



# VIRGINIA TECH ENGINEERING OPEN HOUSE 2021

## Engineering Open House Schedule 2021

### Day 1 - Monday, March 29th

#### 3-6pm

Booth Showcase: College of Engineering Departments, student organizations, and other campus organizations will have information displayed and will be available via zoom on Monday, March 29th from 3-6pm to answer any questions.

#### 6-6:45pm

Mind Music Machine Lab, where Arts and Technologies Meet: The connection between art and technology is much tighter than is commonly recognized. I will introduce a few projects we are working on in the Mind Music Machine Lab, which integrate art and technology: immersive visualization and sonification of performing arts, music effects on emotional driving, and children's live theater production with interactive robots. This talk is expected to facilitate discussions on how various forms of arts can expand representation of the computing process and structure, as well as how computing can expand our perceptual experiences.

Presented by: Dr. Myounghoon "Philart" Jeon

Mining Engineering in a Low Carbon World: This presentation will give a general overview of mining and minerals engineering curriculum and careers. Next, we will discuss the role of sustainable, responsible mineral extraction in low carbon technologies, and the role mining engineers play in the environment.

Presented by: Dr. Kray Luxbacher

#### 7-7:45pm

Galileo & Hypatia Living Learning Community Session/Virtual Tour: Hear about the engineering living learning communities for first year students and learn about the work we do to help students have a successful first year at Virginia Tech. We will also show a virtual tour of Hoge Hall! You will see a typical bedroom, common lounge spaces and our maker space with 3D printers, laser cutters and other tools available to the students in our community. You will also have the opportunity to talk to our students and ask questions about the community.

Presented by: Dr. DeAnna Katey joined by students part of Hypatia, Galileo, and the CEED Peer Mentoring Program

Opportunities in Computer Science: An overview of degrees and career opportunities in computer science.

Presented by: Dr. Cal Ribbens

### Day 2 - Tuesday, March 30th

#### 3-3:45pm

Electrical and Computer Engineering Information Session: The Bradley Department of Electrical and Computer Engineering is the Third largest ECE Department in the United States. This allows us to offer specialized majors in twelve different areas to prepare graduates for a vast array of career choices. In this session, we will discuss the major options available to students and their importance to industry and future research.

Presented by: Scott Dunning, Dr. Jaime De la Ree, Mary Brewer



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**Vlaisavljevich Research Lab:** The overarching goal of our laboratory is to investigate the physical mechanisms with which ultrasound interacts with tissue in order to develop non-invasive therapies for specific clinical applications. This work is separated into five primary research areas including Non-invasive Tissue Ablation, Acoustically-active Biomaterials, Ultrasonic Neuromodulation, Ultrasound-guided in situ Tissue Regeneration, and Biomedical Technologies for Conservation Applications.

**Harris Manufacturing Processes Laboratories:** The Harris Manufacturing Processes Laboratories consist of a collection of individual labs, equipment, and support facilities for both instruction and research in manufacturing processes and metrology. Over 650 undergraduate students from three engineering departments participate in hands-on laboratory instruction in this 5100-square-foot facility each year. A separate research machine shop provides in-house fabrication of fixtures and other devices in support of departmental research activities.

#### **4-4:45pm**

**Civil and Environmental Engineering:** This presentation will describe the civil engineering profession and discuss undergraduate education in the Via Department of Civil & Environmental Engineering at Virginia Tech.

Presented by: Dr. Mark Widdowson, Kara Lattimer

**ECE General Lab Tour:** ECE General Lab Tour

**Looking for something different? Mining engineering is: hands on, global, and high tech:** Ever wondered where all of your stuff comes from? From renewable energy, to our buildings in cities and towns, and the grids connecting us all - mineral resources are critical to just about everything we do. Come learn more about the hands on, global and high tech field of mining engineering.

Presented by: Dr. Emily Sarver

#### **5-5:45pm**

**Center for the Enhancement of Engineering Diversity Pre-College Programs:** The session will present information on pre-college summer and academic year STEM programs. The focus will be on those offered by the Center for the Enhancement of Engineering Diversity, but will include events/programs from across the university.

Presented by: Dr. Kim Lester

**Radios, robots, video games, and antennas:** The presentation describes some ways that radios, robots, video games, and antennas are related to one another, and to projects that you can join as a Virginia Tech Engineering student!

Presented by: Dr. Carl Dietrich

#### **6-6:45pm**

**What is Materials Science and Engineering and what we do:** This will be an overview of what is Materials Science and Engineering (MSE). What is MSE, what we study and what we do. Please attend to learn more how MSE is the center of all engineering.

Presented by: Michelle Czamanske

**Sanghani Center for Artificial Intelligence and Data Analytics:** Brings together computer scientists, engineers, and statisticians to meet the research and workforce needs of today's data-driven society.

**Grado Department of Industrial and Systems Engineering:** The Grado Department of Industrial and Systems Engineering is a top-ranked program, offering a B.S. in Industrial and Systems Engineering (BSISE). Career



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opportunities for ISEs have never been better, and our graduates work for manufacturing facilities, distribution warehouses, hospitals, airlines, railroads, banks, amusement parks, management consulting, military, and federal government organizations.

One of the primary aims of the ISE is to create value for organizations by improving performance of integrated systems, for example, improving quality, productivity, costs, efficiency, worker safety, and/or customer satisfaction. The depth and breadth of the BSISE curriculum at Virginia Tech prepares our graduates to contribute to any organization in any industry.

Presented by: Maggie Johnson, Dr. Eileen Van Aken, Paula Van Curen

## **7-7:45pm**

**Materials Science and Engineering Lab Tour with Demonstrations:** Materials Science & Engineering (MSE) is an interdisciplinary field of materials science based around the design and discovery of new materials. MSE is involved in the research, design, and development of materials to advance technology and products.

One of the most hands on engineering disciplines, MSE students are in the lab every semester. During this tour, the MSE Student Ambassadors will provide a view of the labs, demonstrations, and experiments. After the tour, the MSE Student Ambassadors will be on hand to answer your questions.

**Chemical Engineering Academic & Career Opportunities:** An overview of the Chemical Engineering curriculum and experiential learning opportunities at Virginia Tech from the viewpoint of ultimate career destinations in Chemical Engineering.

Presented by: Dr. Gary Whiting

**DREAMS (Design, Research, and Education for Additive Manufacturing Systems) Lab:** The DREAMS lab is a research lab focused on additive manufacturing (e.g., 3D printing) technologies. The lab consists of an interdisciplinary set of undergraduate and graduate researchers from a variety of majors and backgrounds, including mechanical engineering, materials science, and chemistry. We often work on multi-disciplinary projects involving new materials, designing for additive manufacturing, and developing new additive manufacturing processes. Some of our recent projects have integrated additive manufacturing with cybersecurity, pharmaceuticals, industrial robotics, and biomedical applications. From programming to printing to materials testing, there's always something interesting going on in the DREAMS lab!

## **Day 3 - Wednesday, March 31st**

### **3-3:45pm**

**Engineering Orthopaedics:** I will discuss the ideas of how we use engineering to advance our understanding of human biomechanics. We will focus on how we use state of the art technology to assess injury risk, design data informed rehabilitation programs as well as develop novel technologies for clinical translation. I will discuss the interdisciplinary nature of our work, the role that undergraduates and graduate students play in our work and the integration of our lab with senior design.

Presented by: Dr. Robin Queen

**Global Engineering opportunities at Virginia Tech:** We will present a snapshot of opportunities for students to study, research, and intern abroad in the College of Engineering (when we're not in a pandemic).

Presented by: Dr. Rob Emmett

**Ocean Engineering:** I will present the major Ocean Engineering. It consists of the following: (1) what is OE; (2) subjects/courses of OE; (3) extracurricular activities;(4) job opportunities of OE in naval architecture, oil&gas, renewable energy etc.

Presented by: Dr. Heng Xiao



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## **4-4:45pm**

iPhones, Electric Vehicles, and Renewable Energy - the Critical Role of Mining Engineering in Modern Society: Modern society is facing increased demand for small electronic devices, light weight metals, and high-performance batteries. All of these essential devices require extremely specialized raw materials that are difficult and expensive to mine and extract. The Mining and Minerals Engineering Department at Virginia Tech is world renowned for its teaching and research in critical materials production and separations. This presentation will describe some of this cutting-edge research and explain how new undergraduates can get involved through undergraduate research and internships.

Presented by: Dr. Aaron Noble

Mechanical Engineering Info Session: Information (curriculum, senior design, internship/co-op opportunities, student organizations) about the ME dept.

Presented by: Sarah Deisher, Dr. Clint Dancey, Robin Ott

Smart Manufacturing Analytics Research & Technology (SMART) Lab: SMART stands for smart manufacturing analytics research and technology. We conducting research related to sensing and analytics for smart manufacturing in this lab. We also perform data mining and machine learning for manufacturing and service application. In this lab, we have multiple 3D printers, some of them have advanced capabilities, for example, bio-printing and metal-printing. For the sensing equipment, we have multiple 3D scanners, Digital Image Correlation(DIC), multiple thermal cameras, and other popular sensors such as vibration sensors. For industrial-grade machines, we have a Kawasaki robot arm and a CNC machine. Besides all these, we have a 4 graphic card data mining server and multiple workstations for data processing.

## **5-5:45pm**

Kevin P. Granata Biomechanics Lab: The Kevin P. Granata Biomechanics lab, directed by Robin Queen, is dedicated to preventing injuries, determining optimal rehabilitation strategies, and assessing readiness to return to activity for those impacted by injury or joint pain. In the spirit of Ut Prosim (That I May Serve) we strive to positively impact the lives of individuals across the lifespan from adolescents to older adults by restoring movement and loading symmetry and preserving long-term joint health through mechanical and therapeutic interventions.

inVenTs Studio Project - Hands on Project - The inVenTs Studio on the 2nd floor of Hoge Hall provides a hands on maker space for students in Hypatia and Galileo interested in exploring their ability to envision, create and transform innovative ideas into action. inVenTs Studio Staff will be going over a hands-on project that you can make at home with a few, easy-to-find materials. It is optional to make the project during the presentation, feel free to just watch as well or try out the project later!

## **6-6:45pm**

Biological Systems Engineering: BSE's faculty and students work in a broad range of biological systems, from natural systems, such as watersheds with a focus on water resources, to build systems, such as bioreactors and bioprocessing facilities. We work from the nanoscale to the macroscale. We seek to improve animal, human, and environmental health through development and design of healthy food products, vaccines, bioenergy, biomaterials, and water quality management practices.

Presented by: Priscilla Baker, Madelyn Weaverling, Kirin Anand

Advanced Propulsion and Power Laboratory: The Advanced Propulsion and Power Laboratory (APPL) is one of the nation's premier sites for research in propulsion and gas turbine power applications. The laboratory hosts facilities with several specialized rigs developed for advanced experimentation and testing. The capabilities



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at APPL have been continuously developed for more than 50 years with the intent to provide cutting-edge research experiences for students seeking careers in support of propulsion and power technologies. Students trained there are represented in government laboratories of national prominence, major companies in the propulsion industry, and academia. The skills developed by these students are in high demand due to the objective-driven experimental experience gained with the rigs and engines capable of simulating relevant operating environments.

**Civil Engineering Materials Lab:** This tour will showcase the CEE Materials lab. Participants will be able to see instrumentation used in undergraduate coursework. A birds eye view will be presented on the types of testing that occurs in the lab with explanations from students and faculty. Civil engineering materials include concrete, steel, metals, polymers and wood.

## **7-7:45pm**

**Teaching the Culture of Quality from the Ground Up: Novice-Tailored Quality Improvement for Scratch Programmers:** Across all engineering disciplines, software remains one of the most defect-prone artifacts. Hence, much of software engineering research and practice is concerned with improving software quality. While enormous prior efforts have focused on improving the quality of programs, this talk will describe our research that focuses on providing the means to educate the next generation of programmers who care deeply about software quality. If they embrace the culture of quality, these programmers would be positioned to drastically improve the quality of the software ecosystem, akin to professionals in traditional engineering disciplines.

Presented by: Dr. Eli Tilevich

**High-Tech Mining Engineering: Automation, Drones, and Data Analytics:** Mining Engineering has developed into a high-tech industry focused on automation and data analytics to supply the world with resources used by people in their every day lives. The presentation will focus on automation and the use of drones in mine environments for safety and engineering applications.

Presented by: Dr. Nino Ripepi

**Robots that Learn from Humans:** Robots have the potential to help people in their everyday lives. In this talk I will focus on how robots can learn from the humans around them. Topics include robot learning, human-robot interaction, and game theory.

Presented by: Dr. Dylan Losey

## **Day 4 - Thursday, April 1st**

### **3-3:45pm**

**Biomedical Engineering Undergraduate Program:** Overview of the biomedical engineering undergraduate program.

Presented by: Dr. Sara Arena

**Unbiased Subdata Selection for Fair Classification: A Unified Framework and Scalable Algorithms:** As an important problem in modern data analytics, classification has witnessed varieties of applications from different domains. Different from conventional classification approaches, fair classification concerns the issues of unintentional biases against the sensitive features (e.g., gender, race). Due to high nonconvexity of fairness measures, existing methods are often unable to model exact fairness, which can cause inferior fair classification outcomes. This paper fills the gap by developing a novel unified framework to jointly optimize accuracy



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and fairness. The proposed framework is versatile and can incorporate different fairness measures studied in literature precisely as well as can be applicable to many classifiers including deep classification models.

Presented by: Dr. Weijun Xie

**Hydroelasticity Lab:** The Hydroelasticity Laboratory is an experimental Fluid-Structure Interaction facility for Ocean structures in the Kevin T. Crofton Department of Aerospace and Ocean Engineering. The focus of this group is to understand fundamental physics of various fluid-structure interaction problems near a free surface. One important problem that is currently being studied is of slamming impacts on high-speed planing craft, those vessels which are hydrodynamically loaded. The first phase of the experiment, which is shown in the photos, is of a flexible wedge drop experiment. Measurements are taken of hydrodynamic pressure, kinematics of the structure, and strain. Another phase of the slamming experiment will be conducted in the Tow Tank facility and will allow for more degrees of freedom to be examined.

#### **4-4:45pm**

**General Engineering -** We are home to all new engineering students!: All first-year and transfer students admitted to the College of Engineering at Virginia Tech are classified as “General Engineering” in the Department of Engineering Education. The program introduces students to the wide range of engineering majors in the College of Engineering so that students are able to make informed decisions about their educational pathways.

**Atmospheric Chemistry:** The Atmospheric Chemistry Lab focuses on understanding our air pollution forms and transforms in the atmosphere. We focus on measuring what is in the atmosphere, how pollutants interact with natural ecosystems, and how we can design better tools and instruments for these measurements.

**Biological Systems Engineering Lab Tour**

#### **5-5:45pm**

**Helmet Lab:** The VT Helmet Lab is a comprehensive Injury Biomechanics Laboratory founded in 2007 with a specialty for studying brain injury and sport helmets. Since 2011, Virginia Tech researchers have been providing unbiased helmet ratings that allow consumers to make informed decisions when purchasing helmets. The helmet ratings are the culmination of over 10 years of research on head impacts in sports and identify which helmets best reduce concussion risk. This work is done as part of Virginia Tech’s service mission and is 100% independent of any funding or influence from helmet manufacturers.

**Virginia Tech Stability Wind Tunnel:** The Stability Wind Tunnel is a world-leading aero-acoustic facility operated by the Kevin T. Crofton Department of Aerospace and Ocean Engineering (AOE). The facility features a 1.85m x 1.85m test-section capable of wind speeds up to 80m/s (180mph). Its activity primarily consists in commercial testing (for aero-acoustic testing of wind turbine blade section in particular), but it also houses tests for research projects led by faculty in the College of Engineering for sponsors like NASA, the National Science Foundation, or the Office of Naval Research among others. This state-of-the-art facility is also made available for undergraduate students in the AOE and ME departments.

#### **6-6:45pm**

**ISE Learning Factory:** The Grado Department of Industrial and Systems Engineering’s Learning Factory is an educational platform that includes traditional machining and assembly operations found in most manufacturing environments. The factory can be a perfect testbed for new technologies and the concepts related to industry 4.0.



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**Ware Lab:** The Ware Lab provides a unique learning environment for students from various majors across the university with more than 450 students, some receiving academic credit and others serving as volunteers. Participants may become involved as early as their freshman year, taking success from the classroom, to becoming members of an award-winning team, all the while learning skills transferable to the workplace. The Ware Lab is not limited to just engineering-focused majors, all majors can participate. As Virginia Tech continues to integrate collaboration between different colleges, students from every major can find their place and participate with any team within the lab. The lab is equipped with a 10,000 square foot project center complete with numerous work bays, a welding shop, a machine shop, and a computer design lab. Teams include: Formula SAE, Baja SAE, BOLT Electric Motorcycle, Human Powered Sub, HEVT, Steel Bridge, Concrete Canoe, SailBOT, Astrobotics and Design Build Fly.

## **7-7:45pm**

**Advanced Vehicle and Technology Research Lab:** The AVaTR lab focuses on the uses of advanced technologies in data collection, data mining, active safety, and automation to improve the interaction between humans and vehicles. Safety is primordial to our mission, but so is improving efficiency, quality-of-life, and utility of our current and future automotive fleet.

**Autonomous Mastery Prototyping (AMP) Lab:** The Autonomous Mastery Prototyping (AMP) Lab is a lab space that gives electrical and computer engineering students the opportunity to gain hands-on experience and apply what they've learned in class with fun, hands-on projects. Projects are chosen and created by the student, and are funded completely by the department!

## **Day 5 - Friday, April 2nd**

### **3-3:45pm**

**Building the future in construction:** Explore the construction industry by learning about our curriculum, career opportunities for graduates, and innovations that are driving the future of the industry!

Presented by: Ashley Johnson

**Navigation Safety in Autonomous Systems:** Autonomous vehicles carry the promise of safe, fuel-efficient, and time-efficient mobility for all. These benefits are predicated on autonomous navigation systems achieving unprecedented levels of safety. This presentation describes the design, analysis and evaluation of new methods to quantify navigation and collision detection safety for autonomous vehicles.

Presented by: Dr. Mathieu Joerges

### **4-4:45pm**

**Aerospace & Ocean Engineering: Grand Challenges and Career Prospects:** The fields of Aerospace and Ocean Engineering made some of the most significant contributions to humankind in the 20th Century including invention of the airplane, spacecraft, nuclear submarine, and exploration of the solar system. The 21st Century is upon us, and bringing innovative ideas to market requires a flexible high-technology Virginia Tech engineering education more than ever. On-demand mobility (i.e., flying cars), autonomous vehicles of all types (ocean, space, atmospheric), and environmentally-responsible airplane and ships are just a few examples. Come to this presentation to learn about the AOE curriculum, job and career opportunities and some of the game-changing grand challenges that you are likely to see over the next 30 years of your career.

Presented by: Dr. Eric Paterson

Construction Engineering Labs



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**Frith First-Year Engineering Design Laboratory:** The Frith First-Year Engineering Design Laboratory (Frith Lab) is a space designed to support the retention and development of young engineers through hands-on learning, peer mentoring, and authentic problem-solving.

## **5-5:45pm**

**Advanced Engineering Design Lab (AEDL):** The Advanced Engineering Design Lab is a joint venture between Virginia Tech's College of Engineering and the Aerospace and Ocean Engineering department. The facility houses 9 undergraduate design teams in the areas of rocketry, robotics, drone technology, aircraft technology, and turbine energy. AEDL teams travel to many parts of the United States to compete in world class engineering design events. The Kevin T. Crofton Department of Aerospace and Ocean Engineering Department has been instrumental in spearheading the initiative that has made the AEDL a reality. The AOE department provides 100% funding for space rental expenses and equipment procurement. All college and university majors, in addition to AOE students, are encouraged to participate in the team activities taking place at the facility. Teams include: Mars Ice Challenge, Mars Madness, NASA Student Launch Initiative, Orbital Launch Vehicle Team, Rocketry@VT, RockSat-X, SEDs Rocketry, Wind Turbine Team, and 3D Printed Aircraft Team.

**Chemical Engineering Unit Operations Lab:** The Chemical Engineering Unit Operations Laboratory (UO Lab) is the capstone laboratory course taken by chemical engineering students. The lab contains a variety of pieces of equipment from bench-scale up to pilot-scale and gives students hands-on experience at planning experiments, operating equipment, analyzing data, and reporting on their results. Experiments include large-scale distillation, heat exchange, carbon dioxide absorption, fermentation, and polymer processing, among many others.

**Working Model Theme Park Ride:** The Hokies Ride Engineering Team, a sub-branch of the VT Theme Park Engineering and Design club, is designing a 3D model ride that will function just like a real ride. It is held to very similar safety standards that real rides are held to, and will fully function on its own. This massive project is part of an Iowa State ride engineering competition, and involves so much thinking: how to make a 1/50th scale ride work, how to keep it as financially feasible as possible, and how to make it look amazing with theming and a storyline.

## **6-8pm**

**Student Panel:** Come share your passion for engineering and Galipatia! In this event, we will be having guest speakers talk about and answer your questions about engineering at Virginia Tech, play fun kahoots that will test your knowledge about Virginia Tech's engineering majors, and fun prizes to give away at the end of the presentation. Come join us for a fun and informative event!