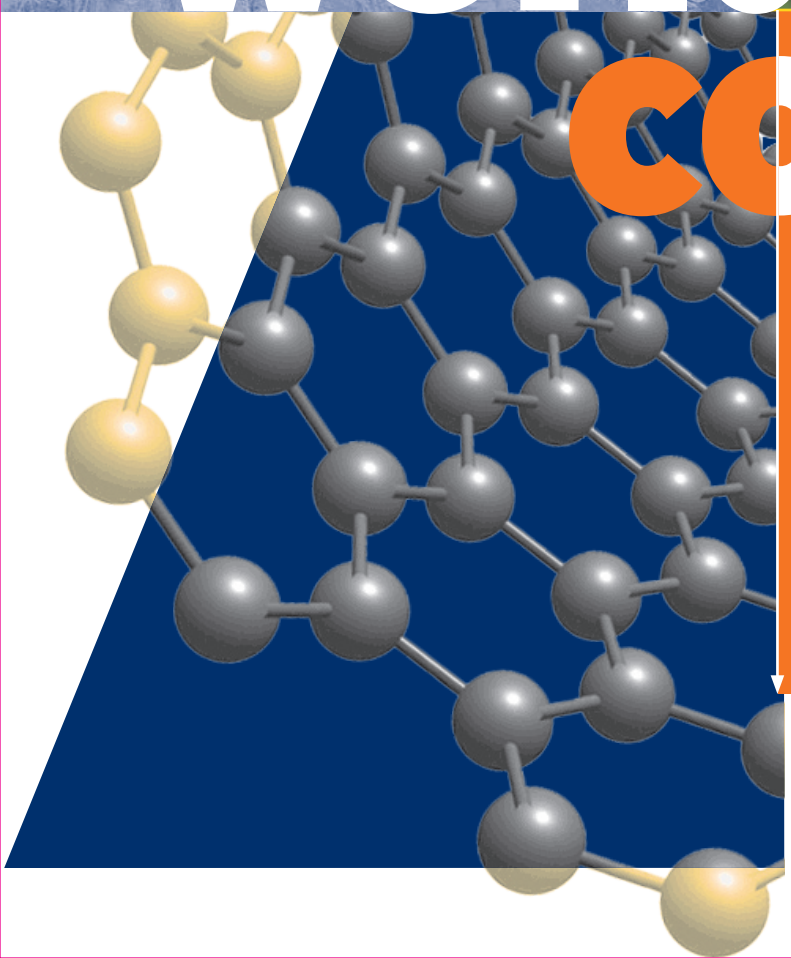


Do great work

worlds collide

Doing Great Science @ Gettysburg College

Gettysburg COLLEGE

worlds collide

COMPUTER SCIENCE

According to the U.S. Bureau of Labor Statistics, computer science jobs are among the highest paid, highest satisfaction jobs in a field with the highest projected job growth.

Students have access to more than 1,300 computers on campus as well as a network of labs and workstations and campus-wide wireless connectivity.

NEUROSCIENCE

Each year 16 lucky students get their first taste of neuroscience in the popular first-year seminar, Reading the Brain.

An epifluorescence microscope with advanced digital imaging and analysis tools gives neuroscience students a chance to "see" neurotransmitters like dopamine in the brain.

MATHEMATICS

Math majors volunteer to operate a drop-in peer tutoring and help center for all Gettysburg students.

In recent years, Gettysburg math majors have studied abroad in Argentina, Hungary, New Zealand, England, and Italy.

ENVIRONMENTAL STUDIES

The CEO of the US Geospatial Intelligence Foundation is Keith Masback '87.

Gettysburg is a charter signatory of the American College and University Presidents Climate Commitment and has made major investments in energy efficiency.

Painted Turtle Farm, Gettysburg's "Certified Naturally Grown" campus garden, offers student opportunities to engage in small-scale sustainable agriculture.

HEALTH SCIENCES

The U.S. Bureau of Labor Statistics projects that the healthcare industry will create over 15.8 million additional jobs by 2022, more than any other sector.

All Health Sciences majors undertake off-campus clinical internships working in healthcare settings here and abroad.

About 90% of well-qualified Gettysburg applicants gain medical school admission on their first try.

PHYSICS

An advanced laser research lab supports student research in plasmas and laser interactions.

The Hatter Planetarium on campus gives students another way to explore the night skies and can also be used for special presentations.

CHEMISTRY

The president of the American Chemical Society is Allison Campbell '85.

Gettysburg chemistry major Dr. J. Michael Bishop '57 shared a Nobel Prize in 1989 for his work in cancer research.

BIOLOGY

"Advancements in microscopy tools go hand in hand with new discoveries. Fortunately we're well equipped at Gettysburg!" —J. Matt Kittelberger, Associate Professor of Biology

Gettysburg offers a spacious greenhouse and herbarium for plant studies and research.

BIOCHEMISTRY + MOLECULAR BIOLOGY

"Salty and Fatty" is a unique course that explores lipids and ions—the physics of DNA, cell membranes, liposomes, and macromolecules.

BMB majors gain experience in state-of-the-art X-ray crystallography, NMR spectroscopy, and single-molecule techniques.

PSYCHOLOGY

Psychology offers excellent career preparation. Graduates pursue careers in counseling, school, psychology, sports medicine, business and more.

In any given year, about 25% of psychology majors present their work at national conferences.

Psychology, the College's most popular major, strongly emphasizes scientific training, research, and lab work.

SUMMER RESEARCH FELLOWSHIPS

3-2 ENGINEERING DUAL DEGREE

Science House

Gettysburg College Entrepreneurial Fellowship

X-SIG

The Cross-Disciplinary Science Institute at Gettysburg College

Peer Learning Associates

CLINICAL INTERNSHIPS

Science Speaker Series

OFF-CAMPUS STUDY

PRE-HEALTH PROFESSIONS ADVISING

Maybe you like science for the opportunities. A background in science or math can be one of the surest paths to a rewarding career. Scientific, quantitative, and critical thinking skills are always in high demand. Then again...

Doing Great Science @ Gettysburg College

Maybe you like the challenge of persistent questions—what is the universe made of? What *is* matter? How did life begin? What is consciousness? If the answer to a problem is easy to check, is the problem itself easy to solve? Why is there so much phytoplankton diversity? How does the golgi apparatus work?

Maybe you have the desire to make a difference—be a surgeon, cure a disease, teach science in an underserved community, save endangered species, figure out the mathematics of climate change, or create new kinds of energy or transportation. You want to build a better internet, a better rocket, a better approach to nutrition—a better world. You're aiming for impact.

Whatever the reason, science is what fires your ambitions. It's what you want and *need* to do with your life.

So let's get started.

At Gettysburg College, the sciences offer many opportunities to do science, even professionally, and to investigate big questions. The liberal arts makes for more successful and effective scientists by connecting you to the world, its cultures, and its people and by exposing you to the myriad ways in which science matters for humanity and the planet. A Gettysburg education not only prepares you for a career and for graduate and professional programs, it also inspires you to take on the challenges and questions that matter most of all. Not just on paper. Not just theoretically. For real. In *vivo*.

Go for it. Invent the future. Solve the problems. Change the world. And do great work.

Learn Science By *Doing* Science.

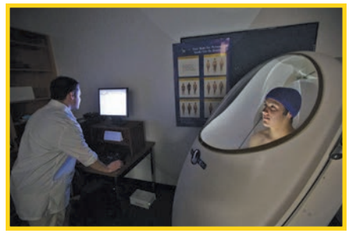
Why wait? Why not learn while doing science? A compelling question is like rocket fuel. You'll learn faster, better, and smarter if you're observing, hypothesizing, experimenting, testing, and analyzing. At Gettysburg we tell our students, "Be impatient." Textbook science isn't enough. Science demands actual *doing*.

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 classmate to see what happens to her VO2 when she goes all out on a treadmill. The *doing* happens 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.



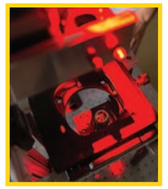
"Classroom science tends be safe and prefabricated, while research is ambitious, uncertain, and DIY. Even before they gain technical ability, students need to be able to form a meaningful hypothesis that can be tested."

–Ryan Kerney, Assistant Professor of Biology

18

Gettysburg has an average class size of 18. Close to 20% of class sections have fewer than 10 students. Introductory labs rarely have more than 15 students.

Health Sciences's specialized labs include a Human Anatomy and Physiology Labs, a Neuromuscular Physiology Lab, a Molecular Physiology Lab which allows students to explore the molecular biology of skeletal muscle and other tissues; and an Integrative Physiology Lab for the study of exercise physiology and biomechanics.



Biochemistry and chemistry labs at Gettysburg offer students a wide array of advanced instrumentation and a chance to develop professional skills with tools like the Beckman Coulter PA 800 Capillary Electrophoresis System, the Bruker Avance 400 MHz Fourier Transform NMR Spectrometer, and the Varian Saturn 2100 Gas Chromatograph/Mass Spectrometer.

Psychology majors complete two advanced labs in which students conduct original research. It's a requirement that's unique among liberal arts colleges and a rare opportunity for undergraduates to work at such an advanced level.

Every Gettysburg major includes a capstone experience in the senior year. For science and math this usually means original research either independently or working as a member of a faculty-led research team.

"Whether you are interested in understanding the growth of tumors, who is going to win the World Series, or what the weather will be next week, one of the best ways to understand phenomena we see is to formulate a mathematical model that describes it. Mathematics and statistics are languages that all of the natural and social sciences rely on when developing and testing their theories."

–Darren Glass, Associate Professor of Mathematics

GRAVITY MASTERS

The Gettysburg Observatory pictured here houses a 16-inch f/11 computer controlled Ealing Cassegrain reflector telescope that make it possible to take pictures of faint celestial objects. Gettysburg also offers a. 3.1 meter Haystack Small Radio Telescope (SRT) for astronomy and physics students.

***Andre Hinds**, Senior, Hopkins, MN. Physics major. A member of the Gettysburg track & field team, he holds the College discus record. Gettysburg students Tessa Thorsen, Andre Hinds, and Paul Lessard worked as research assistants in Professor Ryan Johnson's astro physics lab.*

"Here's the question: How does gravity work on extremely large objects like galaxy clusters? That's what we've been asking this summer in Dr. Johnson's lab. Everyone knows what a ball does when you throw it off a building, but the model that governs that interaction pretty much breaks apart when you try to apply it a cluster of 1,000 galaxies, hot X-ray emitting plasma, and massive amounts of dark matter. I'm trying to create a viable statistic to analyze and identify galactic clustering.

"This work is right at the edge where math meets physics and computer science. I never thought I'd be doing such amazing physics as an undergraduate. So many discoveries are happening right now in this area—and here I am in the thick of it. This is the stuff of grad school, but I'm doing it at Gettysburg now."

Ask Questions. Pursue Answers.

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.

Your research experiences at Gettysburg will give you a taste of what professional science can be like. Research can take you abroad for fieldwork or an off-campus internship, or it keep you on campus for a summer working side by side with a professor. Many student researchers receive summer housing and a stipend.

As part of a research team, you'll share in the frustrations as well as the glory of the research experience. There will be long hours in the lab. There will be bugs, and you'll have to start over. Still, something remarkable may eventually emerge—an insight, an observation, something repeatable and interesting. As you gain experience, you'll develop an impressive level of facility with electron microscopes, spectrophotometers, or linear transformations.

Maybe you'll make a poster for a conference. You might give a talk or co-author a paper. People will want to know what you think, and other scientists will one day build on what you're doing.

Not surprisingly, a unique camaraderie develops among the summer researchers. That camaraderie includes students and professors from many fields—and that feeling of collegiality affects your work. Cutting-edge science almost always involves collaboration that crosses the boundaries of different fields.

Somewhere along the way you'll stop being a student and become a real scientist making real discoveries.

"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 HIV research to biophysics throughout my time at Gettysburg."

–Alex Campbell, Senior, Biochemistry & Molecular Biology major, Neuroscience minor

60%

More than 60% of students study abroad—science and math majors included. Science students have traveled far afield to study, for example, healthcare in Denmark, chemistry in Spain, environmental issues in Japan, and biodiversity in Madagascar or Costa Rica.

Physics major William Vanderpoel who is researching the degradation of PDMS via irradiation also studied gravity first-hand by bungee jumping during a semester in Queensland, Australia.

The popular Gettysburg Spring Symposium poster session showcases student research and advanced lab course work. Participants include majors from the departments of Biology, Environmental Studies, Health Science, Physics, and Psychology.

In Physical Geography (ES-196), students undertake an intensive two-week field-based examination of the physical and cultural geography of the Rocky Mountains.

Summer student researchers look forward to weekly brown bag lunches where members of different teams present their work. There's also a series of roundtables to discuss ethical questions in science, the importance of communication, and life in graduate school.

X-Lab: Drugs and Cells is an upper-level biology/chemistry/health sciences lab course where students design and synthesize organic compounds and the assessment the effect of these compounds on cellular biology in vitro.

RAINFOREST ADVENTURES

Each year the Smithsonian Tropical Research Institute (STRI) hosts more than 1,500 scientists from all over the world at its center in Gamboa—a tiny town in the Panamanian rainforest. Samantha Siomko spent a summer there as part of Professor Alex Trillo's research team. She also spent a semester doing research in the Australian rainforest.

***Samantha Siomko**, Junior, Lititz, PA, Biology major. An award-winning short story writer, Samantha also studied a new phage in a first-year biology course at Gettysburg.*

"I'm here in Panama studying *Trachops cirrhosus*, the fringe-lipped bat—a bat that eats frogs. These bats find frogs by homing in on frog mating calls. Our hypothesis is that these bats target the less common frog species because these can be more easily distinguished from others in a mixed group. Imagine how much easier it is to keep track of an orange fish in a pool of black fish, and you'll get sense of the "oddity effect" and why this could be a useful strategy for predators. If we're right, the oddity effect would influence the reproductive success and survival of certain frog species, which is especially important in light of world-wide amphibian declines.

"To hold one of these frogs in your hand and actually look these special creatures in the eye is a life-changing experience. I've learned so much by being here and by being hands-on. This what science should be."

Test Your Hypotheses. Discover Something Extraordinary.

1

"Plasma is the fourth state of matter. It's created when a gas becomes highly energized causing negatively charged electrons to separate from positively charged atoms. I've been working with Dr. Tim Good and my lab partner Gordon McCann on upgrades to our plasma chamber (which we call the Pickets Charged Plasma Device) and our laser spectroscopy diagnostic system. We're exploring a technique called laser-induced fluorescence to diagnose characteristics of our plasma using ion-acoustic waves. We want to better understand how plasma behaves under different conditions and then apply this knowledge to solar flares and other possibly catastrophic space weather events."

***Avery German** , Junior, Reading PA. Physics major. Co-president of Society of Physics Students (SPS) and Physics Peer Science Mentor (PSM).*

2

"Many different systems in nature exhibit collective behavior—from the cells in your body, to flocks of birds, to people driving in cities. 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 group, and the group as a whole."

***Julia Giannini**, Sophomore. Schwenksville, PA. Math and Physics double major. Hatter Planetarium assistant and lab assistant.*

3

"The opportunities here for science majors really are amazing. Even though I was only a first-year, I was able to intern at the Children's Hospital of Philadelphia. I already had solid lab skills thanks to my biochem 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. Recipient of the Gettysburg College Lincoln Scholarship. Studying bacteriophage genomics in Dr. Veronique Delesalle's lab at Gettysburg, and the TCF7L2 gene in Dr. Struan Grant's lab at the Children's Hospital of Philadelphia.*

4

"I approached Professor Charles Kann with a technical question about an android app that I was working on, and we 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.*

5

"Sophomore year in my physiology class, Dr. Brandauer compared our red blood cells to a bird's. Birds keep their endomembrane system unlike humans. I remember thinking, why is that? What physiological reason do birds have for keeping their nucleus and mitochondria compared to us? I approached him after class. The idea for my research started there."

***Normonique Dyer**, senior, Jamaica, NY. Health Sciences major. Chemistry minor. Member of the fencing club, a film studies club and a swing-dancing ensemble. Studied abroad in Denmark. Recipient of The American Physiological Society's prestigious Integrative Organismal Systems Physiology (IOSP) undergraduate research fellowship.*

6

"Skin—specifically the outermost layer called the stratum corneum—is interesting. I'm doing research in Dr. Frey's lab to determine how its structure affects the efficacy of topical treatments for dermatitis and other dermatological issues. If you swallow a pill, the medicine can go anywhere in the body—but if you apply it to your skin, it's safer and more efficient. I want to understand how the lipid composition of the skin changes to allow for more efficient application of topical drugs."

***Mike Counihan**, Senior. Chemistry and music double major. Honorable mention for the Barry Goldwater Scholarship. Recipient of Dr. Judith Bond Scholarship and ACS Analytical Division Undergraduate Award. Member of Phi Beta Kappa and House Leader for the Blue Note Jazz House residence hall.*

HOW TO SPEND YOUR SUMMER VACATION

Get Inspired. Get Connected. Get Going.

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, home-made LED light sabers 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 bus, from dinner at the Science House to a post-mid-term latté at the campus Cafe, 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.

"Living and working in Gettysburg during the summer is pretty sweet! We work 40 hours a week but then the rest of the time we have to ourselves. There is always something to do on campus or nearby–frisbee, $5 movies on Tuesday, game nights with friends, watching the sunsets on the battlefield, taking advantage of the volleyball court, and more! All in all we're having an amazing, chemistry-filled summer."

–Kathryn Fodale, Senior, Chemistry

Seventeen health science students interested in Ebola and the management of infectious disease recently participated in a two-day career exploration trip that included meetings with the U.S. Department of State, United Nations Development Program, World Bank, Pan American Health Organization, and county emergency management offices.

There are three dinosaur footprints near campus on the bridge at the foot of Big Round Top. The rocks were taken from a nearby quarry, and the prints probably belong to *Anchisauripus sillimani*, a bear-sized meat eater that walked on two legs approximately 200 million years ago when Gettysburg was similar in climate to the Everglades.

"Working together, sharing ideas and making connections among disciplines are what make the liberal arts college environment so different from that of a larger research institution."

–Kazuo Hiraizumi, Associate Professor of Biology

Many of Gettysburg's student organizations revolve around science. They include groups for women in STEM fields, sustainability and environmental groups, chemistry enthusiasts, pre-health support, a chapter of the Association for Computing Machinery (ACM), and a group for students interested in the intersection of biology and public policy.

The Society of Physics students organizes field trips to such places as the National Institute of Standards and Technology (NIST) and the NASA Goddard Space Flight Center.

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

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

Gettysburg was recently awarded a grant from the National Science Foundation to support the scientific aspirations of academically talented but underrepresented minorities and first-generation students.

Students in the Paleobiology course end up with more than a deep knowledge of evolutionary history—they also develop a personal fossil collection during the course.

PLAYTIME

Josh works in Dr. Steve Siviy's lab where research is funded by National Institutes of Health (NIH). The work that Siviy and his students are doing has real implications for the treatment of human psychiatric disorders.

"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 psychosocial disorders are related to play.

In our first experiment, we used drugs to see if differences in play are due to differences in oxytocin systems. Then we did some immunohistochemistry on rat brain slices. We also studied rat mothers with their pups. The more a pup 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 Rubinstein**, Senior. Psychology, neuroscience minor. Josh also volunteers at a local food pantry. He spent last summer as a research intern at the Bradley Sleep Lab in Providence, RI and attended the APSS Sleep conference.*

Aim High. Break the Mold.

Don't just be a science major. Be a scientist.

Being a scientist means knowing the landscape of your discipline, the unanswered questions, the most recent discoveries, and the undiscovered territory at the borders when one field bumps up against another.

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 finesse required by laser spectrometery. 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 to 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 temperamental 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.

"We want students to learn how to interact as working scientists. It's one thing to excel at presenting a PowerPoint—it's another to be able to have an intelligent informal discussion with your peers. Your scientific reputation is based on being able to talk about your research."

–Kurt Andresan, Assistant Professor of Physics

75%

Approximately 75% of Gettysburg science majors pursue advanced degrees.

One of the world's leading researchers working on therapeutic approaches to muscular dystrophy is Eric Hoffman '82, director of the Research Center for Genetic Medicine, Children's National Medical Center. Another is Louis Kunkel '71, Director of the Program in Genomics at Children's Hospital Boston, and Professor of Pediatrics and Genetics, Harvard Medical School, Boston.

Gettysburg's Introduction to Bioinformatics course gives students a head start in the field of bioinformatics, where biology and computer science intersect to interpret and use the rapidly expanding volume of biological information produced by genome sequencing and proteomic exploration of life processes.

10%

Gettysburg is among the top 10 percent of baccalaureate colleges for the number of graduates who earn research doctorates.

Four of the top ten most popular majors at Gettysburg are in the sciences.

125

Of the 125 members of the prestigious Association of University Cardiologists, three are Gettysburg graduates (Michael Cain '71, Blase Carabello '69, and Arthur Feldman '70).

The Pre-Health Professions club and Pre-Veterinary Club provide academic and career support as well as social opportunities for students interested in planning a future in healthcare.

"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

Gettysburg students interact with visiting scientists and lecturers throughout the year—including international experts, Nobel prize winners, and policy makers.

ICE SCULPTOR

Gettysburg's advanced GIS (Geographic Information Systems) lab allows students to explore and analyze a wide range of geographic data—from maps, satellite data, information from remote sensors, GPS data and more.

"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."

***Rachel Grube**, Senior, Lancaster, PA. Environmental Studies major and an art minor. Runs for the Gettysburg Women's Cross Country team and works as a gallery attendant at the Schmucker Art Gallery.*

major elements:

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 at a conference, jointly authoring a research paper, and collaborating with other students and faculty members. Whatever you choose, you'll also have opportunities to share your discoveries across disciplines through the Cross-Disciplinary Science Institute (X-SIG).

KEY:
★ MAJOR ✪ MINOR ✚ B.S. ✚ B.A.

BMB ★ ✚
BIOCHEMISTRY + MOLECULAR BIOLOGY

"What goes on inside a living cell? At Gettysburg BMB is a true interdisciplinary curriculum that exemplifies the nature of contemporary science."

WHAT IT IS: BMB takes place at the intersection of biology, chemistry, neuroscience, mathematics, and physics. Students explore cell structures, protein folding, epigenetics, biosynthesis, RNA, enzyme kinetics., the chemical origins of life—big questions in very tiny packages.

BMB students gain sophisticated lab skills in microscopy, biochemical analysis and recombinant DNA techniques, which are needed for research, graduate school, and careers. BMB majors will also find that their research frequently result in co-authored publications and presentations at scientific meetings.

ES ★ ✪ ✚ ✚
ENVIRONMENTAL STUDIES

"Humans and the environment—we're taking on the complexity of environmental issues from multiple perspectives."

WHAT IT IS: An interdisciplinary department focusing on complex environmental issues from a variety of perspectives. Our program is one of the most comprehensive in the nation.

In their quest to understand environmental change, ES majors travel to Pennsylvania coal country, the beaches of North Carolina's Outer Banks, the decision-making centers of Washington D.C., and the wilds of Iceland, India, and beyond. From fieldwork, to lab work, to computer mapping and modeling, we offer extraordinary opportunities for hands-on learning. The major prepares students for graduate study and careers in environmental science, environmental management, law, urban planning, GIS, and other fields.

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 sciences. Chemists use their experimental and theoretical tools to understand everything from single atoms to giant biomolecules and beyond to the world of nanoparticles. Chemists make lifesaving drugs, new ways to store energy, and fantastic new materials.

Our majors use every instrument in our labs. Nearly all our majors carry out research projects with chemistry faculty. They develop the practical skills and knowledge that make them successful scientists 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 science throughout their careers.

HS ★ ✪ ✚ ✚
HEALTH SCIENCES

"An entire department devoted to the study of the human body—one of the very few such departments in the nation."

WHAT IT IS: From public health to nutrition to the nuts and bolts of human physiology, Health Sciences focuses on topics related to understanding the issues related to human health and disease.

Gettysburg has a number of specialized laboratories in applied physiology, human anatomy and physiology, and molecular physiology. Students also gain hands-on experience by completing a rigorous clinical capstone internship. Majors have a strong record of career success and admittance to professional schools, including physical therapy, medicine, physician assistant, nursing, dentistry, etc. It's one of the Colleges's most popular majors.

Bio ★ ✪ ✚ ✚
BIOLOGY

"To think like a biologist means to view life as a bouquet of questions that have multiple paths for answers. Ask questions and look for answers—at Gettysburg research IS learning."

WHAT IT IS: Biology is life writ large and small in all its extraordinary detail from genes to physiology to evolution. We study developmental biology, animal behavior, ecology, evolution, and more.

Students enjoy outstanding resources such as modern fluorescence microscopy tools and a research-oriented faculty committed to building students' field and lab skills. Research is embedded into courses, including a virus-hunting course, a genetics course in which students identify novel genes involved in the immune response, and tropical biology in the Bahamas and Peru. Majors also typically undertake research projects with faculty or research internships off campus.

CS ★ ✪ ✚ ✚
COMPUTER SCIENCE

"We're building power tools for ideas."

WHAT IT IS: At Gettysburg Computer Science is theoretical and applied. It's logic, analysis, code, and information. We study games, artificial intelligence, cryptography, software, and networks. We create tools that do interesting things. We think about societal aspects of technology. How do we solve problems? What can we automate next? How can we change the world?

Technology changes at blazing speeds. A critical skill you'll gain at Gettysburg is how to teach yourself to master whatever new technologies come your way. Majors enjoy mentorships, research opportunities, and internships—we work with real clients on real projects. Campus resources include Linux machines, a 360° classroom lab, iOS and Android development environments, digital imaging tools, sensor and robotics resources, etc.

Ma ★ ✪ ✚
MATHEMATICS

"Math listens to what science says about the world. Then we ask, can you prove it?"

WHAT IT IS: Math 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 sciences and the world of work. Math has applications in a variety of subjects, and many math majors have second majors in other fields.

At Gettysburg we use a range of sophisticated computer-based tools such as Mathematica and MATLAB. Students take part in mathematics competitions and present at conferences here and abroad. What Gettysburg does particularly well is graduate skilled majors who understand the big picture of mathematics today, from number theory to chaotic dynamics.

Ne ✪
NEUROSCIENCE

"What are you thinking—and how is your brain actually doing that?"

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

The interdisciplinary nature of neuroscience is reflected in the courses that comprise the minor —biology, chemistry, health sciences, philosophy, physics, and psychology. Specialized labs provide a wide range of research opportunities for students who want to study the brain mechanisms of behavior and cognition. Neuroscience at Gettysburg emphasizes research and not only prepares students for graduate study, but also provides tools for graduate work in other areas of biology and psychology, as well as medical school.

Ph ★ ✪ ✚ ✚
PHYSICS

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

WHAT IT IS: Physics probes the interrelationships between matter and energy. Physicists often work closely with other disciplines on questions related to biophysics, nanotechnology, robotics, computing, chemistry, engineering, mathematics, chemistry, and environmental studies.

At Gettysburg physics stresses analytical reasoning, the design of experiments, techniques of precise measurement, and the interpretation of data. Students develop real skills in well-equipped with labs. And Gettysburg, despite its size, graduates more physics majors than 64 percent of all U.S. colleges and universities offering physics as a major.

X-SIG
CROSS DISCIPLINARY SCIENCE INSTITUTE

"Some of the most interesting science happens when worlds collide."

WHAT IT IS: The innovative Cross-Disciplinary Science Institute at Gettysburg College (X-SIG), established with support from the Howard Hughes Medical Institute, supports "early and often" research experiences for Gettysburg science students, including summer research and internships. The Center also creates unique multidisciplinary science courses found only at Gettysburg and sponsors social and scholarly opportunities for knowledge-sharing and interdisciplinary collaboration.

Ps ★ ✚
PSYCHOLOGY

"What are the mechanisms involved in perception, cognition, and social interactions? How does culture shape our beliefs and actions?"

WHAT IT IS: At Gettysburg psychology explores the underpinnings of behavior and mental processes in a scientific way. Specialized research labs include behavioral neuroscience, affect and social cognition, and perception facilities. There's also a childcare center on campus where students can explore early learning and social development.

The program offers many opportunities to gain direct experience with the major methods and theoretical frameworks of the discipline. All students undertake original research and some present their research with faculty at professional conferences. Research, experiences, internships, community- based learning, and fieldwork offer strong preparation for careers and graduate study.

the sciences at Gettysburg

Gettysburg's 86,000 sq. ft. Science Center provides ample research and teaching space and is one of the newest buildings on campus.

3+2 ENGINEERING

Engineers with a strong liberal arts background are uniquely positioned for leadership roles on diverse teams. Our dual degree 3+2 engineering programs are offered in conjunction with Columbia University, Rensselaer Polytechnic Institute, Washington University, and the University of Pittsburgh. Students can earn both a B.A. degree from Gettysburg and a B.S. in an engineering discipline in five years. See website for more details.

Gettysburg students have earned **Rhodes**, **Marshall** and **Goldwater** scholarships, **Fulbright** grants and teaching assistantships and **National Science Foundation** fellowships, as well as other awards.

Gettysburg has distinction of being one of only 17 liberal arts institutions featured in The Princeton Review's newest guide, *Colleges that Create Futures: 50 Schools that Launch Careers by Going Beyond the Classroom.*

Gettysburg ranked 11th in Best Schools for internships—only 4 liberal arts colleges to make it into *The Princeton Review*'s top 25.

One of the most beautiful campus buildings, the iconic Glatfelter Hall is home to math and computer science.

Gettysburg COLLEGE

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