



Graduate programs in
**CIVIL AND ENVIRONMENTAL
ENGINEERING**



MARQUETTE
UNIVERSITY

Be The Difference.



Why graduate studies in Civil and Environmental Engineering at Marquette?

You'll advance your prospects in an intellectually demanding field that directly impacts the environments in which we live, learn and work. You'll tackle some of the most pressing issues facing us as a modern civilization seeking to balance our increasing infrastructure requirements with the need to preserve the environment. You'll have a chance to reshape the world.

Be on the leading edge. You'll be taught by award-winning [faculty](#) advancing civil and environmental engineering through real-world projects commissioned by government and industry — projects such as water-quality modeling; in-situ monitoring and load testing of bridges; lean construction; and repair and retrofitting of buildings and bridges; to name just a few.

Be cosmopolitan. International students comprise roughly half of our full-time student body. You'll broaden your worldview by interacting with students from a wide variety of countries and backgrounds.

Be noticed. A small student-to-faculty ratio (usually two to one) means faculty members take a real interest in students' research and career goals.

Be flexible. We offer late-afternoon and evening classes, as well as independent study courses, to fit busy schedules.

Be supported. We offer generous benefits to qualified students every year in the form of research assistantships, teaching assistantships, tuition scholarships and fellowships. Assistantships include full tuition and a monthly stipend, as well as health care benefits.

Civil and environmental engineering graduate programs

Doctorate in civil engineering

Master of science in civil engineering

Certificates: construction engineering and management, structural design, transportation, water and wastewater treatment processes, water resources engineering

ABOUT MARQUETTE

Our programs. Marquette offers 50 doctoral and master's degree and more than 30 graduate certificate programs, and a School of Dentistry and Law School. And we have a variety of specializations to help you tailor the curriculum to your needs — an opportunity not offered by all universities.

Our students. We enroll approximately 3,700 graduate and professional students from diverse cultural and educational backgrounds and 68 countries all over the world.

Our faculty. Marquette's almost 700 full-time faculty represent renowned scholars and industry experts. As a student, you'll also benefit from established collaborations within the local business and nonprofit communities, as well as other nationally renowned institutions within the region, including the Clinical and Translational Science Institute, Medical College of Wisconsin, Milwaukee School of Engineering, University of Wisconsin system, and others.

Our research. Graduate students can participate in important research alongside our renowned faculty members — making you a contributing member of our research team, not just a face in the crowd like at some other universities. Marquette's overall research award volume in fiscal year 2010 reached a record high, with faculty receiving more than \$28 million. Federal award dollars increased by 81 percent, and the average award size rose by 45 percent.

Our commitment. Class sizes are small and are usually taught by regular faculty members who are conducting cutting-edge research. Your teaching will be informed by current research, and you will often have the opportunity to participate in research.

Our network. As a graduate of Marquette, you'll become part of our alumni family of 110,000 around the world — creating a professional network that spans from right next door to across the globe.

Our values-based education. As a Jesuit institution of higher education, Marquette continues a centuries-old tradition of academic excellence, development of the whole person and research that addresses societal needs.

YOUR JOURNEY

Population growth, an aging national infrastructure and global emphasis on green energy initiatives mean excellent job prospects for you. Civil and environmental engineers are predicted to experience a faster growth in employment than the national average, increasing 24 and 31 percent, respectively, in the next decade, according to the 2010-11 edition of the U.S. Bureau of Labor Statistics' *Occupational Handbook*.

A Marquette civil engineering degree or certificate prepares you for the unique requirements of these demanding fields so you'll be ready to take advantage of the opportunities that come your way. Upon graduation, you'll be able to tackle real-world challenges, think logically, creatively and compassionately, and persuasively express your ideas in verbal and written communications.

Doctoral degree in civil engineering

Course work:

- Students must complete 45 credit hours (typically 15 classes) of course work beyond the bachelor's level, plus 12 credit hours of dissertation work. Students with master's degrees in civil engineering or a closely related field may request credit for up to 21 hours of required courses completed outside Marquette.
- Full-time students must take at least seven credit hours each semester.
- Teaching and research assistants must spend 20 hours per week on work duties.
- More than 50 courses are available for graduate credit, including courses in matrix structural analysis, bridge design, river engineering, industrial wastewater management, e-business in the construction industry, sustainable engineering, airport planning and design, advanced pavement design, environmental impacts of transportation, advanced steel and concrete design, and fiber-reinforced polymer applications in civil infrastructure.
- Average class size is 11 students for all courses carrying graduate credit (5000 and 6000 level) and 6.5 students for those limited to only graduate students (6000 level).

Refine your teaching skills, participate in university committee work, present scholarly lectures and papers, and learn how to conduct a successful job search through our Preparing Future Faculty program. Marquette is one of only 17 U.S. universities to have received funding for this program. For more information, visit marquette.edu/pff.



I looked into several good doctoral programs, but what set Marquette apart from the rest was the faculty's genuine interest in having me become part of the Civil and Environmental Engineering Department. My academic adviser, Dr. Chris Foley, is truly passionate about his research, and his enthusiasm is contagious."

Christopher H. Raebel, P.E., S.E.
Doctoral student
Assistant professor
Department of Architectural Engineering
Milwaukee School of Engineering

Qualifying examination:

- All students must successfully pass a doctoral-qualifying examination. The examination includes written and oral tests and is administered after the student has completed 30 to 36 credit hours of graduate study.

Research:

- Students must work on an original research problem (the dissertation topic), the results of which typically are published in technical literature. Doctoral students will often author or co-author one or more refereed journal papers based on their dissertation research. Student publication rate is two to three papers per graduate.

Dissertation:

- Students must author and successfully defend a dissertation representing an original research contribution.

Specialized training:

- Students may choose elective courses in a variety of areas.

For more program details, including requirements and course descriptions, see the *Graduate Bulletin* at marquette.edu/grad.

Master of science in civil engineering

Course work:

- Non-thesis program
 - Students must complete 30 credit hours (typically 10 classes) of course work, 18 (six classes) of which must be in the Department of Civil and Environmental Engineering.
- Thesis program
 - Students must complete 24 credit hours (typically eight classes) of course work, 18 (six classes) of which must be in the Department of Civil and Environmental Engineering, plus six hours of thesis work. They also must author and successfully defend a thesis.
- Full-time students must take at least seven credit hours each semester.
- Teaching and research assistants must spend 20 hours per week on work duties.
- More than 50 courses are available for graduate credit, including courses in matrix structural analysis, bridge design, river engineering, industrial wastewater management, e-business in the construction industry, sustainable engineering, airport planning and design, advanced pavement design, environmental impacts of transportation, advanced steel and concrete design, and fiber-reinforced polymer applications in civil infrastructure.
- Average class size is 11 students for all courses carrying graduate credit (5000 and 6000 level) and 6.5 students for those limited to only graduate students (6000 level).

Comprehensive examination:

- All students must successfully complete an oral comprehensive exam. The scope of the exam for non-thesis students may span the entire body of course work. The exam for thesis students focuses mainly on the thesis topic.

Research:

- Thesis students must work on an original research problem (the thesis topic), the results of which typically are published in technical literature. Master's thesis students will often author or co-author one or more refereed journal papers based on their thesis research. Student publication rate is two to three papers per master's thesis graduate.

Scheduling:

- Courses are offered in the late afternoon or evening to fit the work schedules of part-time students.

Certificates

Areas of study:

- Construction engineering and management
- Structural design
- Transportation
- Water and wastewater treatment processes
- Water resources engineering

Course work:

- Students must complete 12 credit hours (four classes) of course work from an approved list.
- All courses must be approved for graduate credit, and at least two must be strictly graduate (6000) level.
- Courses must be completed within a three-year time period with a grade point average of at least 3.0 and no grade below a C.
- Average class size is 11 students for all courses carrying graduate credit (5000 and 6000 level) and 6.5 students for those limited to only graduate students (6000 level).

Scheduling:

- Courses are offered in the late afternoon or evening to fit the work schedules of part-time students.

For more program details, including requirements and course descriptions, see the *Graduate Bulletin* at marquette.edu/grad.



The Department of Civil and Environmental Engineering participates in the Peace Corps Fellows/USA Program. Marquette is one of only three U.S. graduate programs in civil engineering affiliated with this program. For more information, visit peacecorps.gov/gradschool.



YOUR FACULTY MENTORS



Dr. Clifford J. Crandall, associate professor

Water and wastewater treatment, wastewater collection systems, water distribution systems, hydraulics, hydrology

Dr. James A. Crovetto, associate professor and director of Transportation Research Center

Analysis of material properties using nondestructive test data, mechanistic pavement design incorporating nonlinear material properties and seasonal effects, laboratory modeling of pavement systems and measurement of load-induced deformation behavior

Dr. Alexander Drakopoulos, associate professor

Geometric design of highways, traffic operations, accident analysis, human factors

Dr. Mark O. Federle, professor and McShane Chair in Construction Engineering and Management

Organizational behavior in construction companies, strategic planning, information technology and its impact on construction productivity, individual behavior and leadership, virtual design and construction, building information modeling, design-build project delivery

Dr. Christopher M. Foley, professor and chair of Civil, Construction and Environmental Engineering

Linear and nonlinear structural and finite element analysis, evolutionary algorithm applications in optimized structural design, structural steel building analysis and design, performance-based design of building and bridge structures, seismic analysis and design

Dr. Stephen M. Heinrich, professor and director of graduate studies

Microcantilever-based sensors, elasticity, solid/structural mechanics, mechanics of electronic packaging, mechanics of MEMS devices

Dr. Saeed Karshenas, professor

Construction safety and building information modeling, visualization

Dr. Charles S. Melching, professor and director of Institute for Urban Environmental Risk Management

Surface-water hydrology, rainfall-runoff modeling, stream water quality modeling, application of risk, reliability, and uncertainty analysis to water resources and environmental problems

Dr. Michael S. Switzenbaum, professor and executive associate dean

Environmental engineering, microbiology and biological treatment processes, wastewater engineering, solid waste management

Dr. Sriramulu Vinnakota, professor

Analysis and design of steel structures, inelastic stability, composite structures

Dr. Baolin Wan, associate professor

Repair and retrofit structures, use of fiber-reinforced polymer materials in structural members, field testing and non-destructive evaluation of bridges, behavior of reinforced and pre-stressed concrete structural elements, finite element analysis

Dr. Daniel H. Zitomer, professor and director of Water Quality Center

Anaerobic biotechnology, biological wastewater treatment, international development/service learning in engineering

For more information about the department's faculty members and their research, visit marquette.edu/eng/civil_environ/faculty.

FACULTY AWARDS

Dr. James A. Crovetto: 2001 Eldon J. Yoder Award for best paper at the Seventh International Conference on Concrete Pavements; 2006 Hot Mixed Asphalt Quality Management Award, WAPA

Dr. Alexander Drakopoulos: 2006-present Chair of the Transportation and Development Institute, ASCE Geometric Design and Operations Committee, Highway Division

Dr. Mark O. Federle: 1998 Outstanding Professor in Construction Engineering, Engineering Student Council, Iowa State University

Dr. Christopher M. Foley: 2009 Rev. John P. Raynor, S.J., Faculty Award for Teaching Excellence; 1998, 2006, 2008 Marquette College of Engineering Outstanding Teacher Award

Dr. Stephen M. Heinrich: 2006 Fulbright Research Scholar and Invited Professor, Université Bordeaux 1 France; 2000 Rev. John P. Raynor, S.J., Faculty Award for Teaching Excellence

Dr. Charles S. Melching: 2008 Outstanding Researcher Award, Marquette College of Engineering; 2001 Walter L. Huber Civil Engineering Research Prize from the American Society of Civil Engineers

Dr. Sriramulu Vinnakota: 1998-present AISC Task Committees on Member Design, Temperature Effects; 1998-present AISC Committee on Manuals and Text Books

Dr. Baolin Wan: 2006 best paper award, Third International Conference on FRP Composites in Civil Engineering; 2005 Way-Klingler Junior Faculty Award, Marquette

Dr. Daniel H. Zitomer: 2008 Gordon Maskew Fair Distinguished Engineering Educator Medal of the Water Environment Federation; 2008 Radebaugh Award, Central States Water Environment Association; 2009 Outstanding Researcher Award, Marquette College of Engineering

FACULTY RESEARCH

Advanced mechanics modeling of microelectromechanical systems — Dr. Stephen M. Heinrich

This area of research focuses primarily on analytical and numerical modeling of the micro-structures found in state-of-the-art MEMS applications. Current work involves the design and analysis of microcantilever-based sensors for the detection of chemical and biological substances.

Infrastructure research — Drs. James A. Crovetto, Christopher M. Foley and Baolin Wan

Faculty are actively involved in research efforts seeking to evaluate and predict infrastructure component performance through in-situ health monitoring, in-situ load testing, laboratory testing and numerical simulation.

Institute for Urban Environmental Risk Management — Dr. Charles S. Melching, director

The institute conducts and coordinates interdisciplinary environmental and water resources research, promotes and coordinates interdisciplinary education in environmental management, and provides a center of knowledge on urban environmental/flood control issues.

Structural engineering analysis, design and simulation — Drs. Foley, Saeed Karshenas, Sriramulu Vinnakota and Wan

Faculty are involved in research that aims to exploit modern tools for simulation of structure performance, design of state-of-the-art structural engineering systems and prediction of in-service behavior.

Transportation Research Center — Crovetto, director, and Dr. Alexander Drakopoulos

The center conducts research, performs testing, and provides training in the areas of highway maintenance and operations; traffic engineering; highway pavements; materials; and construction.

Visualization in construction — Karshenas

The focus of this research group is the application of interactive visualization to improve construction productivity, facilitate collaborative decision-making and simplify communication during construction.

Water Quality Center — Dr. Daniel H. Zitomer, director

The center seeks to solve problems related to lake, river and groundwater quality. These problems often involve municipal wastewater, industrial wastewater, stormwater runoff and drinking water.

For more information about the department's faculty members and their research, visit marquette.edu/engineering/civil_environmental/faculty.

YOUR RESOURCES

As a graduate student in civil and environmental engineering, you'll have access to:

- major research centers focused on transportation, water quality and urban environmental risk management research.
- extensive laboratory facilities, including those dedicated to structural testing; concrete, asphalt and soils testing; environmental processes; hydraulics; and computational modeling.
- world-class engineering projects thanks to Marquette's location near industry and government facilities.

Our graduate programs also provide excellent resources beyond the classrooms. Thanks to our location in downtown Milwaukee and community-connected faculty, you'll enjoy an urban setting with access to a vibrant arts scene, professional sports, restaurants and nightlife.

Marquette University

- Access to networking, career counseling, and job searching counselors and seminars through our free [Career Services Center](#)
- More than 20 academic centers and institutes that foster research in end-of-life care, ethics, neuroscience, rehabilitation engineering, transnational justice, water quality, sports law and others
- Access to more than 1.7 million volumes of books and bound journals, 22,000 journals and other serials in digital format, laptops for checkout, and extensive special collections ([Raynor Memorial Libraries](#) are open evenings and weekends)
- Access to a secure high-speed wireless network (54Mbps) for laptops and other devices
- Remote computer access to campus-only resources through our VPN
- [Student Health Service](#), [Counseling Center](#) and [Campus Ministry](#)
- [Sports recreation](#) and fitness facilities
- [Big East Conference sports](#), including men's basketball, which has 27 NCAA appearances, 14 Sweet Sixteen appearances, three Final Four appearances and one NCAA championship (1977) and plays in front of 18,000 fans at the Bradley Center

Milwaukee

- The Milwaukee metropolitan area has approximately 1.7 million people, ranking among the top cities in the United States by population
- Home to 10 Fortune 500 company headquarters, including Harley-Davidson, Johnson Controls, Northwestern Mutual and Rockwell Automation
- Milwaukee offers many art and cultural opportunities, including a [repertory theatre](#), a [symphony orchestra](#), two opera companies, a [ballet company](#), diverse art galleries, a [public museum](#), the [Milwaukee County Zoo](#) and the [Milwaukee Art Museum](#)
- Professional sports include baseball ([Brewers](#)), basketball ([Bucks](#)), hockey ([Admirals](#)), soccer ([Wave](#)) and skating exhibitions at the [Pettit National Ice Center](#) (an Olympic training facility)
- Known as the city of festivals, Milwaukee has abundant celebrations throughout the year honoring the city's diverse heritage, including [Summerfest](#) — the world's largest outdoor music festival
- More than 10 miles of lakefront, 1,500 restaurants and 15,000 acres of parks



The professors are approachable and available when you need help. They strive to explain concepts so you can understand them and apply them in real-world situations. Small class sizes allow the professors to know each person and address each more individually. Marquette's graduate engineering program was a wonderful experience for me."

Julie Thomas, Eng '09, Grad '10
Design engineer
Westbrook Associated Engineering Inc.
Spring Green, Wis.

YOUR INVESTMENT

Furthering your education is an investment you can count on. Financial aid — in several forms — can help meet the costs of your graduate education at Marquette.

Tuition*

For full-time students:

Nine credit hours per semester at \$945 per credit = \$8,505 per semester

For part-time students:

Three to six credits per semester at \$945 per credit = \$2,835 to \$5,670 per semester

* Figures are based on average credit hours taken per semester and exclude service fees and/or continuous enrollment/continuation course fees. Per-credit cost valid until May 2012.

Merit-based aid

Students with promising credentials have an opportunity to receive significant amounts of financial aid in the form of research and teaching assistantships, tuition scholarships, and fellowships.

Need-based aid

Enroll as a half- or full-time student in a degree program (at least four credit hours, usually two or more classes a semester), and you may be eligible for loans distributed through the [Office of Student Financial Aid](#). Most student loans have competitive interest rates and do not require repayment until after you complete your course of study.

To apply, file the Free Application for Federal Student Aid each year between January 1 and mid-February. It's available from the [Office of Student Financial Aid](#) or at fafsa.ed.gov. Once you have been admitted to your program and completed your financial aid paperwork, we will determine your eligibility and send you a notice explaining what financial aid you are eligible to receive from the university.

Additional resources

- Marquette offers a convenient payment plan that divides tuition costs into monthly installments. For more information, visit marquette.edu/mucentral or contact Marquette Central at (414) 288-4000.
- Employment assistance is available.
- Private lenders feature special educational loans.
- Your employer may offer a tuition-remission plan.
- Some private foundations offer financial aid for graduate study.
- Tax deductions and/or credits can be claimed for work-related educational expenses.

YOUR OPPORTUNITIES

You'll find our graduates working at government facilities or private companies or as faculty members or continuing their education at prestigious universities throughout the United States and abroad. The need for qualified civil and environmental engineers is strong — and will remain strong — as an increasing population places ever-higher demands on our aging infrastructure. More environmental engineers will be needed to help companies comply with ever-changing regulations and develop methods of remediating and preventing environmental hazards. You'll find our recent graduates ...

excelling in industry at:

- Brown and Caldwell in Walnut Creek, Calif.
- CDM in Cambridge, Mass.
- CH2M Hill in Seattle
- Department of Transportation in Green Bay, Wis.
- Harley-Davidson in Milwaukee
- Hey and Associates Inc. in Chicago
- Read Jones Christoffersen Ltd. in Calgary, Alberta, Canada
- Sargent and Lundy in Chicago
- Spann & Associates LLC in Milwaukee
- Thornton Tomasetti in Chicago

and excelling in academia at:

- Arizona State University
- Damascus University in Syria
- Louisiana State University in Baton Rouge, La.
- Middle East Technical University in Ankara, Turkey
- Southern University and A&M College in Baton Rouge, La.
- Wentworth Institute of Technology in Boston



Marquette's civil engineering graduate program provides the depth and breadth in engineering education required to be a leader in today's structural engineering field. From tall to supertall 100-plus-story skyscrapers in the Middle East and Asia to the 2,000-foot-tall Chicago Spire in the United States, Marquette graduates at Thornton Tomasetti have contributed to the design of many of the buildings that have redefined the state of the art in structural engineering."

John L. Peronto, S.E., P.E., S.E.C.B., L.E.E.D. A.P., Grad '03
Project engineer
Thornton Tomasetti
Chicago

YOUR FIRST STEP

We invite you to apply.

Application requirement checklist:

- Online application at marquette.edu/grad/apply (must be submitted online before any additional admission materials)
- Application fee
- Official transcripts from all current and previous colleges/universities except Marquette
- Three letters of recommendation
- (Doctoral applicants only) Statement of purpose
- (Doctoral applicants only) Submission of any English-language publications authored by applicant, including master's thesis (submission of publications is optional but strongly recommended)
- (All doctoral and international applicants and master's applicants with undergraduate GPAs less than 3.0) GRE scores (general test only)
- (International applicants only) TOEFL score or other acceptable proof of English proficiency
- If necessary, submit any additional hard-copy materials in one envelope to:

Marquette University Graduate School
P.O. Box 1881
Milwaukee, WI 53201-1881



We invite you to speak with a faculty member.

Dr. Stephen M. Heinrich

Professor and director of graduate studies
P.O. Box 1881
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Phone: (414) 288-5466
Fax: (414) 288-7521
E-mail: stephen.heinrich@marquette.edu





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