physics

Whatever your interests, the Physics faculty at Benedictine University will help you to explore your career options and market yourself effectively for an exciting, fulfilling career.

## **Recommended Program**

## Bachelor of Science in Physics Calculus I Math Placement

Benedictine University recently reformed its undergraduate curriculum and implementation begins in Fall 2014. This recommended program of study is an example only and subject to change.

#### FRESHMAN

Calculus with Analytics I and Lab	5
Writing Colloquium	3
University Physics I and Lab	5
General Chemistry I and Lab	4
	17
Calculus with Analytics II	4
Research Writing	3
University Physics II and Lab	5
General Chemistry II and Lab	4
	16

#### JUNIOR

Analytical Mechanics	3
Classical Thermodynamics	3
Baptism of Europe (HUMN 230)	3
Core electives	6
	15
Quantum and Statistical Mechanic	cs 3

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Electricity and Magnetism I		Э
Converging Hemispheres (HUMN	240)	З
Core electives		6
		15

#### SOPHOMORE

Calculus with Analytics III	4
Modern Physics and Lab	4
Introduction to Computer	
Science and Lab	4
Speech Communication	3
	15
Differential Equations	4
Electronics	3
Mediterranean World (HUMN 220)	3
Core electives	6
	16

#### SENIOR

Advanced Physics * or elective	3
Contemporary World (HUMN 250)	3
Core electives	6
Research	2
	14
Advanced Physics * or elective	3
Research	2
Core electives	9
	14

\*9 hours at the 300 level are required.

## **Recommended Program**

### Bachelor of Science in Physics Introduction to Calculus I Math Placement

Benedictine University recently reformed its undergraduate curriculum and implementation begins in Fall 2014. This recommended program of study is an example only and subject to change.

#### FRESHMAN

Introduction to Calculus I and Lab	5
Writing Colloquium	3
University Physics I Lab	1
General Chemistry I and Lab	4
Core elective	3
	16
Applications of Calculus I	4
Research Writing	3
University Physics II Lab	1
General Chemistry II and Lab	4
Core elective	3
	15

#### JUNIOR

Analytical Mechanics		3
Modern Physics and Lab		4
Baptism of Europe (HUMN 230)		3
Core electives		6
		16
Differential Equations		4
Electronics		3
Advanced Physics* or elective		3
Converging Hemispheres (HUMN	240)	3
Core elective		3
		16

#### SOPHOMORE

Calculus with Analytics II	4
University Physics I	4
Introduction to Computer	
Science (and Lab)	4
Speech Communication	3
	15
Calculus with Analytics III	4
University Physics II	4
Mediterranean World (HUMN 220)	3
Core elective	3
	14

#### SENIOR

Classical Thermodynamics	3
Research	2
Contemporary World (HUMN 250)	3
Core electives	6
	14
Quantum and Statistical Mechanics	3
Electricity and Magnetism I	3
Advanced Physics* or elective	3
Research	2
Core electives	6
	17

\*9 hours at the 300 level are required.