

Mechanical and Aerospace Engineering

- Welcome! We are very Happy to host you
- Please <u>mute your microphones</u> and <u>turn off your</u>
 <u>cameras</u>
- Presentation will start at 2:10 pm
- You may ask Questions in chat
- ... or at the end of the session by raising your hand





Mechanical and Aerospace Engineering

Welcome!

Assimina Pelegri Professor and Undergraduate Director

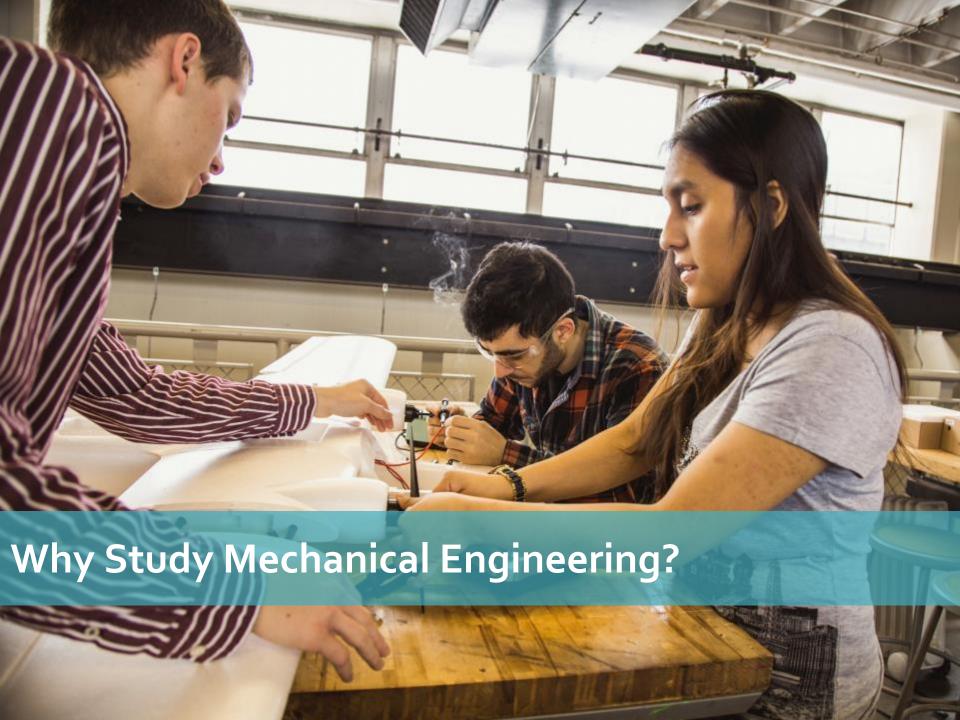


Alberto Cuitino
Professor and Chair



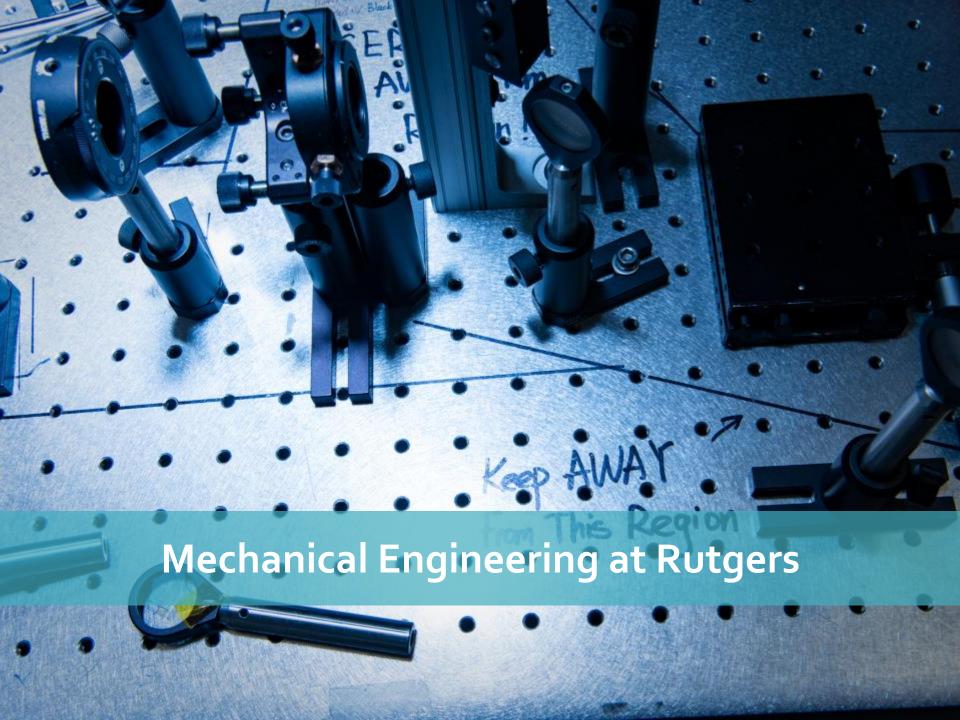
Mechanical Engineering at Rutgers

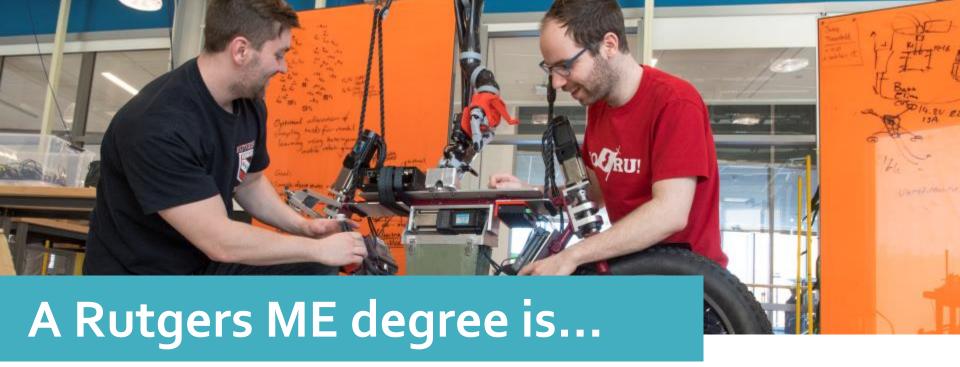






- Bring new ideas to life through design and manufacturing.
- Virtually every object has passed through the hands of a mechanical engineer.
- A broad-based field, extending into a wide range of industries.





Relevant and Impactful

- Prepare to innovate transformative solutions that make the world a better place
- A Path to Professional Success
 - Pursue leadership careers in industry and government



An outstanding choice of degree and program options:

- BS degree in mechanical engineering
- BS degree in mechanical engineering with an energy systems concentration (3 senior level courses in energy systems)
- BS degree in mechanical engineering with an aerospace concentration (3 senior level courses in aerospace systems)

What You Will Study

- Mechanical Systems and Design
- Thermal Sciences
- Solid Mechanics, Materials, and Structures
- Fluid Mechanics
- Controls



ME Courses

Freshman Year						
160:159	Gen Chem for Engrs	3	160:160	Gen Chem for Engrs	3	
160:171	Intro Experimentation	1	440:127	Intro Computers for Engrs	3	
355:101	Expository Writing	3	440:221*	Eng'g Mech (Statics)	3	
440:100	Intro to Engineering	1	640:152	Calculus for Eng'g	4	
640:151	Calculus for Eng'g	4	750:124	Analytical Physics IB	2	
750:123	Analytical Physics IA	2		Hum/Soc Elective	3	
	Hum/Soc Elective	3				
Sophomore Year						
440:222*	Eng'g Mech (Dynamics)	3	640:244	Differential Equations	4	
640:251	Multivariable Calculus	4	650:291*	Mechanics of Materials	3M	
650:388*	CAD in MAE	3 M	650:351*	Thermodynamics	3M	
750:227	Analyt Physics IIA	3	650:361*	Mechatronics	4M	
750:229	Analyt Physics IIA Lab	1	750:228	Analyt Physics IIB	3	
650:289	Prof Devel & Leadersh ME	1M	750:230	Analyt Physics IIB lab	1	

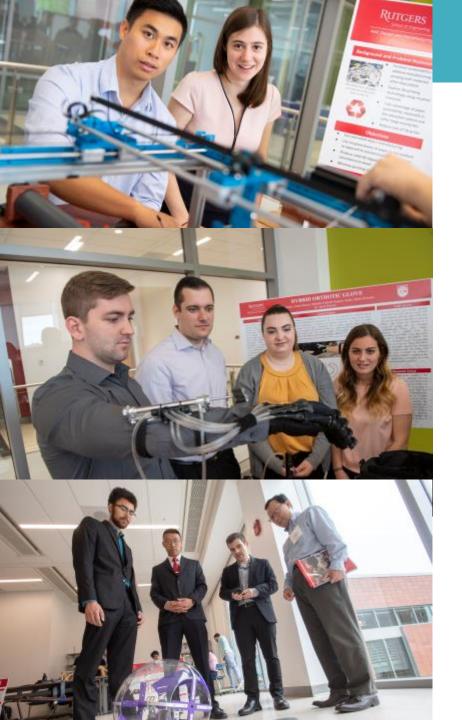
ME Courses

<u>Junior Year</u>							
540:343*	Engineering Econ	3M	635:407	Mech Prop Materials	3M		
640:421	Advanced Calculus	3M	650:312*	Fluid Mechanics	3M		
650:342*	Design Mech Components	3M	650:439*+	Multiphysics Simulations	3M		
650:350*	MAE Measurements w/Lab	4M	650:4XX	Dept/Aero/Energy Core	3M		
	Technical Elective	3		Technical Elective	3		
Senior Year							
650:431	Mech/Aero Eng Lab I	2M	650:401*	Sys Dynamics & Controls	3M		
650:467	Design & Manufacturing I	2M	650:432/3/5	Mech/Aero/Energy Lab II	2M		
650:481*	Heat Transfer	3M	650:468	Design & Manufacturing II	2M		
650:4XX	Dept/Aero/Energy Core	3M	650:4XX	Dept/Aero/Energy Core	3M		
650:4XX	Dept/Aero/Energy Core	3		General Elective	3		
	Hum/Soc Elective (200+)	3		Hum/Soc Elective (200+)	3		

Select hands-on ME Courses

- Introduction to Experimentation (freshman)
- Introduction to Mechatronics (sophomore)
- Engineering Measurements (junior)
- Mechanical Laboratory (senior)
- Design and Manufacturing I & II (senior)





Senior Design Projects

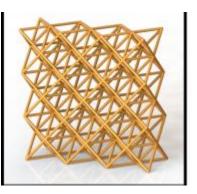
- Design and build a prototype
- Classroom learning put to reallife use
- Students work with industry and faculty
- Collaboration with Business School
- Past projects:
 - Drones in Tandem
 - Solar/Thermal Soaring UAV
 - Orthopedic Power Grasper Glove
 - Pneumatic Sorter
 - Evaporative Cooling System



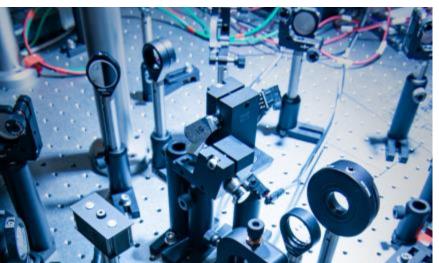
Hands-on research opportunities that set us apart – and let you

- Conduct research alongside faculty in cutting edge fields from
 - Material synthesis to Mechanobiological applications
 - Robotics to fluid mechanics
- Publish research even as an undergraduate
- Embedded in the program up to 6 Technical Electives credits (2 courses)









ME Research

- Paper-based sanitizer with uses ranging from self-sterilizing clothing to smart bandages that heal wounds.
- Manufacturing electronic circuits and biological devices with features that measure a handful of atoms.
- "Unprinting" paper by removing toner with pulses of intense xenon light curbs environmental impact.
- Lightweight, reconfigurable and mechanically tunable materials with 4D printing for better shock absorption, morphing airplane wings, and soft robotics.











KHEED MARTIN













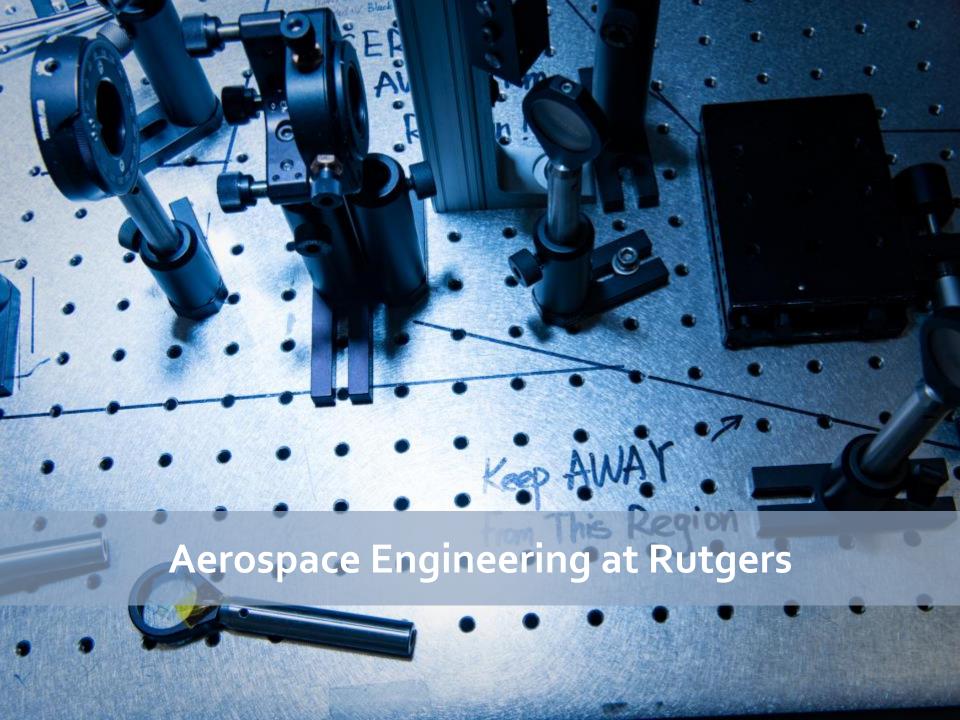


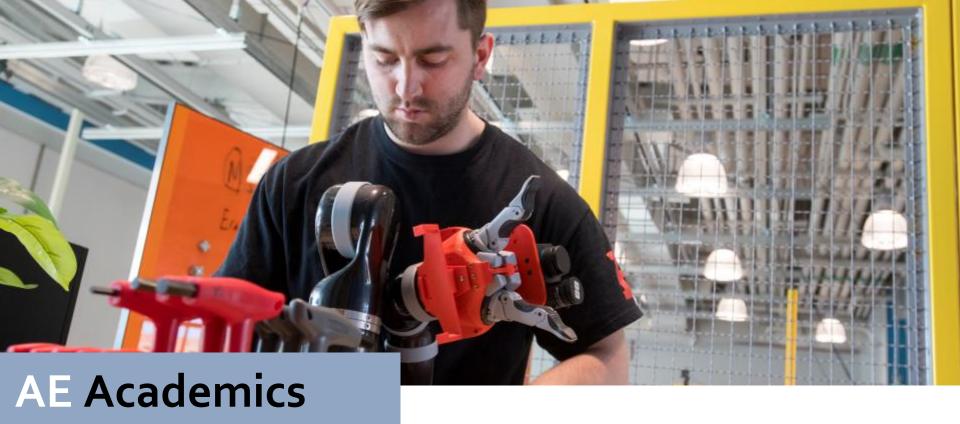
ME Career Preparation



Invaluable *internship* and *co/op* opportunities – with Fortune 500 companies, research organizations and industry leaders – that give you the practical, professional experience to launch your career.

Embedded in the program – up to 6 Technical Electives credits (2 courses)





An outstanding choice of degree and program options:

- BS degree in aerospace engineering
- BS degree in aerospace engineering with an energy systems concentration

What You Will Study

- Aerodynamics
- Propulsion
- Space Flight Dynamics
- Orbital Mechanics
- Fluid Sciences
- Controls
- Materials and Structures



AE Courses

Freshman Year						
160:159	Gen Chem for Engrs	3	160:160	Gen Chem for Engrs	3	
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Sophomore	<u>Year</u>					
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AE Courses

Junior Year					
640:421*	Advanced Calculus	3	650:401*	Syst Dynamics & Controls	3M
650:312	Fluid Mechanics	3M	650:449	Aerospace Materials	3M
650:342*	Design Mech Components	3M	650:458	Aerospace Structures	3M
650:350*	ME Measurements	4M	650:460	Aerodynamics	3M
	Hum/Soc Elective (200+)	3	650:471	Aircraft Flight Dynamics	3M
Senior Year					
650:431	MAE Lab I	2M	650:433	AE Lab	2M
650:439*+	Multiphysics Simulations	3M	650:459	Aerospace Propulsion	3M
650:457	Spacecraft Mission Des	3M	650:463	Compr Fluid Dynamics	3M
650:465	Orbital Mechanics	3M	650:488	Aerospace Design Proj II	2M
650:487	Aerospace Design Proj I	2M		Hum/Soc Elective (200+)	3
	Technical Elective	3		Technical Elective	3

Select hands-on AE Courses

- Introduction to Experimentation (freshman)
- Introduction to Mechatronics (sophomore)
- Engineering Measurements (junior)
- Aerospace Laboratory (senior)
- Aerospace Engineering Project I & II (senior)



Senior Design Projects

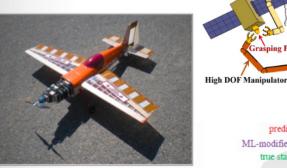
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- Classroom learning put to reallife use
- Students work with industry and faculty
- Collaboration with Business School
- Past projects:
 - Drones in Tandem
 - Thermal detection UAV glider
 - Inflatable deployable lunar structures
 - Aerially deployed micro-UAVs with 3D mapping



Hands-on research opportunities that set us apart – and let you

- Conduct research alongside faculty in cutting edge fields from
 - Design Aerospace Structures to Aerodynamics and Flight controls
 - Morphing Materials to Design Space Habitats
- Publish research even as an undergraduate
- Embedded in the program up to 6 Technical Electives credits (2 courses)







AE Research

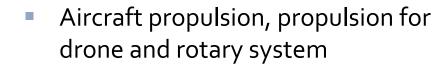
Path #1: Collide with Solar Panel

ML-modified state

Chaser Satellite

estimated state

true state



Lightweight composite material design including 4D printing for morphing airplane wings

Unmanned areal, submersible and hybrid vehicles

Lunar structural concepts

Space guidance and controls

Space robotics

Fire safety in aviation











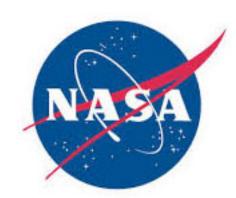








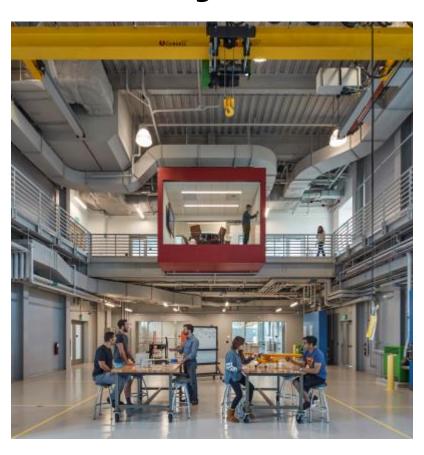
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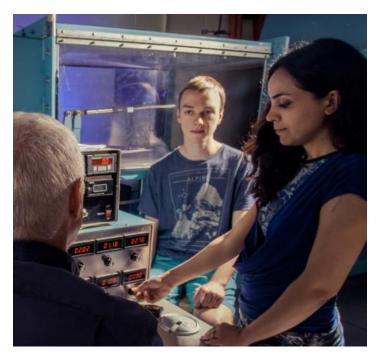
Entangled in the program – up to 6 Technical Electives credits (2 courses)

Manufacturing Lab



Robotics Lab





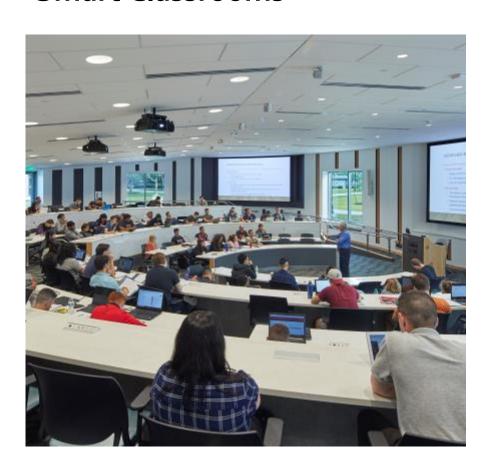
Emil Buehler Supersonic Wind Tunnel

https://www.dailytargum.com/article/2019/04/supersonic-wind-tunnel-at-rutgers-uses-high-speeds-to-observe-how-aircraft-fly

Emil Buehler Aerospace Lab



Smart Classrooms



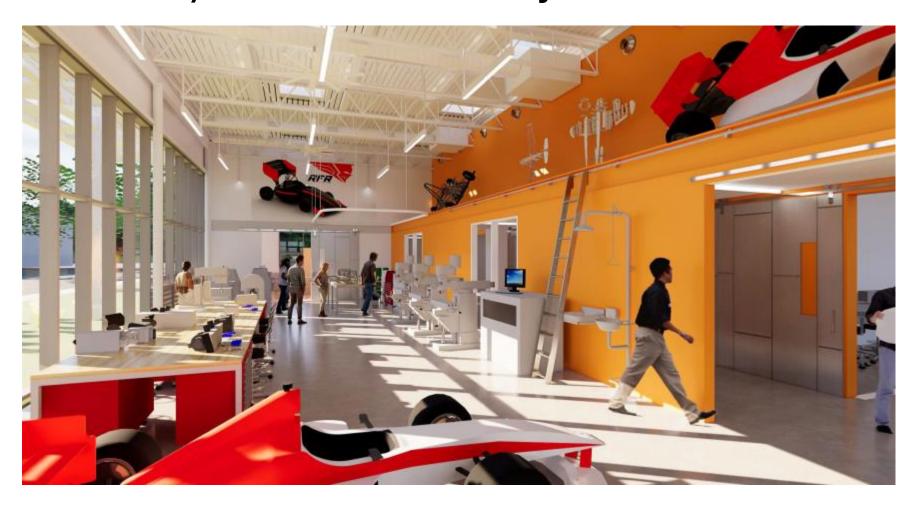




Bruce and Phyllis Nicholas Student Projects Studio: 2021



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Student Organizations

Rutgers Formula Race Car Rutgers Solar Car American Society of Mechanical Engineers (ASME) MAE Girls Connect - Rutgers



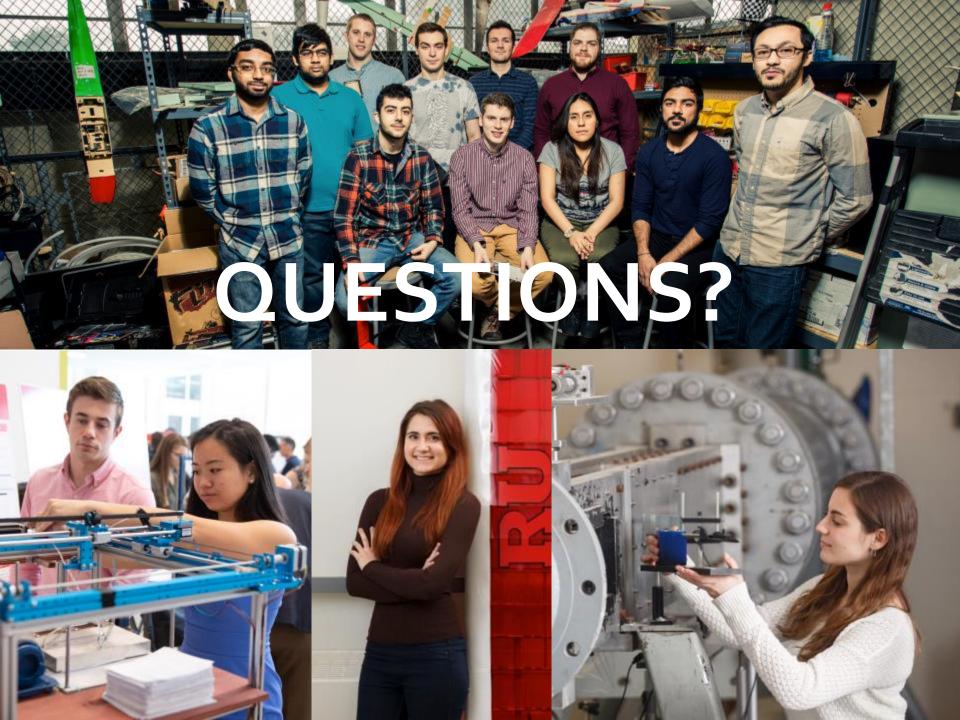


Student Organizations

American Institute of Aeronautics and Astronautics (AIAA)
Space Technology Association of Rutgers (STAR)
Rutgers Rocket League









Mechanical and Aerospace Engineering

Useful Links!

https://mae.rutgers.edu/

https://mae.rutgers.edu/flipbook/ughandbook/mobile/

https://mae.rutgers.edu/where-is-my-mae-class

https://mae.rutgers.edu/research-areas-and-laboratories