

VANDERBILT

School of Engineering



Our curriculum allows you to examine various engineering majors from multiple perspectives before you declare a specific major. As an engineering student, you will explore engineering fundamentals and the responsible use of technology.

All of our students study in state-of-the-art classrooms and laboratories, and you may choose to conduct original research by working with outstanding faculty members. Professors and students collaborate on projects that span the spectrum of engineering from robotics and computer animation to biomedical optics and environmental engineering.

Our engineering graduates are valued for their expertise, intellectual independence, communication skills, and leadership ability. Professional demand for graduates with this background is intense. Graduates are actively recruited, not only for engineering careers but also for careers as diverse as consulting, medicine, law, and finance.

Vanderbilt's School of Engineering offers the depth and breadth of education required to solve real-world problems. Understanding how to solve these problems will give you an edge in any endeavor.

ACADEMIC DEPARTMENTS

Biomedical Engineering

Chemical and Biomolecular Engineering

Civil and Environmental Engineering

Electrical Engineering and Computer Science

General Engineering

Mechanical Engineering

All programs leading to the bachelor of engineering degree at Vanderbilt are accredited by the Engineering Accreditation Commission of ABET, abet.org. The bachelor of science degree in computer science is accredited by the Computing Accreditation Commission of ABET. Vanderbilt also encourages students to take the Fundamentals of Engineering examinations, coordinated by the Tennessee State Board of Architecture and Engineering Examiners. Vanderbilt University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools and is a member of the Association of American Universities.

On the cover: A multigrasp hand prosthesis developed by Vanderbilt engineers enhances dexterity for upper extremity amputees.





INSIGHT, INNOVATION, IMPACT.®

Vanderbilt appeals to engineering students who want to put their careers and lives into a rich context. You will learn creative thinking and problem solving skills that will be valuable throughout your life.



The School of Engineering offers the bachelor of engineering degree in biomedical, chemical, civil, computer, electrical, and mechanical engineering and the bachelor of science degree in computer science and engineering science. The school also confers master of engineering, master of science, and doctoral degrees.

All full-time faculty members hold doctorates and teach undergraduate students. Our research centers and labs investigate topics from nanoscale materials, technology-guided surgery, and robotics to environmental management, intracellular engineering, and combustion diagnostics.

Many engineering students choose double majors, minors, or concentrations in complementary disciplines. In addition to training in engineering science, mathematics, physics, and chemistry, you will take liberal arts courses in the College of Arts and Science. You may also choose selected courses from Vanderbilt's other undergraduate or graduate schools or round out your academic experience with an honors program, internship, engineering-based study abroad, or accelerated degree program.



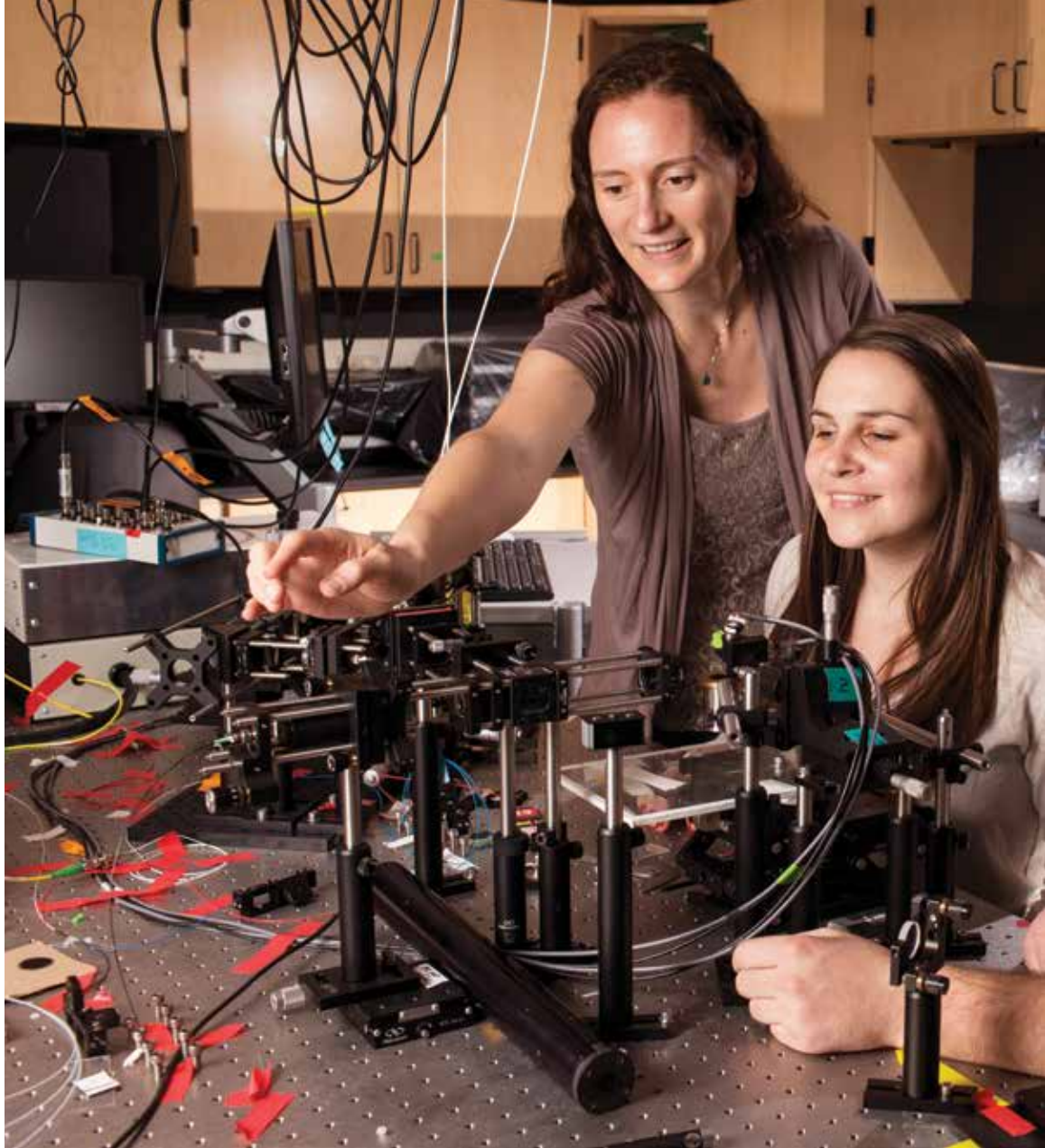
96%
OF SENIORS
GRADUATING FROM VANDERBILT ARE
SATISFIED WITH THE
QUALITY OF INSTRUCTION

Opening in the summer of 2016, the new 230,000-square-foot Engineering and Science Building is specifically designed to foster teamwork and will include an Innovation Center that connects students and faculty with industry mentors.



Our multimillion-dollar engineering complex combines advanced technologies in a student-centered environment. Featheringill Hall features a three-story atrium for student interactions and contains more than 50 teaching and research laboratories brimming with the latest equipment. The design studio, model shop, and project room showcase student ideas from concept to prototype to final product.

Extending the application of our student-centered physical spaces, a new seven-story Engineering and Science Building is set to open in 2016. This newest addition to the engineering complex is designed to foster project teamwork and offer programs, instrumentation areas, and core research space that will promote interdisciplinary work and allow for even greater collaboration between students and faculty across disciplines.



Who or what inspired you to pursue your current career path?

I just followed my passion, and I think this is the best way to find your true calling. Once you are there, it's just a matter of enjoying yourself.

Why did you choose Vanderbilt?

Vanderbilt is a world-class institution that provides a supportive and positive environment. We have the resources to tackle meaningful problems and people who are a joy to work with.



ONE-ON-ONE WITH

Melissa Skala

One of the tragic realities of cancer is that the drugs used to treat it are highly toxic and their effectiveness varies unpredictably from patient to patient. Professor Melissa Skala is leading a team of student researchers who are using fluorescence imaging to monitor the response of cancer cells to different anti-cancer drugs

This new “tumor-in-a-dish” technology can rapidly gauge the effectiveness of specific anti-cancer therapies on an individual’s cancer before chemotherapy begins. In addition, it’s low cost, portable, fast, and provides a wealth of information on tissue structure and function by focusing on biological markers such as cellular metabolic rate, molecular expression, blood oxygenation, and blood flow in vivo.

“The idea here is to eliminate those drugs that don’t work and if needed replace them with drugs that do work, so we are hoping to have the smallest common denominator of drugs that achieve the lowest toxicity yet achieve treatment efficacy. Thirty to forty percent of patients that receive those therapies as their first-line therapy don’t respond to those drugs ever. And so they suffer toxicity from treatment that ultimately isn’t going to benefit them,” said Skala.

Following the team’s success in testing breast cancer cells, Skala and her team began testing samples from pancreatic cancer patients. “I have a unique opportunity to improve the treatment of cancer and other diseases, and I therefore have a responsibility to make the most progress possible. I think about the people who are suffering from disease, and that’s all the motivation I need to continue our work.”

If you could give your college-age self any advice, what would it be?

Have fun! College is a unique opportunity to learn about many different things, meet wonderful people who are lifelong friends, and grow into an adult. Just savor the time you have.

Melissa Skala

Assistant Professor of
Biomedical Engineering



Engineering Programs

In addition to foundations in math, chemistry, physics, and the liberal arts, our eight academic majors provide depth of study in a wide variety of traditional engineering disciplines and some that can be customized based on individual interests. Minors as well as electives should be selected carefully to fulfill a specific purpose and in consultation with your academic adviser.

Biomedical Engineering

Bachelor of Engineering

Biomedical engineering applies engineering concepts to specific and practical problems in biology, medicine, and health care. It attempts to quantify biological events for the purpose of creating and improving upon diagnostic practices and treatment protocols. The main areas of study in our biomedical engineering program include biophotonics, biomaterials, medical imaging, gene therapy, and technology-guided surgical devices.

Chemical Engineering

Bachelor of Engineering

Chemical and biomolecular engineering play a key role in the development and production of pharmaceuticals and bioengineered materials for medical applications. Chemical engineers are also concerned with process control techniques and production in the development of high-strength composites and specialty polymers, semiconductors and microelectronic devices, and a variety of other products.

Civil Engineering

Bachelor of Engineering

Civil and environmental engineering prepares professionals to repair our nation's decaying infrastructure with the use of engineered materials for stronger, lighter, and more reliable buildings, bridges, and transportation systems. Civil and environmental engineers address problems with land use, sustainability, risk management, increasing population, nuclear waste management, environmental quality, and construction management.

Computer Engineering

Bachelor of Engineering

Computer engineering acts at the interface of software and hardware and deals with problems related to the organization, design, and application of digital processing systems as general purpose computers or as components of information processing, control, and communications. Computer engineering allows students to specialize in embedded systems, computing systems and networks, or intelligent systems and robotics.

Computer Science

Bachelor of Science

Computer science blends scientific and engineering principles, theoretical analysis, and computing experience. Program emphasis is on computing activities of both practical and intellectual interest and on theoretical studies of efficient algorithms and the limits of computation. Students may major or minor in computer science. A finance track prepares students for a financial career through a five-year program ending with a master of science in finance from the Owen Graduate School of Management.



engineering.vanderbilt.edu/academics/Undergraduate

Electrical Engineering

Bachelor of Engineering

Electrical engineering focuses on hardware involved in electrical and electronic systems and how electrical components interact with each other. Students study mathematics, physics, and computer science and develop a foundation in circuit analysis and electronics. Students choose an area of further study in computer engineering, microelectronics, signal and image processing, robotics, or networking and communications.

Engineering Science

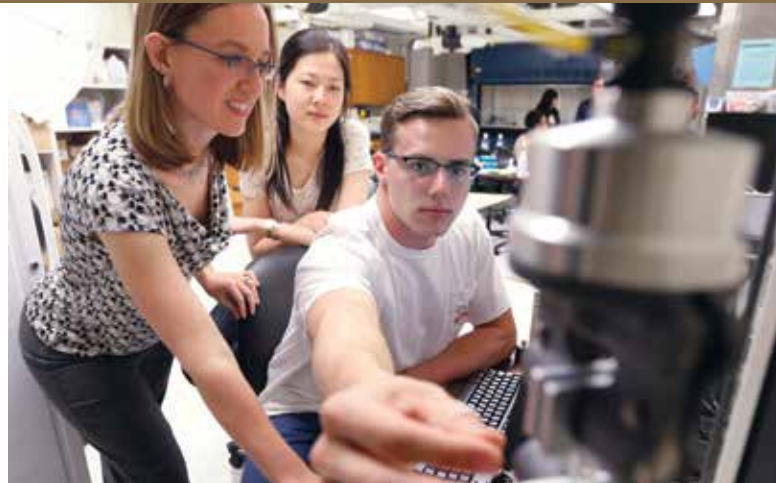
Bachelor of Science

Engineering science combines engineering with specialized knowledge from a concentration in applied physics; engineering management; communication of science, engineering, and technology; or materials science and engineering. Individual programs can be created within this interdisciplinary offering in areas such as engineering mathematics, environmental engineering, business administration, teaching, technical communications, and entrepreneurship, among many others.

Mechanical Engineering

Bachelor of Engineering

Mechanical engineering prepares students to become practicing engineers who design systems to control engineered products and solve problems through manufacturing processes, energy management, and hardware design. Strengths of the department include robotics, intelligent mechatronics, combustion and propulsion, nanostructures, fluid physics, and laser diagnostics of combustion and space experimentation.



Minors

Minors in computer science, scientific computing, environmental engineering, energy and environmental systems, and nanoscience and nanotechnology may be combined with various majors, as can minors offered through the College of Arts and Science. Students may also choose a minor or concentration in engineering management or materials science and engineering.

Engineering Management Minor

This interdisciplinary program links engineering, science, and management. Students study entrepreneurship, management of high-tech enterprises, engineering economics, technology strategy, business psychology, finance, communications, and supply chain management.

Materials Science Minor

High-performance materials are in demand throughout the engineering world, and there is equal demand for specialists who understand the relationship between properties and structure, the thermodynamics of materials, and the physics and chemistry of solids and liquids. In specialized laboratories you'll test the properties of materials and consider new applications of derived information.

32% FEMALE

ENGINEERING UNDERGRADUATES

(vs. national average of 19%)



Engineering Research

Our engineering professors, all dedicated teachers, are also committed to ongoing scholarship and research. Faculty and students collaborate across disciplines to address critical research initiatives that characterize the school's commitment to developing technological solutions with real-world impact.

Multidisciplinary capability is a particular strength of the school. Through programs funded by the National Institutes of Health, the National Science Foundation, the Department of Defense, the Department of Energy, and others, the School of Engineering participates in multidisciplinary collaborations with many top 25 universities and national laboratories.

The school plays a leading role in transinstitutional collaborations in nanoscience, nanoengineering, environmental, and integrative biosystems research. Additional transinstitutional centers in which the school plays an important role include learning sciences, environmental management, and cognitive neuroscience.

\$74
MILLION
SPENT ANNUALLY AT THE SCHOOL OF
ENGINEERING FROM SPONSORED
RESEARCH GRANTS



Engineering faculty members are engaged in a diverse collection of research projects, such as embedded information systems and smart materials, robotics, laser surgery equipment, intelligent transportation systems, genetic therapy techniques, thin films, integrated computer systems, machine learning, renewable energy systems, and power conversion.

Energy and Natural Resources

The School of Engineering at Vanderbilt is recognized as an international research leader in areas of structural reliability and risk, nuclear waste management, and teaching assessment approaches to environmental decision making.

Health and Medicine

Critical research initiatives are ongoing in cellular dynamics in immunology, cardiology, cancer, as well as MRI and imaging systems to guide surgery. Other research efforts include laser-tissue interaction, biomedical optics, and bionanotechnology.

Security

A large number of faculty and students engage in cutting-edge research that involves systems security and privacy for critical commercial and governmental agencies. Research efforts include privacy-aware health information systems, foundations of resilient systems design, system security co-design, and secure control systems for industry and society.

Entertainment

The research in this burgeoning area focuses on computer networking and network security, human-machine teaming, machine learning, and software engineering.



engineering.vanderbilt.edu/research



Members of the Vanderbilt Aerospace Club retrieve their rocket that was equipped with an automated payload installation system. The team took first place in the NASA Student Launch Project Challenge in 2013, 2014, and 2015.

Research and Internships

Students have the opportunity to perform independent research with engineering faculty as well as with other professors from across the entire university. Research interests may be identified by utilizing the school's website, working with academic advisers, or talking to course instructors. You may choose to do research for up to six hours of course credit.

You may also apply to participate in one of two paid summer research programs at Vanderbilt: the university-wide summer research program (VUSRP) or the engineering school-sponsored summer research program. Students also may wish to take advantage of National Science Foundation-sponsored Research Experiences for Undergraduates (REU) that are available across the United States.

Internships teach invaluable lessons. Recent graduating senior survey data indicates that **74% of students have completed at least one internship experience during their time at Vanderbilt.** Our students take advantage of internship opportunities posted in the Center for Student Professional Development as well as utilizing their own networks and those of their professors.

Recent student internships include: serving as a biomedical industrial intern for Lockheed-Martin at the Johnson Space Center

in Houston; writing user guides for medical test hardware for the International Space Station Alpha; developing web applications for UnumProvident, Inc., in Chattanooga; and creating a website and customer kit for medical applications for National Instruments in Austin. In addition to valuable experience beyond technical application, many internships provide an entrée into professional engineering positions.

Centers and Institutes

- Biophotonics Center at Vanderbilt (VBC)
- Center for Intelligent Mechatronics
- Consortium for Risk Evaluation with Stakeholder Participation (CRESP)
- Institute for Software Integrated Systems (ISIS)
- Institute for Space and Defense Electronics (ISDE)
- Vanderbilt Center for Environmental Management Studies (VCEMS)
- Vanderbilt Initiative in Surgery and Engineering (ViSE)
- Vanderbilt Institute for Energy and Environment (VIEE)
- Vanderbilt Institute for Integrative Biosystems Research and Education (VIIBRE)
- Vanderbilt Institute of Nanoscale Science and Engineering (VINSE)
- Vanderbilt University Institute for Imaging Science (VUIIS)



Other Academic Opportunities

Merit Scholarships

Each year, the School of Engineering awards honor scholarships to incoming freshmen through the Cornelius Vanderbilt Scholarship Program, one of Vanderbilt’s three signature scholarship opportunities. Awards are made on the basis of academic achievement, intellectual promise, and leadership and contribution outside the classroom. Cornelius Vanderbilt Scholars receive full tuition, plus a one-time stipend to be used towards a summer study abroad or research experience. Scholarships are renewed each year as long as the recipient maintains at least a 3.0 GPA. Students may also apply for scholarships awarded through Vanderbilt’s two other signature scholarship programs—the Ingram Scholarship and the Chancellor’s Scholarship Programs. To be considered for any of our three signature scholarship programs, students must submit the online scholarship application, available via the MyAppVU portal after they have applied for admission.

First-Year Seminars

First-year seminars introduce students to the expectations of the university—a high level of scholarship and a participatory style of learning. Optional seminars through the School of Engineering or

through The Martha Rivers Ingram Commons offer first-year students opportunities to work in small groups with seasoned engineering professors. By creatively applying engineering concepts to real-world problems, students improve their communication skills and become more certain in their selection of a specific engineering major.

Honors Programs

Qualified engineering juniors and seniors may participate in departmental honors programs that emphasize independent study and research. Honors students may also take selected graduate courses in Vanderbilt’s graduate and professional schools.

Study Abroad

Qualified engineering students may study abroad during the summer or academic year at universities in England, France, Germany, Israel, Scotland, Spain, South Africa, Ireland, Australia, and New Zealand, among others.

A growing number of exchange programs exist and currently include National University of Singapore, City University of Hong Kong, Hong Kong University of Science and Technology, Budapest University of Technology, and Politecnico di Torino.



22%
OF THE SCHOOL OF ENGINEERING
CLASS OF 2015
STUDIED ABROAD
AT MORE THAN 40 PROGRAMS
IN 19 COUNTRIES



Integrated Bachelor of Science/ Master of Business Administration

Selected engineering undergraduates may be accepted into an integrated engineering program through which both bachelor's and master's degrees are earned. You may earn a bachelor of science in engineering science and an MBA through Vanderbilt's Owen School of Management.

Integrated Bachelor/ Master of Engineering

Selected engineering undergraduates who have completed at least 75 hours with a B average or higher may be accepted into an integrated engineering program through which both bachelor's and master's degrees are earned. The last two years, generally of five, are planned as a unit. You may earn bachelor's and master's degrees in engineering through this program.



B.S. Engineering/M.S. Finance

Computer science students interested in a career in business and finance may opt for this track. With judicious planning, computer science majors are able within four years to earn a B.S. in computer science, an optional minor in engineering management or math, and they may participate in a study abroad experience and/or a senior design experience. During the fifth year, students take all courses in the Owen Graduate School of Management and may obtain a master of science in finance after the fifth year.

Dual Degree with Fisk University

Students may earn an A.B. degree in biology, chemistry, physics, or mathematics from Fisk and a B.E. or B.S. in engineering from Vanderbilt, generally within five years.

Academic Advising

Each student is assigned a faculty adviser in his or her major department. This adviser remains with the student all four years as long as he or she does not change majors. These advisers guide course selection, direct students toward academic and research opportunities, and provide information on careers after graduation. Advisers meet with students throughout each semester and are readily available for consultation.

Teacher Licensure

The School of Engineering and Vanderbilt's Peabody College offer a teacher education program that leads to licensure as a secondary school teacher in physics. Students major in engineering science in the School of Engineering and complete a second major in education at Peabody. The Office of Teacher Licensure at Peabody provides guidance and information on this option.

Accelerated Graduate Program

Students who enter with 20 to 30 hours of credit—earned through Advanced Placement tests or in college courses taken during high school—may be eligible for the Accelerated Graduate Program in Engineering. A student may earn a bachelor's degree in four years and an M.S. by completing a master's thesis the following summer.



ONE-ON-ONE WITH

Doug Adams

How do we build things we can trust? This simple question with complex answers is at the heart of Professor Doug Adams' research. Inside a lab large enough to experiment on full-scale aircraft, wind turbines, and automobiles, Adams uses a baseball bat and hammer to demonstrate how sensors embedded in materials report damage from impact.

"I have always focused on how to make 'planes, trains, and automobiles' more intelligent to prevent, and reduce the cost of, failure. But advances in new measurement systems have opened my mind to the possibility that what we really need are smart, more 'lifelike' materials that sense and repair themselves. That's exciting stuff, and we are working across department and school boundaries to develop this new generation of materials."

According to Adams, the biggest breakthroughs in his field are found in the dark corners of the data. "Chaotic patterns in data were long believed to be 'noise,' because no one understood how structured it was. Like the scientists who discovered chaos, our group develops mathematical models of physical processes in materials like concrete, and machines like spacecraft, to illuminate the surprising signatures we see in our data. When we see something we expected to see in experimental data, it is gratifying. When we see something that surprises us in data, that is exciting," he explains.



"But honestly, nothing is more exciting than teaching—whether it's in the classroom, the lab, or on the way to lunch—when I'm watching someone learn, I'm having a good day."

Doug Adams

The Daniel F. Flowers Professor of Engineering
Chair of the Department of Civil and Environmental Engineering



Who or what inspired you to pursue your current career path?

The Apollo 11 mission to the moon inspired a nation. As a kid growing up in rural Ohio, that mission to the moon inspired me too. I went on to study engineering largely because of it.

If you could give your college-age self any advice, what would it be?

My high school math teacher, Mr. Shoemaker, gave me some great advice: "Do something that you are excited to do every day."

For More Information

Vanderbilt University School of Engineering

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Nashville, Tennessee 37235-1826

(615) 322-2762

Web: engineering.vanderbilt.edu

Office of Undergraduate Admissions

Vanderbilt University

2305 West End Avenue

Nashville, Tennessee 37203-1727

(615) 322-2561 or (800) 288-0432

Email: admissions@vanderbilt.edu

Web: admissions.vanderbilt.edu

Office of Student Financial Aid and Scholarships

Vanderbilt University

2309 West End Avenue

Nashville, Tennessee 37203-1725

(615) 322-3591 or (800) 288-0204

Email: finaid@vanderbilt.edu

Web: vanderbilt.edu/financialaid

Accreditation

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As part of a trans-institutional collaboration, computer science major Nolan Michael Smith created an app full of rewarding sounds and incentives to help researchers at Peabody College collect data on how preschoolers interact with touch screens.

VISIT US

admissions.vanderbilt.edu/visit



Dates to Remember 2015/2016

- July 1** Universal College Application available at universalcollegeapp.com
- August 1** Common Application available at commonapp.org
- November 1** Application deadline for Early Decision I
- November 9** Priority filing deadline for College Scholarship Service (CSS) PROFILE for Early Decision I
- December 15** Decision notification for Early Decision I
- January 1** Application deadline for Early Decision II and Regular Decision
- January 4** Priority filing deadline for CSS PROFILE for Early Decision II
- February 1*** Priority filing deadline for CSS PROFILE for Regular Decision
- February 1** Priority filing deadline for FAFSA for Early Decision I, Early Decision II, and Regular Decision
- February 15** Decision notification for Early Decision II
- April 1** Decision notification for Regular Decision
- May 1** Deadline for matriculation deposit

**For international students, priority filing deadline for CSS PROFILE is January 4, 2016.*



VANDERBILT
UNIVERSITY

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