worlds collide
Doing Great Science @ Gettysburg College
Roll up your sleeves. Pick up a pipette. Fire up the particle accelerator. Active, hands-on learning is what turns a student interested in science into a scientist. For example, in the Gettysburg first-year biology course Introduction to Phage Biology students find and describe new phages. To do this, they need to learn field and lab skills, apply them in the real world, and then study the existing literature for context and depth.

In Environmental Studies, you’ll do field work in almost every course right from the start. In Biochemistry & Molecular Biology, you’ll gain hands-on experience with state-of-the-art biochemical analysis and recombinant DNA technology in your first year. In Health Sciences, you’ll soon be wiring up a classroom to see what happens to her VO2 when she goes all out on a treadmill. That’s happening all the time at Gettysburg—in every science department, in every course, in every major.

Don’t get us wrong. Textbooks, papers, lectures, and problem sets all have an important place at Gettysburg just as they do at most colleges and universities. Knowing your field is critical, so you’ll spend plenty of time in the library. But Gettysburg science courses also incorporate hands-on research experiences starting at the introductory level. That’s something that makes us a little different—and doing science here a little more interesting.

The doing, after all, is really what science is about.

18

Gettysburg has the average class size of 18. Close to 25% of class sections have fewer than 10 students. Introductory level courses, even those with more than 10 students, “are languages that all of our students need to know,” says role model.”
Most of the science faculty at Gettysburg are active researchers, and, because we don’t have graduate students, most science students will have the opportunity to be part of a faculty research team at least once. Some students will also undertake independent research projects.

*Alex Campbell, Senior, Biochemistry & Molecular Biology major, Lebanon, PA. “The faculty are overwhelmingly supportive. They go above and beyond to create opportunities for you. Starting in my first year, I have been able to be consistently involved in research from biochemistry in Spain, to biophysics throughout my time at Gettysburg.”*
Test Your Hypotheses. Discover Something Extraordinary.

“I approached Professor Charles Kann with a technical question about an android app that I was working on, and he had a lengthy discussion about Java memory management. When Professor Kann then invited me to work on a summer project building an app that maps all the Gettysburg battlefield monuments, I was immediately interested! I love history-related projects, and jumped at the chance to learn something new. This project was my first real-world project.”

John Duncan, Junior, Potomac, MD. Computer Science major. David Wills Merit Scholarship recipient. Secretary of the Gettysburg chapter of the Association for Computing Machinery, member of Gettysburg College Independents Club.

“Many different systems in nature exhibit collective behaviors—from the cells in your body, to flocks of birds, to people driving in a car. We can ask some interesting questions about the organization and properties of these systems. How and why do motion patterns in collective systems arise? How can we use physics to model collective behavior? Can we then use these models to predict the behavior of groups of animals? To investigate these questions, we use high-speed cameras and imaging techniques which allow us to obtain spatial information for each individual in a group, and the group as a whole.”

Julie German, Sophomore, Schwenksville, PA. Math and Physics major. University Math and Physics Mentor and student-faculty liaison.

“Afternoon plasma research is really amazing. Even though I was only a freshman, I was able to intern at the Children’s Hospital of Philadelphia. I already had solid lab skills thanks to my biochemistry courses at Gettysburg. While there, I also took on an individual research project in molecular genetics working on TCF7L2—a gene associated with Type II diabetes. And my mentor? He happens to be the scientist who first discovered the correlation of TCF7L2 with Type II diabetes!”

Elizabeth Burton, Sophomore, Wilmington, DE. Biochemistry/Molecular Biology and Music double major. Gettysburg College Choir and Music Committee Chair of Sigma Alpha Iota, President of the Gettysburg College Music Club Scholarship. Studying bacteriophage genomics in Dr. Veronique Delesalle’s lab at Gettysburg, and the TCF7L2 gene in Dr. Brian Green’s lab at the Children’s Hospital of Philadelphia.

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Visit any science department at Gettysburg, and you’ll find that the center of gravity often exists in the department’s student lounges. These lounges are furnished with overstuffed sofas and places to spread out and work. Some offer computer workstations. Others have mini fridges and bowls of snacks.

Look around and you’ll see jigsaw puzzles in progress, notebooks filled with thoughts on cell biology or karst topography, homemade LED light savers and lost flip flops. In one corner, maybe a self-watering philodendron with a sensor system rigged up by a couple of computer science students.

They aren’t classrooms, but a great deal of learning takes place in these spaces. Students drop in to recharge their batteries and find friends to answer questions for a survey they’re conducting for a psychology research thesis. Classmates will make weekend plans to bike a new trail and share some terrible jokes. In between classes, younger students wander in to review an assignment or get help with a regression analysis just beyond their reach. Some come to seek real “been-there-done-that” advice about study abroad or independent research or applying to graduate school from a wise senior. But mostly people come to talk “science.”

At every level, science at Gettysburg is collaborative, collegial, encouraging and fun. From the lab to the field trip, from dinner at the Science House to a post-midterm latté at the campus café, from club meetings to a pre-med info session, you’ll find friends who share your enthusiasm and your triumphs when you find success. It’s not a competition here. We know what it means to work together.

“I’m studying rats that play less than other rats. We think this is due to a complex interaction between the rat’s genetics and its early social experiences. Early experiences affect play behavior, and many human psychological disorders are related to play. In our first experiments, we tested if the drugs to see if differences in play are due to differences in oxytocin systems. Then we did some immunochemistry on rat brain slices. We also studied rats under these conditions. The more a pop gets groomed, the less anxious it is likely to be later in life.

These are three very different research methodologies, but I’m getting great experience in all of them. And I get to see how the different kinds of data we are collecting come together to shape our understanding of play. That’s exciting and a lot more than what I thought psychology would be.”

Josh Hendsperger, Senior Psychology major who is conducting a study on oxytocin and play behavior at the Bradley Sleep Lab at The National Institute of Mental Health (NIMH). The work that Josh and his students are doing has implications for the treatment of human psychiatric disorders.

The Society of Physics students organise field trips to such places as the Goddard Space Flight Center and the NASA Goddard Space Flight Center.

Check out Assistant Professor of Environmental Studies Andy Wilson’s website for lists of birds, mammals, and other creatures found on campus.

Science House is a housing option organized around the common intellectual interests of its residents, and hosts activities of the Global Club and science-related social gatherings.

There are three dinosaur footprints near campus on the bridge at the foot of Big Round Top. The prints were taken from a nearly 800-foot-long, 15-ton beast that walked on two legs approximately 200 million years ago when the climate was very different from what it is today.

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The National Institute of Standards and Technology, the National Institute of Standards and Technology (NIST) and the NASA Johnson Space Flight Center.

The National Institute of Standards and Technology and the National Institute of Standards and Technology (NIST) are what make the liberal arts college environment at Gettysburg similar in many ways to a larger research institution.

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It means having real skills with instruments and tools, abstract and concrete, whether that the calculus and statistics you need to explain your GIS data or the finesses required by laser spectrometry. You’ll have opportunities to develop those skills here along with your knowledge.

Being a scientist at Gettysburg also means speaking and writing about your work to people who know much more than you do as well as to people who are completely unfamiliar with what you’re working on. What Gettysburg can give you is the gift of being grounded, of real confidence when you’re presenting what you know. We can help you take the next steps, too. Whether your goal is a Ph.D., getting into med school, or landing a job designing the next great app or cancer drug, we can help get you there.

Most of our students will tell you that they love what they do—they love being in lab, tackling impossible questions, and making discoveries. They even love the challenge of trying to calibrate a temeporal instrument, debug a routine, or re-do a titration. They also love thinking and talking about science. Science on its own is a richly rewarding enterprise. But really, at Gettysburg, we do science to change the world, to make a difference, to be useful. We do science because we’re interested in the future of what the world can be.

“Every professor in the psychology department was incredibly influential in my research. Having three years of hands-on experience with multiple professors isn’t something you get at a larger institution.”

–David Hauser ’08, Psychology Ph.D. candidate at University of Michigan

‘ICE SCULPTOR’

“I measure cirque formations. I’m interested in this topic.”

–Natalie hope ’10, Environmental Studies major and an art minor.

‘GETTYSBURG’S ADVANCED GIS’

“GIS is a core technology and a tool that we use as part of our environmental studies and other fields. We use it to collect data and build environmental models so that we can analyze what’s already happened in an environment and then project what might happen in the future.”

–Timmy Massa, Director of Geographic Information Systems

My research focuses on cirque formation in Iceland. Cirques are bowl-shaped depressions created by glaciers. I measure cirque morphology and other factors that influence characteristics of these formations. I also traveled to Iceland last summer and climbed into a few cirques to study them firsthand.

My work involves Geographic Information Systems. GIS is a core technology for modern environmental studies and other fields. We use it to collect data and build environmental models so that we can analyze what’s already happened in an environment and then project what might happen in the future.

To address the challenges of climate change, we need to know what influences glacial processes. It was this real-world problem—and the chance to acquire some sophisticated, marketable skills—that got me interested in this topic.”
**BMB | BIOCHEMISTRY • MOLECULAR BIOLOGY**

“What goes on inside a living cell? At Gettysburg BMB, it’s a hands-on learning experience that matches the essence of contemporary science.”

**WHAT IT IS:** BMB places take at the intersection of biology, chemistry, neuroscience, mathematics, and physics. Students explore on structures, genetic heritage, design patterns, biomolecules, DNA sequences, and the flow of information in living organisms. A wide variety of disciplinary research options is available, and projects are often led by the students. BMB majors often study abroad. Your major might also include presenting research at a conference, jointly mentoring and advising, and internship experience, close collaboration with chemistry faculty, and research internships off campus.

**WHAT IT TAKES:** BMB majors gain expertise in the fields of biochemistry, molecular and cellular biology, and biophysics. They also develop critical thinking and writing skills, and the ability to work collaboratively in teams.

**ES | ENVIRONMENTAL STUDIES**

“From the complexity of environmental issues to the variety of perspectives. Our program is one of the most comprehensive in the nation.”

**WHAT IT IS:** ES is a disciplinary department focused on complex environmental issues from a variety of perspectives. Our program is one of the most comprehensive in the nation.

**WHAT IT TAKES:** ES majors travel to Pennsylvania coal country, the reservations of North Carolina’s Outer Banks, the decision-making centers of Washington, D.C., and the beaches of the Carolinas. From fieldwork to lab work, to computer mapping and field school, and courses. ES majors will also find that their research frequently result in on-authored publications and presentations at scientific meetings.

**Ph | PHYSICS**

“Physics asks the big whys. Then we want to model the answers.”

**WHAT IT IS:** Physics explores the interrelationships of science and engineering, and physics. Students often work on various projects including topics related to biophysics, nanotechnology, robotics, computer science, engineering mathematics, chemistry, and environmental studies.

**WHAT IT TAKES:** Physics combines theoretical training, the design of experiments, techniques of data analysis, and the nuts and bolts of computer programming.

**Ch | CHEMISTRY**

“Chemistry is the foundation for much of science. It’s also essential to big questions at the boundaries of different disciplines.”

**WHAT IT IS:** Chemistry stands at the center of the natural sciences. Chemistry uses traditional and theoretical tools to understand everything from super small to super large and beyond to the world of nanotechnology. Chemists make housing, drugs, new ways to save energy, and many other new materials. Our majors can work in the laboratory, industry, and nearly any career path. Majors carry out research projects with chemistry faculty. They develop problem-solving skills and knowledge that make them successful leaders in graduate school and their careers.

**WHAT IT TAKES:** Our majors carry out research projects with chemistry faculty. They develop problem-solving skills and knowledge that make them successful leaders in graduate school and their careers. The intellectual skills they develop in our labs and classes help them to become leaders in the world of chemistry throughout their careers.

**Ma | MATHEMATICS**

“What listenes to what science says about the world and then asks, how can we change the world?”

**WHAT IT IS:** Mathematics is truth and beauty. We want you to appreciate the intrinsic purity and precision of mathematics as well as its power and practical value. Math skills are extremely valuable in the world of technology, and math is an essential tool for graduate work in other areas of biology, psychology, and as well as medical school.

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**Ne | NEUROSCIENCE**

“What are the brain mechanisms of behavior and cognition? How do neurons shape our behaviors and actions?”

**WHAT IT IS:** Neuroscience is the interdisciplinary study of behavior and the brain. The mind, and behavior.

**WHAT IT TAKES:** Neuroscience is the interdisciplinary study of behavior and the brain. The mind, and behavior.

**Sx | CROSS DISCIPLINARY SCIENCE INSTITUTE**

“Some of the most interesting science happens when worlds collide.”

**WHAT IT IS:** Sx is a true interdisciplinary curriculum that established with support from the Howard Hughes Medical Institute. Sx majors travel to Pennsylvania coal country, the reservations of North Carolina’s Outer Banks, the decision-making centers of Washington, D.C., and the beaches of the Carolinas. From fieldwork to lab work, to computer mapping and field school, and courses. ES majors will also find that their research frequently result in on-authored publications and presentations at scientific meetings.

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**For most Gettysburg students, the elements of a science major will include 12 to 14 courses in the sciences, including courses outside your department, a transformative research or internship experience, close mentoring and advising, and often study abroad. Your major might also include presenting research at a conference, jointly mentoring and advising, and internship experience, close collaboration with chemistry faculty, and research internships off campus.

**X-SIG | SCIENCE INSTITUTE**

**At Gettysburg**

Gettysburg’s 6,600 sq. ft. Science Center provides amongst research and teaching space and is one of the newest builds on campus.

**3+2 ENGINEERING**

Engineering is one of the most successful academic background options uniquely positioned for management and technical careers. Our dual degree 3+2 engineering programs are offered in conjunction with Universidad de los Andes in Colombia, the University of Richmond, and the University of Pittsburgh. Students earn both a B.A. degree from Gettysburg and a B.S. in engineering discipline in five years. See website for more details.

Gettysburg students have earned Rhodes, National and Goldwater scholarships. Fulbright grants and building apprenticeships and National Science Foundation fellowships, as well as other awards.

Gettysburg has distinction of being one of only 17 liberal arts institutions finalists in the Princeton Review’s newest guide, *Colleges that Pays You Back: CAMPUS Payoff Rankings for Upcoming Graduates.*

Gettysburg ranked 18th in Best Schools for Internships—only 4 liberal arts colleges higher (#6). *The Princeton Review’s top 21.*

One of the most beautiful campus environments in the nation, home to math and computer science.
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GPS location:
300 Carlisle Street
Gettysburg, PA 17325

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