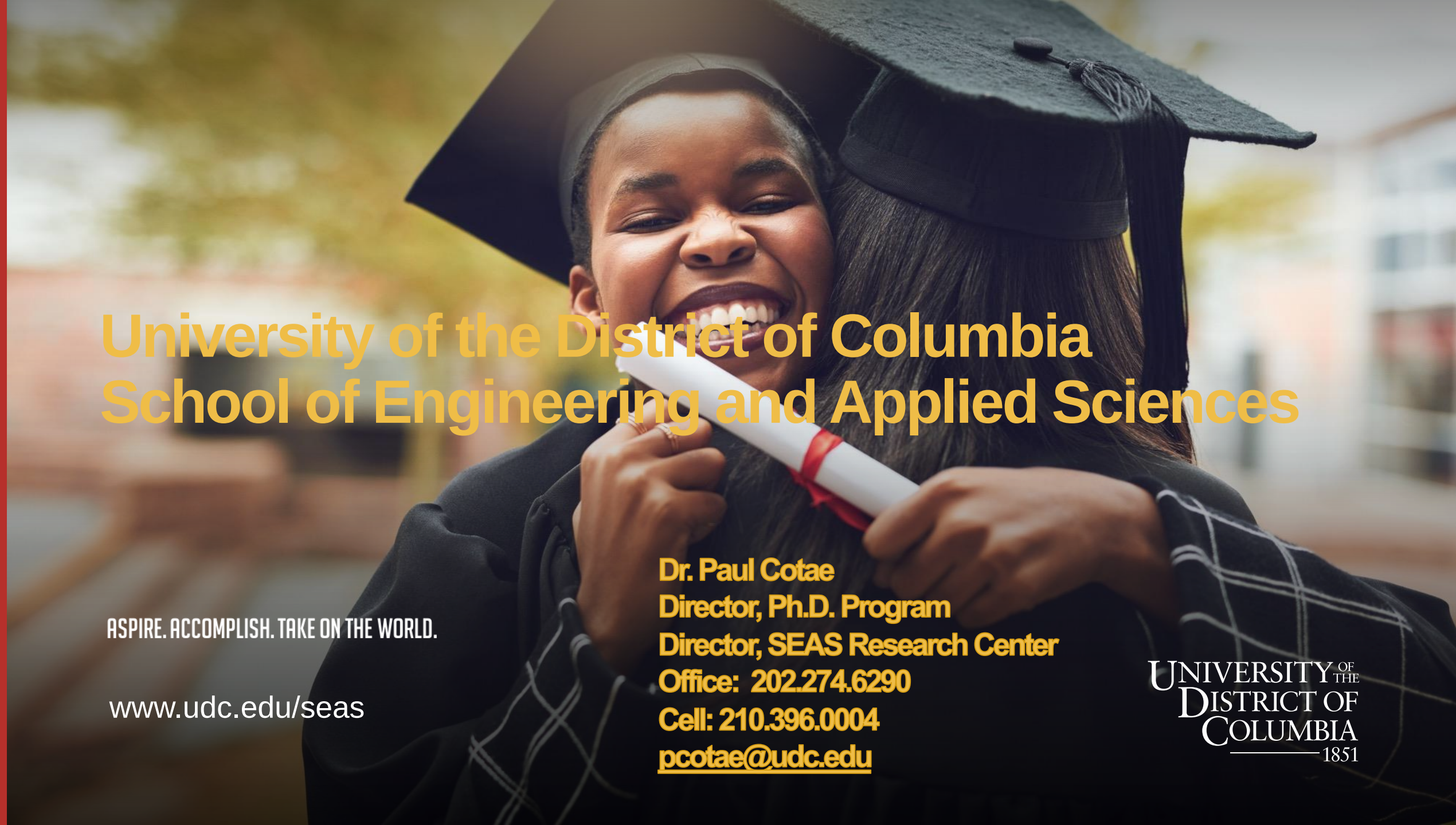

University of the District of Columbia
School of Engineering and Applied Sciences

ASPIRE. ACCOMPLISH. TAKE ON THE WORLD.

www.udc.edu/seas

Dr. Paul Cotae
Director, Ph.D. Program
Director, SEAS Research Center
Office: 202.274.6290
Cell: 210.396.0004
pcotae@udc.edu

UNIVERSITY OF THE DISTRICT OF COLUMBIA
1851

Agenda

- Introduction of the Graduate SEAS Programs (Dean Shetty, 5 -10 min)
- PhD Program CSE SEAS (Dr. Paul Cotae, 5-10 minutes)
- Biomedical Engineering Program (Dr. Lara Thompson, 5 minutes)
- Civil Engineering Program (Dr. Lei Wang, 5 minutes)
- Computer Science Program (Dr. Lily Liang, 5 minutes)
- Electrical Engineering Program (Dr. Wagdy Mahmoud, 5 minutes)
- Mechanical Engineering Program (Dr. Pawan Tyagi, 5 minutes)
- Q&A (40 minutes)

Degree Programs

BACHELOR OF SCIENCE

- Biomedical Engineering
- Civil Engineering
- Computer Science
- Electrical Engineering
- Computer Engineering option
- Information Technology
- Mechanical Engineering

MASTER OF SCIENCE

- Computer Science
- Civil Engineering
- Electrical Engineering
- Mechanical Engineering

DOCTOR OF PHILOSOPHY

Specializations in

- Biomedical Engineering
- Civil Engineering
- Computer Science
- Electrical Engineering
- Mechanical Engineering

Dean
Dr. Devdas Shetty

Why UDC?
Why School of Engineering & Applied Sciences (SEAS)?

1. Growing shortage of technically trained graduates in engineering and computer science.
2. Big need for Engineers and Computer Scientists--Shortage threatens to undermine our standard of living at home and our leadership
3. Most affordable in the region and the country. Ranked SEAS 7, ME1
4. Accredited by Accreditation Board for Engineering and Technology (ABET)-MIT/IVY leagues
5. Great Jobs. –Industries- LM, Raytheon, Intel, Apple, Grad Schools, Direct PhD scholarships. -Many examples Columbia Cornel
6. Salaries- SEAS graduates earn very good starting salary
7. SEAS program prepare graduates for high demand careers in Engineering and CS. In fact, Mayor' Bowser's Strategic Plan identifies Engineering and Computer Science (Construction, Cyber Security, Energy Robotics and Unmanned Systems)
8. Labs and facilities are modernized ($1M investment this year from DC) of high standard –major renovation

UNIVERSITY OF THE DISTRICT OF COLUMBIA 1851

Why UDC?
Why School of Engineering & Applied Sciences (SEAS)?

9. Exceptional faculty with considerable professional experience who came here to teach!
10. Large amount of Research Grants $30M this year -5 National Centers (NSF, NASA, DOE, NIST and NIH)- Support modernization of labs
11. Funds can go to support students in research –UG research- Students able to do serious publication as undergraduates
12. Large amount of Internship, Summer Opportunities-Work in National Labs (Johnson (Houston) Oak Ridge National Lab Albuquerque, Las Alamos, (Jet propulsion Pasadena, NASA Center Goddard, MD, Naval Surface Warfare Card rock, Glenn (Cleveland)-NOW
13. Good Hands-on experience through projects Curriculum balance between theory & Practice, technological competence, Societal aspects of engineering and computer science
14. Students experience a capstone project based on national/international competitions
15. Industry partnership with a corporate mentor

UNIVERSITY OF THE DISTRICT OF COLUMBIA 1851

Ph.D. in Computer Science and Engineering

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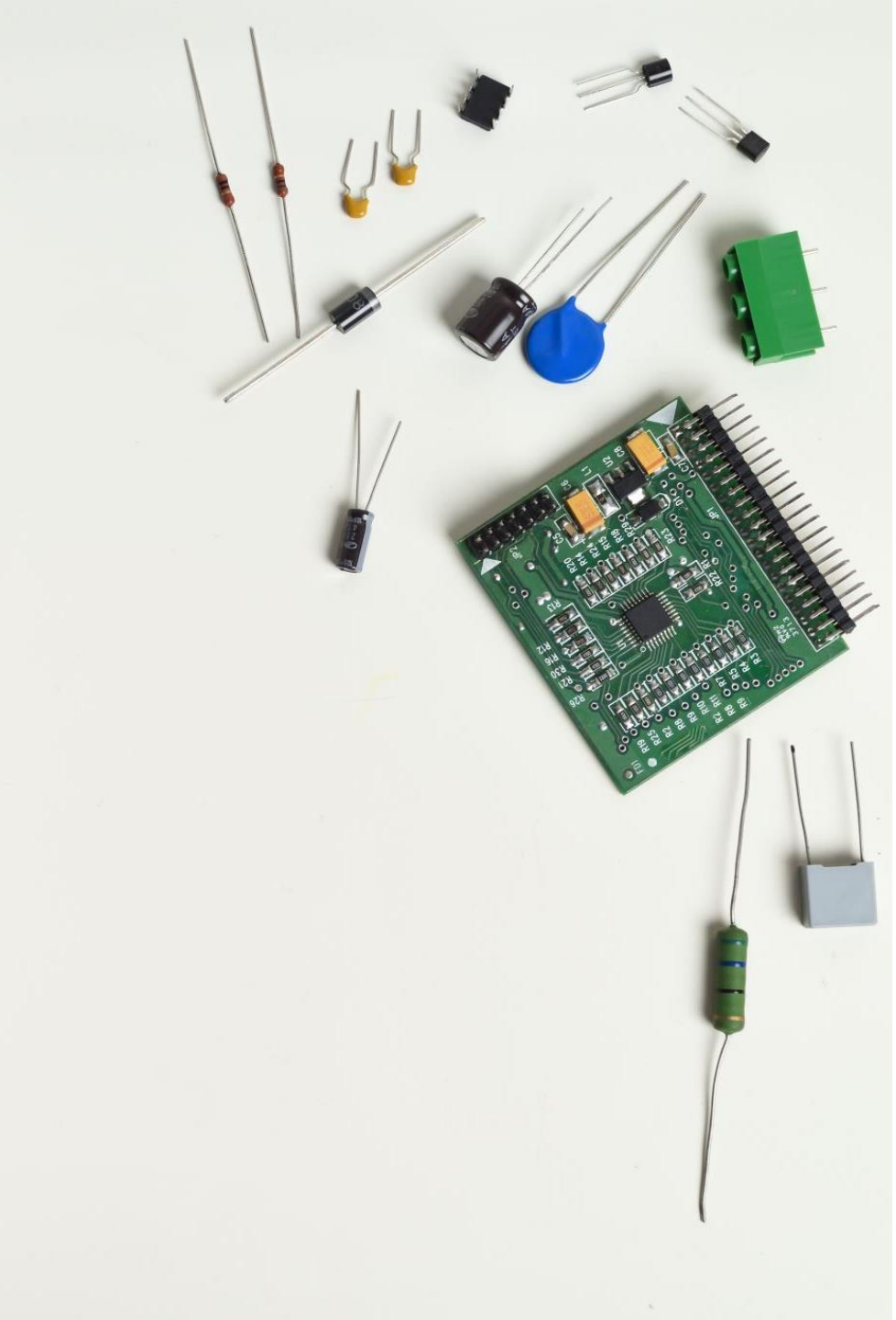


PhD Specializations

- **Doctorate Programs & Degrees | University of the District of Columbia**

  https://www.udc.edu/programs/doctorate

- **Ph.D. in Computer Science and Engineering | School of Engineering & Applied Sciences**

  https://www.udc.edu/seas/phd-in-computer-science-and-engineering

- **Ph.D. in Computer Science and Engineering with Specialization in**

  - Biomedical Engineering
  - Civil Engineering
  - Computer Science
  - Electrical Engineering
  - Mechanical Engineering

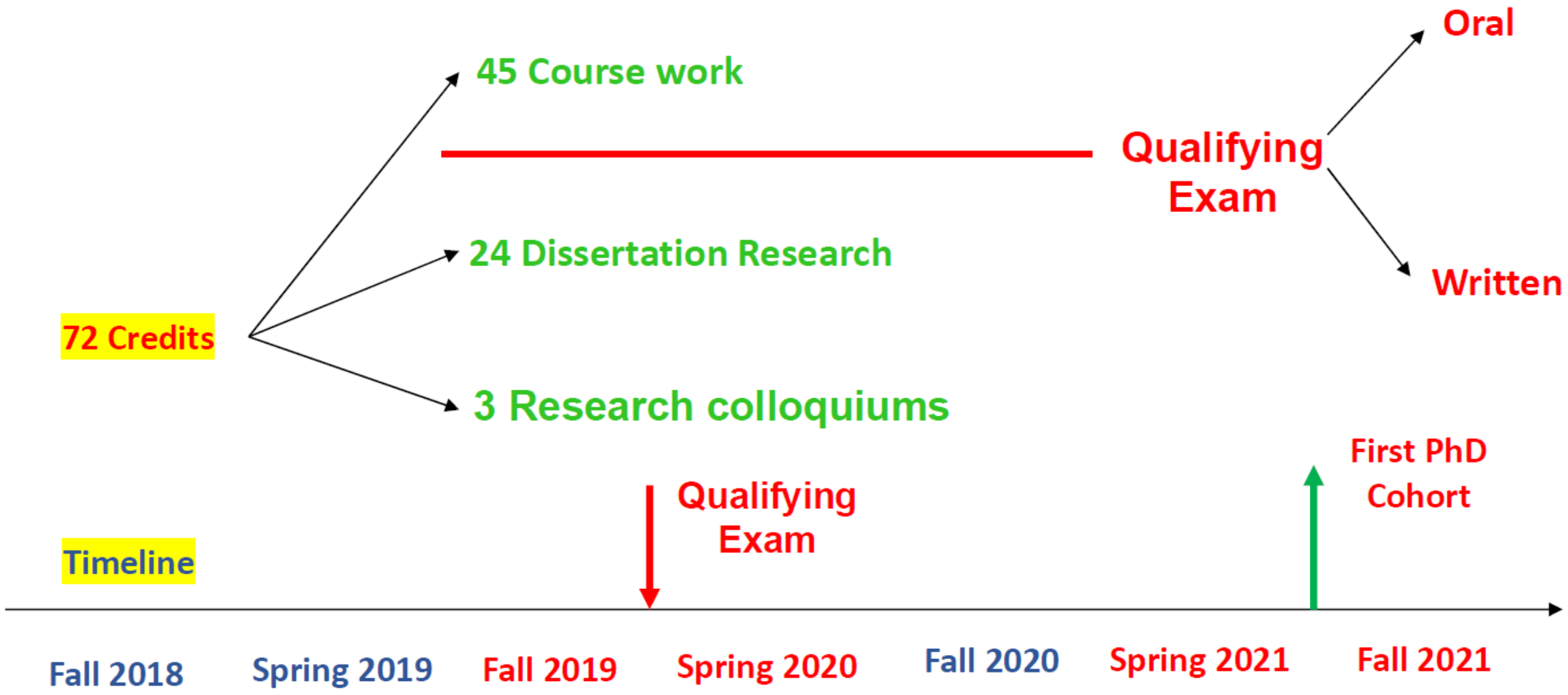
Ph.D. Specializations

- **Biomedical Engineering:** Biomedical Imaging Systems | Signal Processing | Physiological Systems Analysis
- **Civil Engineering:** Transportation System Engineering
  Water and Environmental Engineering
- **Computer Science**: Artificial Intelligence | Machine Learning
  Image Processing | Computer Vision
  Robotics | Cybersecurity
- **Electrical Engineering**: System Level Design | Artificial Intelligence
  Machine Learning | Embedded Systems
  Communication and Signal Processing
- **Mechanical Engineering:** Nanotechnology | Renewable Energy
  Advance Manufacturing

Financial support

- Grants
- GTA, GRA
- Stipend
- Financial aid
- VA aid

PhD in Computer Science and Engineering Implementation



“Per aspera ad astra”

"through hardships to the stars".

“Scientia potentia est”

“knowledge is power”


ASPIRE
ACCOMPLISH
TAKE ON THE WORLD

Biomedical Engineering

Dr. Lara Thompson
Program Director
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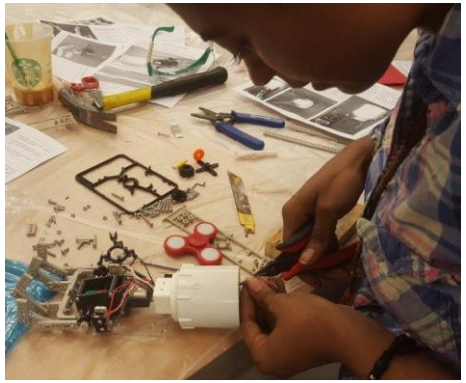
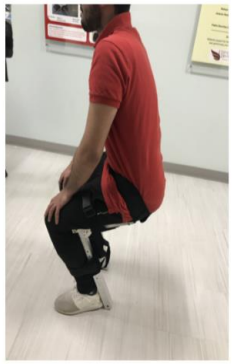
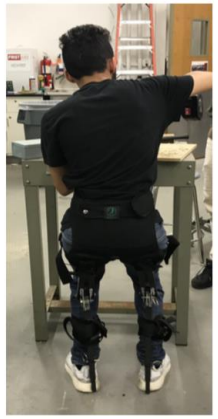
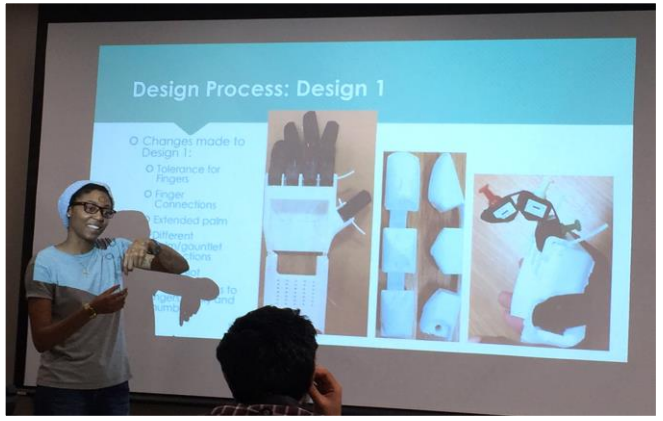
Dr. Kate Klein
Department Chair
kate.klein@udc.edu

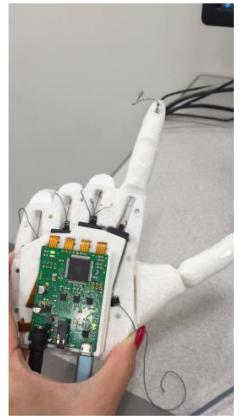
UDC Biomedical Engineering











NIH NIA MSTEM Project

Balance & falls

- Balance aids and devices
- Virtual reality based training
- Differences in balance and gait
- Wearables and remote monitoring

Imaging

Osteoporosis: Investigating bone mechanical properties via

- 3D micro-CT image analysis
- Ultrasound wave propagation
- Finite element methods

Data analytics

Use of supervised machine learning algorithms to investigate:

- Balance & gait data
- Noninvasive imaging data
- Other

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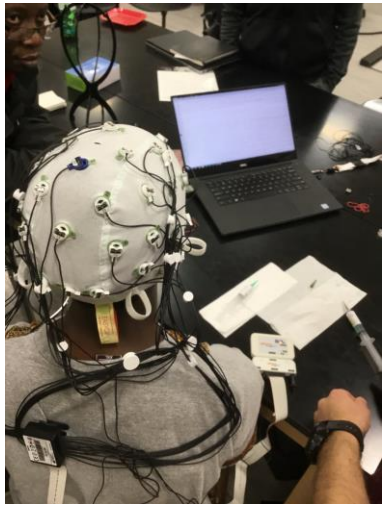
CENTER FOR BIOMECHANICAL & REHABILITATION ENGINEERING

CBRE

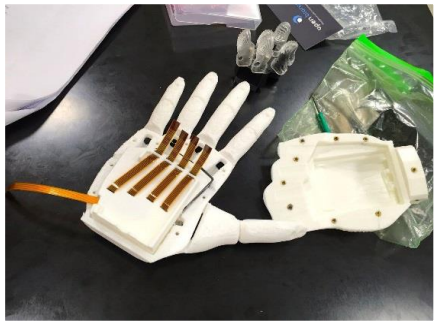
Creator & Director: Lara Thompson, Ph.D. Associate Professor of Mechanical Engineering
University of the District of Columbia, School of Engineering and Applied Sciences

Vicon Motion Capture & NaviGAITor

Students, Researchers, and Workshop participants

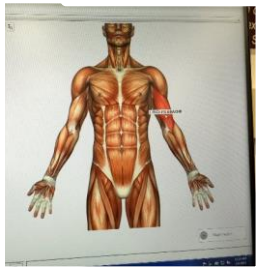


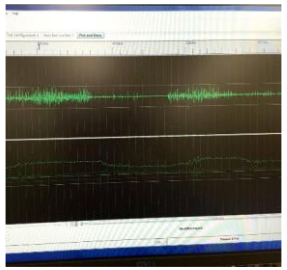
EEG System



Open Bionics Hand

Tekscan forceplate walkway





CBRE Lab

New: $5.4M NIH C06 grant Specialized Technological center for Assistive Rehabilitation Research (STAR)

New laboratories and fixed equipment will only further enhance aging-related undergraduate research development and training

Gait & Balance

- in fall-prone elderly, survivors of stroke, Parkinson's patients, veterans & amputees
- in un-impaired individuals (such as athletes);

Assistive Robotics for Rehabilitation

- fall-prone elderly, survivors of stroke, veterans & amputees (assistive robotics for gait & balance)
- for amputees or paralyzed individuals (brain-to-machine interface using EEG and robotics)
- post-traumatic stress disorder (PTSD) in veterans & teaching children with autism (utilizing robotics for behavioral/ psychology-related studies)

Virtual Reality Rehabilitation

- fall-prone elderly, survivors of stroke, veterans & amputees (locomotion, sensorimotor integration)
- older individuals & survivors of stroke
- People with disabilities (e.g., autism)
- Veterans (e.g., with post traumatic stress disorder (PTSD) or traumatic brain injury (TBI))

Biomechanics

- Imaging-related research (tied to injury-biomechanics)
- Materials-related research tied to implantable devices, orthopedics, and biomaterials

UNIVERSITY OF THE DISTRICT OF COLUMBIA 1851

Welcome

Dr. Lara Thompson, Ph.D
Associate Professor of Mechanical Engineering
Director of the Biomedical Engineering Program
Director of the CBRE Laboratory

E-mail: lara.thompson@udc.edu

UNIVERSITY OF THE DISTRICT OF COLUMBIA 1851

Computer Science

Dr. Lily Liang
Graduate Program Director
lliang@udc.edu

Dr. Briana Wellman
Department Chair
briana.wellman@udc.edu

MS in Computer Science Contact

- Program Director: Prof. Lily R. Liang
- Contact information: lliang@udc.edu
- Appointment Reservation: https://udc.youcanbook.me/
- WebEx: https://universityofdc.webex.com/meet/lliang (by appointment)

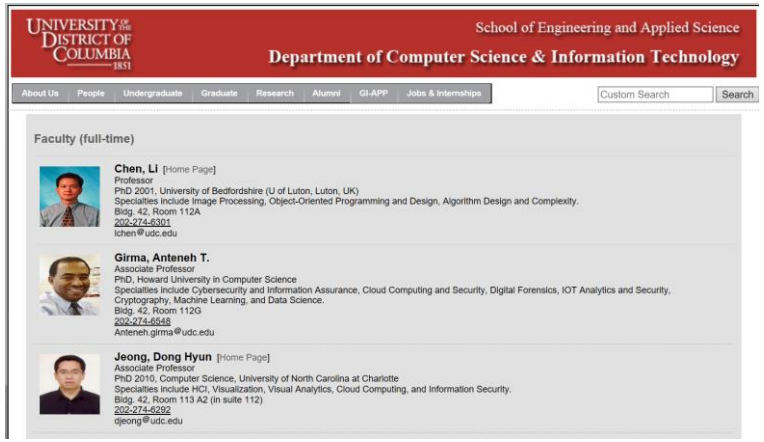
MS in Computer Science Highlights

- Started in 2007
- The first MS program in SEAS
- Current enrollment: 15
- Evening/late afternoon classes
- Hybrid classes

MS in Computer Science

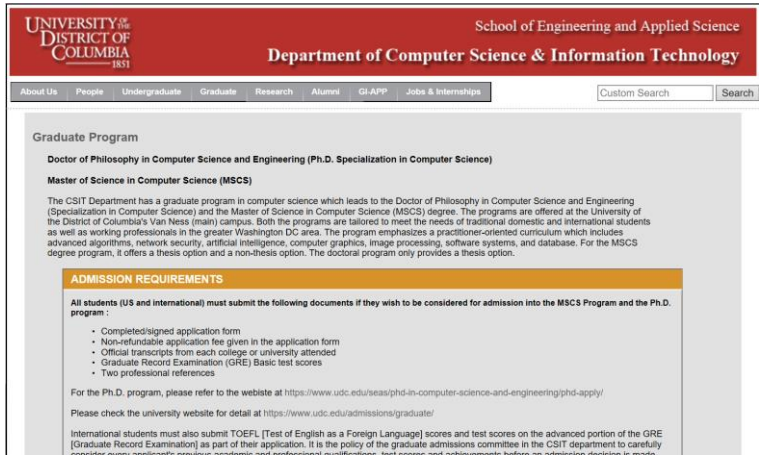
Faculty

http://www.csit.udc.edu/faculty.php



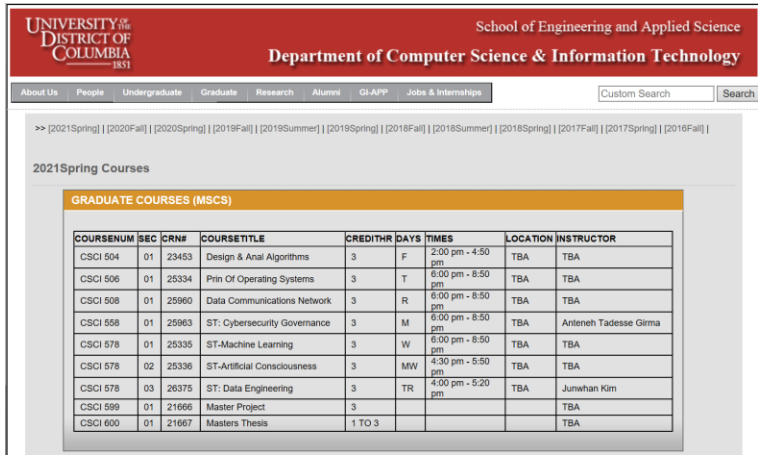
Program

http://www.csit.udc.edu/graduate/



Spring Offerings

http://www.csit.udc.edu/graduate/courseopenings.php



COURSENUM	SEC	CRN#	COURSETITLE	CREDITHR	DAYS	TIMES	LOCATION	INSTRUCTOR
CSCI 504	01	23453	Design & Anal Algorithms	3	F	2:00 pm - 4:50 pm	TBA	TBA
CSCI 506	01	25334	Prin Of Operating Systems	3	T	6:00 pm - 8:50 pm	TBA	TBA
CSCI 508	01	25960	Data Communications Network	3	R	6:00 pm - 8:50 pm	TBA	TBA
CSCI 558	01	25963	ST: Cybersecurity Governance	3	M	6:00 pm - 8:50 pm	TBA	Anteneh Tadesse Girma
CSCI 578	01	25335	ST-Machine Learning	3	W	6:00 pm - 8:50 pm	TBA	TBA
CSCI 578	02	25336	ST-Artificial Consciousness	3	MW	4:30 pm - 5:50 pm	TBA	TBA
CSCI 578	03	26375	ST: Data Engineering	3	TR	4:00 pm - 5:20 pm	TBA	Junwhan Kim
CSCI 599	01	21666	Master Project	3				TBA
CSCI 600	01	21667	Masters Thesis	1 TO 3				TBA

UNIVERSITY OF THE DISTRICT OF COLUMBIA 1851

Civil Engineering

Dr. Lei Wang,
Graduate Program Director
lei.wang@udc.edu
202-274-6327

Dr. Pradeep Behera
Department Chair
pbehera@udc.edu

Introduction of MS in Civil Engineering Program

- The Department of Civil Engineering offers a high quality graduate program leading to the degree of Master of Science in Civil Engineering
- The MS in CE is designed to meet the needs of working professionals in the greater Washington, D.C., metropolitan area and full-time graduate students.
- The mission of the MS in CE graduate program is to meet the advanced Civil Engineering educational needs of recent graduates of undergraduate Civil Engineering, practicing engineers, and those non-engineering professionals wishing to redirect their career paths.
- Graduate of MS in CE will possess the following attributes or educational outcomes: 1) advanced knowledge and skills in civil engineering at graduate level; 2) Ability to independently conduct research or a significant practice-oriented project in civil engineering; 3) Ability to communicate their ideas and results in written, oral, and graphical forms, and develop attitude for lifelong learning

MS in Civil Engineering Program Specializations

- Students will develop a more fundamental and complete understanding of the principles that govern their field, including current design methodology and technical knowledge, and skills to research and develop new sustainable solutions in the Civil Engineering field for the 21st Century.
- Students may pursue a specialization in:

    a) **Geotechnical and Transportation Engineering**
    b) **Water and Environmental Engineering**

- Students can also choose general master degree in civil engineering
- Students must satisfactorily complete a minimum of 30 credits of approved graduate study. Students have the option to complete up to 6 credits of independent research toward the master of science thesis.
- Accelerated MS in CE available for UDC undergraduate students (up to 9 credits)

MS in Civil Engineering
Thesis and Non-Thesis Options

CE – Thesis Option		CE – Non-Thesis Option	
Category	Credit hours	Category	Credit hours
Core Courses	06	Core Courses	06
Technical Elective Courses	18	Technical Elective Courses	21
Master's Thesis	06	Master's Project	03
Total	**30**		**30**

- A non-thesis option is offered for those seeking to enhance their depth and breadth of engineering knowledge, suitable for students interested in developing the marketable skills and pursue industry position (combination of courses plus a design project).
- A thesis option is offered for students who want to obtain research expertise in research in one of sub-discipline of civil engineering and who may be interested in pursuing a doctoral degree in civil engineering or closely related field (research focused and master thesis is required).

MS in Civil Engineering Application Procedure

- Hold a baccalaureate degree from an accredited college or university, preferably a major in civil/environmental engineering or closely related field.
- Submit two official transcripts from all prior undergraduate and graduate work. Applicants must have an undergraduate grade point average of 2.5 or higher.
- Submit the Graduate Record Exam Verbal, Quantitative, Analytical Reasoning and Essay tests and (for international students) official TOEFL scores from a recent administration.
- Submit at least two letters of recommendation. One letter should be from an individual familiar with the applicant's capacity for relating to clients, professionalism, and personal attributes.
- A 500-word essay/personal statement articulating reasons for pursuing graduate studies in civil engineering, familiarity with the profession, and related work experience.

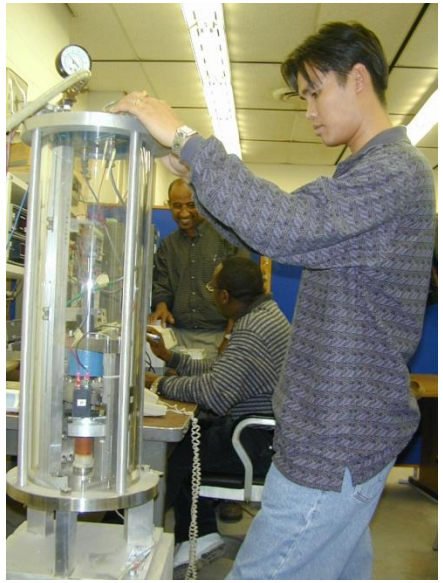
Application Website: https://www.udc.edu/admissions/graduate/

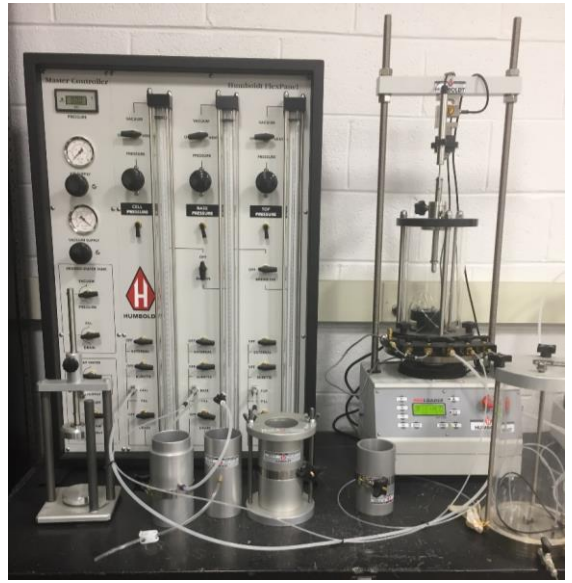
PhD in CSE with a Specialization in CE

- Civil Engineering Department also hosts a Doctor of Philosophy in Computer Science & Engineering (PhD) with specialization in Civil Engineering.
- Students will conduct in-depth and breakthrough research in the interdisciplinary field of civil engineering with computer science.
- Students will work on funded projects in a chosen sub-disciplines of civil engineering with the faculty advisors to address the grand challenges faced by the society. CE graduate students also have the opportunity to conduct internships at NASA, NIST, DC Water etc.
- CE faculty are part of the NASA Center for Advanced Manufacturing in Space Technology & Applied Research at UDC (CAM-STAR) and NSF Center for Nanotechnology Research and Education (CNRE) to support PhD level research in civil engineering.

Civil Engineering Laboratories

- Geotechnical Laboratory
- Environmental Engineering
- Structural Engineering Laboratory
- Hydraulics Laboratory
- Concrete and Materials Laboratory
- Material Testing Laboratory
- Modeling and Simulation Laboratory





Civil Engineering Faculty

- **Water Resources Engineering: Pradeep K Behera, Ph.D., PE, DWRE**
- Water Resources Engineering, Urban Water Systems, Storm Water Management, Non-Point Source Pollution, Climate Change.
- **Structural Engineering: Ahmet Zeytinci, Ph.D., PE**
- Structural Engineering, Structural Dynamics, Earthquake Engineering, Structural Analysis and Design, Engineering Education, Engineering License Exams.
- **Geotechnical Engineering: Lei Wang, Ph.D., PE**
- Geotechnical Risk and Reliability, Infrastructure Robustness and Resilience, Underground Excavation and Tunneling, Earthen Levees and Dams, Sustainable Civil Engineering Materials, Numerical and Centrifuge Modeling, Geotechnical Earthquake Engineering.

Civil Engineering Faculty

- **Transportation Engineering: Bryan Higgs, Ph.D., EIT**
- Psychophysiological Driver Behavior, Transportation Network Vulnerability and Optimization, Travel Demand Modeling, Multi-level Multi-Objective Game Theory.
- **Environmental Engineering: Hossain Azam, Ph.D., PE**
- Experimental and Modeling Based Water and Wastewater, Solid Waste Management with Leachate Treatment, Water-Energy-Food-Climate Nexus, Environmental Chemistry and Microbiology, Groundwater/Sediment Remediation, Resources Recovery

The Civil Engineering graduate students can work with faculty in grant-funded research as research assistant, and also have the opportunity to serve as teaching assistants for the School of Engineering and Applied Sciences, as well as other schools at UDC.

Civil Engineering Research

- Make solar energy economical
- Provide energy from fusion
- Develop carbon sequestration methods
- Manage the nitrogen cycle
- Provide access to clean water
- Restore and improve urban infrastructure
- Advance health informatics
- Engineer better medicines
- Reverse-engineer the brain
- Prevent nuclear terror
- Secure cyberspace
- Enhance virtual reality
- Advance personalized learning
- Engineer the tools of scientific discovery

Civil Engineering Research Directly Addresses the key Grand Challenges of Engineering related to infrastructure, water, energy, and environment.

NAE:
https://www.youtube.com/watch?v=wmHD8yzA63I

Recent Grants to Civil Engineering

- MRI: Acquisition of Dual Beam FIB/SEM to Enable New Capability for Research, Education and Training at UDC, National Science Foundation
- Research Initiation Award: Robust Management of Earthen Levee Stability in the Face of Uncertainty for Resilient Geotechnical Infrastructures, National Science Foundation
- Targeted Infusion Project: Integrating Risk and Resilience into Undergraduate Engineering Education Towards a Hazard-Resilient Built Environment, National Science Foundation
- Development of A New and Optimal Geothermal System for Urban Agriculture Sustainability and Food Security in the District of Columbia, USDA/National Institute of Food and Agriculture (NIFA)

Job Perspectives for Civil Engineering Graduate Degree

Electrical Engineering

Dr. Wagdy Mahmoud
Electrical Engineering Graduate Program Director
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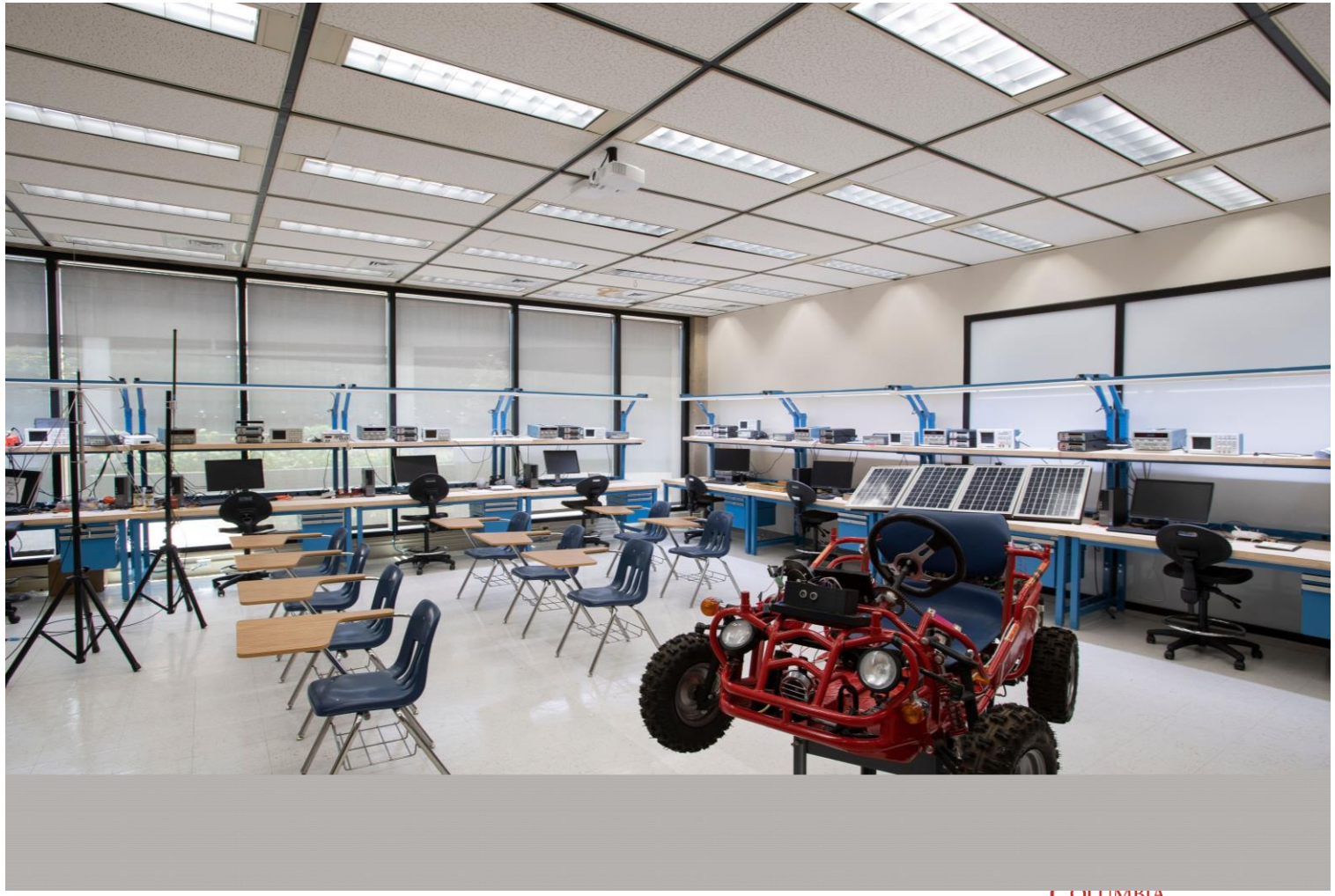
Dr. Esther Ososanya
Department Chair
eososanya@udc.edu
eososanya@gmail.com

Electrical and Computer Engineering



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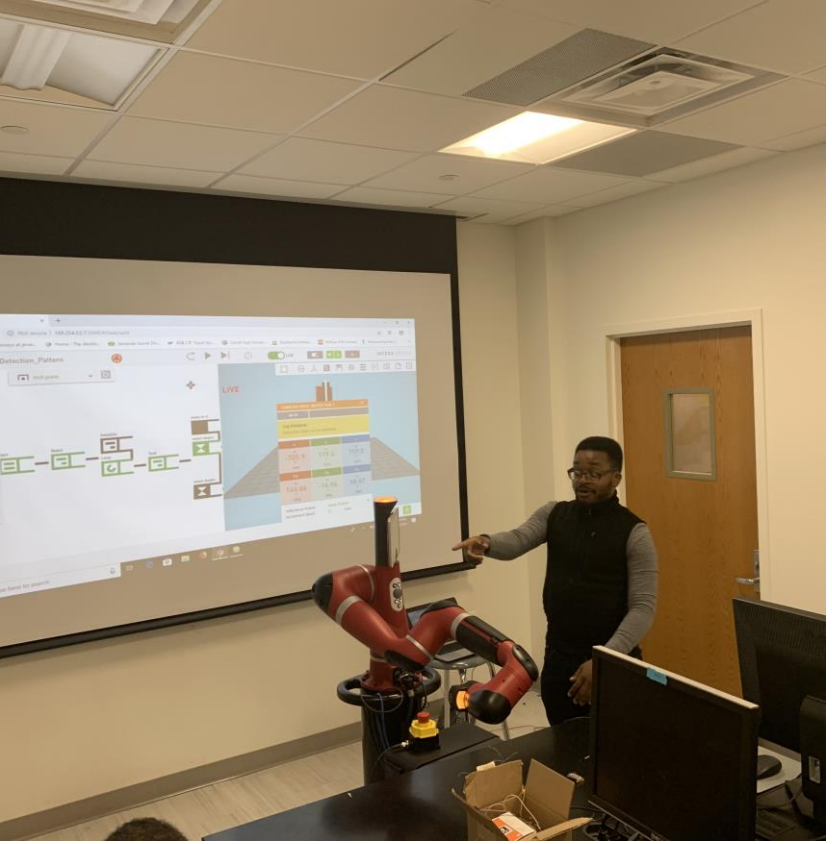
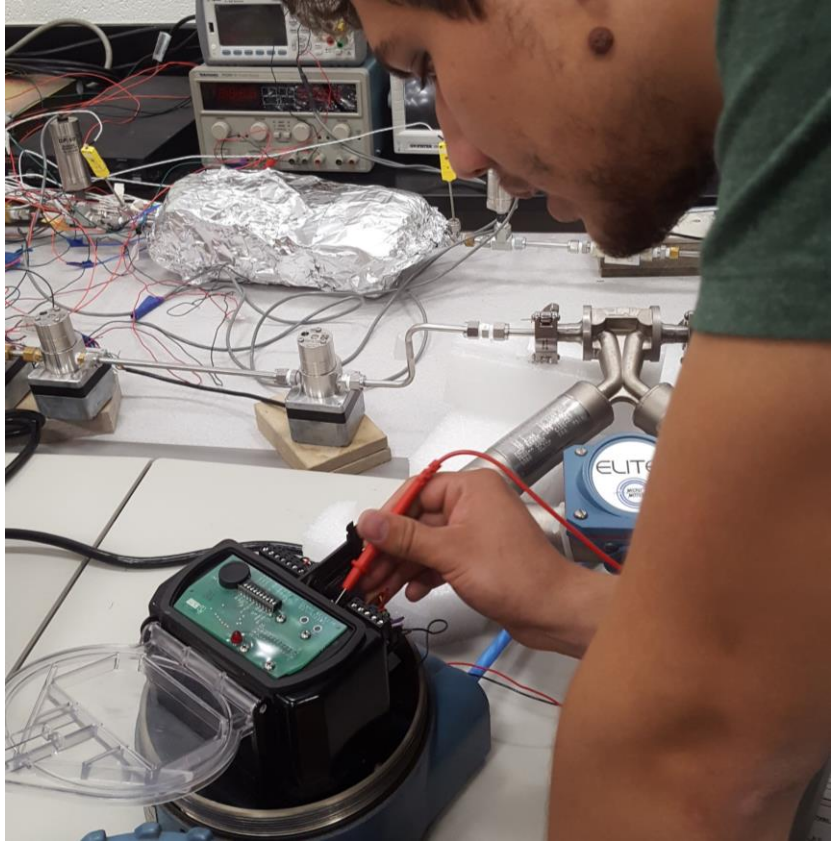




M.S. in Electrical Engineering

Emphasis in the context of urban issues and homeland security:

- Communications and Signal Processing, and
- Systems Engineering.

These two niche areas have numerous applications in national security, defense, and high-tech consumer products.

Mechanical Engineering

Dr. Pawan Tyagi
Graduate Program Director
ptyagi@udc.edu

Dr. Kate Klein
Department Chair
kate.klein@udc.edu

MS and PhD in Mechanical Engineering

UDC is #1 in USA for quality and affordability for BS in ME

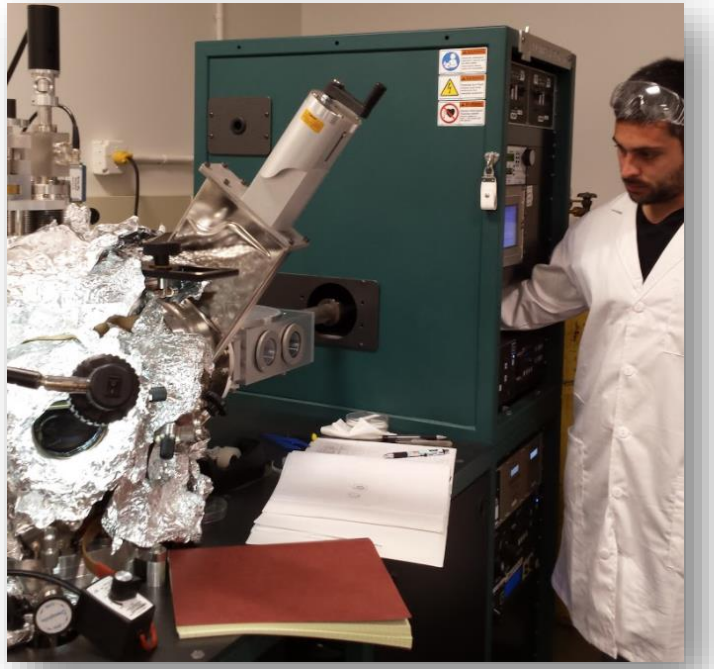
- Cutting-edge research under world renowned faculty (search Google Scholar)
- Funding support: $20 Million funding for NSF, DOE, NASA, NIH funded research centers at UDC
- Collaborations: Industry and Federal Laboratories like NIST, ORNL, Boston Scientific, NASA
- Resources: Biomedical lab, EOS-Metal 3D printer, Nanotechnology lab (come visit!)
- Flexible: Part-time, full-time.

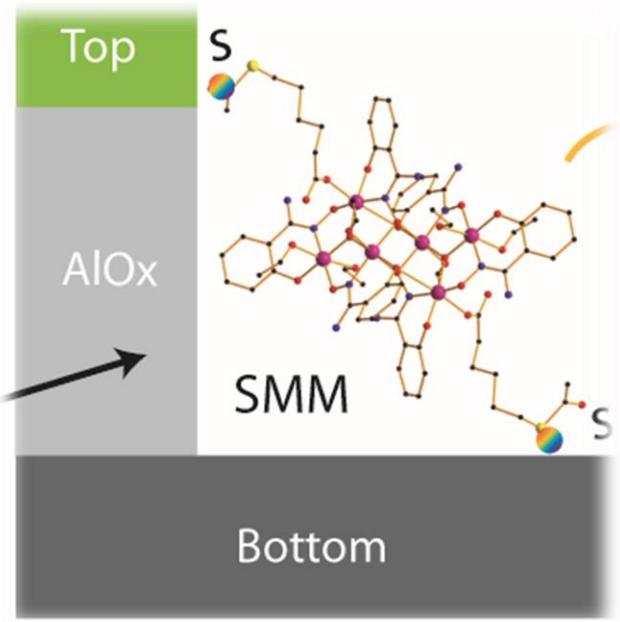
MS Program to PhD

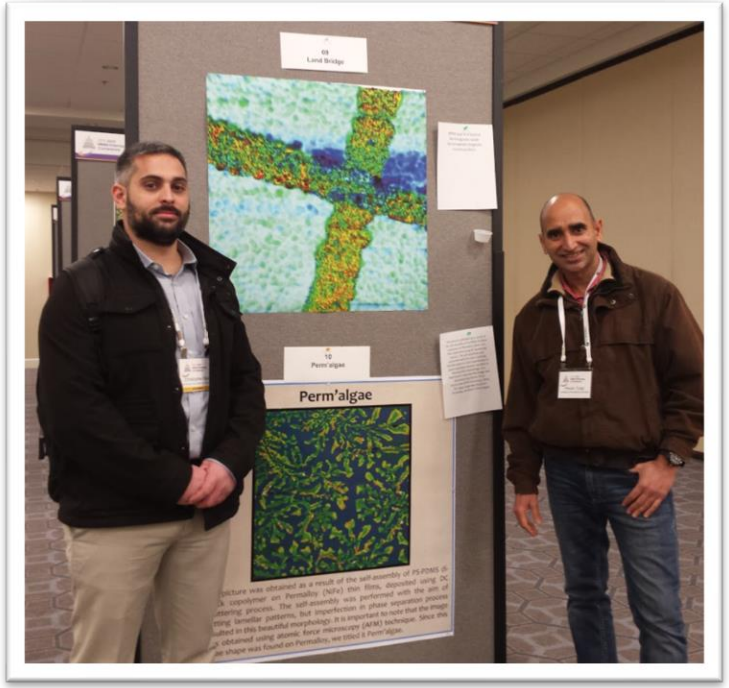
- 30 credits total required
- Accelerated MS (UDC undergraduates can use 9 credits from their BS to apply towards MS)
- 6 credits special topic courses based on thesis research need
- MS research and coursework can be applied towards PhD program

Research Topics

- Atoms to space
- Energy, Health, Computer, Manufacturing
- Molecule based quantum computers and sensors
- Thermal energy management
- Solar cells, hydrogen energy storage
- Biomedical and environmental sensors
- Rehabilitation engineering
- Advanced manufacturing (3D printing)







Quality of research is proven by publications

"Publish or perish"

MECH 500 Research Methods and Technical Writing

1. *Tyagi, P.; Riso, C.; Amir, U.; Rojas-Dotti, C.; Martínez-Lillo, J., Exploring room-temperature transport of single-molecule magnet-based molecular spintronics devices using the magnetic tunnel junction as a device platform. RSC Advances* ***2020, 10 (22), 13006-13015.***

COVID-19: Research Accomplishments

2. *Hayden Brown, Andrew Grizzle, Christopher D'Angelo, Bishnu R. Dahal, Pawan Tyagi, Impact of direct exchange coupling via the insulator on the magnetic tunnel junction based molecular spintronics devices with competing molecule induced inter-electrode coupling,* ***AIP Advances (2020)***

3. *Andrew Grizzle, Christopher D'Angelo, Pawan Tyagi, Monte Carlo simulation to study the effect of molecular spin state on the Spatio-temporal evolution of equilibrium magnetic Properties of magnetic tunnel junction based molecular spintronics devices,* ***AIP Advances (2020)***

4. Mikelann Scerbo, Giancarlo D'Orazio, Pawan Tyagi, Impacts on Head Loss in a Pumpless Solar Thermal Heater Using Hardy-Cross Methodology, ASME-IMECE-21928 (2020)

<u>+16 International Conferences, 6 manuscript under preparation</u>

Top co-authors View all

Tobias Goulet
6.70 · (11) · Univ...
Following

Christopher Riso
13.05 · (10) · Uni...
Following

Collin Baker
8.55 · (8)
Following

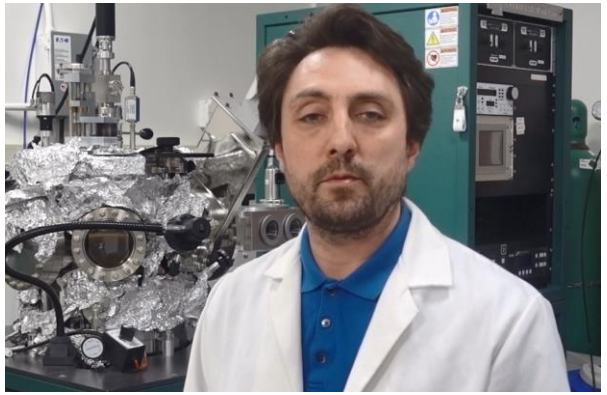
Edward Friebe
8.04 · (6) · Unive...
Following

Are you ready to gain unique skills and make the best of your talent?

UDC Mechanical Engineering is ready!!!

"UDC has some of the greatest Mechanical Engineering faculty in the country. Because of the dedication to students, the education received is unparalleled."

Dedication to Excellence



"In addition to classroom instruction, UDC offered me the opportunity to work closely with professors and student clubs in both laboratory and makerspace settings. This experience gave me the familiarity I needed to solve the engineering needs of the Neuroscientists I now work with."

Unleashing Creativity!

"Most importantly, the research conducted my last year at UDC set me up to get hired where I am today. I was hired due to my experience in additive manufacturing and most of the lab work at my job consists of AM material characterization."

Dream Career via Research Experience

"I had numerous opportunities to join research positions with some ME professors. This taught me skills that I would not have learned in the classroom. Skills such as photolithography, thin film deposition etc. It also gave me the opportunity to hone my soft skills such as time management, teamwork, problem-solving and dependability."

How far can you go?

UNIVERSITY OF THE DISTRICT OF COLUMBIA 1851

Learn About the ME Department Faculty

- https://www.udc.edu/seas/mechanical-engineering/faculty-staff-me/

Faculty	Fields
Dr. Pawan Tyagi Graduate Program Director ptyagi@udc.edu	Molecular spintronics for quantum based computer technology, nanotechnology enabled additive manufacturing and post-processing, renewable energy harvesting, photovoltaic cells and solar thermal air heaters, nanosensors for biochemical and electromagnetic energy detection
Dr. Kate Klein Department Chair Kate.klein@udc.edu	Nanomaterials synthesis & characterization, electron and ion beam applications, microscopy and in-situ experimentation, mechanical properties of materials, microstructural and mechanical study of additively manufactured parts
Dr. Jiajun Xu Undergrad Program Director jiajun.xu@udc.edu	Nanotechnology, thermal energy science and technology, additive manufacturing
Dr. Reza Shaeri mohammad-shaeri@udc.edu	Heat transfer in nano/microstructures, high-heat-flux thermal management solutions, cryogenic cooling, desalination, thin film deposition
Dr. Lara Thompson Biomed. Program Director lara.thompson@udc.edu	Postural control and mobility, non-invasive and invasive prostheses, sensory substitutes, rehabilitative devices
Dr. Max Denis max.denis@udc.edu	Diagnostic ultrasound imaging, cancer detection, acoustic remote sensing

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Thank You
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