ece

4805/4806/4304

Two-semester Major Design Experience (MDE)
and other design experiences in ECE

POSTER EVENT

December 5, 2018 | The Inn at Virginia Tech

VIRGINIA TECH™

The Major Design Experience (MDE), ECE 4805-06, is a culminating experience for undergraduate and graduate students during which they have the opportunity to combine all the technical, communication, and teamwork skills that they have learned in one exciting and meaningful project. Whether a student's career interests lie in working for industry, continuing on for an advanced degree, or pursuing a job in our national labs, the capstone experience is an opportunity to define how they will impact the technical community or society in general.

After much success with combining a two-semester format with industry sponsorship, we are pleased to host our second-ever MDE Poster Event for the student teams in the Spring-Fall sequence. This parallel section was created out of feedback from industry that they would also like juniors to participate. Now second semester junior students are joining this class and can consider an internship during the summer break. I think that you will agree with me that the result has been a wealth of inspiring and useful projects that have challenged our students to solve open-ended technical problems defined by our industry partners and guided by our faculty subject matter experts.

I was very pleased to have Professor of Practice Ken Schulz lead this effort this year, partnering with Gino Manzo and Toby Meadows as this course grows in importance to our department. Ken, Gino, and Toby's combined experience and insight is invaluable to our students in preparing them for the next step in their engineering careers beyond graduation.

Congratulations to all the students for their dedicated efforts, and thanks to our industry sponsors, instructors, and subject matter experts for their tremendous support in this endeavor.

Luke Lester
Professor and Department Head
Bradley Department of Electrical and Computer Engineering

Welcome and thank you for attending our fifth Major Design Experience (MDE) Poster Event! This is also the second ever Poster Event in our new Spring/Fall Cohort.

Today we are celebrating the achievements of about 30 students who have diligently worked on eight diverse industry problems. We are pleased to showcase projects from our 4805/4806 Major Design Experience and a project from Virgilio Centeno's ECE 4304 Design in Power Engineering Capstone projects.

The goal of this class is to provide students with a "real-life" industry project as part of their major design experience. Student teams work with sponsors, who are the customers. With advice from subject matter experts, they complete a meaningful engineering project. This project is managed exactly as if the students were just hired by a company and placed on an engineering team. Students are responsible for generating the project plan and then executing the plan. Throughout the two semesters, they are guided in technical areas by the subject matter experts, and mentored by the instructors in a host of professional and business skills, such as communication, teamwork, ethics, professionalism, company values, metrics, and new-business acquisition. By working in teams, they develop leadership and group interpersonal skills and deal with schedule conflicts and meeting deliverables. Students are responsible for managing the customer relationship and solving the many real-life issues that undoubtedly will occur.

This program is only possible with dedicated support from our sponsors and subject matter experts whom we whole-heartedly thank for their unwavering assistance. Thank you for engaging with our program and helping make our students more valuable.

I also want to acknowledge and thank Luke Lester for initiating this class at Virginia Tech and guiding this strategy to better prepare Virginia Tech ECE graduates for the work place. Thank you, Luke Lester! We also thank Virgilio Centeno and his students for joining this exciting poster event.

The growth in student enrollment, projects, and parallel sections has allowed us to utilize Toby Meadows and Gino Manzo in addition to myself as professors, providing the students with industry perspective as they navigate their projects. Between the three of us, we have over 100 years of industry experience as practicing engineers and leaders in our respective companies.

Finally, we want to thank our students, who were brave enough to try something new. Stepping out of your comfort zone is always a valuable learning experience. We wish you all the best as you pursue your aspirations.

Kenneth R. Schulz
Major Design Experience Professor of Practice

PROGRAM

Sign-in, review posters	11:30
Welcome remarks, short team presentations	12:00
Lunch, review posters	1:00
Best Poster awards	2:00
Adjourn	2:30

All guests are requested to vote for Best Poster. Every vote counts.

"This class challenged me to work without a set of constraints that we normally have in a class. The open-ended nature of the class leaves the students to find and solve their own problems."

Altria

ANALOG DEVICES

Belle-Hampton Farm

GM

MACOM

SAIC

UTC Aerospace Systems

ZETA ASSOCIATES

SPONSORS

We greatly appreciate their support.

"I enjoyed having more of a real-world experience than that of just a classroom setting. This course has really made me aware of how important communication truly is in the industry."

In addition to our project sponsors and subject matter experts, there were many others that significantly contributed to the success of this class. We want to take this opportunity to express our deep-felt appreciation and thanks for their contributions.

William Baumann

Virginia Tech - ECE

Design Studio Safety Training and Material Procurement Instruction

Michael Miller

Intellectual Property Specialist Professional

GUEST SPEAKERS

in order of appearance

"This class allowed me to apply what I learned, improve my teamwork skills, and experience what it is like to work in a real-life industry project."

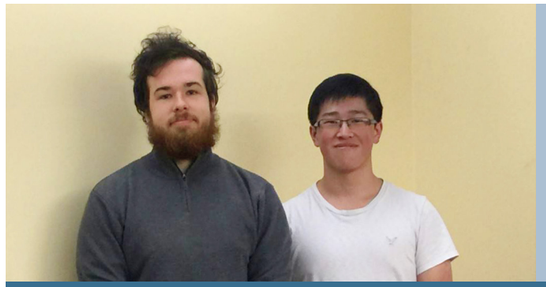
PROJECT LEADERSHIP

This class is only possible because of the commitment, dedication, and spirit of the following customers and subject matter experts. Thank you!

SPONSOR	CUSTOMERS	PROJECT	SUBJECT MATTER EXPERT
Altria, Richmond, VA	Brian Cramer Warren Hall Clinton Blake	On-Line Vision Based Quality Inspection System	Lynn Abbott
Analog Devices, Greensboro, NC	Ryan Bunch	FPGA-Based FM Receiver	Dong Ha
Belle-Hampton Farm, Dublin, VA	Tom Hoge	Belle-Hampton Microgrid Project	Virgilio Centeno
General Motors, Detroit, MI	Keith Van Houten	High-Definition Map Update from DOT Construction Data	Walid Saad
Macom, Lowell, MA	Thomas Winslow	GaN-Si High Power Amplifier Design	Dong Ha
SAIC, San Diego, CA	Taylor Wilson	Sensor Package for Underwater Remotely Operated Vehicle	Dan Stilwell
United Technologies Corporation, Wilson, NC	Brett Standifer Stefan Coreth	Next Generation Overheat	Ryan Gerdes
Zeta Associates, Fairfax, VA	Ben Beasley Michael Botkin	Personal Locator Beacon System	Louis Beex

PROJECT TEAMS

ON-LINE VISION BASED QUALITY INSPECTION SYSTEM



CHALLENGE

Develop a camera system that is capable of inspecting products at high frequency and interface with the existing inspection system.

LEFT TO RIGHT: Mike O'Connor, Jonathan Yu | **SME:** Lynn Abbott

Mike O'Connor Fredericksburg, VA

B.S. Electrical Engineering

Aspirations

I aspire to become a well-rounded electrical engineer that can utilize every experience and aspect of my career. I wish to apply the knowledge I have amassed at Virginia Tech and other experiences to a broad spectrum of problems that I will face.

Class comment

The professional experience and real-world open-ended problem-solving was perhaps one of the most meaningful and well-rounded opportunities I have had.

Jonathan Yu Lynchburg, VA

B.S. Computer Engineering

Aspirations

In the future, I envision myself working as a software engineer.

Class comment

I valued the experience of being able to work with Altria on a real-world problem with guidance from mentors and professionals in the field.

PROJECT SPONSORS: BRIAN CRAMER, WARREN HALL, CLINTON BLAKE

Altria

FPGA-BASED FM RECEIVER

CHALLENGE

Implement an FPGA-based FM Receiver using the AD9689 Evaluation Board's full bandwidth capture and the FPGA on the ADS7 Evaluation Board to output an FM radio station.

LEFT TO RIGHT: Alex Kahnke, Andrea Baldioceda, Kartik Nair | **SME:** Dong Ha

Alex Kahnke Waseca, MN

B.S. Electrical Engineering

Aspirations

Alex prefers working for military defense contractors who work with naval technologies. He completed an internship at BAE Systems in support of the Trident II missile program and will begin work with Huntington-Ingalls Industries after graduation working on the Gerald R. Ford class carrier for the U.S. Navy.

Class comment

I liked the emphasis on the business aspect of engineering. While it is important to be capable of the technical aspects, it is also important to know the business strategy and plan of the company you work for.

Andrea Baldioceda San José, Costa Rica

B.S. Electrical Engineering

Aspirations

Combine my two greatest passions, audio and electrical engineering, by forming part of the audio industry and working on DSP, audio, and acoustics.

Class comment

The senior design experience provided me with an opportunity to apply the knowledge and skills I developed in my classes into a real world project. It also gave me insight into the professional work environment.

Kartik Nair Jaipur, Rajasthan, India

M.S. Electrical Engineering

Aspirations

To excel in the field of FPGA/ASIC design.

Class comment

This class provided me an opportunity to gain hands-on experience with the FPGA-based Digital Signal Processing. Also, the class is organised in a way that helps students learn more about how the professional projects work in the industry.

PROJECT SPONSOR: RYAN BUNCH

ANALOG DEVICES

BELLE-HAMPTON MICROGRID PROJECT

CHALLENGE

Developing a power supply and infrastructure that will allow the Belle-Hampton Farm, owned by Tom Hoge, to be completely off the grid. The project includes the design and development of a hydro-electric pump, which can harness the water flow from a dam on the property as well as energy storage for peak demand.

LEFT TO RIGHT: Thaddaeus Petty, Huy Nguyen | **SME:** Virgilio Centeno

Thaddaeus Petty Phoenix, AZ

B.S. Electrical Engineering

Aspirations

Work in the automotive industry to advance the limits of what we believe is possible.

Class comment

This class challenged me to work without a set of constraints that we normally have in a class. The open-ended nature of the class leaves the students to find and solve their own problems.

Huy P. Nguyen Annandale, VA

B.S. Electrical Engineering

Aspirations

I hope to apply what I learned at Virginia Tech to contribute and make an impact on the world.

Class comment

The class provided me an opportunity to work on the future of the power distribution system. The course allowed me to apply my knowledge to solve the real-world problem.

PROJECT SPONSOR: TOM HOGE

HIGH-DEFINITION MAP UPDATE FROM DOT CONSTRUCTION DATA

CHALLENGE

General Motors needed updates to the road work documentation process in order to expedite integration in Global Positioning Satellite (GPS) systems in autonomous vehicles. Our team created a solution that automatically updates and generates a database clearly identifying roadway projects for GPS use.

LEFT TO RIGHT: Matthew Tucker, Ryan Gold, Fayzan Saleem | **SME:** Walid Saad

Matthew Tucker Knoxville, TN

B.S. Electrical Engineering

Aspirations

Following graduation, I hope to put the skills I've developed here at Virginia Tech into action in the industry. Tech has provided me with numerous opportunities to work with teams in a professional environment, and I feel very prepared moving forward.

Class comment

The most valuable experiences I gained from this course were those involving our customer at General Motors. We were incredibly lucky to be partnered with a knowledgeable, experienced engineer, who not only coached us throughout the project, but also gave us professional advice.

Ryan Gold Blacksburg, VA

B.S. Electrical Engineering

Aspirations

Gain relevant engineering experience within my field of study, then transition into management to lead many high performing teams.

Class comment

This course introduced us to many professionals who were and continue to be excellent mentors for us. Being able to network and gain professional experience is the best benefit from this course.

Fayzan Saleem Chantilly, VA

B.S. Electrical Engineering

Aspirations

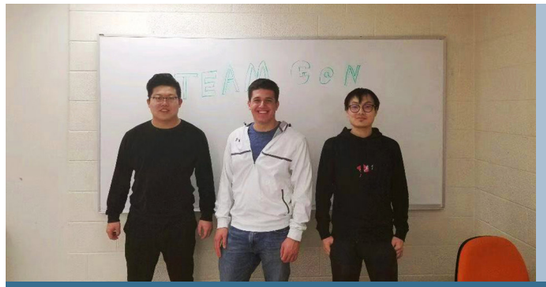
To continuously strive for the best work and achievement in life and establish myself as a critical-thinking developer.

Class comment

I appreciated the real-world experience that this class had to offer, and working with a professional from the industry helped me to boost not only my technical skills but also my interpersonal skills.

PROJECT SPONSOR: KEITH VAN HOUTEN

GaN-Si HIGH POWER AMPLIFIER DESIGN



CHALLENGE

Design a two-stage high-frequency power amplifier with MACOM GaN-Si process using ADS software and deliver s-parameter and spectrum test on fabricated power amplifier chip.

LEFT TO RIGHT: Qihao Song, Michael Chalawsky, Yuting Cai | **SME:** Dong Ha

Qihao Song Taiyuan, Shanxi, China

B.S. Electrical Engineering

Aspirations

I want to work in the field of analog/RF IC or optics.

Class comment

ECE 4805/4806 is a great course. It brings us from school to real industry. After completing this course, we also gain tremendous valuable design experience on RFIC design, which definitely was a huge benefit for my career.

Michael Chalawsky Baltimore, MD

B.S. Electrical Engineering

Aspirations

I hope to work as an RF engineer after graduation.

Class comment

I appreciate how this class has allowed me to take both the professional and technical skills that I have learned over my 4 years at Virginia Tech and apply them in a real-world scenario. This class truly allows for an all-encompassing experience.

Yuting Cai Kunming, Yunnan, China

M.S. Electrical Engineering

Aspirations

After I get my master's degree, I would like to join the renewable energy industry to help develop renewable energy technology.

Class comment

I really appreciate how our professor and our customer provided me with a chance to enter the RF field. They also provided lots of assistance and guidance for our team. That made us gradually learn the process of power amplifier design in the real world.

PROJECT SPONSOR: THOMAS WINSLOW

SENSOR PACKAGE FOR UNDERWATER REMOTELY OPERATED VEHICLE

CHALLENGE

Design a sensor package to track location and motion of an underwater remotely operated vehicle (UROV).

LEFT TO RIGHT: Lauren Swan, Nicholas Kennedy, Camilo A. Riascos, Mario Ortiz | **SME:** Daniel Stilwell

Lauren Swan Lynchburg, VA

B.S. Electrical Engineering

Aspirations

I will be working full-time at NAVAIR after I graduate and hope to eventually start to develop my own electronic hardware applications and products.

Class comment

I enjoyed having more of a real-world experience than that of just a classroom setting. This course has really made me aware of how important communication truly is in the industry.

Nicholas Kennedy Smithfield, VA

B.S. Electrical Engineering

Aspirations

I plan to enter the workforce, obtain an M.S. in electrical power engineering, and explore a variety of roles such as project manager or designer.

Class comment

This class was a great experience giving us real-world problems and forcing us to solve them in a team setting, much like we will have to do in our future careers.

Camilo A. Riascos Cali, Colombia

B.S. Electrical Engineering

Aspirations

Following graduation I will start a career with Marathon Petroleum Corporation as a refining engineer. I would like to be the technical lead for power distribution, process instrumentation, and control at their refinery in Garyville, Louisiana.

Class comment

The senior design experience allowed me to improve my technical, communication, and teamwork skills. It gave me a good taste of what is coming next in my career.

Mario Ortiz Mexico City, Mexico

B.S. Electrical Engineering

Aspirations

My goal is working in a company as a project engineer, design, and development.

Class comment

The project was very challenging, and I enjoy working in design and development.

PROJECT SPONSOR: TAYLOR WILSON

NEXT GENERATION OVERHEAT

CHALLENGE

Developing a replacement to current linear overheat detection systems by implementing quasi-distributed fiber optic sensors. Fiber Bragg Gratings (FBG) will be utilized in the fiber optic core to optimize the temperature sensing capabilities of the optic fiber.

LEFT TO RIGHT: Moath Alhefdi, Kemaya Nguyen, Oscar Alarcon | **SME:** Ryan Gerdes

Moath Alhefdhi Abha, Saudi Arabia

B.S. Electrical Engineering

Aspirations

My aspiration is to develop products that would make an impact on people's daily lives.

Class comment

This class allowed me to apply what I learned, improve my teamwork skills, and experience what it is like to work in a real-life industry project.

Kemaya Nguyen Alexandria, VA

M.S. Electrical Engineering

Aspirations

Serve my country and join the United States federal civil service. Work as an electrical engineer with a focus in photonics.

Class comment

This class provides real, hands-on experience in industry work. I gained confidence in my decision between a future in academia versus industry.

Oscar Alarcon Centreville, VA

B.S. Electrical Engineering

Aspirations

I'd like to continue my development as an electrical engineer and inspire future generations of electrical engineers with my work.

Class comment

Senior design has brought the opportunity to experience real job projects in the field of electrical engineering.

PROJECT SPONSORS: STEFAN CORETH, BRETT STANDIFER

PERSONAL LOCATOR BEACON SYSTEM

CHALLENGE

Design, test, and prototype a complete system that utilizes FSK modulation and demodulation schemes to transmit and receive GPS signals of multiple beacons.

LEFT TO RIGHT: Beau Robertson, Huy Nguyen, Alvin Dela Paz, Weerasu Warajuntano | **SME:** Louis Beex

Beau Robertson Rocky Mount, VA

B.S. Electrical Engineering

Aspirations

Solve complex engineering problems with innovative solutions.

Class comment

This course was exceptional at garnering professional skills and gaining experience in real-world problem solving.

Huy Nguyen Annandale, VA

B.S. Electrical Engineering

Aspirations

I hope to apply what I learned at Virginia Tech to contribute and make an impact on the world.

Class comment

The class was a fantastic platform for me to develop my technical knowledge, and also prepared me to be successful in the professional world.

Alvin Dela Paz Dumfries, VA

B.S. Computer Engineering

Aspirations

Lead an engineering team.

Class comment

I have learned the process of requesting a proposal, getting client feedback, and revising appropriately, as well as creating the proposal and providing updates to the client.

Weerasu Warajuntano Centreville, VA

B.S. Electrical Engineering

Aspirations

I hope to work in the field that relates to power and learn more about that area to increase the power efficiency.

Class comment

I like that the class allows the students to come up with our own solution to solve a problem with a real-world application. Sometimes, our solution might be hard to achieve, but the class has a subject matter expert to give advice to achieve the goal. Moreover, the class taught us to communicate, be accountable for the team's task, and be a leader.

PROJECT SPONSORS: BEN BEASLEY, MICHAEL BOTKIN

UTC Aerospace Systems

ZETA ASSOCIATES

Many people contributed to this program who we want to acknowledge and thank:

Luke Lester
for his vision and continued unyielding support to make this class available for students.

Gino Manzo and Toby Meadows
for being our assistant instructors, mentoring teams, and making the class better.

Greg Atkins
for developing an outstanding class website.

Mary Brewer, Nicole Gholston, Kimberly Johnston, JoAnna Lewis, Susan Broniak, Minerva Sanabria, Jamie De La Ree, Paul Plassmann, and Laura Villada
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