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### Engineering

The College of Engineering, Computing, Technology, and Mathematics offers an interdisciplinary Doctor of Philosophy (Ph.D.) in Engineering Science at the college level. This program supports a cooperative program with SIU Edwardsville. To support graduate programs, the College has well equipped laboratories and computer facilities that are housed in a modern engineering complex. Additional research opportunities and funding are provided through the Advanced Energy Institute, the Materials Technology Center, and the Office of Sponsored Projects Administration.

For information on additional doctoral degrees offered in the college, refer to the program pages for:

- Computer Science
- Electrical and Computer Engineering
- Mathematics

### Doctor of Philosophy (Ph.D.) in Engineering Science

The Doctor of Philosophy degree in Engineering Science is available for five concentrations:

#### Civil and Environmental Engineering Concentration

Course offerings and research activities include: water and wastewater treatments, hazardous and industrial waste treatment, geotechnical and geoenvironmental engineering, hydrologic and hydraulic engineering, sediment transport, water resources engineering, steel and concrete design, structural analysis, seismic design and analysis, and engineering materials.

#### Electrical and Computer Engineering Concentration

Course offerings and research activities include antennas, circuits and systems theory, electromagnetics, robust and adaptive control, robotics, embedded control, MEMS, nanoelectronics, energy conversion, power systems, power electronics, pattern recognition, image processing, biomedical engineering, neural networks, optical computing, stochastic modeling, wireless communications, detection and estimation theory, communication networks, mobile ad hoc networks, sensor networks, digital systems, programmable ASICs design, bioengineering, computer architecture, CMOS VLSI, fault tolerance, mixed signal testing and design, low power system design, hardware/software co-design, synthesis and verification of digital systems, physical design automation, and VLSI testing.

#### Industrial and Quality Engineering Concentration

Course offerings and research activities include: quality assurance, statistical process control, six sigma, lean enterprise, service quality, reliability analysis, quality function deployment, design of experiments, project management, human safety, risk management, management of information technology resources, energy management and conservation.

#### Mechanical Engineering and Energy Processes Concentration

Course offerings and research activities include: mechanics, mechanical systems, fractional calculus and their applications, fluid/thermal systems, material and chemical systems, air pollution control, mass and

heat transfer, coal conversion, electrochemical processes, catalysis, thermal science, thermal systems design, combustion, internal combustion engines, chemical and biochemical processes, dynamics and vibrations, mechanical systems control, computational modeling and simulations, composite materials and ceramics, tribology, and micro- and nano-technology, electro-hydrodynamics, computational multiphase flow and heat transfer, microfluidics, bio-fluidics, CFD, computations of phase change phenomena and capillary driven flows.

## **Mining and Mineral Resources Engineering Concentration**

Course offerings and research activities in this area of concentration include: rock mechanics and ground control, geological engineering, mineral and coal processing, surface and underground mining systems performance optimization, mine design innovative mining systems, surface mine reclamation, in-situ mining, mine environment and ventilation, coal mine dust control, coal bed methane reservoir engineering, carbon dioxide sequestration, and coal combustion byproduct utilization and management.

## **Cooperative Ph.D. Program**

The College of Engineering, Computing, Technology, and Mathematics at SIU-Carbondale and SIU-Edwardsville have entered into a cooperative Ph.D. program in Engineering Science which enables students to do work on both campuses. Additional information may be obtained at <https://siue.edu/engineering/programs-departments/doctoral.shtml>.

## **Admission and Retention**

Admission to the doctoral program requires a master's degree in engineering or its equivalent. Applicants for the doctoral degree in Engineering Science must meet Graduate School admission requirements and be approved by the college graduate studies committee. This program requires a \$65 application fee that must be submitted with the application for Admission to Graduate Study in Engineering Science.

In addition to Graduate School and other college requirements, the committee ordinarily requires a grade point average of 3.25 (4 point scale) in graduate level work. Applicants are required to submit GRE scores in support of their application for admission. Except for persons from English-speaking countries, international students are required to have a minimum TOEFL score of 550 (paper score) or 213 (computer score) or 80 (internet score) or an IELTS score of 6.5 or higher for admission.

Admission to the doctoral program also requires the identification of an initial graduate adviser for each student. For students seeking admission to the Cooperative Ph.D. in Engineering Science Program, both an initial SIU-Edwardsville advisor along with an initial SIU-Carbondale co-advisor must be identified. This advisor will be responsible with the student for planning the student's course work. The college graduate studies committee will be kept informed of the student's program of study.

Retention is governed by the rules of the Graduate School. Students should avoid the accumulation of incomplete grades. No student with more than two incomplete grades can be awarded a graduate assistant appointment, and a student holding a graduate assistant appointment is subject to having the appointment terminated upon acquiring two or more incomplete grades.

## **Accelerated Entry**

After at least two semesters in residence in an engineering M.S. program and after completing a minimum of 18 credit hours of approved coursework with a minimum GPA of 3.75, a student may request for an accelerated entry into the Ph.D. in Engineering Science program. Such entry is permitted only to superior students who have exhibited evidence that they are prepared to begin the research activities of doctoral-level study. In addition, the student must have GRE scores that are at or above the 50th percentile for both verbal component and analytical essay component and 80th percentile for the quantitative component or a combined total percentile score of 180 or higher. In case of a domestic student, an undergraduate GPA of 3.5 or higher is also a requirement. For an international student, a TOEFL score of 550 (paper score) or an IBT score of 80 or an IELTS score of 6.5 is an additional requirement. In exceptional cases, to substitute for the abovementioned GRE and TOEFL score requirements, the student's current faculty advisor, with the approval of the school director, may submit a letter of recommendation for their student's accelerated entry into the Ph.D. in Engineering Science program.

The student, having an accelerated entry into the Ph.D. in Engineering Science program, may not write a M.S. Thesis. In addition, six credit hours of course work of 500-level completed prior to his/her entry into the Ph.D. in Engineering Science program may be counted toward the Ph.D. course requirement. In the rare event that the student getting an accelerated entry into the Ph.D. in Engineering Science program fails to pass the Ph.D. qualifying exam in two attempts, they will be allowed to complete a M.S. degree in their respective discipline.

## Curriculum

A minimum of 26 credit hours of course work, including two credit hours of seminar, and 24 credit hours of dissertation research is required. The course work must be completed in two areas: area of concentration and program core. A student must complete a minimum of 15 credit hours of course work relevant to an area of concentration. The course work in the area of concentration is intended to provide depth in the student's area of research. The program core consists of 11 credit hours of course work. A dissertation must be completed in the student's area of research interest with the approval of the dissertation committee.

## Program Core

The program core consists of 11 credit hours of course work:

- Six credit hours in math
- Three credit hours in engineering or science
- Two credit hours of seminar

The math courses to choose from are: all 400 and 500, except MATH 400, MATH 411, MATH 412, MATH 480, MATH 483, MATH 511, MATH 513A-I, and MATH 516A, MATH 516B.

The engineering courses to choose from are: ENGR 530 Engineering Data Acquisition: Theory and Practice, ENGR 540 Design of Engineering Experiments, ENGR 545 Advanced Numerical Methods in Engineering, ENGR 521 Probability and Stochastic Processes for Engineers.

The science course could be any 400- or 500-level course in Computer Science, Physics, Chemistry, or Geology as approved by the student's advisor.

The seminar course, ENGR 580, must be taken in two separate semesters, each time as one credit hour course.

It is recommended that the seminar classes be taken after the initiation of doctoral research or after candidacy is granted. Guide for Core and Concentration Courses

- Only two 400-level courses (typically six credit hours) can be counted towards the minimum required 26 credit hours of course work.
- Special Investigation course can be taken under ENGR 590—Special Investigations in Engineering Science, and only three credit hours can be counted towards the minimum required 26 credit hours of course work.
- Transfer credit will normally be given for some of the graduate level courses suitable to the program upon review by the college Ph.D. in Engineering Science Committee. Proficiency examinations may be authorized by the committee for areas in which questions of transfer credit arise. No credit will be given for industrial experience. A maximum of six credit hours of course work can be transferred in all cases due to residency requirement, which states that every student must complete at least 24 credit hours of approved course work at SIU prior to taking the candidacy examination. Of the 24 credit hours of dissertation research (ENGR 600) only six credit hours can be completed before candidacy.
- A student transferring credits from a master's program must have earned those credits over and above the required course work to obtain the M.S. degree in their institution. Credit cannot be transferred from master degrees obtained from international institutions.

## Candidacy

A Ph.D. in Engineering Science student must satisfy all Graduate School requirements to become a candidate. Acceptance to Ph.D. in Engineering Science candidacy is contingent upon the completion of

all courses, excluding the seminar, with *A* or *B* grades and successful completion of a written and an oral examination in the student's area of concentration.

The examination in the area of concentration is organized and administered by the student's academic advisor. The candidacy examination committee consists of at least three faculty chosen by the advisor in consultation with the student. The committee has to be approved by the program director before it conducts the examination. Normally, the examination can be conducted at any time during the year when classes are in session. In the written examination, the student is tested in at least two major topics of the area of concentration with an appropriate number of questions prepared by the members of the student's candidacy committee. Each student has to score at least 70 percent in each major topic test in order to successfully complete the written part of the candidacy examination. If a student fails to pass any topic test of the written examination, a second chance is given for the failed topic test. If a student does not successfully complete the written examination after two attempts, he/she will not be accepted to candidacy in the Ph.D. in Engineering Science program. A student is qualified to take the oral examination only after successfully completing the written examination.

The oral examination is conducted within two weeks of the successful completion of the written examination. In the oral examination, the student is tested again in the area of concentration by the candidacy committee members. If a student fails to pass the oral examination in the first attempt, a second chance is given. If a student does not successfully complete the oral examination after two attempts, he/she will not be accepted to candidacy in the engineering science Ph.D. in Engineering Science program.

After the completion of the concentration examination, copies of the graded tests, along with signoff sheets for both the written and oral examinations are submitted to the director of the Ph.D. in Engineering Science program.

## Dissertation

A dissertation must be written under the direction or codirection of an engineering faculty member and approved by a dissertation committee consisting of a minimum of five members, one of whom must be from outside the College of Engineering, Computing, Technology, and Mathematics. For students enrolled in the cooperative Ph.D. in Engineering Science program, the committee will be made up of at least six members, three SIUC faculty members and three SIUE faculty members, with a chair from SIUE and a co-chair from SIUC.

The dissertation adviser must be chosen by the end of the student's first academic year. The dissertation committee should be formed after successful completion of the candidacy examination. The members of this committee need not be the same as the members of the candidacy examination committee.

A dissertation research proposal must be approved by the dissertation committee. Candidates will be required to present an acceptable dissertation describing original research performed with minimal supervision.

Dissertation approval is based on a successful oral defense of the dissertation research and approval of the dissertation. This requires approval of at least 80 percent of the dissertation committee.

## Graduation

1. All requirements of the Graduate School must be met.
2. A minimum of 26 credit hours of doctoral level course work must be completed with a minimum grade point average of 3.25.
3. An acceptable dissertation must be completed within five years after admission to candidacy or the student will be required to repeat the candidacy examinations.

## Engineering Courses

**ENGR521 - Probability and Stochastic Processes for Engineers** Axioms of probability, random variables and vectors, joint distributions, correlation, conditional statistics, sequences of random variables, stochastic convergence, central limit theorem, stochastic processes, stationarity, ergodicity,

spectral analysis, and Markov processes. Restricted to graduate student status. Project-based fee: \$20 to help defray cost of software licenses. Credit Hours: 3

**ENGR522 - Intellectual Property and Commercialization** (Same as BA 537, LAW 633) Course teaches substance & practice of commercializing products of scientific & technical research. Provides a basic understanding of intellectual property laws in commercialization context & how those laws are applied in various fields of technology. Will learn how to value intangible assets, taking into account their commercial potential & legal status. Course will consider the legal & business issues surrounding marketing of products of research. Will prepare & negotiate license agreements. Will analyze legal & business issues surrounding whether & how to enforce intellectual property rights. Content & methods of course delivery & evaluation has been approved for provision by distance education. Credit Hours: 3

**ENGR530 - Engineering Data Acquisition: Theory and Practice** (Same as ECE 530) Theory of data acquisition and measurement systems. Criteria for selection of data acquisition hardware and software, instruments, sensors and other components for scientific and engineering experimentation. Methods for sampled data acquisition, signal conditioning, interpretation, analysis, and error estimation. Lab fee: \$60 to help defray cost of software licenses and equipment. Credit Hours: 3

**ENGR540 - Design of Engineering Experiments** Planning of experiments for laboratory and field studies, factorial designs, factorial designs at two levels, fractional factorial designs, response surface methods, mixture designs. Prerequisite: MATH 483, or equivalent, or consent of instructor. Credit Hours: 3

**ENGR545 - Advanced Numerical Methods in Engineering** Engineering applications of linear and nonlinear equations, eigenvalue problems, interpolation and approximating functions and sets of data, numerical solutions of ordinary and partial differential equations. Prerequisite: ENGR 222 or equivalent, ENGR 351 or equivalent, and MATH 305 or consent of instructor. Credit Hours: 3

**ENGR580 - Seminar** Study and presentation of research topics from students' own specialty areas within engineering and science. Graded S/U only. Restricted to enrollment in the Ph.D. in engineering science program or consent of instructor. Credit Hours: 1

**ENGR590 - Special Investigations in Engineering Science** Investigation of individual advanced projects and problems selected by student or instructor. Restricted to admission into Ph.D. program in engineering science. Credit Hours: 1-3

**ENGR592 - Engineering Cooperative Education** Supervised work experience in industry, government or in a professional organization. Work must be directly related to student's program of study. Student works with on-site supervisor and faculty advisor. Activity report is required from the student and performance report is required from the employer. Enrollment requires Chair's approval. Hours do not count toward degree requirements. Mandatory Pass/Fail. Restricted to graduate standing. Credit Hours: 1-3

**ENGR593 - Special Topics in Engineering** Studies of various special topics in the area of engineering science. Special approval needed from the instructor. Credit Hours: 3

**ENGR600 - Doctoral Dissertation** Dissertation research. Hours and credit to be arranged by director of graduate studies. Graded S/U only. Restricted to admission to Ph.D. in engineering science program. Credit Hours: 1-16

**ENGR601 - Continuing Enrollment** For those graduate students who have not finished their degree programs and who are in the process of working on their dissertation, thesis, or research paper. The student must have completed a minimum of 24 hours of dissertation research, or the minimum thesis, or research hours before being eligible to register for this course. Concurrent enrollment in any other course is not permitted. Graded S/U or DEF only. Credit Hours: 1

**ENGR699 - Postdoctoral Research** Must be a Postdoctoral Fellow. Concurrent enrollment in any other course is not permitted. Credit Hours: 1

# Engineering Faculty

## Civil, Environmental, and Infrastructure Engineering Faculty

**Chevalier, Lizette R.**, Professor and Associate Provost for Academic Programs, Ph.D., Michigan State University, 1994; 1995. Environmental restoration of groundwater aquifers, experimental investigation of immiscible flow, and numerical modeling of subsurface transport.

**Fakhraei, Habibollah**, Assistant Professor, Ph.D., Syracuse University, 2016; 2019. Environmental engineering, environmental modeling, biogeochemistry, aquatic chemistry, water quality modeling, air pollution effects, GIS, geostatistical analysis, hydrology, numerical optimization.

**Hsiao, J. Kent**, Professor, Ph.D., University of Utah — Salt Lake City, 2000; 2001. Structural earthquake engineering, structural reliability, structural design of buildings and bridges using steel, reinforced or prestressed concrete, masonry, and wood.

**Kalra, Ajay**, Assistant Professor, Ph.D., University of Nevada, 2011; 2015. Hydraulics and water resources engineering, hydro-climatology, urban sustainability, water-energy-climate nexus, probabilistic forecasting and downscaling, surface water and groundwater interactions.

**Kassimali, Aslam**, Professor and Distinguished Teacher, Ph.D., University of Missouri, 1976; 1980. Structural engineering, nonlinear structural analysis, structural dynamics and stability.

**Kolay, Prabir**, Associate Professor, Ph. D., Indian Institute of Technology, IIT Bombay, 2001; 2010. Geotechnical engineering, soil stabilization, utilization of recycled concrete aggregate (RCA) and coal ash, unsaturated soil, thermal properties of soil, and numerical modeling.

**Kumar, Sanjeev**, Professor, Distinguished Teacher, Director, and Interim Associate Dean. Ph.D., University of Missouri Rolla, 1996; 1998. Dynamic soil-structure interaction, piles under lateral loads, settlement prediction of landfills, hydraulic conductivity of clay barriers, seismic analysis and design of landfills, ground motion amplification in soils, liquefaction of silts and sands and machine foundations.

**Liu, Jia**, Assistant Professor, Ph.D., University of Houston, 2014; 2015. Environmental engineering, renewable energy production, microbial fuel cell, water/wastewater treatment and groundwater/soil remediation, material development for energy safety and environmental pollution detection.

**Puri, Vijay K.**, Professor, Ph.D., University of Missouri-Rolla, 1984; 1986. Geotechnical engineering, soil dynamics, machine foundations, liquefaction of soils.

**Shams, Mehnaz**, Assistant Professor, Ph.D., Washington State University, 2019; 2020. Environmental engineering, fate and transport of emerging pollutant in surface water, plastic pollution and prevention, water/wastewater treatment, environmental chemistry, storm water management, electrochemical remediation.

**Tezcan, Jale**, Professor, Ph.D., Rice University, 2005; 2005. Non-linear structural behavior, neural networks In system identification and structural control, rehabilitation, and retrofitting of structures damaged by earthquakes.

**Warwick, John J.**, Professor, Ph.D., The Pennsylvania State University, 1983; 2011. Numerical modeling of the transport and fate of contaminants in surface water systems, impacts of nutrients on stream algal growth, transport of sediment and associated mercury in fluvial systems, and simulating the effects of non-point source pollutants on instream water quality.

## Electrical, Computer, and Biomedical Engineering Faculty

**Ahmed, Shaikh S.**, Professor, Ph.D., Arizona, 2005; 2007. Nanotechnology, semiconductor devices and circuit design, simulation and characterization.

**Anagnostopoulos, Iraklis**, Associate Professor, Ph.D., National Technical University of Athens, 2014; 2015. Many-core architectures, run-time resource management, embedded systems.

**Aruma Baduge, Gayan**, Associate Professor, University of Alberta, 2013; 2016. Communications theory, wireless communications, massive MIMO systems, millimeter-wave communications, cooperative relay networks, wireless energy harvesting for IoTs, physical-layer security.

**Asrari, Arash**, Assistant Professor, Ph.D., University of Central Florida, 2015; 2017. Power systems operation and planning, power systems optimization, smart grid.

**Chen, Kang**, Associate Professor, Ph.D., Clemson University, 2014; 2015. Software-defined networking (SDN), network function virtualization (NFV), vehicular networks, mobile opportunistic/ad hoc networks.

**Chen, Ying (Ada)**, Associate Professor, Ph.D., Duke, 2007; 2007. Biomedical imaging, image reconstruction, digital tomosynthesis, image quality analysis, signal and image processing, simulation and computing.

**Chilman, Bae**, Assistant Professor, Ph.D., Pennsylvania State University, 2009; 2019. Bioelectrical engineering, neuroscience, mechanobiology.

**Haniotakis, Themistoklis**, Associate Professor, Ph.D., University of Athens, 2008; 2013. Digital VLSI design and test, RF IC design and test, low power VLSI design, and fault-tolerant systems.

**Harackiewicz, Frances J.**, Professor, Ph.D., University of Massachusetts-Amherst, 1990; 1989. Electromagnetics, antenna theory and design, microwaves, microstrip phased arrays and anisotropic materials.

**Kagaris, Dimitrios**, Professor, Ph.D., Dartmouth College, 1994; 1995. VLSI design automation, digital circuit testing, communication networks.

**Komae, Arash**, Associate Professor, Ph.D., University of Maryland, College Park, 2008; 2015. Control systems, microrobotics, signal processing, estimation theory.

**Lu, Chao**, Associate Professor, Ph.D., Purdue University, 2012; 2015. VLSI system design, device-circuit co-design, 3D IC.

**Qin, Jun**, Associate Professor, Ph.D. Duke University, 2008; 2012. Sensors and instrumentation, data acquisition, medical devices, therapeutic ultrasound, haptics.

**Sayeh, Mohammad R.**, Professor, Ph.D., Oklahoma State University, 1985; 1986. Neural networks, optical computing, image processing, stochastic modeling, quantum electronics.

**Tragoudas, Spyros**, Professor and Director, Ph.D., University of Texas at Dallas, 1991; 1999. Design and test automation for VLSI, embedded systems, computer networks.

**Wang, Haibo**, Professor, Ph.D., University of Arizona, 2002; 2002. Mixed-signal VLSI design and testing, digital VLSI, VLSI design automation.

**Weng, Ning**, Professor, Ph.D., University of Massachusetts at Amherst, 2005; 2005. High performance routers, network processors, system-on-a-chip, computer architectures.

## **Mechanical, Aerospace, and Materials Engineering Faculty**

**Chowdhury, Farhan**, Associate Professor, Ph.D., University of Illinois at Urbana-Champaign, 2011; 2015. Biomedical Engineering, stem cell biology, regenerative medicine, biomedical and molecular mechanism of tumorigenic cancer cells.

**Chu, Tsuchin P.**, Professor, Interim Director, Ph.D., University of South Carolina, 1982; 1990. Non-destructive evaluation, biomedical engineering, FEA, carbon composites, CAD/CAM, machine vision, optical methods in experimental mechanics, image processing and analysis.

**Eslamiat, Hossein**, Assistant Professor, Mechanical Engineering, Ph.D., Syracuse University, 2020; 2020. Nonlinear dynamics, control and estimation for underactuated systems.

**Esmaeli, Asghar**, Professor, Ph.D., The University of Michigan, 1995; 2005 Large scale computations of multiphase flows, phase change phenomena, and electrohydrodynamics.

**Farhang, Kambiz**, Professor, Ph.D., Purdue University, 1989; 1990. CAD/CAM, controls, vibrations, kinematics, dynamics, control and stability of flexible and rigid-body mechanical, electromechanical, mechanical-drive systems; manufacturing processes and process control.

**Filip, Peter**, Professor, Ph.D., Technical University Ostrava, D.Sc., Academy of Sciences, Prague, Czech Republic, 1989. 1989; 1999. Materials science and engineering nanotechnology, friction science and applications, biomaterials, shape memory, alloys and advanced composite materials.

**Koc, Rasit**, Professor, Ph.D., Missouri University Science and Technology, 1989; 1994. Advanced materials and composites processing and characterization.

**Mathias, James A.**, Associate Professor, Ph.D., Ohio State University, 2001; 2003. Nanotechnology, microchannels, heat transfer, thermodynamics, energy utilization.

**Mondal, Kanchan**, Professor, Ph.D., SIUC, 2001; 2006. Electrochemistry, energy from coal, catalysis, reactor systems and design.

**Nilufar, Sabrina**, Assistant Professor, Ph.D., University of Illinois, Champaign, 2014. Advanced materials, composites and reinforced composite materials processing and characterization, phase transformation, corrosion resistance, and thermal and electrical properties for aerospace, military armors, cardiovascular stents application, and biomedical implants for orthopedic application.

**Nsofor, Emmanuel C.**, Professor, Ph.D., Mississippi State University, 1993; 1999. Heat transfer, advanced energy systems, renewable energy sources, computational fluid dynamics (CFD).

**Suni, Ian I.**, Professor and Director of the Materials Technology Center, Ph.D., Harvard University, 1992; 2013. Application of electrochemistry and electrochemical engineering to technology advancement in thin film growth and dissolution, including both photovoltaic thin films and ULSI materials, electrochemical biosensors, including the use of electrochemical impedance spectroscopy (EIS) for detecting antibody-antigen recognition, and nanotechnology, including the use of nanoporous template materials for alternative energy development and biosensing.

**Swift, Geoffrey**, Assistant Professor, Ph.D., California Institute of Technology, 2004; 2020. Advanced batteries and battery materials, mechanics of materials, ceramic materials.

## SIU Edwardsville Faculty

**Benjankar, Rohan**, Assistant Professor, Ph.D., University of Idaho, 2009. Water resources engineering and management: interaction between hydraulics, hydrology and ecosystems.

**Bouvier, Dennis J.**, Professor, Ph.D., University of Louisiana at Lafayette, 1994. Computer science education, cognitive tutoring, human computer interaction.

**Celik, Serdar**, Professor, Ph.D., Southern Illinois University Carbondale, 2007. Renewable energy, energy efficiency, green roofs, HVAC.

**Chen, Xin**, Assistant Professor, Ph.D., Purdue University, 2009. Operations research.

**Cho, Sohyung**, Professor, Ph.D., Pennsylvania State University, 2000. Manufacturing automation and integration, robotics, PC/PLC based control, CAD/CAM/CIM, machine vision, manufacturing system control and complexity analysis, production planning/scheduling, data mining/machine learning, system performance evaluation, biomanufacturing, automation of allograft machining, surgical skill assessment, cryogenics, design of special machines.

**Crk, Igor**, Associate Professor, Ph.D., University of Arizona in Tucson, 2010. Quantifying usability, energy management in interactive systems, distributed software engineering.

**Cross, Brad**, Professor, Ph.D., P.E., S.E., Johns Hopkins University, 1992. Structural engineering: historic preservation, earthquake engineering, structural dynamics, computational mechanics.

**Darabi, Jeff**, Professor, Ph.D., University of Maryland, 2000. MEMS and micro/nanofluidics, biomicrofluidics, nanoengineered energy and thermal systems, multiphysics modeling (coupled fluid, electromagnetic, and thermal fields).

**Engel, George L.**, Professor, D.Sc., Washington University, 1990. Analog and digital electronics, VLSI.

**Ercal, Gunes**, Associate Professor, Ph.D., University of California, Los Angeles, 2008. Graph theory, machine learning, complex networks.

**Fries, Ryan**, Professor, Ph.D., P.E., Clemson University, 2007. Transportation engineering: intelligent transportation systems.

**Fujinoki, Hiroshi**, Professor, Ph.D., University of Southern Florida, 2001. Network routing algorithms and protocols, application protocols over TCP/IP, multicast data transmissions, operating systems, graph theory.

**Gordon, Chris**, Professor and *Associate Dean*, Ph.D., Carnegie Mellon University, 2006. Construction engineering and management, construction automation, artificial intelligence.

**Gu, Keqin**, Professor, Ph.D. Georgia Institute of Technology, 1988. Robust control, robotics, and timed delayed systems, control of flexible structures, and nonlinear dynamic systems.

**Huang, Jianwei**, Associate Professor, Ph.D., Syracuse University, 2010. Structural engineering.

**Karacal, Cem**, Professor and Dean, Ph.D., Oklahoma State University, 1991. Operations research and optimization, quality assurance, computer simulation modeling and analysis.

**Ko, Hoo Sang**, Associate Professor, Ph.D., Purdue University, 2010. Data analytics and machine learning for intelligent systems, modeling and predictive control of artificial pancreas systems,



collaborative control of manufacturing & service systems with IT/IoT, statistics, design and analysis of experiments, and simulation.

**Kweon, Soondo**, Associate Professor, Ph.D., University of Illinois at Urbana-Champaign, 2009. Computational solid mechanics, crystal plasticity, ductile fracture, computational material science.

**LeAnder, Robert W.**, Associate Professor, Ph.D., University of Illinois at Chicago, 2002. Bioengineering systems.

**Lee, Heungsoon F.**, Professor, Ph.D., University of Michigan, 1989. Computer simulation & operations research, CAD/CAM/CAE and 3D modeling industrial applications, design and operation of advanced manufacturing systems, continuous quality improvements.

**Lozowski, Andy G.**, Professor, Ph.D., University of Louisville, 1999. Analog and digital electronics, power electronics.

**Luo, Albert**, Professor, Ph.D., University of ManitobaWinnipeg, 1996. Discontinuous discrete dynamical systems, periodic flows to chaos in time-delayed nonlinear systems, bifurcation trees of periodic flows to chaos in nonlinear systems, synchronization of dynamical systems, discontinuous dynamical system theory, internal resonant layers in nonlinear systems, a numerical approach for prediction of resonance in stochastic layer, an approximate theory of nonlinear plates, stochastic and resonant layer theory in nonlinear dynamic systems, continuum damage theory, generalized fractal theory.

**McKenney, Mark**, Associate Professor, Ph.D., University of Florida, 2008. Spatial modeling, geographical information systems, location based services, artificial intelligence, machine learning.

**Molki, Majid**, Professor, Ph.D., University of Minnesota, 1982. Computational fluid dynamics and heat transfer, electronics cooling.

**Morgan, Susan**, Professor, Ph.D., P.E., Clemson University, 1995. Environmental engineering, pollution prevention, waste management, green roofs.

**Noble, Brad**, Associate Professor, D.Sc., Washington University, 2000. Computers and networking.

**Onal, Sinan**, Associate Professor, Ph.D., University of South Florida, 2014. Medical image processing and its applications, medical product development, machine learning & data mining, computational biomechanics, and engineering education.

**Osouli, Abdolreza (Reza)**, Associate Professor, Ph.D., University of Illinois at Urbana-Champaign, 2009. Geotechnical engineering.

**Qi, Yan**, Associate Professor, Ph.D. Louisiana State University, 2010. Transportation engineering.

**Umbaugh, Scott E.**, Professor, Ph.D., University of Missouri Rolla, 1989. Computer vision, image processing.

**Wang, Fengxia**, Assistant Professor, Ph.D., Purdue University, 2008. Piezoelectric energy harvesting, nonlinear dynamics.

**Wang, Xin**, Associate Professor, Ph.D., Marquette University, 2011. Power systems, motors.

**Weinberg, Jerry B.**, Professor, Ph.D., Vanderbilt University, 1996. Conceptual clustering, human-computer interaction, human-robot interaction, mobile robotics, robotics in education, abductive reasoning.

**Werner, Anne**, Associate Professor, Ph.D., University of Illinois at Urbana-Champaign, 2004. Material science, construction materials, sustainability, sustainable materials, green building.

**Yan, Terry**, Professor, Ph.D., University of California at Davis, 1993. Experimental fluid mechanics and convective heat transfer, experimental techniques, turbulence measurements, numerical simulation of electronic cooling packages.

**York, Tim**, Associate Professor, Ph.D., Washington University, 2015. Analog and digital electronics, biomedical hardware.

**Yu, Xudong W.**, Associate Professor, Ph.D., Vanderbilt University, 1994. Integrated diagnostic systems, robotics, teachable agents, database and data warehouse, data mining and knowledge discovery.

**Zhou, Jianpeng (Jim)**, Professor, Ph.D., P.E., University of British Columbia, 2003. Wastewater treatment and process modeling, wastewater sludge treatment and biosolids management, green infrastructure for stormwater management, life cycle assessment.

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Last updated: 01/27/2022

**Southern Illinois University**

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**Catalog Year Statement:**

Students starting their collegiate training during the period of time covered by this catalog (see bottom of this page) are subject to the curricular requirements as specified herein. The requirements herein will extend for a seven calendar-year period from the date of entry for baccalaureate programs and three years for associate programs. Should the University change the course requirements contained herein subsequently, students are assured that necessary adjustments will be made so that no additional time is required of them.