At the graduate level, the department educates leaders in infrastructure and environmental engineering research and practice, with emphasis on the use of reliability and risk management. Reliability and risk management include engineering design, uncertainty analysis, construction and repair, life-cycle and cost-benefit analysis, information management and fundamental phenomena intrinsic to the understanding of advanced infrastructure and environmental systems.

The graduate program in civil engineering offers M.S. and Ph.D. degrees, with emphasis in the areas of structural engineering and mechanics and transportation engineering. The graduate program in environmental engineering offers the M.S. and Ph.D. degrees in the areas of environmental engineering and environmental science, with emphasis on contaminant behavior in the environment, waste management, nuclear environmental engineering, environmental remediation and environmental management and policy. Both thesis and non-thesis options are available at the M.S. level. The graduate programs in both civil engineering and environmental engineering also offer the master of engineering (M.Eng.), an advanced professional degree especially designed for practicing engineers wanting to pursue post-baccalaureate study on a part-time basis, and for engineers seeking greater emphasis on engineering design as part of graduate education.

Contact
Director of Undergraduate Studies
Eugene LeBoeuf
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Contact
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Contact
Director of Graduate Studies in Environmental Engineering
James Clarke
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Phone: (615) 322-3897

The Department of Civil and Environmental Engineering offers courses of study leading to B.E., M.Eng., M.S. and Ph.D. degrees. Our program leading to the Bachelor of Engineering degree is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, phone (410) 347-7700.
Research in nuclear environmental engineering (NEE) at Vanderbilt includes work under contracts and grants from the Department of Energy’s Office of Nuclear Energy and Environmental Management, the Tennessee Valley Authority and the Electric Power Research Institute. Ongoing NEE research projects include evaluating nuclear safety and environmental risk assessment impacts, along with the strategic communication challenges associated with the use of mixed-oxide fuel in commercial nuclear power plants. Also, safety, security, environmental and other societal criteria are critical to deciding what future nuclear fuel cycle research and development programs are best suited to meet the nation’s needs. Other projects emphasize understanding the environmental and societal impacts of nuclear processes work safely and in concert with the environment, minimizing the generation of radioactive waste, performing properly tailored risk assessments and incorporating regulatory and stakeholder insights in a coordinated and timely manner. Such projects draw chiefly on expertise in the fields of systems, environmental, nuclear and chemical engineering, along with risk and policy insights. Recently, the secretary of energy named me to a technical and policy team evaluating programmatic improvements to nuclear safety culture initiatives within the department. Prior to joining the Vanderbilt community, I served as a deputy assistant secretary of energy for safety and security in the Department of Energy’s Office of Nuclear Management.

Steven KRAHN
Professor of the Practice of Nuclear Environmental Engineering

The emerging field of NEE is an area of research and practice that has aggregated over the past decade to meet the dual challenges of satisfying the growing needs of society for electric power while ensuring that stringent requirements in the areas of environmental protection and nuclear safety are met. Our research projects emphasize understanding the environmental and societal impacts of the nuclear fuel cycle comprehensively, ensuring that new or re-engineered nuclear processes work safely and in concert with the environment, minimizing the generation of radioactive waste, performing properly tailored risk assessments and incorporating regulatory and stakeholder insights in a coordinated and timely manner. Such projects draw chiefly on expertise in the fields of systems, environmental, nuclear and chemical engineering, along with risk and policy insights. Recently, the secretary of energy named me to a technical and policy team evaluating programmatic improvements to nuclear safety culture initiatives within the department. Prior to joining the Vanderbilt community, I served as a deputy assistant secretary of energy for safety and security in the Department of Energy’s Office of Environmental Management.

James CLARKE
Professor of the Practice of Civil and Environmental Engineering

Along with Steven Krahn, I co-direct graduate students pursuing the Ph.D. in environmental engineering in the area of NEE, as well as students working in the areas of waste management and contaminated site remediation. Prior to serving the Vanderbilt engineering faculty in 2000, I was the chairman, president and CEO of an internationally recognized consulting firm that specialized in the investigation and remediation of contaminated sites, risk assessment and industrial wastewater treatment. Since joining the faculty, my research has focused on risk assessment, both human health and ecological, environmental restoration approaches for the Department of Energy’s former nuclear weapons complex and comparative risk assessment for selected nuclear fuel cycles.

As a former member of the Nuclear Regulatory Commission (NRC) Advisory Committee on Nuclear Waste and Materials, it was my role to lead decommissioning and risk-informed regulation. Currently, I serve as a consultant to the NRC Advisory Committee on Reactor Safeguards, the U.S. Environmental Protection Agency and the Department of Energy. I am a member of the American Academy of Environmental Engineers and Scientists and a board-certified environmental scientist.
The environmental laboratories within the civil and environmental engineering department include facilities for characterizing, analyzing and evaluating the fate and transport of emerging contaminants to include pharmaceuticals and engineered nanomaterials in the environment. Physical and chemical characterization facilities include a multigas adsorption instrument for surface area and pore size measurement, a high-resolution, thermogravimetric analysis-mass spectrometer (TA Instruments TGA/SDT 2960) and an inductively coupled plasma mass spectrometer (ICP-MS, Perkin Elmer ELAN 6000 Series DRC II) with a laser ablation system. A state-of-the-art, high-resolution, environmental scanning electron microscope (FEI Quanta 650 FEG) allows for imaging and analysis of pressure-sensitive samples such as nanomaterials and other environmental materials, including wet samples. A key feature of the system is the integration with energy dispersive spectroscopy for elemental analysis and electron backscattered diffraction for mapping of nanomaterial agglomeration site recognition. The environmental laboratory also includes a dedicated, rack-mounted, 64-bit, quad-core, Dell server class computer with 16 gigabytes of RAM running Materials Studio 6.0 from Accelrys, a software environment for execution and visualization of molecular dynamics simulations with parallel processing capabilities.

Eugene LEBOEUF
Associate Professor of Civil and Environmental Engineering
Director of Undergraduate Studies in Civil Engineering

My research interests focus on two primary areas: physicochemical processes of environmental systems and developing improved methods to manage and increase sources of hydro-based renewable energy. Our current National Science Foundation-funded efforts include an integrated experimental and modeling research framework structured around four objectives: advance characterization methods to link physicochemical and macromolecular characteristics of organic matter and the fundamental nanostructure of engineered nanomaterials with their macroscopic interactions, quantify the interactions of nanomaterials and natural organic matter by conducting quartz crystal microbalance attachment/detachment experiments, quantify the influence of natural organic matter on the transport of nanomaterials in porous media, and develop and experimentally validate a mathematical model capable of simulating nanomaterial transport in porous media. The second area of interest focuses on sustainable-energy water systems, including optimization of multireservoir hydropower systems. The goal of this Department of Energy-funded research initiative is to apply state-of-the-art mathematical and modeling approaches for model reduction, linearization, and multi-objective optimization to multisystem hydropower operations that maximize energy production while minimizing environmental impacts.

Additional Faculty
Andrew Garrabrants
Research Associate Professor of Civil and Environmental Engineering

George Hornberger
Craig E. Philip Professor of Engineering

David Kosson
Cornelius Vanderbilt Professor of Engineering

Alan BOWERS
Associate Professor of Civil and Environmental Engineering

I’m interested in biological and physical/chemical processes in the environment. This includes the kinetics of biodegradation and the role of uncertainty in the application of these processes to the design and operation of wastewater treatment operations. This is important to modeling biological treatment processes including the biodegradation of organic and the concurrent air-stripping of volatile organic compounds. Currently, I’m working on the fate of pharmaceuticals and personal care products (micropollutants) in the environment and in conventional wastewater treatment processes. In addition, my research group is examining the formation of magnesium-ammonium-phosphate (struvite) in wastewater systems where magnesium hydroxide is employed as an alkalinity booster.

I’m interested in the discovery of apparently non-biodegradable micropollutants in the environment and the role of uncertainty in the environmental impacts.

Our research group strives to understand the basic chemistry and biology involved in these problems and to develop new technologies for water and wastewater treatment like treating fracking wastes and pharmaceuticals and personal care products. In addition, we are evaluating novel chemistries to recycle critical resources such as struvite precipitation to recycle high-grade phosphorus from wastewater. Our environmental laboratories are well-equipped to evaluate environmental processes from a fundamental standpoint. They include most standard environmental test equipment and instrumentation for monitoring radio-labeled tracers and measuring organic and inorganic pollutants in the environment such as GC/MS, ICAP and ion chromatography.
Sustainable environmental management of waste from nuclear energy and industrial processes is a national challenge with tens of billions of dollars in annual expenditures. Our research provides basic knowledge and applied tools and technologies that allow decisions to be made that are sustainable, environmentally protective and cost effective. Achieving the needed balance requires research that includes thermodynamics and kinetics of contaminant fate and transport in natural and engineered systems, human health and environmental risk evaluation, development of practical tools and policies, and coupling with active engagement with diverse stakeholders. We carry out basic research and collaboration with national agencies (Environmental Protection Agency, Department of Energy, Nuclear Regulatory Commission), international partners and national laboratories, through the Consortium for Risk Evaluation with Stakeholder Participation, a collaboration of several federal agencies, national laboratories and international partners formed under my leadership, is providing the tools necessary to predict the long-term performance of cement and concrete materials used in nuclear energy and nuclear waste management.

David KOSSON
Cornelius Vanderbilt Professor of Engineering
Professor of Civil and Environmental Engineering
Professor of Chemical Engineering
Professor of Earth and Environmental Sciences

I focus on research in waste management and environmental remediation that allows new understanding of the fundamental behavior of chemical and radionuclide contaminants in wastes, engineered systems and the environment to impact major decisions and policy. For example, we in my research group in collaboration with other faculty and international partners has resulted in establishment of the U.S. EPA Leaching Environmental Assessment Framework, which is now being used for national policy decisions on the management of coal fly ash. Research on improving remediation and waste treatment processes has changed the approaches being used at several Department of Energy sites formerly used for the production of nuclear defense materials. The Cementitious Barriers Partnership, a collaboration of several federal agencies, national laboratories and international partners formed under my leadership, is providing the tools necessary to predict the long-term performance of cement and concrete materials used in nuclear energy and nuclear waste management.

Andrew GARRABRANTS
Research Associate Professor of Civil and Environmental Engineering

With nearly 20 years of experience in development of leaching protocols, interpretation methodologies and assessment models, primarily for inorganic constituents in hazardous, radioactive and mixed waste systems, my research focuses on advancing the development and acceptance of the Leaching Environmental Assessment Framework for environmental impact assessment of solid wastes and construction materials and reuse of the byproducts of energy production and industrial processes. I am a collaborator in the development of the LeachXS and LeachXS Lite software packages designed for data management, visualization, modeling and assessment. Other research interests include release assessment approaches for semi-volatile organics in soil/cement mixtures (in-situ stabilized soils), physiochemical models for estimating source terms for risk assessment and risk evaluation, and leaching chemistry and long-term durability of cement-based solidification/stabilization (S/S) waste treatment and cementitious engineered barriers for nuclear waste disposition. In addition to research, I'm actively involved in ASTM International, serving as chair of the D-34 committee on waste management, chair of the D-34.03 subcommittee on recovery and reuse and leader of the D-34.01.04 task group on waste leaching techniques. I also hold memberships in the American Institute of Chemical Engineers, American Society of Civil Engineers and the American Chemical Society. www.vanderbilt.edu/leaching

Additional Faculty
Florence Sanchez
Associate Professor of Civil and Environmental Engineering
The Vanderbilt Center for Transportation Research (VECTOR) was established in 1988 and continues to focus on the integration of transportation engineering, planning and management. VECTOR has a solid record of conducting groundbreaking applications of information technology and risk management. VECTOR researchers’ strengths are in geographic information systems, risk management, hazardous materials transportation, safety data analysis and decision support system development. The application of these tools to freight transportation issues is especially powerful in analyzing large amounts of real-time data in order to provide actionable, clear information to decision makers. VECTOR has experience in developing transportation performance analysis websites that enable real-time reporting of transportation conditions and ad hoc data access to large amounts of data. VECTOR software resources include ESRI’s suite of GIS products (ArcInfo, ArcGIS Server and ArcSDE), Microsoft Visual Studio Professional and Oracle 11g relational database management products (ArcInfo, ArcGIS Server and ArcSDE). Microsoft Visual Studio Professional and Oracle 11g relational database management products (ArcInfo, ArcGIS Server and ArcSDE). My research interests are in transportation performance analysis including risk assessment and development of transportation information systems. Most of my research is focused on freight transportation, with particular interest in intermodal freight transport and inland waterways transportation. I specialize in the use of geographic information systems and related information technology tools, such as database management systems and custom software development, to perform network safety and efficiency analyses. I’m also involved in intelligent transportation systems design, primarily in the design and development of travel information systems that report real-time conditions to the traveling public.

James DOBBINS
Research Associate Professor of Civil and Environmental Engineering
Director of the Vanderbilt Center for Transportation Research

My research interests are in transportation performance analysis including risk assessment and development of transportation information systems. Most of my research is focused on freight transportation, with particular interest in intermodal freight transport and inland waterways transportation. I specialize in the use of geographic information systems and related information technology tools, such as database management systems and custom software development, to perform network safety and efficiency analyses. I’m also involved in intelligent transportation systems design, primarily in the design and development of travel information systems that report real-time conditions to the traveling public.

James DOBBINS
Research Associate Professor of Civil and Environmental Engineering
Director of the Vanderbilt Center for Transportation Research

I have a broad range of interests, but ultimately I’m interested in studying the interactions of nature and man-made systems utilizing geospatial technologies. This includes modeling future flooding and the potential impacts on communities and infrastructure systems to identify key risk areas. Using a holistic, all hazards approach, we can use risk management techniques to not just identify those key risk areas, but also consider future planning and adaptation strategies that may pose low-cost, high-reward opportunities to assist in informed decision-making. I’m also strongly interested in sharing knowledge with the next generation on these issues by integrating engineering and geospatial technologies in K–12 education to prepare the next group of engineers and scientists to address the challenges of the future. In addition, I’m involved in several interdisciplinary projects focused on infrastructure system adaptation to climate change, risk management and also STEM integration into education.

Janey CAMP
Research Assistant Professor of Civil and Environmental Engineering

Additional Faculty
Mark Abkowitz
Professor of Civil and Environmental Engineering

Robert Stammer
Associate Professor of Civil and Environmental Engineering

Additional Faculty
Mark Abkowitz
Professor of Civil and Environmental Engineering

Robert Stammer
Associate Professor of Civil and Environmental Engineering
The future health and well being of humanity hinge in large part on smart production and use of energy, water and related resources, as these are central determinants of climate change, habitable space and human and ecological health.

The Vanderbilt Institute for Energy and the Environment (VIEE) engages in research and education that directly link the social and behavioral sciences, physical sciences, engineering, law and policy, and that bear on energy and environmental decision-making by individuals and by public and private institutions. Specifically, VIEE research elucidates the relationships among individual, institutional and societal choices for energy production and use, and the impacts and benefits of these choices on the environment and health through links with climate, water quality, economics, social psychology and natural resources. A key aim of VIEE is to create a strong multidisciplinary undergraduate and graduate research and education program and to be an international leader in contributing to the resolution of critical issues by fostering links among diverse fields of human thought and action in unprecedented collaborations.

www.vanderbilt.edu/viee

I am interested in how hydrological processes are affected by humans and in how human behavior is affected by hydrological processes. As risks of both flooding and water scarcity become more acute over time, there is grave concern that our infrastructure systems—water treatment facilities, pipelines, sewers, highways, bridges, dams, hydroelectric facilities, irrigation systems and other aspects of the built environment—will become more vulnerable and less resilient, leading to potentially catastrophic consequences. Furthermore, under conditions of water scarcity, vulnerability can be exacerbated by approaches to allocate water among competing demands. For example, tradeoffs between hydropower and irrigation, or between biofuels and food, may lead to badly suboptimal adaptation. My current work on climate change and drought in Sri Lanka is aimed at understanding how adaptation decisions can be informed by interdisciplinary research.

Additional Faculty
David Kosson
Cornelius Vanderbilt Professor of Engineering
The research objective of our group is bringing understanding to nonlinear mechanical and functional response of multiscale materials and structures through computational modeling and simulation. Our research focus is on computational characterization of the failure response of material and structural systems that involve multiple temporal (fatigue loading) and spatial scales (structures made of heterogeneous materials), development of computational methodologies for failure and fragmentation of composite systems subjected to extreme loading conditions including impact, blast and crushing loads, characterization of complex and hybrid composite systems and analysis of multiphysics problems that involve the effect of environment on mechanical response.

Çağlar OSKAY
Assistant Professor of Civil and Environmental Engineering

The Structures and Materials Laboratory has reinforced floors to withstand heavy loads and an overhead electric crane to facilitate both vertical and horizontal loads testing of model structures. A complete set of hydraulic loading equipment is available for load application. Apart from a range of sensors like LVDTs and load cells and strain pickups, associated data acquisition and processing systems are also available. The laboratory has a number of medium capacity equipment (Tinius Olsen, MTS, Fronny, etc.) for static and dynamic testing of material specimens and small-scale structural elements. For vibration testing, a medium-capacity LDS Shaker with controls and data acquisition and processing system is also available. The laboratory has facilities for fabricating test specimens and structural elements and is supported by a technical staff.

P.K. BASU
Professor of Civil and Environmental Engineering
Director of Graduate Studies in Civil Engineering

My most recent research interests are related to the following five topics: improvement of performance of short fiber-reinforced cementitious armor materials as well as multiscale modeling (MSM) and simulation, real-time monitoring of health and structural integrity of bridge structures using acoustic emission and other techniques, rapid extension of the life of highway bridge structures using bonded composite patch repairs, multidimensional modeling of complex structural systems with various types of irregularities and behavior of helicoidal structural systems. The first research topic is of great importance for the U.S. Department of Homeland Security and Department of Defense. As a representative volume element-based scheme will not work, a new MSM scheme is being developed. The second research topic is focused on enabling the U.S. Department of Transportation to issue real-time warnings against compromises in bridge safety, followed by corrective actions. In these days of acute budget shortfall, with more than one-third of the nation’s bridges being structurally deficient, the third research effort is developing a low-cost, rapid solution to extending the life of deficient bridges. The fourth research topic emphasizes improved computational efficiency through superior modeling and simulation schemes. The final research topic fills the need for better understanding of behavior and the need for efficient design methodology for helicoidal structures used in highway flyovers and other structures.
Sankaran MAHADEVAN
John R. Murray Sr. Chair in Engineering
Professor of Civil and Environmental Engineering
Professor of Mechanical Engineering

My research interests cover both basic and applied research topics related to risk assessment and decision-making under uncertainty in engineering systems. Basic research interests include adaptive simulation methods for system and component reliability estimation, reliability and design optimization techniques for multidisciplinary systems, methods for material degradation modeling (fatigue fracture, corrosion, concrete degradation), uncertainty and optimization methods for structural health monitoring and Bayesian methods for modeling and data uncertainty assessment. My research projects investigate these methods for a large range of civil, mechanical and aerospace systems. This includes materials (metals, composites, cementitious materials), civil infrastructure (bridges, pavements, waterways structures, multi-story buildings), mechanical systems/components (automobile components and joints, dynamics and energy dissipation, railroad wheels, micro-electro-mechanics devices) and aerospace systems/components (rotorcraft mast, aircraft engine components, aircraft wing and fuselage, space shuttle fuel tank, spacecraft thermal protection system panels, satellite systems, and space telescope components). My research in systems reliability and optimization also includes systems of systems with human interactions, such as transportation networks, security systems, emergency response and business supply chains.

Florence SANCHEZ
Associate Professor of Civil and Environmental Engineering

My research interests include multiscale experimental characterization and computational modeling of the performance and durability of cement-based composites. The research aims at understanding the complex processes associated with cement-based composites and the relationship between molecular-level chemical changes at internal interfaces and the macro-scale properties affected by those changes. The development of novel, cement-based composites with superior structural and functional properties and enhanced long-term durability occupies a central focus. Specific areas include: understanding the mechanisms of interaction of nano-sized materials such as nanotubes, nanofibers and nanoparticles with cement pastes and their influence on the nano/microstructure and performance of the composites; elucidating the molecular structure and dynamics at solid-solid and solid-liquid interfaces that control reinforcement mechanisms in composites using molecular dynamics modeling, and understanding the controlling mechanisms of the weathering of nano/microfiber-reinforced, cement-based materials under various environmental conditions, mechanical stresses and weathering forces.
My research interests are in the general area of computational solid mechanics with an emphasis on computational multiphysics and fracture mechanics. Topics include fracture in materials and structures, characterization of advanced materials such as composites and super-alloys, modeling of tectonic rift evolution for hydrocarbon exploration and numerical methods for evolving discontinuities. Specifically, I’m interested in understanding and predicting fracture and damage processes involving multiple space and/or time scales within the framework of the finite element method. In addition, I’m interested in reactive transport modeling via residual-based variational multiscale stabilized finite elements. The computational methods and models I intend to develop are useful to study a wide array of applications in the areas of structural engineering and materials, geophysics, tissue and cell mechanics and energy research. Currently, I’m working on simulating fractures in ice sheets in order to investigate iceberg calving from grounded tidewater and outlet glaciers using continuum damage mechanics. Large-scale simulations of disintegration of ice sheets, ice shelves and glaciers can help us estimate the global change in ocean levels due to melting ice and the resulting socioeconomic impacts. 

https://sites.google.com/site/rduddu/home

Ravindra **DUDDU**
Assistant Professor of Civil and Environmental Engineering

Enterprise risk management is emerging as a spotlight topic as our nation grapples with how to allocate resources across natural and man-made threats. My research focuses on developing analysis tools and management processes to help address four important questions: What can go wrong? How likely is it? What are the consequences? What can we do to reduce the threat? An equally compelling topic is the impact of extreme weather events on the ability of our nation’s critical infrastructure to withstand the anticipated effects. My colleagues and I are involved in both improving our understanding of the impact of extreme weather events on infrastructure vulnerability and developing adaptation strategies that will overcome this challenge. In this age of information technology, there are exciting opportunities to combine geographic information technology, global positioning systems and Web-based tools to develop sophisticated and visually appealing graphics that help travelers enhance their safety, security and efficiency. Our research group is a leader in this field. With events such as the nuclear disaster in Japan and difficulties in establishing a permanent repository for spent nuclear fuel and high-level waste, I have been integrally involved in informing the debate through demonstrating the waste management consequences associated with different energy scenarios. Underpinning my work is a strong desire for interdisciplinary collaboration, through affiliation with colleagues in various engineering disciplines, along with my counterparts in law, business, public policy, arts and sciences and education. Because today’s problems are rarely defined along traditional lines, it is extremely important that these other perspectives are an integral part of the process for defining problems and searching for achievable solutions. 

www.vanderbilt.edu/vector

Mark **ABKOWITZ**
Professor of Civil and Environmental Engineering
Professor of Engineering Management
Director of Vanderbilt Center for Environmental Management Studies

Additional Faculty
James Clarke
Professor of the Practice of Civil and Environmental Engineering
My research focuses on the testing and assessment of minimally invasive technologies for pipeline condition assessment, repair and rehabilitation. Traditional rehabilitation and renewal methods for underground infrastructure often focus on first cost, rather than lifecycle costs. I have developed and tested a framework for a multi-attribute model that addresses the various objectives in underground infrastructure asset management, through a life-cycle cost approach. In addition, I've developed a robust decision tool to assist the project team in evaluating and executing projects that are cost-driven. In defining the cost-schedule trade-offs, the decision tool has the capability to model all of the variables in a capital project execution plan that influence the cost-versus-schedule decisions.
To educate some of the best and brightest engineering students in the world regarding the importance of transportation engineering is both an honor and a challenge. There is no greater reward than introducing a new concept in class and recognizing by the student's facial expression that you have just implanted new knowledge. But, education is certainly a two-way street. I learn something new every class period by listening to my students. They are intelligent and inquisitive and they educate me continually. Recognizing that you may have made a difference in their lives is one of the most rewarding aspects of my more than 30-year teaching career. As the department's career adviser, I help students plan their next career step after graduation and assist undergraduates with internship placement. Seeing the students mature from freshmen to highly successful graduates who make a difference through their professional careers is another significant benefit of being an educator.

Robert STAMMER
Associate Professor of Civil and Environmental Engineering

Vanderbilt students are capable of learning the fundamental science underlying any engineering curriculum, but they need mentoring to understand how to use that fundamental knowledge to creatively solve the very real problems that engineers, and only engineers, can address. My role is to be one of their first mentors by transferring to them the insights and methods that I learned from over 35 years of engineering practice and from those who mentored me. This universal process of one generation of engineers helping the next generation has resulted in the fantastic growth and sophistication of the engineered world. It is extremely rewarding to see these fine young engineers of Vanderbilt enthusiastically accept the challenges of their profession.

Curtis BYERS
Professor of the Practice of Civil and Environmental Engineering

Getting to know undergraduate engineering students at Vanderbilt has been very rewarding. It is a joy to be a part of their lives whether they know exactly what they want to do or they do not know why they are in engineering. Interaction with students in class and especially through the American Society of Civil Engineers (ASCE) is a way to teach not only engineering skills, but relational and professional ones as well. In the classroom, I like to make sure each student is engaged in learning so I use discussions, hands-on examples and even competitions to teach. Introducing students to sustainability issues in civil engineering is a recent endeavor. I have the privilege of taking students to the U.K. in the summer to learn even more about this important issue.

Lori TROXEL
Associate Professor of the Practice of Civil and Environmental Engineering

Vanderbilt’s chapter of ASCE is consistently ranked in the top student chapters nationwide and provides opportunities for professional development.
Vanderbilt leads the Consortium for Risk Evaluation with Stakeholder Participation (CRESP), which works to advance cost-effective, risk-informed cleanup of the nation’s nuclear weapons production facility waste sites and management of potential future nuclear sites and wastes. This is accomplished by seeking to improve the scientific and technical basis for environmental management decisions by the Department of Energy (DOE) and by fostering stakeholder participation in that search. CRESP carries out multidisciplinary research, education and review in waste processing and special nuclear materials; remediation, near-surface disposal and strategy; and, stakeholder engagement and communication.

Principal Investigator David Kosson and Co-Principal Investigator Charles Powers lead the multi-university consortium that has served the DOE and its stakeholders since 1995, currently through a cooperative agreement (2006–2017) awarded to Vanderbilt University. The CRESP Management Board is comprised of technical, engineering, scientific, medical and policy experts from seven university consortium member institutions in addition to Vanderbilt: Georgia Institute of Technology, Howard University, New York University School of Law, Oregon State University, Rutgers–The State University of New Jersey, University of Arizona, and University of Wisconsin–Madison.

CRESP currently has 22 centers and institutes.

Consortium for Risk Evaluation with Stakeholder Participation (CRESP)
www.cresp.org

Vanderbilt Engineering Center for Transportation Operations and Research (VECTOR)
www.vanderbilt.edu/vector

VECTOR conducts research on:
- Geographical information systems for transportation
- Intelligent transportation systems
- Routing and logistics
- Hazardous materials transport
- Traffic engineering
- Highway safety
- Infrastructure adaptation
- Transportation risk management

Vanderbilt Institute for Environmental Management Studies (VCEMS)
www.vanderbilt.edu/vcems/

The Vanderbilt Center for Environmental Management Studies was established to promote and develop interdisciplinary relationships focused on the impact of environmental engineering, management and law on environmental policy and practice. The center's principal activities are:
- To coordinate and encourage development of undergraduate/graduate courses on campus to constitute an interdisciplinary environmental management and policy concentration
- To develop and offer executive management programs and symposia focused on critical and emerging topics in environmental management and policy
- To stimulate development of new methods and management practices for achieving reductions in environmental risk
Undergraduate
Admission to the undergraduate school is managed by the Office of Undergraduate Admissions. Prospective students are encouraged to investigate the university by visiting the campus. Admissions staff are available to answer questions, arrange campus tours, provide additional information about degree programs and link visitors with appropriate campus offices and members of the university community.

Contact
Office of Undergraduate Admissions
Vanderbilt University
2305 West End Avenue
Nashville, TN 37203-1727
(615) 322-2561 or (800) 288-0432
admissions.vanderbilt.edu

DATES TO REMEMBER

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<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>November 1</td>
<td>Application deadline for Early Decision I</td>
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<tr>
<td>December 15</td>
<td>Early Decision I notification</td>
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<tr>
<td>January 1</td>
<td>Earliest deadline to submit the Free Application for Federal Student Aid (FAFSA)</td>
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<td>January 3</td>
<td>Application deadline for Early Decision II and Regular Decision</td>
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<td>February 5</td>
<td>CSS PROFILE and FAFSA due to addresses as indicated</td>
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<td>April 1</td>
<td>Regular Decision notification</td>
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<td>May 1</td>
<td>Postmark deadline for matriculation deposit</td>
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Undergraduate
Vanderbilt is committed to enrolling talented, motivated students from diverse backgrounds. More than 60 percent of Vanderbilt students receive some type of aid. The university offers a full range of merit-based scholarships, need-based financial assistance and financing/payment options to families of all income levels. More information can be found at www.vanderbilt.edu/financialaid.

Opportunity Vanderbilt
Beginning in the fall of 2009, need-based financial aid packages for all undergraduate students no longer include need-based loans. This latest initiative does not involve the use of income bands or “cut-offs” to pre-determine levels of eligibility and applies to all undergraduate students with demonstrated financial need who are U.S. citizens or eligible non-citizens. The end result is that, in addition to a realistic academic year earnings expectation, all need-based aid packages now include scholarships and/or grants (gift assistance) in place of need-based loans that would have previously been offered to meet demonstrated need.

Graduate
Graduate students in the Department of Civil and Environmental Engineering seeking the Ph.D. degree receive a competitive stipend, full-tuition scholarship award and health insurance. Typically, students are first supported on a Teaching Assistantship and then a Research Assistantship once a thesis adviser has been identified. Students on a Teaching Assistantship assist the faculty with undergraduate courses, typically by grading assignments and holding office hours. Opportunities to teach are available for those that wish to gain such experience. Both Teaching and Research Assistantships can be supplemented by any one of the following university fellowships, which are awarded through a competitive process to highly qualified applicants.

- University Graduate Fellowships
  $10,000/year for up to five years
- Provost’s Graduate Fellowships
  $10,000/year for up to five years
- Harold Stirling Vanderbilt Graduate Scholarships
  $6,000/year for up to five years
- School of Engineering IBM Fellowships
  $4,000/year for up to four years plus an award of $1,000 for professional development
- Pao Chung Chen Fellowship
  $4,000/year for one year
- Peter G. Hoadley Graduate Award
  $4,000/year for one year
- Carl E. Adams Jr. Graduate Award
  $4,000/year for one year

In order to be considered for these fellowships, an applicant’s file must be complete by January 15. Prospective applicants are also urged to apply for external fellowships or grants from national, international, industrial or foundation sources.
Mark Abkowitz  
Professor of Civil and Environmental Engineering  
Professor of Engineering Management  
Enterprise risk management, infrastructure adaptation to extreme weather events, intelligent transportation systems, nuclear waste disposal

P.K. Basu  
Professor of Civil and Environmental Engineering  
Director of Graduate Studies in Civil Engineering  
Multiscale modeling, new cementsitious materials, real-time infrastructure health monitoring, life extension of structures, blast and ballistic impact effects

Alan Bowers  
Associate Professor of Civil and Environmental Engineering  
Environmental chemistry, modeling of water and wastewater treatment processes, role of uncertainty in biological and physical/chemical reactions

Curtis Byers  
Professor of the Practice of Civil and Environmental Engineering  
Structural analytical modeling and design, foundation systems

Janey Camp  
Research Assistant Professor of Civil and Environmental Engineering  
Geographic information systems (GIS), risk management, environmental engineering, climate change adaptation, infrastructure management, STEM for K-12 education

James Clarke  
Professor of the Practice of Civil and Environmental Engineering  
Director of Graduate Studies in Environmental Engineering  
Chemical and nuclear waste management, human health and ecological risk assessment, sustainable approaches to the remediation of contaminated sites

James Dobbins  
Research Associate Professor of Civil and Environmental Engineering  
Director of the Vanderbilt Center for Transportation Research  
Geographic information systems (GIS) for transportation, intermodal freight transportation, inland marine transportation, transportation information system development

Ravindra Duddu  
Assistant Professor of Civil and Environmental Engineering  
Computational solid mechanics, multiscale and multiphysics fracture mechanics, constitutive modeling, cohesive zone modeling of fatigue delamination

Andrew Garrabrants  
Research Associate Professor of Civil and Environmental Engineering  
Fate and transport, leaching test method development, environmental release assessment, beneficial reuse of waste materials

Sanjiv Gokhale  
Professor of the Practice of Civil and Environmental Engineering  
Director of Graduate Program in Construction Management  
Trenchless technology, infrastructure—water and wastewater, schedule and cost reduction for Capital EPC projects

George Hornberger  
Distinguished University Professor  
Chair and Professor of Civil and Environmental Engineering  
Professor of Earth and Environmental Sciences  
Human-natural system interactions, drought adaptation, catchment hydrology, transport of dissolved species in soils and streams

David Kossen  
Cornell University Professor of Engineering  
Professor of Civil and Environmental Engineering  
Professor of Chemical Engineering  
Professor of Earth and Environmental Sciences  
Nuclear waste, environmental remediation, leaching assessment, energy production residuals, contaminant mass transfer (groundwater, soil, sediment, waste), cement materials durability

Steven Krah  
Professor of the Practice of Nuclear Environmental Engineering  
Nuclear fuel cycle, risk assessment, the implementation of technology in nuclear fuel cycle facilities

Eugene LeBoeuf  
Associate Professor of Civil and Environmental Engineering  
Director of Undergraduate Studies in Civil Engineering  
Physiochemical processes of environmental systems, fate and transport of engineered nanomaterials in the environment, optimization of multireservoir hydropower system operations

Sankaran Mahadevan  
John R. Mearay Sr. Chair in Engineering  
Professor of Civil and Environmental Engineering  
Professor of Mechanical Engineering  
Structural and mechanical systems reliability, materials durability, fatigue and fracture, structural health monitoring, modeling and data uncertainty, optimization under uncertainty, multidisciplinary systems

Çağlar Oskay  
Assistant Professor of Civil and Environmental Engineering  
Multiscale computational mechanics, life prediction, performance assessment, computational modeling of heterogeneous materials, modeling of multiphysics problems

Charles Powers  
Professor of Environmental Engineering  
How can technical assessments be framed to inform regulatory requirements to produce protective, cost-effective and sustainable environmental priorities and results?

Florence Sanchez  
Associate Professor of Civil and Environmental Engineering  
Performance and durability of cement-based composites, multiscale experimental characterization of materials, molecular dynamics modeling at interfaces, mass transport processes with chemical reactions in porous media

Robert Stammer  
Associate Professor of Civil and Environmental Engineering  
Traffic engineering, urban transportation planning, transportation design issues, highway safety, and accident reconstruction

Lori Trosel  
Associate Professor of the Practice of Civil and Environmental Engineering  
Concrete and steel design, sustainable infrastructure
Vanderbilt
Cornelius Vanderbilt had a vision of a place that would “contribute to strengthening the ties that should exist between all sections of our common country” when he gave a million dollars to create a university in 1873. Today, that vision has been realized in Vanderbilt, an internationally recognized research university in Nashville, Tenn., with strong partnerships among its 10 schools, neighboring institutions and the community.

Vanderbilt offers undergraduate programs in the liberal arts and sciences, engineering, music, education and human development, as well as a full range of graduate and professional degrees. The combination of cutting-edge research, liberal arts education, nationally recognized schools of law, business and divinity, the nation’s top-ranked graduate school of education and a distinguished medical center creates an invigorating atmosphere where students tailor their education to meet their goals and researchers collaborate to address the complex questions affecting our health, culture and society.

An independent, privately supported university, Vanderbilt is the largest private employer in Middle Tennessee and the second largest private employer based in the state.

Nashville
Vanderbilt’s hometown of Nashville is a vibrant, engaging city known proudly as “Music City, U.S.A.” The university’s students, faculty, staff and visitors frequently cite Nashville as one of the perks of Vanderbilt, with its 330-acre campus located a little more than a mile from downtown.

From serving as home to the nation’s largest Kurdish population to being named America’s friendliest city for three years in a row, Nashville is a metropolitan place that exudes all of the charm and hospitality one expects from a Southern capital.

The city was settled in 1779 and permanently became state capital in 1843. The city proper is 533 square miles with a population of nearly 570,000. Major industries include tourism, printing and publishing, technology manufacturing, music production, higher education, finance, insurance, automobile production and health care management. Nashville has been named one of the 15 best U.S. cities for work and family by Fortune magazine, was ranked as the No. 1 most popular U.S. city for corporate relocations by Expansion Management magazine and was named by Forbes magazine as one of the 25 cities most likely to have the country’s highest job growth over the coming five years.

Vanderbilt University
Vanderbilt University School of Engineering is internationally recognized for the quality of its research and scholarship. Engineering faculty and students share their expertise across multiple disciplines to address four specific research initiatives that characterize the school’s commitment to help solve real-world challenges with worldwide impact. They are health and medicine, energy and natural resources, security, and entertainment. All programs leading to the bachelor of engineering degree are accredited by the Engineering Accreditation Commission of ABET (www.abet.org).