

The Materials Science and Engineering Major

Department of Materials Science and Engineering

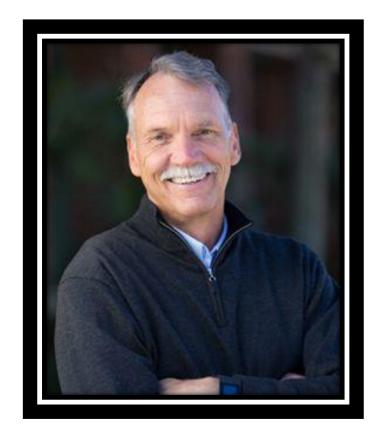
POWERING THE NEW ENGINEER TO TRANSFORM THE FUTURE

Kevin Jones, PhD

Undergraduate Coordinator, MSE

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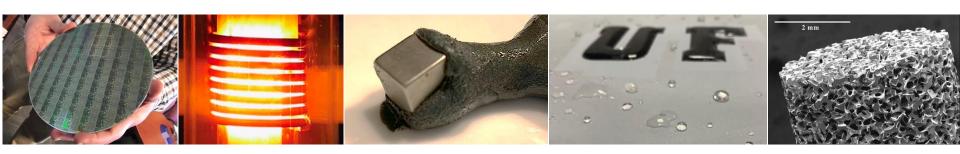
Research Interests: Semiconductor Processing and electron microscopy characterization; Ion implantation of Si, Ge and compound semiconductors; Li ion battery anode and cathode development



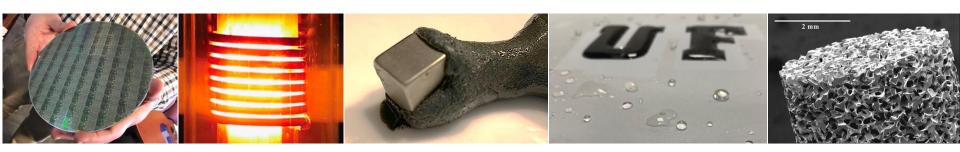
Mission

The mission of the MSE Program is to educate students with strong engineering and science backgrounds for Bachelor of Science, Master of Science, or Doctor of Philosophy degrees in Materials Science & Engineering so that they can productively apply their training to the solution of engineering problems in all materials related fields.

Have you ever heard of Materials Science and Engineering (MSE)?



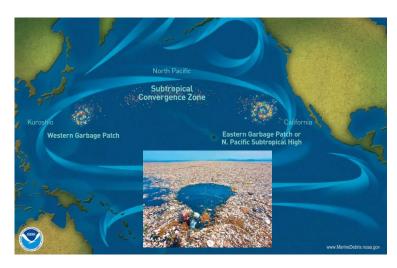
Materials Science and Engineering (MSE) creates the materials that shape our world—from batteries to turbine blades, medical implants to smartphone glass.



Solving Society's Biggest Problems with MSE

Example #1: Plastic waste and recycling





By developing bio-degradable plastics made without fossil fuels, we can dramatically reduce future environmental damage from plastic products.

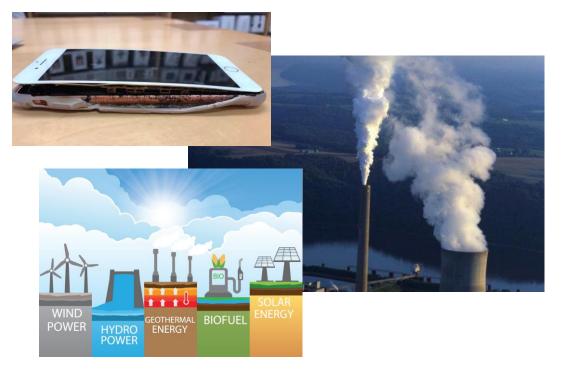
A key interest of our faculty members, Dr. Angelika Neitzel and Dr. Guilhem De Hoe





Solving Society's Biggest Problems with MSE

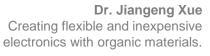
Example #2: Pollution, climate change, energy generation and storage



Three professors, three approaches!



Dr. Megan ButalaBuilding better batteries with atomic-scale characterization during and after operation.



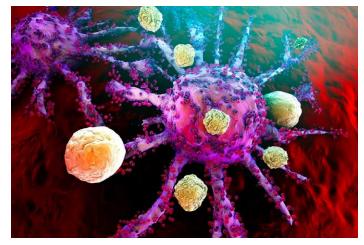




Dr. Tori MillerEnabling lighter cars and aircraft by strengthening lightweight Mg alloys.

Solving Society's Biggest Problems with MSE

Example #3: Disease and injury



https://www.newscientist.com/article/2229155-the-immune-cells-inside-tumours-hint-at-a-new-way-to-treat-cancers/



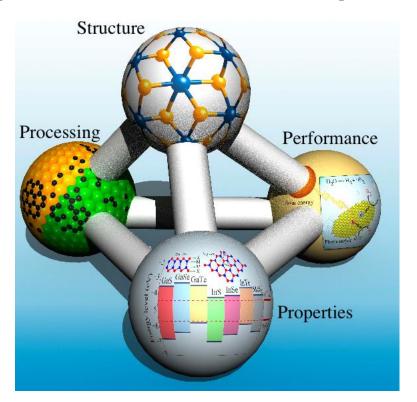
https://www.biolinscientific.com/blo g/top-5-q-sensors-for-biomaterialsmedical-device-research

Materials can be made to interact with the body to correct injury and modify our immune response

Dr. Josy Allen Engineering stem cells through their interactions with materials



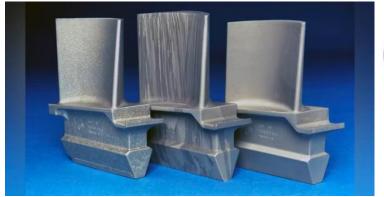
The **performance** of a material is directly connected to its **properties**, **structure**, and **processing**

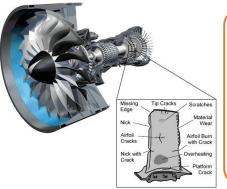


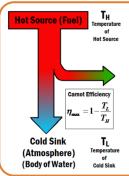


In MSE, we change the processing and structure of parts to improve the material's performance

Turbine blades for jet engines

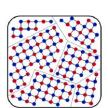






Opportunity:

Engines are more efficient when they're run hotter.



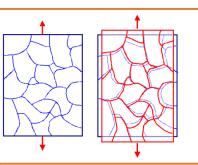
Polycrystalline

Increasing grain size, decreases high-T creep



Challenge:

As blades heat up they soften and the stress of spinning elongates them. Too much and they clip the outer wall...



Details about the MSE major

Curriculum Overview

125 total credits

Science and Math Core (8 courses)

Engineering Core (5 courses)

MSE Core (12 courses)

Engineering Design (8 courses)

Technical Electives (5 courses)

General Education (3 courses)



Technical Electives for In-Depth Coverage of Materials

Applications and Fundamentals

BioMaterials

- BioMaterials; Structure & Properties
- Biopolymers: Manufacturing, Stability, and Biocompatibility
- BioMaterial Lab

Polymers

- Physical Properties of Polymers
- Processing Polymers
- Polymer Lab

Metallurgy

- Physical Metallurgy
- Processing Metallurgy
- Metallurgy Lab

Semiconductors/Electronic

- Compound Semiconductor
- Production of Electronic Materials
- Electronic Lab

Ceramics

- Physical Ceramics
- Processing Ceramics
- Ceramics Lab



Our students take five hands-on lab courses, using advanced equipment in the undergraduate laboratory

- Scanning electron microscopes
- Energy dispersive spectroscopy
- X-Ray diffraction
- Fourier transform infrared spectroscopy
- Simultaneous thermal analysis and differential scanning calorimetry



- Mechanical testing machine
- Charpy fracture tester
- Hardness testers
- 3D printers
- Bioprinters
- Furnaces



Research Opportunities

- Join a research lab for further hands-on experience
- Faculty Research Areas: https://mse.ufl.edu/research/faculty-research-areas/







We have 20 Faculty directly involved with the MSE undergraduate program





Michael Tonks
Department Chair, Interim

We Have Two Dedicated Academic Advisors

They can help:

- Answer questions about the program
- Provide guidance and recommendations



Tahara Franklin
Academic Advisor III



Allyson Beatty
Academic Advisor II



We have several student associations that can enrich your experience

(not a complete list)



Mission: Help our members achieve success in their studies and career endeavors.

Chair: Dr. Tori Miller



Mission: Build professional networks and skills with a focus on current advancements in biomaterials.

MATERIALS SCIENCE & ENGINEERING | NUCLEAR ENGINEERING

COMMUNITY COALITION

Mission: Improving sense of community and belonging in MSE at UF.

Chair: Dr. Simon Phillpot



Fun activities around Gainesville for students



Watch a play at the Hippodrome



Tube down the Ichetucknee River



Hike through Payne's Prairie



See a game in The Swamp VisitGainesville.com



Observe local wildlife

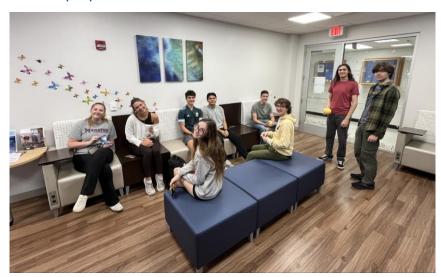


Bike the Gainesville-Hawthorne Trail



Benefits of a Smaller Department

- Coffee/tea station and snack pantry for all MSE/NE students
- A close, supportive department and program culture
- Fewer Students Per Class Means More Hands-On Learning
 - Smaller class sizes allow for more hands-on projects, personalized feedback, and tailored guidance to help you excel in your studies and career preparation.







Job opportunities with an MSE degree



Help Seeking Internships and Full-Time Jobs

Career Fair

- Every Fall semester
- Dedicated Exhibit Hall for MSE companies

Access to UF Career Connections Center

- Workshops and Interview training
- Resume building
- Internship listings





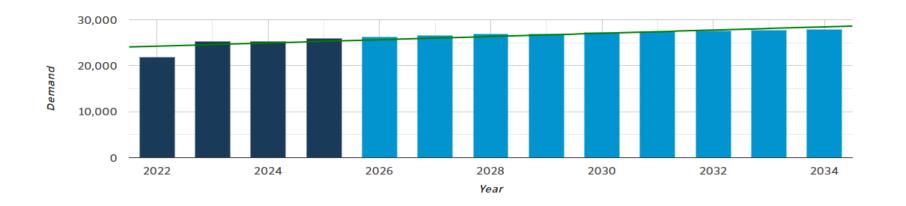


Increasing Material Engineering Opportunities

Employment Trends

The number of jobs in the career for the past two years, the current year, and projections for the next 10 years. Job counts include both employed and self-employed persons, and do not distinguish between full- and part-time jobs. Sources include Emsi industry data, staffing patterns, and OES data.

Over the next 10 years, employment demand is expected to change by +7.54% for Materials Engineers.





Salary Prospects with an MSE Degree

Average Initial Salaries:

	2023	2022	2021	2020	2019	5 yr Avg.
B.S.	\$76,220	\$71,323	\$71,685	\$73,870	\$68,500	\$72,320
M.S.	\$92,847	\$80,170	\$78,151	\$72,500	\$85,000	\$81,734
Ph.D.	\$103,792	\$99,750	-	\$85,000	\$85,000	\$93,386

^{*}These are real number collected from our graduates.

Graduate degrees are <u>not</u> required for good pay job security in MSE.

Consider a grad. degree mainly if you want to do R&D or management.

^{**}Note, because of smaller numbers of PhDs and MS students, those numbers appear to bounce around more, and thus it can be more helpful to compare multiyear running averages.



Top Employers

These companies are currently hiring for Materials Engineers.



- 1. Raytheon Technologies
- 2. S&Me
- 3. GPAC
- 4. Braun Intertec
- 5. Northrop Grumman
- 6. Acuren
- 7. Apple
- 8. Actalent
- 9. Blue Origin
- 10. Freeport-McMoRan

- 11. Barrick Gold Corporation
- 12. GE Aerospace
- 13. Aerotek
- 14. Caterpillar
- 15. SpaceX
- 16. Lockheed Martin
- 17. Bechtel
- 18. Howmet Aerospace
- 19. American Bureau Of Shipping
- 20. Terracon Consultants













Our alumni work at many excellent companies, national laboratories, and universities





SIEMENS



























Johnson Johnson



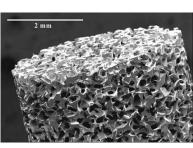
Thank you for listening!

If you're ready to dive into innovation, exploration, and making an impact on the world, Materials Science and Engineering at UF is the place to be. With our world-class faculty, cutting-edge research, and vibrant community, we offer a truly exceptional experience in the heart of Florida.









Any questions?

Dr. Kevin Jones (352) 846-3301 kjones@eng.ufl.edu

MSE Advising (352) 846-3312 Advising@mse.ufl.edu

Reach out at any time with questions! ©

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