

# Graduate Programs in Materials Science and Engineering

## ABOUT

Materials science and engineering centralizes multiple disciplines: materials science, metallurgy, physics, biology, chemistry, nuclear engineering and mechanical engineering. UCF researchers in the field have contributed to scientific advances as diverse as medicine and space exploration. UCF's MSE graduates are sought-after by industry. Many become entrepreneurs by securing patents and starting promising companies.

## THE UCF DIFFERENCE

### REPUTATION OF EXCELLENCE

Ranks as a Top 50 graduate MSE program by *U.S. News and World Report Best Graduate Programs 2019*. The National Research Council, part of the National Academy of Engineering and the National Academy of Science, ranked UCF among the top MSE programs in the country.

### HIGH-IMPACT RESEARCH

MSE's research funding totaled more than \$4 million in 2017-2018, to support a wide variety of topics in bioengineering, magnetics, nanotechnology, structural and energy materials, semiconductors, additive manufacturing and more. See page 2 for highlighted projects.

### WORLD-CLASS FACULTY

Students work alongside and publish with distinguished researchers who are internationally renowned for their contributions to science. They author approximately 80 refereed publications yearly. MSE has 21 core faculty, 20 program faculty and two lecturers.

### POWERFUL PARTNERSHIPS

Our faculty work with numerous industry and government agencies, including Lockheed Martin, Siemens, National Science Foundation, National Institutes of Health, U.S. Dept of Energy, U.S. Dept of Defense, U.S. Dept of Agriculture, NASA and many more.



## PRIME LOCATION

UCF is a large metropolitan institution located in Orlando, a regional economic powerhouse surrounded by industry. Research opportunities, jobs and internships are plentiful. The Central Florida Research Park, adjacent to UCF, is the nation's 7th largest with more than 120 companies and 10,000 employees.

With UCF as a founding partner, the Florida High Tech Corridor Council has, since 1996, generated more than \$1.3 billion to the Florida economy and 4,000 new jobs.

## FACTS OF INTEREST

The Advanced Materials Processing and Analysis Center (AMPAC) began in 1998 to promote research, education and economic growth in central Florida. AMPAC's ongoing research excellence led to the creation of the Department of Materials Science and Engineering in 2012.

The Materials Characterization Facility is where researchers and industry partners advance their work, increase competitiveness and boost the region's economy. It provides classroom education and hands-on training on state-of-the-art equipment, and user-friendly support services with expert advice and data interpretation.

## GRADUATE DEGREES OFFERED

### MASTER'S

Materials Science and Engineering

### DOCTORAL

Materials Science and Engineering

## FACULTY HONORS

Our faculty are members and fellows of scientific societies that recognize distinguished achievement, including National Academy of Inventors, American Association for the Advancement of Science, ASM International, American Ceramic Society, SPIE, American Vacuum Society, The Electrochemical Society, the American Institute for Medical and Biological Engineering, World Academy of Ceramics, and more.

Our faculty also include NSF CAREER and ONR Young Investigator Awardees.

## ALUMNI SAY

"At UCF, I've learned cutting-edge science and used the latest equipment, which has helped my thesis and dissertation work. The professors are knowledgeable and supportive. I also coached new graduate and undergraduate students."

– Le Zhou, Ph.D., '16

"I have been able to make an immediate impact at my company, and I owe that opportunity to the lessons I learned at UCF."

– Catherine Carlisle Kammerer, Ph.D., '13, '15, principal engineer, Aerojet Rocketdyne

"My UCF education and research experience enabled me to move into a faculty position at Donghua University in China."

– Jinan Ding, Ph.D., '17

"The MSE graduate program has linked so well theory and practice with analytical instruments that I'm successfully applying the same model to convey my passion for Atom Probe Tomography worldwide. Our knowledge from UCF grows to higher levels year after year until we reach the stars."

– Hugues Francois-Saint-Cyr, Ph.D., '01





## HIGH-IMPACT RESEARCH

A proposal to the Joint NSF/SRC program “Energy Efficient Computing: from Devices to Architectures” by Prof. Kevin Coffey et al has been funded for \$1 million over three years. It involves multi-disciplines – physics, materials and chemistry – and researchers at Columbia University, MIT and Rensselaer Polytechnic Institute.

Assistant Prof. Kristopher Davis received \$1.58 million from the U.S. Dept of Energy to develop high-speed measurement techniques that can identify potential sources of power degradation in photovoltaic modules, focusing on the metal contacts that carry current.

Assistant Prof. Lorraine Leon and team’s article, in the journal *Advances in Colloid and Interface Science*, highlights the advantages of polypeptides, versus synthetic polymers, to form polyelectrolyte complexes at varying length scales. With potential for numerous delivery applications, the research emphasizes heterogenous complexes formed using nucleic acids.

Prof. Yongho Sohn and team has been awarded a Cooperative Agreement with U.S. Army Research Laboratory with an initial installment of \$490,000 for research involving additive manufacturing of metallic alloys.

Assistant Prof. Elizabeth Brisbois and team develop polymer coatings to make implanted medical devices more biocompatible. A \$374,000 grant from JDRF is supporting her effort to develop a coating for insulin-delivery cannulas that can stay in the body a month longer than current devices which must be changed every two days, which could dramatically improve diabetic patient care.



## RESEARCH FOCUS AREAS

Our research is broad-based and explores a wide spectrum of topics in the properties and structure of hard and soft matter, including:

- electronic materials
- semiconductor interconnects
- nanomaterials, 0D, 1D, 3D
- magnetics
- organic and molecular engineering
- biological materials/prosthetics
- additive manufacturing
- novel and flexible/hybrid materials
- shape memory alloys
- structural materials and sensors
- energy/solar materials

## TYPICAL MSE LABORATORIES

- Ceramic Processing and Analysis
- Thin Films & Energy Materials
- NanoFAB and BioMEMS
- Corrosion/Electrochemistry
- Nano-Bio-Materials
- Microstructural & Mechanical Characterization
- Soft & Smart Materials
- Computational Materials
- Surface Engineering/Nanomaterials
- Plasma Spray & Nanomanufacturing Additive Manufacturing
- Materials and Coatings for Extreme Environments
- Prosthetics/Biomedical Engineering

### Advanced Materials Processing and Analysis Center

AMPAC is home to two university-wide user facilities that enable cutting-edge research. Facilities feature ultra-modern equipment for characterization and processing, and provide students training and education opportunities. Collaborations with other universities, government agencies and private industry are encouraged.

### Materials Characterization Facility

The user-friendly facility occupies 7,000 square feet and is supported by three research engineers and a faculty coordinator. It houses an impressive array of materials characterization equipment.

### Advanced Microfabrication and Clean Room Facility

The 3,000-square-foot space supports research activities including miniaturization, nanomaterials fabrication and applied acoustoelectronics technology. The class 100 and 1,000 clean rooms contain assorted lithography and device fabrication equipment.

## ALUMNI STARS

### CATHERINE CARLISLE KAMMERER, Ph.D., '13, '15

Works at Aerojet Rocketdyne as a principal engineer specializing in materials and processes. She supports the design and manufacturing of rocket engines, and provides direction on materials selection and process development.

### STEVEN SCHWARZ, Ph.D., '02

Started the Orlando-based company NanoSpective, Inc., in collaboration with three other UCF alumni. UCF resources, such as the AMPAC Materials Characterization Facility, have played an instrumental role in the company’s success in overcoming the market-entry barrier.

### VINOD PHILIP, '00

Chief Technology Officer, Power and Gas Division, Siemens AG.

### SWETHA BARKAM, Ph.D., '13, '17

Process Development Engineer at Micron Technology, Inc.

## CONTACT

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## ADMISSION

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**College of Engineering  
and Computer Science**