



## College of Engineering

### Points of contact:

#### Dean

Dr. John Usher  
(251) 460-6140  
usher@southalabama.edu

#### Associate Dean, Research

Dr. Clive Woods  
(251) 460-6140  
rcwoods@southalabama.edu

#### Chemical and Biomolecular Engineering

Dr. Carl Knopf, Chair  
(251) 460-6160  
cknopf@southalabama.edu

#### Civil, Coastal, and Environmental Engineering

Dr. John Cleary, Interim  
Chair, (251) 460-6174  
cleary@southalabama.edu

#### Electrical and Computer Engineering

Dr. Hulya Kirkici, Chair  
(251) 460-6117  
hkirkici@southalabama.edu

#### Mechanical, Aerospace and Biomedical Engineering

Dr. Anh-Vu Phan,  
Interim Chair  
(251) 460-6168  
vphan@southalabama.edu

#### Systems Engineering

Dr. Robert Cloutier, Chair  
(251) 460-3996  
rcloutier@southalabama.edu

## University of South Alabama

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150 Student  
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Mobile, AL 36688

engineering@southalabama.edu

(251) 460 6140

# Engineering Research at the University of South Alabama

## Chemical and Biomolecular Engineering

### Dr. Grant Glover [glover@southalabama.edu](mailto:glover@southalabama.edu)

- Adsorbent materials including metal-organic frameworks (MOFs), carbons, and composites
- Fibers functionalized with nanostructures and quantum dots
- Surface chemistry

### Dr. Carl Knopf [cknopf@southalabama.edu](mailto:cknopf@southalabama.edu)

- Computer-aided process design
- Supercritical fluid processing
- Piston-driven/oscillatory mixing

### Dr. Silas Leavesley [leavesley@southalabama.edu](mailto:leavesley@southalabama.edu)

- Novel biomedical and clinical imaging and detection methods
- Illumination technologies in imaging
- Hyperspectral imaging and analysis
- Microscopy, endoscopy, and small-animal fluorescence imaging

### Dr. Brooks Rabideau [brabideau@southalabama.edu](mailto:brabideau@southalabama.edu)

- Predicting thermodynamic and transport properties of ionic liquids
- Molecular simulations of biomass dissolution
- Binary adsorption in metal-organic frameworks using molecular simulation
- Yield stress determination using squeezing flow
- Noninvasive imaging of paste extrusion using MRI velocimetry
- Self-assembly of nanoparticle superlattices

### Dr. Nicholas Sylvester [nsylvest@southalabama.edu](mailto:nsylvest@southalabama.edu)

- Microcontinuum fluid mechanics
- Multicomponent adsorption
- Solid-liquid mass transfer

### Dr. Sean Walker [seanwalker@southalabama.edu](mailto:seanwalker@southalabama.edu)

- Power-to-Gas for energy storage, utility ancillary services and support of hydrogen vehicle fleets
- Use of Power-to-Gas to generate synthetic natural gas from landfill gas and agricultural biogas
- Use of repurposed electric vehicle (EV) batteries for residential and commercial energy storage
- Applications of game theoretic models to environmental management decision making

### Dr. Christy Wheeler West [cwwest@southalabama.edu](mailto:cwwest@southalabama.edu)

- Effects of molecular scale environment on reactive chemical systems
- Behavior of reactive chemical systems
- Synthesis of efficient oxide-supported noble metal catalysts using supercritical fluid deposition
- Novel quaternary ammonium salts for phase-transfer catalysis and metal recovery

### Dr. Kevin West [kevinwest@southalabama.edu](mailto:kevinwest@southalabama.edu)

- Solution chemistry and molecular thermodynamics
- Ionic liquids and supercritical fluids
- Lipidic ionic liquids for separation of nonpolar species
- Supercritical fluids as solvents
- Synthesis methods for components of metal-organic frameworks (MOFs)



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# Engineering Research at the University of South Alabama Systems Engineering

### Dr. Robert Cloutier [rcloutier@southalabama.edu](mailto:rcloutier@southalabama.edu)

- Model-based systems engineering
- Model-based engineering
- Digital Thread/Digital Twin
- System Architecture Patterns
- Metaverse for systems engineering
- Graphical concept of operations (CONOPS)

### Dr. Kari Lippert [klippert@southalabama.edu](mailto:klippert@southalabama.edu)

- Metaverse for systems engineering
- Systems Engineering

### Dr. John Usher [usher@southalabama.edu](mailto:usher@southalabama.edu)

- Systems simulation, modeling and analysis
- Design and analysis of production systems
- Application of artificial intelligence in manufacturing
- Database design and development



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# Engineering Research at the University of South Alabama Civil, Coastal, and Environmental Engineering

### Dr. John Cleary [cleary@southalabama.edu](mailto:cleary@southalabama.edu)

- Post-disaster structural evaluation and investigation
- Forensic analysis, investigation, and evaluation
- Large and small scale structural testing (including in-service)
- Construction vibration evaluation and investigation
- Concrete testing, experimentation, and evaluation

### Dr. Samantha Islam [sislam@southalabama.edu](mailto:sislam@southalabama.edu)

- Transportation and infrastructure systems and planning
- Application of econometric and statistical methods to highway/traffic safety, traffic congestion, transportation economics
- Highway safety, application of highway safety manual
- Resilience in transportation systems
- Design and operation of roundabouts
- Application of intelligent transportation systems (ITSs)
- Traffic operations and control
- Hurricane evacuation

### Dr. Min-Wook Kang [mwkang@southalabama.edu](mailto:mwkang@southalabama.edu)

- Advanced traffic operations and congestion management
- Highway safety analysis and modeling
- Artificial Intelligence (AI) in transportation, geometric design, and optimization
- Driver behavior studies: distracted driving, fatigued driving, and dilemma zone

### Dr. Rebecca Macdonald [rmacdonald@southalabama.edu](mailto:rmacdonald@southalabama.edu)

- Construction management
- Forensic engineering

### Dr. Husam Omar [omarh@southalabama.edu](mailto:omarh@southalabama.edu)

- Durability of reinforced concrete structures
- Behavior of structures subjected to extreme wind forces
- Computer modeling of linear and non-linear structures
- Modeling of space and lunar structures

### Dr. Stephanie Patch [spatch@southalabama.edu](mailto:spatch@southalabama.edu)

- Coastal community resiliency
- Development and evaluation of adaptation strategies to sea-level rise
- Post-disaster structural and geotechnical evaluation
- High-resolution numerical modeling of coastal processes
- Coastal structures and their interaction with morphological changes during tropical cyclones
- Engineering education and citizen science

### Dr. Danny J. Smyl [dsmysl@southalabama.edu](mailto:dsmysl@southalabama.edu)

- Nondestructive evaluation and structural health monitoring
- Smart materials and structures
- Characterization of concrete and novel civil infrastructure materials
- Inverse problems and AI in engineering and medical imaging

### Dr. Eric Steward [esteward@southalabama.edu](mailto:esteward@southalabama.edu)

- Geotechnical engineering
- Design, analysis, and construction of foundations, slopes, retaining structures
- Load and resistance factor design (LRFD) of deep foundations
- Driven pile setup (freeze) prediction methods
- Soil/structure interaction
- Trenchless pipeline infrastructure installation and rehabilitation techniques

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Civil, Coastal, and Environmental Engineering continued...

### Dr. Kaushik Venkiteshwaran [kvenkiteshwaran@southalabama.edu](mailto:kvenkiteshwaran@southalabama.edu)

- Chemical and biological wastewater treatment
- Advanced oxidation targeting organic contaminant and pathogen destruction
- Developing bio-adsorbents for nutrient recovery and contaminant removal
- Modelling microbial interactions in natural and engineered environments
- Relating microbes to biological process performance
- Developing novel microbial cultures for wastewater treatment

### Dr. Bret Webb [bwebb@southalabama.edu](mailto:bwebb@southalabama.edu)

- Coastal resilience, vulnerability, and adaptation
- Highways and bridges in the coastal environment
- Natural hazards including coastal storms and sea level rise
- Nature-based shore protection including living shorelines
- Coastal mapping, monitoring, and measurement studies

### Dr. Kevin White [kwhite@southalabama.edu](mailto:kwhite@southalabama.edu)

- Drinking water, wastewater, & storm water treatment
- Constructed wetlands for wastewater and storm water treatment
- Onsite and small-community wastewater technologies and management
- Decentralized wastewater technologies and concepts
- Micro-pollutants (pharmaceuticals, etc.) in wastewater & their treatment
- Low-impact development (storm water management) practices

### Dr. Shenghua Wu [shenghuawu@southalabama.edu](mailto:shenghuawu@southalabama.edu)

- Asphalt technology and pavement engineering
- Smart, resilient and green pavement materials characterization and design
- Advanced laboratory characterization for asphalt binders and mixtures
- Pavement recycled materials, rehabilitation and maintenance, and sustainability
- Pavement performance and modeling, mechanistic-empirical pavement design



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# Engineering Research at the University of South Alabama Electrical and Computer Engineering

## Dr. Yousef El-Sharkh [yel-shark@southalabama.edu](mailto:yel-shark@southalabama.edu)

- Smart grid
- Distributed generation
- Renewable and alternative energy systems and virtual power plants
- Integration of renewables with smart grid
- Phasor measurement units and wide area monitoring systems
- Multi-agent systems and distributive control
- Energy storage systems
- Power system planning and control, power quality, and power electronics
- Artificial intelligence (intelligent optimization techniques) in power system problems

## Dr. Na Gong [nagong@southalabama.edu](mailto:nagong@southalabama.edu)

- Artificial Intelligence (AI) technology
- Intelligent data-enabled computing circuits and systems
- Viewer-aware mobile systems
- Multi-level (device/circuit/architecture/application) efficient and privacy-preserving VLSI circuits and systems
- Energy-efficient computing
- Memory systems for video, vision, and deep learning
- Neuromorphic computing
- Embedded vision

## Dr. Aurangzeb Khan [akhan@southalabama.edu](mailto:akhan@southalabama.edu)

- Multijunction super high efficiency solar cells (InGaP/GaAs/Ge/Si)
- GaAs/InGaP dual solar cells on low-cost Si and Ge substrates
- Defects in optoelectronic devices
- Microelectronics, design of integrated circuits, low voltage/low power VLSI, RF CMOS, simulation
- Radiation-hard electronic materials; nanostructures, nanoelectronics, solid state sensors for space applications
- Advanced materials for PhotoElectroChemical (PEC) hydrogen production, nanocomposites, carbon nanotubes and nanofibers

## Dr. Hulya Kirkici [hkirkici@southalabama.edu](mailto:hkirkici@southalabama.edu)

- Electrical insulation
- Pulsed power engineering
- Breakdown characteristics of dielectrics
- Compact plasma switches
- Pulsed plasmas
- Laser and lidar systems

## Dr. Saeed Latif [slatif@southalabama.edu](mailto:slatif@southalabama.edu)

- Antennas and sensors for biomedical devices
- Large-scale antenna arrays for 4G/5G wireless systems
- Metasurfaces for millimeter wave applications
- Miniaturized antennas for satellite applications
- Antennas for radar detection and biomedical imaging
- Antenna concepts using engineered and low loss materials

## Dr. Samuel Russ [sruss@southalabama.edu](mailto:sruss@southalabama.edu)

- Embedded systems, including microprocessor-based design, sensors, nanosatellites, and robotic agriculture
- Consumer electronics including digital video recording and home networking
- Systems engineering for high-volume electronic manufacturing
- Signal integrity, design of high-speed digital systems
- Circuit-board design including high-speed design, design for signal integrity, and circuit-board cybersecurity

## Dr. Adel Sakla [asakla@southalabama.edu](mailto:asakla@southalabama.edu)

- Programmable logic devices (PLDs)
- Embedded systems

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## Electrical and Computer Engineering continued...

### Dr. Mohamed Shaban [mshaban@southalabama.edu](mailto:mshaban@southalabama.edu)

- Image processing for digital pathology
- Digital signal analysis for electroencephalography
- Machine and deep learning applications
- Algorithm optimization for artificial intelligence systems

### Dr. Edmund Spencer [espencer@southalabama.edu](mailto:espencer@southalabama.edu)

- Space plasma physics and space weather
- Instruments for space science and space plasma characterization
- Interaction of solar wind with the earth's magnetosphere

### Dr. John W. Steadman [jsteadman@southalabama.edu](mailto:jsteadman@southalabama.edu)

- Bioengineering
- Medical electronics
- Electronic instrumentation
- Environmental monitoring
- Digital electronics
- Microcomputers

### Dr. Tom Thomas [tthomas@southalabama.edu](mailto:tthomas@southalabama.edu)

- Automated environmental monitoring, including air, water and soil monitoring for contaminants using chromatographic, spectroscopic or optical instrumentation
- Robotics and robotic sensors
- Hyperspectral image processing for target recognition and tracking, environmental monitoring and detection of disease
- Chemical adsorption, absorption and material separation using zeolite-based materials
- Engineering education

### Dr. Daniela Touma [dtouma@southalabama.edu](mailto:dtouma@southalabama.edu)

- Wireless power transfer (WPT), inductive power transfer (IPT), transcutaneous energy transmission (TET)
- Simulation of electromagnetic effects by finite element method (FEM)
- Optimization methods, including single-objective and multi-objective algorithms, and artificial intelligence in power systems
- Smart grids, including renewable energy, microgrids, energy management systems (EMS), and vehicle-to-grid (V2G)

### Dr. JinHui Wang [jwang@southalabama.edu](mailto:jwang@southalabama.edu)

- Artificial Intelligence (AI) technology
- Very-large-scale integration (VLSI) circuits and systems
- Three-dimensional integrated-circuit (3D IC) design
- Neuromorphic computing hardware based on CMOS and emerging devices
- Hardware-enabled privacy preserving in cyber security
- Novel memory design including SRAM and DRAM
- Non-volatile memories based on emerging devices such as memristors
- Cooling techniques for electronic devices
- Wireless sensor networks and Internet of Things (IoT)
- Electronic subsystems for Unmanned Aerial Vehicles (UAVs)

### Dr. Clive Woods [clivewoods@southalabama.edu](mailto:clivewoods@southalabama.edu)

- Novel microelectronic devices, including optical applications and imaging
- Models of semiconductor avalanching and electronic devices using avalanche breakdown
- Phototransistors and bipolar transistors using III-V semiconductors
- Band-gap engineered devices including multi-quantum-well photodetectors
- Acoustic charge transfer (ACT) devices and their applications
- Surface-acoustic wave (SAW) devices for signal processing
- High-frequency gravitational waves
- Superconducting devices



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## William B. Burnsed Jr. Department of Mechanical, Aerospace and Biomedical Engineering

**Dr. Lanier S. Cauley** lcauley@southalabama.edu

- Thermodynamics

**Dr. Melike Dizbay-Onat** monat@southalabama.edu

- Natural fiber derived activated carbons
- Physical and chemical activation methods
- Physical adsorption
- Porous materials
- Bio-based composites
- Engineering education
- STEM outreach

**Dr. Kuang-Ting Hsiao** kthsiao@southalabama.edu

- 3D printing of polymer composites
- Carbon fiber reinforced polymer (CFRP) composites
- Carbon nanofiber z-threaded CFRP (ZT-CFRP) multi-scaled composites
- Artificial intelligence in advanced manufacturing
- Void and defect characterization and modeling for polymer composites
- Micro/nano-fluids and suspensions in porous media
- Functionally graded materials
- Rheology, viscous flow, ER/MR fluids
- Transport phenomena in porous media
- Energy storage and harvesting

**Dr. Julia Kar** jkar@southalabama.edu

- Medical imaging modalities such as MRI, ECG and Spectroscopy
- Clinical heart failure detection
- Magnetic resonance sequence (contrast, phase, SPAMM, perfusion, DENSE, T1/T2) development

**Dr. Carlos Montalvo** cmontalvo@southalabama.edu

- Dynamic simulation coupled with applied estimation of custom made aircraft
- Experimental flight testing to improve the performance of autonomous aerospace vehicles
- Flight dynamics, control and design of unmanned aerial vehicles with a focus on multi-body systems
- Reconfigurable control laws for multirotor vehicles
- Rocket ascent dynamics and controls
- Tethered aerospace vehicles including electric sails and parafoils

**Dr. David A. Nelson** danelson@southalabama.edu

- Human thermoregulation and thermoregulation modeling
- Biological effects of non-ionizing radiation
- Medical device design
- Heat transfer enhancement

**Dr. Anh-Vu Phan** vphan@southalabama.edu

- Symmetric Galerkin boundary element method with applications to dynamic fracture mechanics, wave diffraction and moving boundary problems
- Computational biomechanics

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Engineering continued...

### Dr. Joseph Richardson [jdrichardson@southalabama.edu](mailto:jdrichardson@southalabama.edu)

- Hypersingular integral equations in heat conduction and stress analysis including fracture mechanics
- Modeling strain gradient elasticity
- Modeling functionally graded materials
- Multipole methods accelerated with fast Fourier transforms
- Airfoil design and modeling
- Delaunay triangulations in representing and simulating random structure
- Nonlinear, unpredictable random number generation
- Ascent debris transport in supersonic flows
- Dynamic modeling of space tethers

### Dr. Dhananjay T. Tambe [dtambe@southalabama.edu](mailto:dtambe@southalabama.edu)

- Physical laws governing the function of cells, tissues, and organs
- Mechanical characterization of cells, tissues, and organs
- Tools for life sciences researchers and healthcare providers
- Monolayer stress microscopy and monolayer mechanics
- Creativity-focused activities in engineering education

### Dr. Aref Yadollahi [ayadollahi@southalabama.edu](mailto:ayadollahi@southalabama.edu)

- Metal additive manufacturing (AM)
- Fatigue and fracture mechanics
- Extreme environments (high-temperature and irradiation)
- Solid mechanics
- Materials characterization
- Multi-scale modeling (microstructure evolution and residual stresses)