Civil and Environmental Engineering

Department Information

- **Interim Department Chair:**
  Achintya Bezbaruah, Ph.D.
- **Graduate Program Coordinator:**
  Kalpana Katti, Ph.D.
- **Department Location:**
  201 Civil and Industrial Engineering Bldg.
- **Department Phone:**
  (701) 231-7244
- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Application Deadline:**
  February 15 for fall admission; September 15 for spring admission
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

Programs

The Department of Civil, Construction and Environmental Engineering (CCEE) offers the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in civil engineering, and the Master of Science (M.S.) degree in environmental engineering. Also, the College of Engineering offers a program leading to a Ph.D. degree in engineering, in which civil engineering is an area of specialization. The department also participates in several interdisciplinary programs such as Environmental and Conservation Sciences, Materials & Nanotechnology, and Transportation and Logistics.

Specialty areas in the M.S. and Ph.D. degrees in civil engineering include construction, environmental, geotechnical, materials, structural, transportation, and water resources engineering. Other related areas are also accommodated. The academic and research foci are tailored to individual needs and interests. To complement the major area of study, additional courses are often selected from other disciplines. The programs are designed to advance the technical knowledge, competence, and interdisciplinary understanding of the students and to prepare them for entering or advancing within the civil engineering profession.

Application to the Civil Engineering and Environmental Engineering programs is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School admission requirements, the applicant must have adequate preparation in civil engineering. A Master's degree in civil engineering is preferred for applicants to the Ph.D. program.

Financial Assistance

Research and/or teaching assistantships may be available. Applicants are considered based on scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference (and English test results for international applicants) must be submitted to the Graduate School.

For teaching assistantships, refer to the English tests and additional requirements for eligibility (https://catalog.ndsu.edu/graduate/admission-information/#internationalapplicantstext)

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Master of Science

The Master of Science degree is a Plan A - Master's Thesis option. This format emphasizes research, the ability to analyze and interpret data, and to prepare a scholarly thesis. The student and adviser develop a program of study consisting of at least 30 credit hours of graduate level material to meet individual educational goals. A cumulative GPA of 3.0 or better is required. An oral defense of the research-based thesis is required.

Accelerated Master's Program

Curriculum for the Accelerated (4+1) program

Code	Title	Credits
***Required Courses**		**12**
Management/Business/Communication		5
MGMT 630	Leadership in Organization	
CE 740	(**)	
CE 757	Pavement Evaluation and Rehabilitation (**)	
CM&E 603	Scheduling and Project Control	
CM&E 660	Infrastructure Management	
COMM 711	Communication Theory	
COMM 782	Theories of Persuasion	
MIS 770	Information Resources Management	
NRM 702	Natural Resources Management Planning	
Engineering Tool		6
CE 641	Finite Element Analysis	
CE 739	Computational Methods for Engineering (**)	
ENGR 729	Machine Learning for Engineers	
GEOG 665	Remote Sensing of the Environment	
IME 661	Quality Assurance and Control	
IME 662	Total Quality In Industrial Management	
IME 663	Reliability Engineering	
IME 765	Data Analysis	
ME 711	Advanced Engineering Analysis	
STAT 661	Applied Regression Models	
STAT 726	Applied Regression and Analysis of Variance	
CE 790	Graduate Seminar	1
CE 798	Master's Thesis	6
***Focus Area Courses - Select at least 12 credits from one of the following focus areas.**		**12**
Focus Area 1 - Civil Infrastructure		
Structure		
CE 611	Design of Pre-stressed Concrete	2
CE 625	Bridge Evaluation and Rehabilitation	3
CE 630	Timber and Form Design	3
CE 645	Advanced Steel Design	2
CE 646	Basic Dynamics of Structures	3
CE 647	Stability of Structures	3
CE 720	Continuum Mechanics	3
CE 793	Individual Study/Tutorial (Deep Learning for Engineers)	2
CM&E 665	Bridge Engineering and Management	3
Transportation		
CE 619	Pavement Design	3
CE 652	Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance	3
CE 654	Geometric Highway Design	3
CE 656	Railroad Planning and Design	3
CE 782	Introduction to Intelligent Infrastructure	3
Geotechnical		
CE 617	Slope Stability and Retaining Walls	3
CE 661	Foundation Engineering	3
CE 662	Designing with Geosynthetics	2
CE 663	Geotechnical Earthquake Engineering	3

CE 664	Advanced Soil Mechanics	2
Focus Area 2 - Water Environmental		
Environmental		
CE 610	Water & Wastewater Engineering	3
CE 671	Environmental Nanotechnology	3
CE 672	Solid and Hazardous Waste Management	3
CE 673	Air Pollution	3
CE 679	Advanced Water and Wastewater Treatment	3
CE 790	Graduate Seminar (Small Community Water Supply and Sanitation)	3
CE 696	Special Topics (Environmental Engineering Design)	3
Water Resources		
CE 621	Open Channel Flow	3
CE 674	Groundwater Sustainability Design	3
CE 676	Watershed Modeling	3
CE 677	Applied Hydrology	3
CE 776	Ground Water and Seepage	3
CE 793	Individual Study/Tutorial (Advanced Fluid Mechanics)	3

* The above course list will be updated as new courses are considered or to be offered.
** Courses can be taken either in Category A or B but cannot be double counted.
*** Courses to be developed when the program starts.

Doctor of Philosophy

The Doctor of Philosophy degree requires 90 credits beyond the baccalaureate degree in civil engineering with a cumulative GPA of 3.0 or higher (60 credits beyond an M.S. degree in Civil Engineering or a sub-area of Civil Engineering) for graduation. A dissertation supervisory committee should be formed and a plan of study be filed by the end of first year of study. A minimum of 30 hours of additional course work chosen by the student and the supervisory committee from appropriate existing Civil Engineering graduate courses, new courses, and courses outside the department must be completed.

An M.S. degree from another institution may substitute for up to 30 credits of the 90 credits required; however, suitability of transfer or use of courses and research credits in the plan of study would be decided by the adviser and supervisory committee.

A comprehensive preliminary examination is administered after completion of the greater portion of the course work. The committee chair will coordinate the examination. The format and duration will be determined by the committee. The student will present a research proposal within one year after the preliminary examination. A minimum of 30 and a maximum of 40 credit hours can be earned for research, preparation, and defense of a dissertation in Civil Engineering. A minimum of 12 credit hours in a minor or cognate area as deemed appropriate by the student and the supervisory committee may be completed by the student. The student will defend the dissertation in a final examination attended by the supervisory committee members and other academics.

FACULTY

Achintya N. Bezbaruah, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Environmental Sensors, Recalcitrant and Micro Pollutants, Contaminant Fate and Transport, Small Community Water and Wastewater Treatment, Environmental Management

Xuefeng Chu, Ph.D.
University of California, Davis, 2002
Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Surya Congress, Ph.D.
University of Texas at Arlington, 2018
Research Interests: Transportation Infrastructure, Design and Stabilization of Geo-Materials, Sustainable and Resilient Infrastructure Design and Monitoring, Site Characterization and Visualization Models, Slope Stabilization, Dam and Bridge Inspections, Airport Pavement Inspections, Artificial Intelligence, Image Analysis, Digital Twins, Disaster Response, Traffic Safety, and Smart City Concepts.

Ying Huang, Ph.D.
Missouri University of Science & Technology, 2012

Research Interests: Structural Health Monitoring/Smart Structures for Transportation Infrastructure, Intelligent Transportation Systems, Applications of Adaptive and Smart Materials, Finite Element Modeling and Multi-Hazard Assessment and Mitigation

Syeed Md Iskander, Ph.D.
Virginia Polytechnic Institute and State University, 2019
Research Interests: Sustainable Waste Management: Food Waste Treatment, Landfill Leachate Treatment, Environmental Health: Disinfection Byproducts, Antibiotic Resistance Genes, Microplastics, Water-Energy Nexus: Desalination, Membrane Fabrication, Advanced Oxidation, Environmental Biotechnology: Anaerobic Biotechnology, Bioelectrochemical Systems

Dinesh Katti, Ph.D., P.E.
University of Arizona, 1991
Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bio-nanocomposites. Computational Biophysics

Kalpana Katti, Ph.D.
(Graduate Coordinator)
University of Washington, 1996
Research Interests: Advanced Composites, Nanomaterials, Biomaterials, Biomimetics, Materials Characterization and Modeling, Analytical Electron Microscopy, and Microspectroscopy, Bone Tissue engineering

Trung B. Le, Ph.D.
University of Minnesota
Research Interests: Hydraulics, Fluid Mechanics, Numerical Methods for Fluid-Structure Interaction

Zhibin Lin, Ph.D., P.E.
University of Wisconsin, 2010
Research Interests: Advanced Materials, High-Performance, Resilient and Sustainable Bridge Systems, Structural Durability and Structural Health Monitoring in Bridges and Earthquake Engineering

Kelly Rusch, Ph.D., P.E.
Louisiana State University, 1992
Research Interests: Microbial System Design and Modeling, Biofuels and Bioproducts, Engineering Education Research, Aquaculture Engineering, and Water and Wastewater Treatment.

David R. Steward, Ph.D., P.E., PG, F.ASCE
University of Minnesota
Research Interests: Engineering Mathematical and Computational Methods, Groundwater Flow and Analysis, Interdisciplinary Water Resources: Water and Society

Wenjie Xia, Ph.D.
Northwestern University, 2016
Research Interests: Multiscale Modeling of Structural Materials, Polymer and Nanocomposites, Granular and Soft Matters, Bioinspired Materials, Mechanobiology, Computational Mechanics, Data-Enabled Design of Multifunctional Materials

Jiale Xu, Ph.D.
State University of New York at Buffalo, 2020
Research Interests: Wastewater and Water Treatment, Wastewater Reuse, Photochemical Processes, Electrochemical and Membrane Technologies, and Disinfection Byproducts

Mijia Yang, Ph.D., P.E.
University of Akron, 2006
China University of Mining and Technology, 1999
Research Interests: Advanced Materials, Structural Assessment, Solid Mechanics

Adjunct & Emeritus

Ravi Kiran Yellavajjala, Ph.D. P.E. (adjunct)
University of Notre Dame, 2014
Interests: Experimental and Theoretical Mechanics, Constitutive Modeling of Materials, Numerical Methods, Sensitivity Analysis of Structural Response, Forensic Failure Analysis and Advanced Visualization Techniques.

Eakalak Khan, Ph.D. (adjunct)
University of California, Los Angeles, 1997
Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Denver D. Tolliver, Ph.D. (adjunct)

Virginia Polytechnic University, 1989
Research Interests: Transportation, Planning and Economics

Robert Zimmerman, Ph.D. (adjunct)
North Dakota State University, 1991
Research Interests: Water and Wastewater Treatment, Solid Waste

G. Padmanabhan, Ph.D. (emeritus)
Purdue University, 1980
Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling