LYLE SCHOOL OF ENGINEERING

FALL 2017

SMU

LYLE NOW

RACING TOWARD THE FUTURE

SMU team competes using science and speed

SMU LYLE NOW

Prof. Kim is amazing! His work with microrobots is known around the world.

FEATURE STORY

4 Biologically Inspired Nano/Micro Engineering

DR. MINJUN KIM, *Professor, Mechanical Engineering, and Robert C. Womack Chair in Engineering*

ON THE COVER

Hilltop Motorsports and SMU Lyle Team Up

SMU students designed and constructed a single-seat, Formula One-style racecar to rival top engineering schools in the annual Formula SAE competition, a Society of Automotive Engineers event held every summer in Lincoln, Nebraska. This year, SMU's Formula SAE team ranked No. 27 out of 78 teams and received praise from design judges on its advanced level for a second-year competitor. **Read more on page 11**

Prof. Minsker joined SMU Lyle because we value leadership & community engagement.

FACULTY FOCUS

7 Stakeholder-Driven Innovation for Resilient Cities

DR. BARBARA MINSKER, *Chair, Civil & Environmental Engineering, Bobby B. Lyle Professor of Leadership and Global Entrepreneurship, and Senior Fellow, Hunt Institute for Engineering and Humanity*

SMU Lyle is on fire!
We need to get the word out about the awesome things our faculty & students are doing.

Marc P. Christensen, Ph.D., P.E.
Dean and Lyle Professor of Engineering Innovation
DEAN@LYLE.SMU.EDU

STUDENT SPOTLIGHT

Gavin Maestas

M.S. Mechanical Engineering, SMU MilVets, Hilltop Motorsports

Read more about Gavin on page 11

It's amazing what students can do when their interests overlap with engineering skills.

World Changer making an impact on clean water delivery!

STUDENT SPOTLIGHT

Amber Long

B.S. Environmental Engineering with minor in Global Development

Read more about Amber on page 8

FALL 2017

This program took top honors as Information and Telecom Education and Research Association Program of the Year.

SMU Lyle Now Magazine is published twice a year by the Dean's Office for the SMU Lyle community.

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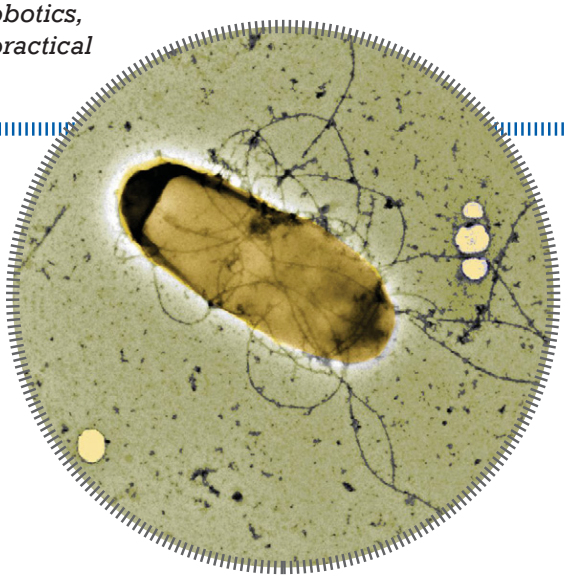
BIOLOGICALLY INSPIRED NANO/MICRO ENGINEERING

Dr. MinJun Kim and his BAST Lab Team are an interdisciplinary research group developing new classes of Microbiorobotics, Nano/Microfluidics, and Nanopore Technologies for practical medical and biomedical applications



IMAGINE AN ARMY OF MICROSCOPIC ROBOTS ENTERING A PATIENT'S BLOODSTREAM AND PERFORMING HIGHLY SPECIALIZED TASKS, such as localized drug delivery, minimally invasive surgical procedures, and enhanced medical imaging. This is the goal for Dr. MinJun Kim and his research team of students in the new, state-of-the-art Biological Actuation, Sensing, and Transport (BAST) Lab at SMU Lyle School of Engineering.

Dr. Kim joined SMU Lyle last fall as the Robert C. Womack Chair in Engineering and professor of mechanical engineering. His talents led to recognition as the first investigator to fully use flagellated bacteria – whose cells have a whip-like projection that allows them to move through bodily fluids – as micro-actuators in engineered systems.

The BAST Lab currently includes eight Ph.D. students eager to work with Dr. Kim. In addition, he has recruited eight SMU undergraduate students to the BAST Lab, who come from diverse science and engineering disciplines. "This nanotechnology applies to all majors including mechanical engineering, biochemistry, computer science and electrical engineering," Dr. Kim says. "SMU undergraduates aren't afraid to explore the challenges of a new field."

Fellow faculty members referred some undergraduate students to Dr. Kim. "SMU's collegial atmosphere provides open communication and collaboration among SMU Lyle faculty, SMU departments and administration to put students in the right places based on their research interests," he says.

Daehee Kim '16, one of Dr. Kim's Ph.D. students, received his undergraduate degree in mechanical engineering from SMU Lyle. "Dr. Kim is a fantastic advisor whose innovative passion in combining biological research with engineering principles attracts students keen in both research fields," Daehee says. "A pioneer in microbiorobotics and nanopore research, Dr. Kim seeks to develop the best scientific methods and data while enforcing optimal lab environments. My interest in the sciences persuaded Dr. Kim to offer me a position in his BAST research group dealing with flagellar forests. He is a great professor and motivates me daily to succeed."

Read more at smu.edu/lylenow

DR. MINJUN KIM
Professor, Mechanical Engineering, and Robert C. Womack Chair in Engineering

EMAIL DR. KIM

VIEW DR. KIM'S FACULTY PROFILE

THE BAST LAB AT SMU LYLE is part of the SMU-NNFC-DREXEL Nano Co-op Research Center, an international collaborative research center, established in 2016 with Drexel, SMU and KAIST-NNFC, funded by the National Research Foundation of Korea Global Research Development Center (GRDC) program and the City of Daejeon. The BAST Lab is valued at approximately $5.4 million and has eight ongoing research projects funded by the National Science Foundation, the National Institute of Health, the Korea Evaluation Institute of Industrial Technology, and the National Research Foundation of Korea, among other diverse agencies sponsoring this work. ➤ **Learn more at bastlabs.org**

DISCOVER THE REAL BUSINESS OF ENGINEERING

MASTER OF SCIENCE ENGINEERING ENTREPRENEURSHIP

The SMU M.S. in Engineering Entrepreneurship is designed for the confident engineer who wants to master the alchemy of bringing new technology to market and managing products based on sophisticated technology. The fast-paced 31-credit program blends entrepreneurship courses from SMU's Cox School of Business with SMU Lyle courses in engineering and engineering management. The two-semester program is anchored by a year-long Technology Commercialization Studio, in which students explore a new technology and its commercial opportunities to develop high-tech product management skills.

This degree will prepare a new generation of engineers to look at technology through a business lens. The program will enable students to fill leadership roles in management and as entrepreneurs who can jump-start new technology ventures in any size company in the world, smoothly bringing sophisticated technology into the marketplace.

➤ **For more information, please contact Duncan MacFarlane at dmacfarlane@smu.edu**

➤ **Enroll Now: SMU Graduate Studies Application**

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EngineeringLeaders@smu.edu | smu.edu/lyle
214-768-2002 | 800-601-4040

STAKEHOLDER-DRIVEN INNOVATION FOR RESILIENT CITIES

Dr. Barbara Minsker, Civil and Environmental Engineering Chair, brings the perfect alignment of leadership, sustainability and Big Data expertise to change the landscape of Dallas

DR. BARBARA MINSKER,
Chair, Civil and Environmental Engineering, Bobby B. Lyle Professor of Leadership and Global Entrepreneurship, and Senior Fellow, Hunt Institute for Engineering and Humanity

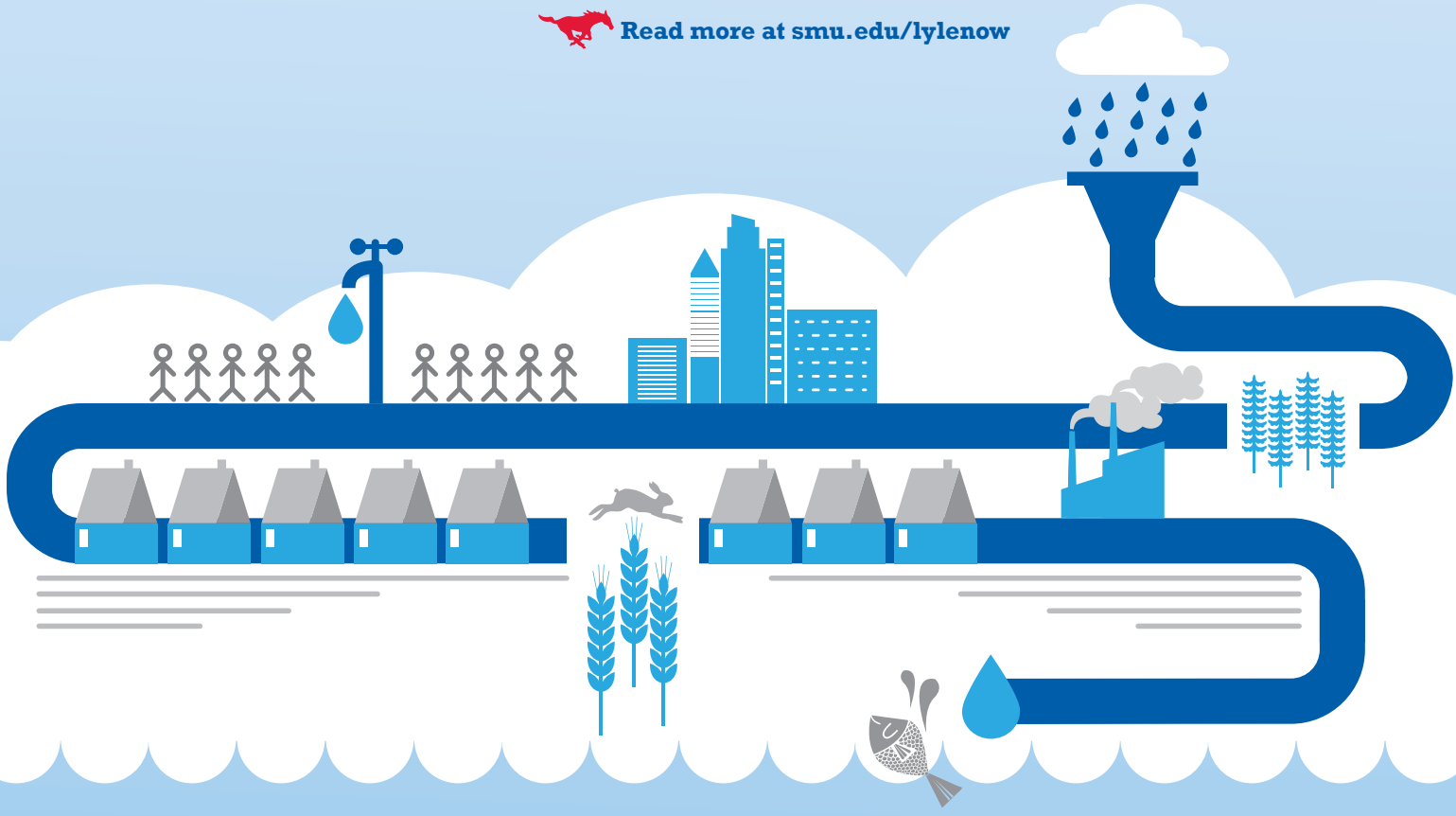
- EMAIL DR. MINSKER
- VIEW DR. MINSKER'S FACULTY PROFILE

Over half of the world's population currently lives in an urban area, a number predicted to expand to 60 percent by 2030. Urban areas face unprecedented and growing challenges that threaten society's long-term well-being including poverty, chronic health problems, widespread pollution, resource degradation and increased natural disasters. The solution calls for open information sharing and collaboration across industry, communities, disciplines and organizational boundaries, as well as the tools of information technology.

Dr. Barbara Minsker, a nationally recognized expert in environmental and water resource systems analysis and informatics, joined SMU last fall to address these complex challenges facing cities. Last spring, Dr. Minsker was elected a Fellow in the Environmental and Water Resources Institute (EWRI) of the American Society of Civil Engineers. EWRI is the premier professional organization for the field of environmental and water resources systems analysis.

Dr. Minsker's research uses information technology and Big Data to improve sustainability and resilience of complex environmental and human systems. Two of her ongoing projects, funded by the National Science Foundation (NSF), explore how social media data and online stakeholder input can support the design of urban green spaces — like rain gardens — to capture and treat stormwater.

Read more at smu.edu/lylenow



AMBER LONG

B.S. ENVIRONMENTAL ENGINEERING, GLOBAL DEVELOPMENT MINOR

For most of Amber Long's life, she has carried two passions: international travel and making a difference in the world. Both helped guide Long's decision to major in Environmental Engineering and minor in Global Development at SMU Lyle.

Long is pursuing a 4+1 degree in Environmental Engineering, focusing on water resources and international development. She's also interested in a Master of Arts in Design and Innovation (MADI), undertaking double masters' degrees because she "would really like to work on the design end of water purification systems in developing countries."

Long, who speaks Spanish and French, has naturally embraced each study abroad program that aligns with her plans. Every summer or term break is scheduled with as much university and degree-program credit or real-world experience as her schedule permits. "Because of my passion for travel, I made it a priority to figure out the most efficient, yet creative, way to make the most of my SMU experience – and still graduate on time," Long says. "At SMU Lyle, I have a close-knit community of professors, advisors and deans supporting me as I make my plans a reality. Dr. Andrew Quicksall has been an endless source of wisdom for me, since he has had significant experience in the developing world, and will do everything in his power to help prepare me for the future."

Read more at smu.edu/lylenow

MEET EVIE, HUNT INSTITUTE'S MOBILE GREENHOUSE FOR GOOD

Students at SMU Lyle's Hunter and Stephanie Hunt Institute for Engineering and Humanity transformed an old Shasta camping trailer, nicknamed "Evie," into an experimental mobile greenhouse.

Evie is an evolution of the student-led Greenhouse for Good project that began in 2015. It embodies the Hunt Institute's interdisciplinary approach to student engagement, community connection, innovation and urban agriculture. Evie also connects with many of the challenges faced by disadvantaged communities, such as food access, transportation access, urban heat island effect and energy costs. Evie debuted with great success at Earth Day TX 2017, completing the retrofit first phase of the project. The second phase, starting this fall, is focusing on optimizing Evie as an urban-controlled environment production system, involving various scientists and student teams.

➤ **Read More About Evie**

➤ **Learn More about the Hunt Institute**

SMU | Hunter & Stephanie Hunt Institute for Engineering & Humanity
LYLE SCHOOL OF ENGINEERING

ENGINEERING MANAGEMENT, INFORMATION & SYSTEMS:

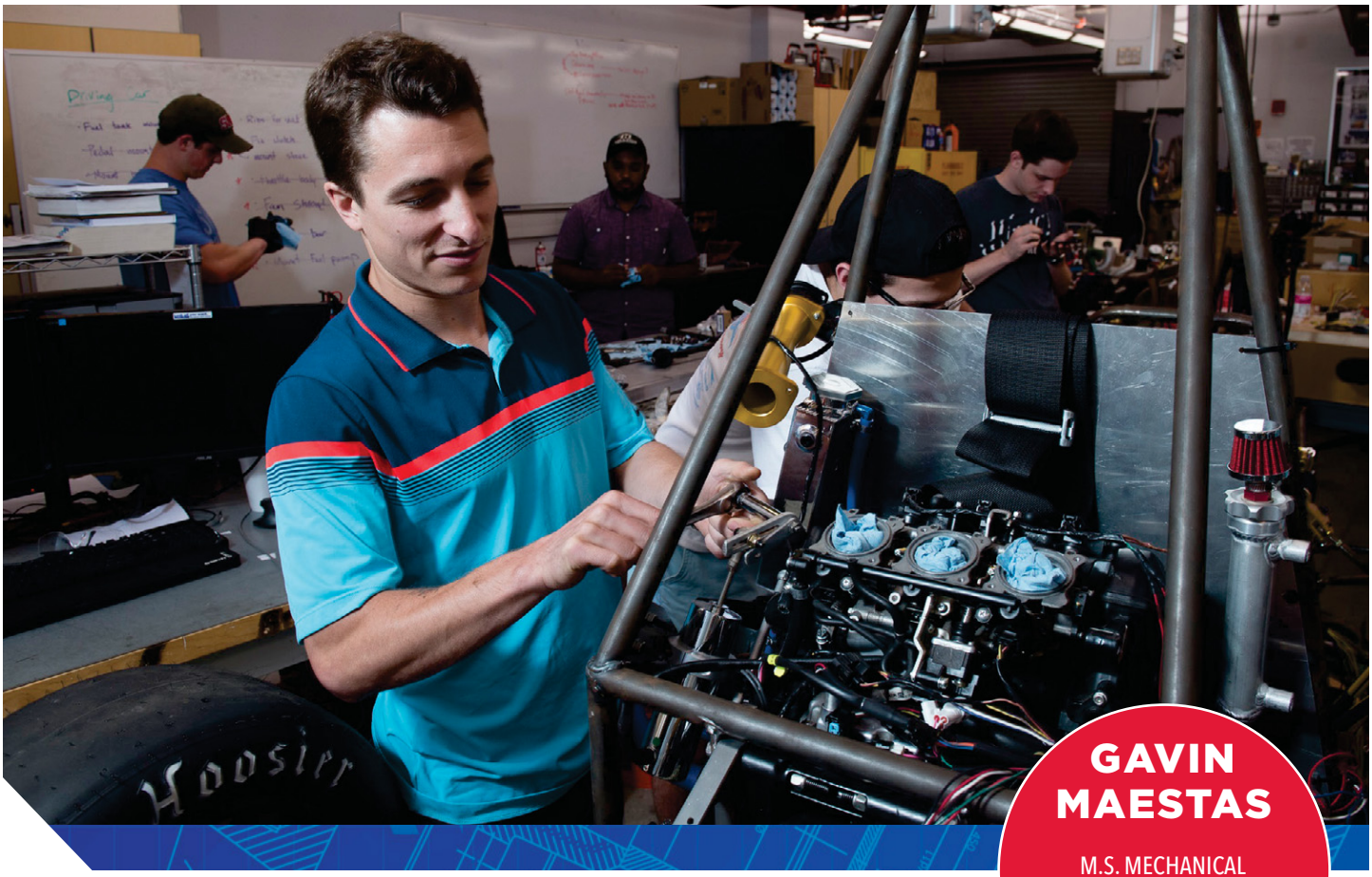
Advanced Analytics Drives Managerial Decisions in any Industry

In today's complex business world it's crucial to leverage available data to create rigorous models and help managers make better decisions. This is where a degree in Engineering Management, Information, and Systems (EMIS) makes the difference. SMU Lyle EMIS graduates deliver high-impact managerial insights based on advanced analytics and big data in all industries, including logistics, supply chain management, revenue management, healthcare systems engineering, finance and more.

A degree in EMIS provides students with comprehensive technical instruction along with quantitative business training to perform data analytics, management science and operations research. Our graduates are instantly productive, using their knowledge in optimization, simulation, analytics, data mining, mathematics, computer science, process analysis and best business practices to help companies achieve their goals.

➤ **Learn more about SMU Lyle EMIS**

➤ **Get involved with SMU INFORMS**



GAVIN MAESTAS

M.S. MECHANICAL ENGINEERING, SMU MILVETS, HILLTOP MOTORSPORTS

Before coming to SMU Lyle on the G.I. Bill, Gavin Maestas spent five years in the U.S. Army, stationed at Fort Bragg. He sharpened his mechanical skills by identifying and addressing key design issues for a prototype weapons system, developing communication infrastructure and maintaining over $100,000 in intelligence-sensitive equipment. He was drawn to SMU Lyle for its prestigious engineering program, the smaller class sizes and the school's support for veterans. Maestas is currently pursuing a master's degree in Mechanical Engineering through the 4 + 1 program.

"SMU really takes care of vets," Maestas says. "They give vets everything we need and ask for, as well as special advisors who understand our unique situation and make us feel included." He is active in SMU MilVets — a growing community that provides a safe meeting space and study room for student veterans, helping them transition back to civilian and campus life — and even served a term as its president. Last spring, Maestas received the Outstanding Student Leadership Award for his work with the organization.

He also is a founding member of Hilltop Motorsports, a team of SMU students that design and construct a single-seat, Formula One-style racecar. The team rivals top engineering schools in the annual Formula SAE competition, a Society of Automotive Engineers event held every summer in Lincoln, Nebraska. Teams are ranked by an overall score in design, construction, performance and cost. Hilltop Motorsports received financial support from Susan and Tom Armstrong and the SMU Student Senate. The team also receives discounts and donations on materials and parts from automotive manufacturers.

> *"SMU really takes care of vets. They give vets everything we need and ask for, as well as special advisors who understand our unique situation and make us feel included."*
>
> – GAVIN MAESTAS

Read more at smu.edu/lylenow

AMIR ALI, PH.D.

ASSISTANT PROFESSOR, MECHATRONICS ENGINEERING, GERMAN UNIVERSITY IN CAIRO, EGYPT

DR. AMIR ALI,
Assistant Professor, Mechatronics Engineering, and Director, ARAtronics Lab, German University in Cairo, Egypt

- EMAIL DR. AMIR ALI
- LEARN MORE ABOUT ARATRONICS
- VISIT THE ARATRONICS FACEBOOK PAGE

After earning his Ph.D. in Mechanical Engineering from SMU Lyle, Dr. Amir Ali returned to his home in Cairo, Egypt, to begin a position as an assistant professor at the German University in Cairo (GUC). There, Ali founded and is the director of the ARAtronics Lab, a research group of students of all collegiate levels that use a diverse range of science applications to develop feasible solutions for mechatronics applications in research and industry. This year the ARAtronics team has been selected to join the Cairo Invents Program in cooperation with the Scientific Research Academy in Cairo.

"We follow the same model as my research at SMU," Ali says. "Specifically, with micro-optical sensors in robotics systems, neuroscience and electrophysiology to create prosthetic limbs that are controlled by EEG brain signals and EMG muscle signals enhanced by micro-optical sensors."

The son of two physical chemistry professors, Ali grew up wanting to be just like his parents. "I learned from a very young age about scientific applications and conferences, and so it became part of my personality," he says. "I needed to have continuous science and research, to learn something new every day."

Ali teaches classes in person at the German University's Cairo campus, and via online learning at the Berlin campus. German University requires classes on both campuses to be taught in English, to attract more university students. In addition to Arabic and English, Ali also possesses basic proficiency in Spanish and German.

He models his teaching style after his mentor and advisor, Dr. Volkan Otugen, Senior Associate Dean and the George R. Brown Chair in Mechanical Engineering at SMU Lyle. "Dr. Otugen is my role model," Ali says. "I've emulated his way of thinking, interpreting problems, inspiring students and looking for funding, and use these skills in my career."

Read more at smu.edu/lylenow

STOP CYBER THREATS IN THEIR TRACKS:

GET A DEGREE IN COMPUTER ENGINEERING WITH SECURITY

Almost every week a major corporation, government office or retailer suffers from a new cyber attack, exposing sensitive information and increasing vulnerability. SMU Lyle has been a leader in cyber security education and research for over 10 years. Our degrees in Computer Science and Engineering (CSE), combined with the security track, offer a rigorous and competitive curriculum where students seek out the latest cyber threats and deploy cutting-edge defensive techniques to stop them.

While adversaries continue to attack at the software application level, recent trends indicate they are going deeper and striking computer systems at lower layers, including the hardware level. SMU Lyle's Computer Engineering degree, when coupled with the security track, provides an excellent background for dealing with these emerging threats. Students pursuing an advanced education in cyber security can enroll in SMU Lyle's M.S. in Security Engineering, one of the first graduate degree programs of its kind in the nation. Our CSE programs go beyond the classroom to the front lines, giving motivated undergraduate and graduate students the opportunity to conduct directly applicable research in the Darwin Deason Institute for Cyber Security.

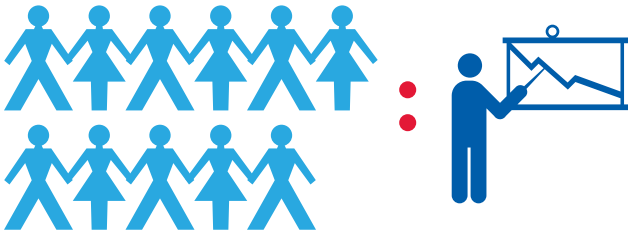
» **Learn more about SMU Lyle CSE**
» **Learn more about Darwin Deason Institute for Cyber Security**

WHO ARE SMU LYLE STUDENTS?

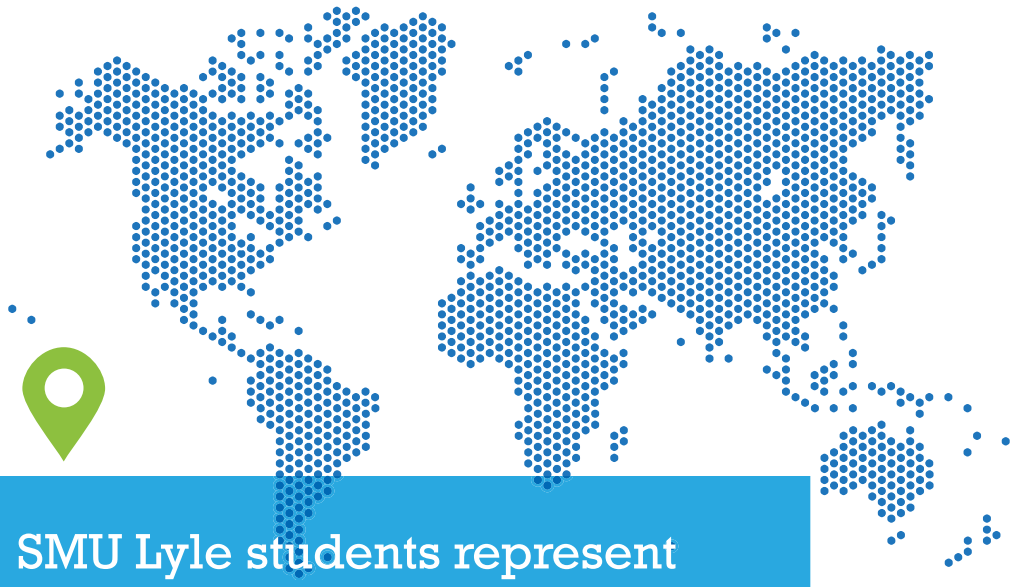
SMU Lyle enrollment includes **MORE THAN 2,000** undergraduate and graduate students

STUDENT-TO-FACULTY RATIO IS CURRENTLY

11 – 1



WOMEN MAKE UP 34% of the undergraduate student population, nearly double the national average.



SMU Lyle students represent **44 STATES & 37 COUNTRIES**

20% GRADUATE with multiple engineering majors*

25% EARN A SECOND DEGREE outside of engineering*

SMU LYLE TOTAL STUDENT POPULATION BY DEPARTMENT:

8%
Civil & Environmental

20%
Computer Science & Engineering

26%
Electrical Engineering

21%
Engineering, Management, Information & Systems Engineering

23%
Mechanical Engineering

2%
Other
Multidisciplinary, Dual Degree (MBA), Joint Degree

Over 75% of SMU Lyle undergraduate students receive some form of merit-based scholarships

90% are involved in student clubs/organizations*

68% held a student leadership position in a student club/organization*

80% held a co-op/internship/sponsored research position*

73% REPORT SECURING JOBS within 90 days post-graduation*

** Based on 2017 graduating senior responses to the exit survey conducted by the Hart Center for Engineering Leadership*

UPCOMING EVENTS

CARUTH INSTITUTE

The Caruth Institute for Engineering Education helps prepare the next generation of engineers by hosting several outreach events for K-12 students throughout the year. Upcoming events include:

Visioneering • Feb 3, 2018
Dallas Regional Science and Engineering Fair • Feb 24, 2018
Summer Camp 2018 Registration opens • March 1, 2018

➤ **Click here to learn more or email ciee@lyle.smu.edu.**

COX/LYLE RED ZONE FOOTBALL TAILGATE EXPERIENCE

Join SMU Lyle and SMU Cox at the Red Zone, our home game tailgating plaza that opens three hours before kickoff. The Red Zone is located on Bishop Boulevard, between Boaz Hall and Crow Building. We welcome Cox and Lyle alumni, students, parents, faculty, staff and guests of our deans.

➤ **Register here for the Red Zone.**

SMU Vs UCF (Homecoming).....Saturday, Nov 4 TBA
SMU Vs Tulane.....Saturday, Nov 25 TBA

DEASON INNOVATION GYM

This 24/7 makerspace, located in Caruth Hall at SMU Lyle, is open to all SMU students.

➤ **For hours or to check out the DIG's events, please visit thedig.org/calendar or email us at hello@theDIG.org**

DOWNLOAD @ LYLE

This breakfast speaker series features presentations on current engineering research and initiatives. Mark your calendars for some exciting conversations. Speaker line-up and registration will open approximately 30 days before the date of each Download on the Lyle website.

Events are scheduled for Nov 1, Nov 29, Feb 7, March 7 and April 4.

➤ **Learn about the latest Download.**

HUNT INSTITUTE

The Hunter & Stephanie Hunt Institute for Engineering & Humanity hosts several events over the academic year.

➤ **For more information, please click here or email HuntInstitute@SMU.edu.**

LYLE UNDERGRADUATE PROSPECTIVE STUDENT SPECIAL EVENTS

The Office of Undergraduate Recruitment and Retention offers special opportunities throughout the year to showcase the great things for engineering students at SMU Lyle.

➤ **Email enrollment@lyle.smu.edu to learn more, or join us for these on-campus events:**

Engineering Class Visit Days

Prospective engineering students attend a class and get a true feel for what daily life is like here at SMU Lyle. Come experience first-hand our small class sizes and world class professors. Space is limited.

The next event is scheduled for Thursday, November 9.

Lyle Academic Spotlight

Come see SMU Lyle School of Engineering through the eyes of students and alumni. Explore where students work on innovative projects in state-of-the-art facilities. Learn more about your intended major and the research opportunities available to undergraduate students. Gain a better understanding of the admission process and see how SMU Lyle can help you achieve your career goals.

The next event is scheduled for Friday, November 10.

LYLE GRADUATE PROSPECTIVE STUDENT SPECIAL EVENTS

SMU Lyle offers distinctive graduate programs in various formats designed to cater to student needs. Working professionals can choose to take courses on campus, via distance education or in the weekend format program. If you or your employees are interested in more information or registration for upcoming events, please click on the domestic or international links below or email Lylegrad@smu.edu

➤ **Domestic Graduate Student Events**

➤ **International Graduate Student Events**

LYLE STUDENT/INDUSTRY EVENTS

SMU Lyle and The Hart Center for Engineering Leadership offer a variety of events for engineering students to interact with industry contacts throughout the year.

➤ **For more information on how you can participate, please click here or email thehartcenter@smu.edu.**

Events include:

Engineering Connections.....Sept 2017 / Feb 2018
Engineering Resumania.....Aug 2017 / Feb 2018
Spring Mentor Reception .....Jan 2018
Mock Interview Day .....Sept 2017
Senior Design Expo.....May 2018
She Networks, She Wins .....Feb 20, 2018

TEDxSMU

TEDxSMU brings together ideas and interesting people from around the world to engage with SMU and the Dallas community. Although we are licensed by TED, we are independently organized.

➤ **Check out what's coming up and view previous TEDxTalks.**

This year's events include:

TEDxSMUWomen ..... Nov 2, 2017
TEDxKids@SMU ..... Nov 30, 2017

ELECTRICAL ENGINEERING: MOMENTUM IN TELECOMMUNICATIONS & NETWORKING ENGINEERING

A discussion with Dr. Dinesh Rajan, Chair, Electrical Engineering, Cecil and Ida Green Endowed Professor of Engineering, and Scott Kingsley, Program Director and Senior Lecturer in Telecommunications and Network Engineering

For decades, SMU Lyle electrical engineering has been a pipeline for talent both nationally and internationally in the telecom field. With the resurgence of the Telecom Corridor and the global internet and digital revolution, SMU Lyle is poised and ready to meet the growing demand for technology-trained engineers. "We are kicking our efforts into high gear to give our graduate students the empirical independence they need, plus the real-world experience they want, with actual software used in industry to set them apart from others in the field," Dr. Rajan says. "The school has made a significant investment and commitment in the program to provide us with the resources needed to build and support advanced telecommunications labs."

The master's program in telecommunications and network engineering is growing rapidly, up from 59 students five years ago to over 200 students this year. Coursework and advanced telecommunications labs, built by students with supervision from faculty and industry advisors, are regularly updated to keep pace with industry demands. According to Professor Kingsley, "In just about every class, I have to modify at least half the material over the summer before teaching in the fall, and we are constantly offering new courses." The program has seen so much success recently that it received the 2015 Program of the Year Award from the Information and Telecommunications Education and Research Association (ITERA) for exceptional ability to deliver high-quality education and community support.

Read more at smu.edu/lylenow

DR. DINESH RAJAN,
Chair, Electrical Engineering, Cecil and Ida Green Endowed Professor of Engineering

EMAIL DR. RAJAN

SCOTT KINGSLEY,
Program Director and Senior Lecturer, Telecommunications and Network Engineering

EMAIL DR. KINGSLEY

Spark Engineering Education with an Instant Impact Gift to SMU Lyle

At SMU Lyle, we are changing the way people think about engineers. Through innovative instruction and access to hands-on research, we are attracting a diverse mix of talented men and women at both the undergraduate and graduate levels, from across the nation and around the globe.

When you make a current-use gift to SMU Lyle, you demonstrate a commitment to the School's continued excellence and make an immediate impact. Your gift will enable students, faculty and staff working in laboratories, research centers and community partnerships to develop new solutions to pressing problems, and help shape the way we change the world.

Strengthen SMU Lyle Today

To discuss the many giving options available, please contact the SMU Lyle development team at (214)768-4136 or email lylegiving@smu.edu.

Pony Power

GIVE NOW:
SMU.EDU/LYLEGIVING

World Changers Shaped Here

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