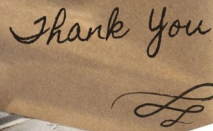


# WFU Engineering Educating the Whole Engineer

**The best way to predict the  
future is to create it.**

A small, tilted image of a "Thank You" card with a pencil and a small bowl, placed over the bottom left corner of the main image.

*Thank You*

**Dr. Olga Pierrakos**  
**Founding Chair and Professor**  
**April 2021**



WAKE FOREST  
UNIVERSITY

# Reimagining Engineering Education

**“If you always do what you always did,  
you will always get what you always got.”**

*Albert Einstein*



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# Why Engineering?



No profession unleashes the spirit of innovation like engineering. From research to real-world applications, engineers constantly discover how to improve our lives by creating bold new solutions that connect science to life in unexpected, forward-thinking ways. Few professions turn so many ideas into so many realities. Few have such a direct and positive effect on people's everyday lives. We are counting on engineers and their imaginations to help us meet the needs of the 21<sup>st</sup> century.

# Why Engineering?

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**Engineers better our lives and society**

# **Why WFU Engineering?**

## **Top 10 List**



# #10 – Innovative Curriculum

**~60%**

**Common Knowledge**

**~ 40%**

**Specialized Knowledge**

**Over 30 Technical Electives**

**EGR 111 (4 hr)**  
– Intro to  
Engineering  
Design

**EGR 112 (4 hr)**  
– Intro to  
Engineering  
Experimentation

**EGR 211 (4 hr)**  
– Materials &  
Mechanics

**EGR 212 (4 hr)**  
– Transport  
Phenomena

**EGR 311 (4 hr)**  
– Controls &  
Instrumentation

**EGR 312 (4 hr)**  
– Computational  
Modeling

**EGR 313 (1 hr)**  
– Capstone  
Design 1

**EGR 314 (4 hr)**  
– Capstone  
Design 2

**EGR 315 (4 hr)**  
– Capstone  
Design 3

EGR 317. Renewable Energy Systems  
EGR 318. Biomimetic Engineering  
EGR 319. Environmental Engineering  
EGR 320. Biomedical Applications  
EGR 324. Hydrologic and Hydraulic Engineering  
EGR 330. Infrastructure Systems Design  
EGR 332. Structural Engineering  
EGR 334. Mobile Robotics  
EGR 338. Bioprinting and Biomanufacturing  
EGR XXX. Biomaterials  
Etc.....

**10. Our engineering curriculum is flexible and customizable.  
60% is common knowledge / 40% is customizable.**

~60%  
Common Knowledge

EGR 111 (4 hr)  
– Intro to  
Engineering  
Design

EGR 112 (4 hr)  
– Intro to  
Engineering  
Experim

EGR 212 (4 hr)  
– Trans  
Pho

EGR 313  
– Capsto  
Design

**Rolling Out 5 Concentrations Next Year**  
**(leveraging our existing degree credits)**

Biomedical Engineering  
Civil and Environmental Engineering  
Electrical Engineering  
Materials and Chemical Engineering  
Mechanical Engineering

Hydraulic Engineering  
Systems Design  
Engineering  
Robotics  
Bioprinting and Biomanufacturing  
XXX. Biomaterials  
Etc.....

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60% is common knowledge / 40% is customizable.



# #9 – Balancing Theory & Practice

## Design Projects



## Research Projects



## Community Engagement Projects



## Laboratory Experiences



**9. There is theory and practice in every class and diverse projects across the curriculum. Experiential learning in action!**

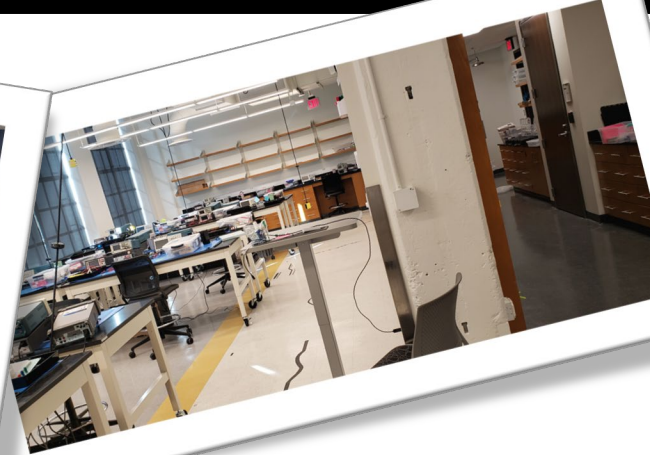
# Our newly build and renovated spaces support innovative engineering practice



Materials & Mechanics



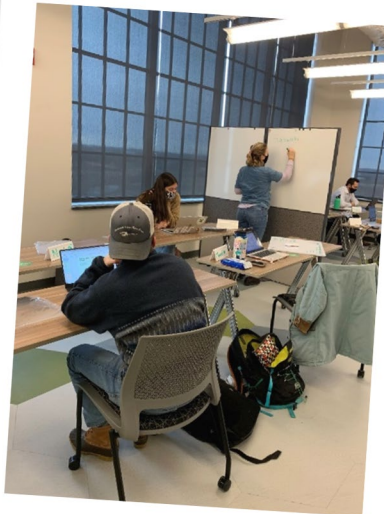
Thermal Fluids



Circuits & Instrumentation



First Year Studio



Capstone Project Studio



Innovation Studio



## #8 – A liberal arts exploration



**Computer science**  
**Mathematics / Statistics**  
**Chemistry / Biology**  
**Environmental science**  
**Environmental studies**  
**Physics**  
**Economics**  
**Neuroscience**  
**Music / Studio Art**  
**Art History**

**Entrepreneurship**  
**Psychology**  
**Philosophy**  
**Latin American studies**  
**Middle East & South Asian Studies**  
**Chinese Language & Culture**  
**German / Russian / French**  
**Theatre**  
**Writing**

**8. We believe that engineers should have other interests.**  
**Over 50% of our students pursue minors or a second major.**



## #7 – Exploring the world.



Switzerland  
The Netherlands  
Morocco  
Florence, Italy  
Venice, Italy  
Barcelona, Spain  
Salamanca, Spain  
Madrid, Spain  
Vienna, Austria  
Copenhagen, Denmark  
London, England  
Sydney, Australia  
Buenos Aires, Argentina  
Santiago, Chile

**7. We believe that engineers should explore the world. Over 50% of our students participate in study abroad. Europe, South America, Australia, Africa, Asia.**

White Blood Cell Modeling  
Water Quality Assessment using Drones  
Training AI Systems  
Crash Injury Research  
Developing Autonomous swarm robotic system  
Heat-sensor concussion research  
Solid Oxide Fuel Cell  
Effects of flash droughts on vegetation productivity  
Solar thermal device research and design  
Vortex ring formation in cardiac flows  
Body-on-a-chip tissue engineering research  
Meteorological and soil observation station  
Brain activity measuring device  
Promoting Vascularization in a 3D Hydrogel Environment  
Medical Device Design & Prototyping  
Assessing energy usage and increasing energy efficiency  
High Rock Lake Water Quality Lab  
Coral reef monitoring systems  
Prosthetic arm project for cello student  
.....



**6. We believe that engineers should discover new knowledge.**  
Over 50% of our students participate in undergrad research.



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**5. We believe that engineers should explore real world practice. Over 70% of our students participate in internships. Some leveraging our unique location in the heart of Innovation Quarter.**



# #4 – Making impact as students.

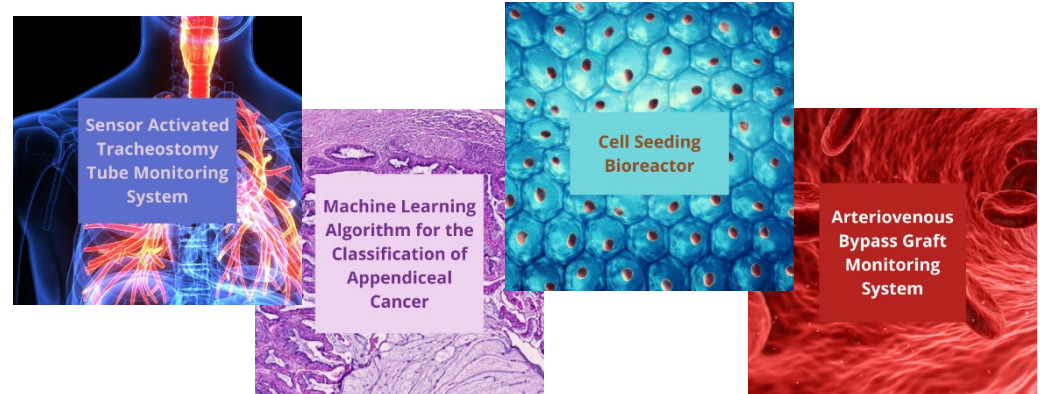
## Challenge 1: Renewable Energy Technologies for Sustainable impact



## Challenge 2: Environmental Solutions for Restoring Our Ecosystems



## Challenge 3: Biomedical Engineering Innovations for Saving Lives



**4. We believe that engineers should make impact before they graduate.** Our students participate in client-driven, year-long capstone design projects supported by faculty & external experts.

# #3 – Leadership starts with giving back.

Wake Forest Dance Company & Wake Forest Dance Team

Head Coach of Wake Forest Women's Soccer Club

Fraternity and Sorority Leadership Positions

Wake Forest Chapter of the National Society of Leadership & Success

Wake Radio Show Host

Innuendo Co-Ed Acapella Group

WFU Women in STEM

Wake 'N Shake Committee Member

Skiing Club

WFU Campus Garden

ROTC

OLAS (Organization of Latin American Students)

Rock Climbing Club

Virtual Tutoring for Children in Winston Salem

Local Food Bank Volunteer

WFU Media Council

University President's Aide

Reynolda Strings

Mindful Wake

Campus Kitchen

Student Staff at Wakerspace

Office of sustainability

Resident Adviser

Member of Black Student Alliance (BSA)

Kids Cooking Coalition Student Leader

Student Representative on the Faculty Athletics Committee

HOPE KidsFest Hospitality Chair

Storage Scholars Mover

Habitat for Humanity volunteer

MathCounts Volunteer

**3. We believe that engineers should be leaders in their community (WFU and local partnerships). Our students take leadership roles across our community.**



*We must remember that intelligence is not enough.  
Intelligence plus character - that is the goal of true education.*  
– Dr. Martin Luther King, Jr.

Wake Forest News

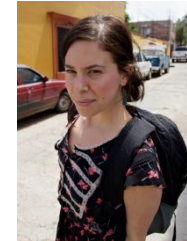
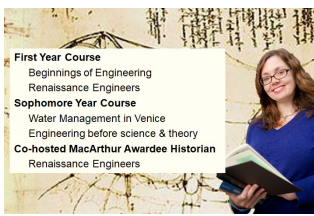
Headlines

Experts

Resources

THE  
KERN  FAMILY  
FOUNDATION

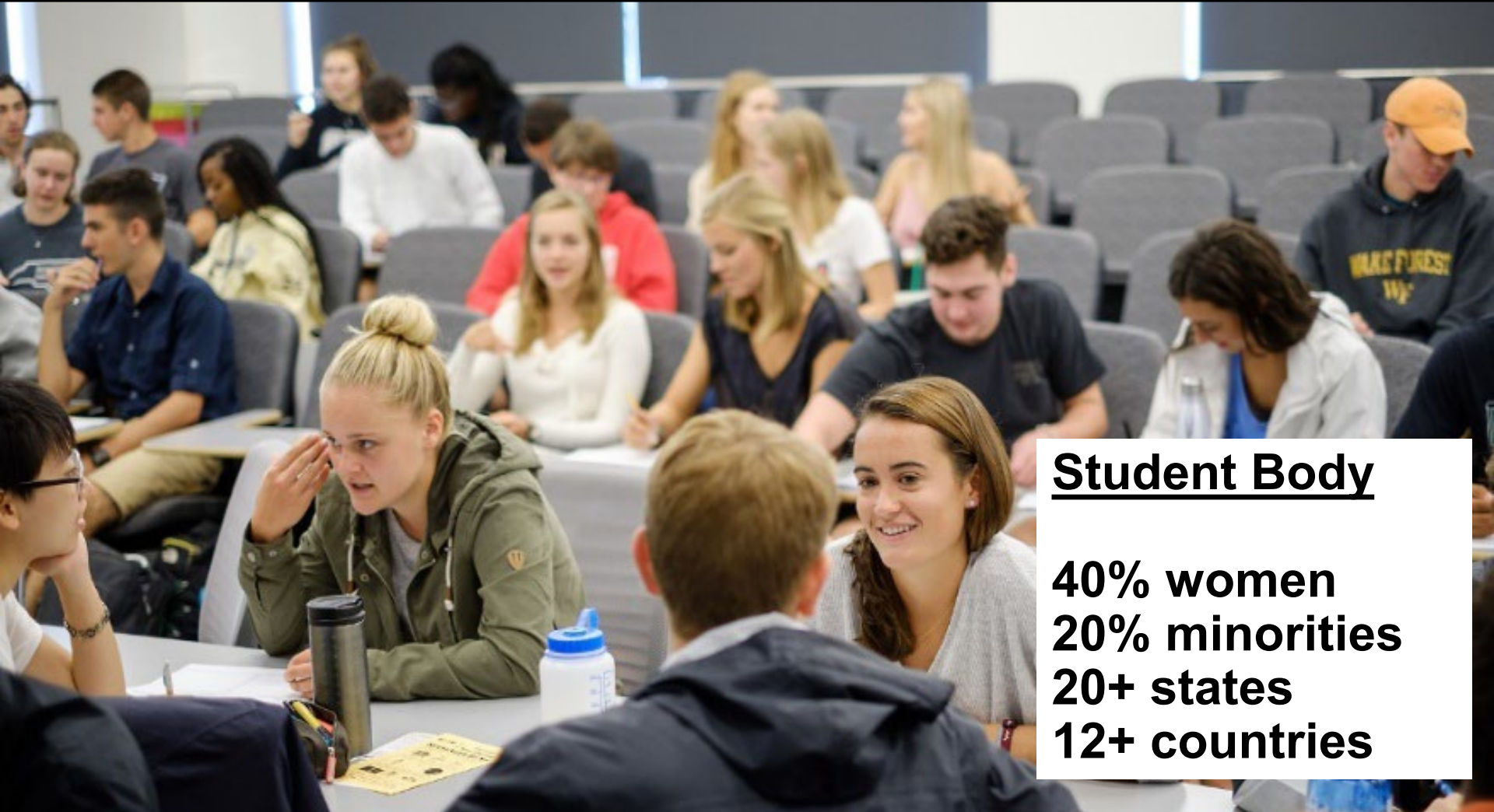
## WFU awarded \$700K+ to advance new model for engineering education



**2. We believe that a successful engineer is a virtuous engineer.** We bring a breadth of perspectives to the practice of engineering when we teach with humanists, social scientists, policy & business experts, etc.



# #1 – Our diversity & inclusive culture.

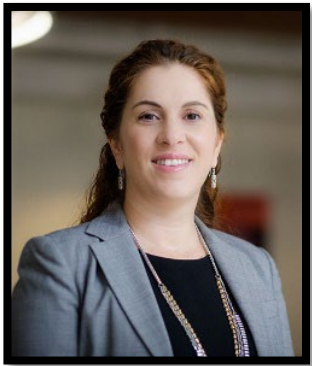


## Student Body

**40% women**  
**20% minorities**  
**20+ states**  
**12+ countries**

**1. We believe that our diversity is our strength and it makes us better engineers.** This diversity is embodied in our students & faculty.

# #1 – Our diversity & inclusive culture.



**Pierrakos**

Biomedical / Mechanical



**Bachman**

Mechanical



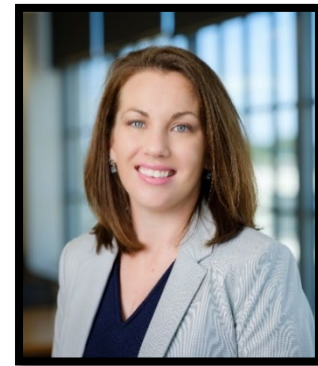
**Di Vittorio**

Civil / Environmental



**Gross**

Materials / Chemical



**Henslee**

Biomedical / Mechanics



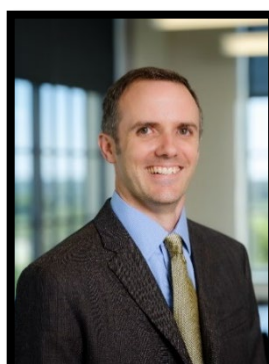
**Kenny**

Biological Systems



**Lowman**

Civil / Environmental



**Luthy**

Electrical / Computer



**Lutzweiler**

Structural



**Yazdani**

Biomedical / Mechanics



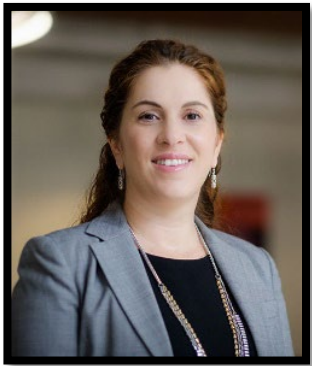
**Young**

Civil / Environmental

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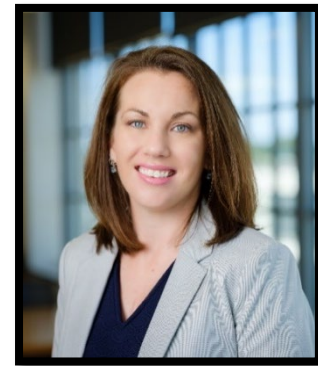
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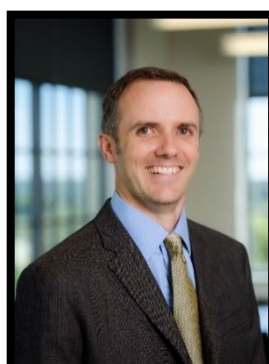
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# Why WFU Engineering?

**The average person has 10 jobs by the age of 40**  
*Bureau of Labor Statistics*

**Most engineers have positions that are very different from the type of BS degree received**

**Industry continues to ask for more well-rounded competencies**

**The *Best Performing CEOs* have studied engineering**

**Because Educating the Whole Engineer means we are preparing our students for a lifetime of careers**

# **Post Graduation Plans Inaugural WFU Engineers**

## **Class of 2021**

~65%

Industry &  
Government

~23%

Graduate  
Schools

~12%

Professional  
Schools

80% placement (as of April 20, 2021)...and going up each day.

~65%

Industry &  
Government

**ORACLE**

Cloud Solution  
Engineer

**WT**  
WHITING-TURNER

Project  
Engineer

**Deloitte.**

Solutions Engineer




Operations  
Engineer

**Schneider**  
Electric

Leadership  
Development  
Program



Sales Engineer

 **Premier Health**

Data Scientist

**AstraZeneca** 

R&D Engineer



Technology Consultant



2<sup>nd</sup> Lieutenant  
Engineering  
Branch

Staff Civil Engineer  
Digital Engineer  
Market Research  
Analyst  
Associate Consultant  
Control Systems  
Engineer  
Software Engineer  
City Engineer

....

~23%

Graduate  
Schools

Duke  
UNIVERSITY



Biomedical  
Engineering



Mechanical  
Engineering



UNIVERSITY OF  
**GEORGIA**

Structural  
Engineering



SMU

Engineering  
Management



**POLITECNICO**  
MILANO 1863

Architectural  
Engineering



JOHNS HOPKINS  
UNIVERSITY

Biomedical  
Engineering

~12%

Professional  
Schools



Georgetown  
University

Management  
Business School

**Being  
Determined**

Medical School  
Gynecology

**Being  
Determined**

Law School  
IP and Patent Lawyer

**Being  
Determined**

Renewable Energy & Policy



**Sharing gratitude to the WFU Community  
you for all you have done to support us!**



Olga Pierrakos - [pierrao@wfu.edu](mailto:pierrao@wfu.edu)