

Graduate Tracks

STRUCTURAL ENGINEERING

Structural engineers plan, analyze, and design a wide variety of large-scale structures, including bridges, buildings, transmission towers and space structures. Structural engineers incorporate various materials in their designs, such as steel, concrete, timber, and composites. They need to understand the mechanical, thermal, elastic, and nonlinear properties associated with these materials. Structural engineers also estimate strength, as well as deflection and acceleration response of structures under extreme loads and environmental factors, such as wind, earthquakes, temperature, and vibrations.

Research

Research activities aim to understand the behavior of materials, structures and systems, and to improve the structural response and design process under extreme loads, such as earthquakes, using advanced computational methods or test data. Specific topics and research expertise of each faculty member are listed below.

Faculty

Hojjat Adeli, Professor, PhD, Stanford University (artificial intelligence, computational intelligence, computer-aided design, optimization, earthquake engineering and structural dynamics, bridge engineering, high-performance computing, smart and sustainable structures, vibration control of structures, signal processing and wavelets, health monitoring of structures, intelligent transportation systems, design-build integration, construction automation, computational neuroscience and neurology, signal processing of brain signals, computer-aided diagnosis of neurological and psychiatric disorders). E-mail: adeli.1@osu.edu.

Natassia Brenkus, Assistant Professor, PhD, University of Florida (bridge engineering; structural design codes and construction methodologies; prestressed and post-tensioned concrete design and repair; large-scale experimental structural evaluation) Email: brenkus.4@osu.edu.

Lisa Burris, Professor, PhD, University of Texas at Austin (concrete durability including testing and remediation of ASR, sulfate attack, salt crystallization damaged, carbonation, chloride diffusivity, and corrosion of reinforcing bars; understanding and optimization of cement hydration; synthesis and testing of novel cementitious materials and characterization of supplementary cementitious materials; use of non destructive test methods to evaluate concrete quality; life cycle analysis of concrete; modeling of concrete durability). E-mail: burris.189@osu.edu.

Tarunjit Butalia, Research Associate Professor, PhD, The Ohio State University, PE (engineering characterization including numerical modeling, laboratory, and field-scale testing, and beneficial use of natural and synthetic materials in sustainable engineered structures; coal combustion and other industrial by-products; structural composites for aerospace and civil infrastructure rehabilitation; computational and soil mechanics; geotechnical engineering; structural dynamics) E-mail: butalia.1@osu.edu; Webpage: <https://ccp.osu.edu>.

Nan Hu, Assistant Professor, PhD, Michigan State University (structural design and analysis; structural mechanics; buckling and instability; smart materials and structures; biomimetics; the art and history of structures; fiber-reinforced composites; bridge engineering; sustainability). E-mail: hu.1773@osu.edu; Webpage: <http://u.osu.edu/hu.1773/>.

Halil Sezen, Professor, PhD, University of California, Berkeley (modeling, analysis and design of structures and their components; dynamic response and collapse of buildings; reinforced and prestressed concrete design, earthquake engineering and structural dynamics; evaluation and rehabilitation of buildings and bridges; nonlinear structural analysis; sustainable structural design; seismic evaluation; structural design codes; and structural performance of non-building structures under extreme loads) E-mail: sezen.1@osu.edu.

Abdollah Shafieezadeh, Assistant Professor, PhD, Georgia Institute of Technology (performance assessment of geo-structures such as bridges, wharves, levees and floodwalls, and transmission towers against extreme hazards of earthquakes, hurricanes, and storm surge; reliability evaluation of deteriorating reinforced and prestressed concrete structures; seismic soil-structure interaction analysis; optimal maintenance policies for infrastructure systems; seismic control of nonlinear structures; reliability and hazard resilience assessment of networked infrastructure systems) E-mail: shafieezadeh.1@osu.edu; Webpage: <http://ramsis.engineering.osu.edu>.

Facilities

The department maintains specialized computational facilities to address the needs of our programs. The facilities are under the auspices of the College of Engineering and consist of several computer laboratories. Students have 24-hour, 7-days-a-week keycard access. Some are available on a walk-in basis; others provide studio settings for advanced users. At least 50 software packages are available, including the SAP2000, ANSYS, ABAQUS, AutoCAD, various GIS and image processing packages. The University also provides an environment that gives students access to a variety of computer resources on campus, in Ohio, and on the Internet.

Academic Program

Master of Science (MS) Program. Two types of MS programs are offered: thesis and non-thesis. The thesis option requires 30 graduate credit hours, including 6 credit hours for research and thesis. The non-thesis option requires 33 graduate credit hours. A minimum of 6 credit hours of coursework to develop depth in structural engineering is to be selected from the current Graduate Committee-approved Table A listing. A minimum of 6 credit hours of coursework to develop breadth in structural engineering is to be selected from Table B. At least 3 credit hours of mathematics or statistics is also required.

Doctoral Degree (PhD) Program. The PhD degree requires 80 graduate credit hours, including 30 credit hours for research and dissertation. A minimum of 12 credit hours of structural engineering coursework (Table A) is required. An additional 8 credit hours of courses from Table B are also required.

Funding

Funding is available to support graduate education through Graduate Research Assistantships (GRAs), Graduate Teaching Assistantships (GTAs), University and Department Fellowships, and other sources. Prospective students are encouraged to contact faculty in their area of interest to inquire about funding opportunities.

Course Offerings

TABLE A	Title	Credits
CIVILEN 5168	Introduction to Finite Element Method	3
CIVILEN 5310	Matrix Structural Analysis	3
CIVILEN 5320	Intermediate Structural Steel Design	3
CIVILEN 5350	Intermediate Reinforced Concrete Design	3
CIVILEN 5360	Bridge Engineering	3
CIVILEN 5370	Prestressed Concrete Design	3
CIVILEN 7330	Earthquake Engineering	3
CIVILEN 7332	Advanced Behavior and Design of Metal Structures	3
CIVILEN 7350	Advanced Reinforced Concrete	3
TABLE B		
CIVILEN 5390	Knowledge-Based Systems in Engineering	2
CIVILEN 5561	Principles of Soil and Rock Mechanics	3
CIVILEN 5571	Principles of Foundation Analysis and Design	3
CIVILEN 8810	Construction Intelligent System and Simulation I	3
CONSYSM 5670	Green Building and Sustainable Construction	3
CSE 5243	Introduction to Data Mining	3
CSE 5249	Intermediate Studies in Databases	3
CSE 5361	Numerical Methods	3
CSE 5441	Introduction to Parallel Computing	3
CSE 5521	Survey of Artificial Intelligence I: Basic Techniques	3
CSE 5523	Machine Learning and Statistical Pattern Recognition	3
CSE 5526	Introduction to Neural Networks	3
CSE 5531	Introduction to Cognitive Science	3
CSE 6441	Parallel Computing	3
CSE 6449	Advanced Studies in Parallel Computing	3
CSE 6539	Advanced Studies in Artificial Intelligence	3
ECE 5551	State-Space Control Systems	3
ECE 6200	Signal Processing	3
ECE 6202	Stochastic Signal Processing	3
ECE 7854	Nonlinear and Adaptive Control	3
ECE 7858	Intelligent Control	3
ECE 7868	Pattern Recognition and Machine Learning	3
ISE 5200	Linear Optimization	3
ISE 5850	Operations Research Models and Methods	3
ISE 6200	Fundamentals of Optimization	3
ISE 6210	Integer Optimization	3
ISE 7200	Algorithms for Nonlinear Optimization	3
ISE 7210	Large Scale Optimization	3

MATH 6251	Theory of Probability I	3
MECHENG 5134	Introduction to Vibrations of Deformable Solids	3
MECHENG 5139	Applied Finite Element Method	3
MECHENG 5374	Smart Materials and Intelligent Systems	3
MECHENG 7040	Elasticity	3
MECHENG 7100	Introduction to Continuum Mechanics	3
MECHENG 7101	Constitutive Models in Continuum Mechanics	4
MECHENG 7163	Advanced Strength of Materials for Design	3
MECHENG 7250	Vibration of Discrete Systems	3
MECHENG 8038	Advanced Topics in Finite Element Method	2
MECHENG 8042	Nonlinear Finite Element Method	2
STAT 6450	Applied Regression Analysis	4
STAT 6520	Applied Statistical Analysis with Missing Data	3
STAT 6550	Statistical Analysis of Time Series	2
STAT 6560	Applied Multivariate Analysis	3
MATH (MS only)	Students pursuing an MS in the Structural Engineering track will consult	

Graduate Applications: To be considered for admission, you must first apply to the University. Applications are available at <http://gpadmissions.osu.edu/apply/grad.html>. For additional information, contact Mary Leist, leist.48@osu.edu, 614/ 292-2005.