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Dr. Sunderesh S. Heragu  
School Head, Regents Professor, and Humphreys Chair

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Graduate Program Director

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Industrial Engineering & Management  
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Greetings!

Exciting things are happening in IEM @ OSU. On September 21st, twelve new members will be inducted into the Cowboy Academy of Industrial Engineering and Management (TCA). See their pictures on page 31 and bios at http://iem.okstate.edu/iem-academy-members. Our new and current TCA members represent giants in industry and academia, including: Presidents, Vice-Presidents, Chief Executive Officers, and Partners of major corporations; Inventors, Entrepreneurs, Researchers, Philanthropists, and Thought Leaders; Members of the National Academy of Engineering; Provosts, Deans, Department Heads, and Professors; Presidents and Fellows major professional societies. Two of our newest Academy members are featured on pages 9 and 10.

We have been successful in our fundraising efforts and raised almost $6.2 million in gifts and pledges towards the IEM endowment, scholarships, and named chairs. We hope to bring additional news on this front in the next several months and appear to be on our way towards the $20 million goal.

IEM’s Industrial Advisory Board (IAB) has added two new members – G. Satish and Brenda Shumate. IEM also welcomes Dr. Juan Borrero and Ms. Jillian George to the IEM family. See their brief biographies on page 20. The IAB meets on campus twice a year and provides advice as well as help to IEM in a variety of ways. For example, each IAB member mentors senior design teams via conference calls and face-to-face meetings. See page 12 for other ways in which IAB is actively engaged with IEM.

IEM has been hosting weekly seminars and invites distinguished speakers from academe and industry to talk about cutting-edge research topics. See http://iem.okstate.edu/content/iem-seminar-series for a list of speakers in Fall 2017.

IEM is also proud to announce that two of our faculty have recently received funding from the highly competitive Operations Engineering program in the Division of Civil, Mechanical, and Manufacturing Innovation at the National Science Foundation. See https://iem.okstate.edu/news for more information.

Our students and alumni have also won prestigious awards including:

- The Award for Technical Innovation in Industrial Engineering (Dr. R. Logendran)
- The George L. Smith International Award for Excellence in Promotion of Industrial Engineering (Greg Watson)
- IISE scholarships (Hannah Anthony, Babak Farmanesh, Lacy Greening, Akash Gupta, McKenna Morrison, and Wendy Lau Wong)
- MHEFI scholarships (Ashutosh Atre, Akshay Nigade, Ronny Pacheco, and Zechariah Shrum)
- APICS Case Study Competition (Kunal Bhosale, Swaraj Meher, and Kartik Josyula)
- Hidden Figure scholarship (Rikayah Fletcher), and
- Women for OSU scholarship (Wendy Lau Wong).

Our undergraduate enrollment continues to increase. It is at 180, compared to 125 in 2013. The Fall 2016 freshmen class had more women students than men. OSU’s online master’s engineering programs (of which the fully online MS program in Engineering and Technology Management is a major player) was ranked #2 in a review of schools from across the nation. OSU’s online program stood out in both quality and affordability. See http://www.affordablecolleges.com/rankings/affordable-online-masters-engineering-degrees/.

A 32-page newsletter is not sufficient to celebrate the numerous accomplishments of our alumni, faculty, staff, and students. We will therefore be sending out more frequent communication in bite-sized digital formats. Watch your social media accounts for more information in the coming weeks.

Go Pokes!

Sunderesh S. Heragu
Regents Professor, Head and Humphreys Chair
IEM Mission, Vision & Goals

Vision
IEM’s vision is to place industrial engineers in a wide variety of industries including manufacturing, service, energy, healthcare, humanitarian and others, so that our society at large can benefit from systems that effectively use an optimal set of resources, efficiently produce goods or provide services and enrich the quality of life for all.

Mission
IEM’s mission is to develop a diverse group of professionals and leaders in industrial engineering and management by being a leader in education, research, and outreach.

Educational Goals
IEM’s educational goals are to educate and produce a new generation of diverse students who are proficient in theoretical, applied, and technology relevant concepts and practices that will have a global reach and global impact. IEM will continue to monitor and enhance the student recruiting, learning, retention, advising, mentoring, internship, and placement processes.

Research Goal
IEM’s research goals are to engage in cutting edge research of global importance and to produce innovators as well as next generation engineering, education, and societal leaders.

Outreach Goals
IEM’s outreach goals are to actively engage in community projects, economic development, and service for the greater good. The outreach goals also include enhancement of IEM’s image within CEAT and OSU and the world at large.
The School of Industrial Engineering and Management looks to alumni and friends, like you, who make the next steps in our innovative future possible. We appreciate every donation, big or small, that supports our school. However, we have listed below several priorities for you to make the most impact.

**Space on donor wall in refurbished IEM space** | $1,000
- IEM spaces will be fully renovated in 2018

**Study Abroad Scholarship** | $2,000 per student
- scholarships can be awarded to up to 12 students

Any gift made by a donor to the IEM at **$2,500** or more will receive a **$2,500 matching scholarship** from a generous benefactor that will be awarded to an IEM student in the donor’s name.

**Annual contribution to two IEM billboards** | $15,000 per year

**Sponsorship of IEM networking events** | $25,000

**Annual sponsorship of student travel** | $25,000
- IISE conferences, INFORMS conferences, commencement lunches, IAB-student luncheons and IEM reception at annual IISE meeting

**Annual sponsorship of the weekly seminar series with a naming opportunity** | $75,000

**Endowing a professorship** | $500,000

**Endowing a chaired professorship** | $1,000,000

**Naming and endowing opportunity of IEM** | $20,000,000

If you wish to donate, please send a check payable to the “Industrial Engineering and Management Excellence Fund” at Oklahoma State University, 322 Engineering North, Stillwater, OK 74078 or make a gift online (click the GIVE button at iem.okstate.edu).

For more information please contact

Bryce Killingsworth – Assistant Development Director

Office: 405-385-5623
Cell: 405-385-3497
Email: bkillingsworth@osugiving.com
Tim Hardin had a circuitous route to academia. He received a B.S. in Industrial Engineering from the University of Oklahoma. With that education, he had a diverse career in industry working in airline, package express, financial services, industrial sales, and eventually as an owner of a small business focused on sales engineering of industrial processing equipment. After compiling this varied resume, he returned to college and obtained his M.S. and Ph.D. in Computer Science from the University of Louisville where he joined the faculty in both Computer Science and Industrial Engineering. He joined the IEM faculty at OSU in 2016, and he is the Director of the Master of Science in Engineering and Technology Management program. His wife, Dr. Amy Hardin, is a pediatrician, and he enjoys fly fishing and working with Tessa, their therapy dog.

“I am still learning.”
-Michelangelo

Hannah Schneeberg
Administrative Assistant
Assistant to the Graduate Program Director

Seven short months ago, you may have seen a new face in the IEM Department. Hannah is a recent alumni, from our very own Spears School of Business, with a concentration in Marketing and a Minor in Entrepreneurship. Hannah’s role as the Administrative Support Assistant and Assistant to the Graduate Program Director during the last few months have helped to open her eyes a little bit wider. She has no idea what the future will hold, but she would love to pursue her Master’s Degree, utilize both her educational and real-life experiences to keep working with students, and hopefully teach at the collegiate level. Hannah and boyfriend of four years, Pedro, have a teacup Pomeranian, named Baylor (no affiliation with the University). Step inside Hannah’s office for some adorable pictures of the most spoiled, four-pound, puppy you have ever seen. While Hannah’s family lives in Georgia, just North of Atlanta, they are cowboys at heart. Overall, life is good and Hannah is looking forward to what the future may hold.

“Coffee in one hand, Confidence in the other.”
-Unknown
Zechariah grew up in Tulsa, Oklahoma with a mostly lovable family. With over 21 years of life experience under his belt, he still has no clue what he is doing half the time. However, OSU believed in him and provided numerous opportunities for Zechariah’s education and career development. The School of IEM has provided a community filled with intelligent students, memorable faculty, and successful alumni. Zechariah has served as the secretary, vice president, and now president of IIE. He has attended just about every regional and national ISE conference these past few years. It has been a great way for Zechariah to learn about other students’ backgrounds and interests outside of the classroom. Zechariah believes that IEM has allowed him to develop his problem-solving and continuous improvement skills. He is very grateful to the School of IEM, the OSU faculty, and his fellow students for their support.

“All we have to decide is what to do with the time that is given to us.”
-J.R.R. Tolkien

Goutham has just began his final semester of his Master’s degree in IEM at Oklahoma State University. He received his Bachelor’s in Mechanical Engineering from the National Institute of Technology in Warangal, India. After completing his undergraduate program, Goutham worked as an Operations Engineer for Rashtrya Ispat Nigam Ltd., a seven-million-ton steel manufacturing company, for four years. He is a member of Alpha Pi Mu, and is still involved in MEA (Mechanical Engineering Association) activities. His passion for education has driven him to pursue his Masters, after which he will continue on to pursue his Doctoral studies. Goutham’s parents are his greatest inspiration. They taught him that hard work, perseverance, and respecting the opinions of others are virtues that will help you be successful in all endeavors. He is an avid reader whose favorite books include Daniel Kahneman’s Thinking, Fast and Slow and Nassim Nicholas Taleb’s Black Swan. His other hobbies include playing cricket and listening to classical Indian Carnatic music.

“I have no special talents, I am just passionately curious.”
-Albert Einstein
Taylor Voss
Master’s ETM distance education student

Taylor (Moody) Voss is a student in the M.S. in Engineering and Technology Management (MSETM) program. She also earned her B.S. degree in Industrial Engineering and Management from OSU in 2014. As a full-time Process Engineer at Tinker Air Force Base, she works in the Engineering Process Group (EPG) within the 76th Software Maintenance Group (SMXG). SMXG is responsible for the maintenance of software on various planes used by the United States Air Force, including the B-1, B-2, and B-52 bombers, the E-3 Navigation system, and other mission-related systems. She attends class part-time through distance learning.

Outside of work, she enjoys spending time with family and friends, and traveling whenever possible. She is recently married; she and her husband are the proud ‘parents’ of a very handsome golden retriever named Maverick. Taylor runs half marathons, so she trains 3-4 times a week and enjoys HIIT (high intensity interval training) on non-running days. She is also an OSU football season ticket holder and loves getting to come back to Stillwater during football season!

Fun Fact: Taylor’s dad, Scott Moody, is a 2010 graduate of the MSETM program. When Taylor graduates next year, they will be the first father/daughter MSETM alumni!

Ali Bagheri
Doctoral Student

Ali Bagheri is an IEM doctoral student from Iran. He received his B.S. degree in applied mathematics from the Yazd University, Yazd, Iran in 2005 and his M.S. degree in industrial engineering from the Mazandaran University of Science and Technology, Babol, Iran, in 2008. After six years of working in industry and teaching at the undergraduate level, he joined the IEM department at OSU in Fall 2014. He is currently pursuing his Ph.D. under the supervision of Dr. Chaoyue Zhao. His research interests include optimization under uncertainty, data-driven optimization, power systems operations and renewable energy management. His research has been published in peer reviewed journals such as IEEE Transactions on Power Systems, Journal of Manufacturing Systems, International Journal of Production Research and Future Generation Computer Systems. He has also served as a reviewer of IEEE Transactions on Power Systems, Neural Computing and Applications and IIE Conference Proceedings. In his free time, he enjoys cooking, playing volleyball, traveling, and watching movies.

“Life is like riding a bicycle. To keep your balance, you must keep moving.”
- Albert Einstein
Q & A with Denny Carreker

J. D. (Denny) Carreker is Vice Chairman, a member of the board of directors, and an owner of Jet Linx Management Company. He joined Jet Linx in 2009 and established its Dallas, Fort Worth, Houston and San Antonio private jet operations. He is also CEO of Signal 88, a Dallas Fort Worth Security Company and Managing Partner of Promontory Insight a camera technology and monitoring company. He is active in his community’s philanthropic affairs. He is chairman of the board of Promising Youth Alliance, an innovative joint venture between Big Brothers Big Sisters, Phoenix House, Parkland Hospital and UT Dallas which he helped found in Dallas to provide a continuum of afterschool care to at-risk youth. Denny is also a member of the regional board of the Salvation Army and serves on the regional boards of Phoenix House Texas and Big Brothers Big Sisters Lone Star. The Carrekers make their home in Highland Park, Texas. They have three children and eight grandchildren.

How have your IEM degrees helped you?
For me, the IEM degree provided the optimal combination of analytical development and business awareness that was perfect as an entrepreneur. The ability to think through a business plan and understand the business requirements that will be essential for it to succeed is crucial. Then comes the execution! The success at getting a B.S. and MSIEM builds a good work ethic.

What aspects of your OSU affiliation (while you were a student) or faculty interactions stand out?
As the first in my family to go to college, it was a very daunting experience. Dean Wilson Bentley was like my second dad. He was a wonderful mentor to me while I was at OSU and afterwards. The other professors and staff were also encouraging and excellent educators.

What has motivated you to stay engaged with OSU years after graduation?
My appreciation of the value of the academic experience and quality of friends developed during that stage of life continue to this day.

What do you think the future holds for the IEM student?
I believe that the well-rounded mix of courses found in the IEM program is excellent for developing a business leader. The analytical thought process developed through the engineering courses, combined with the management courses are perfect for the student who wants to pursue a career in business.

One or two highlights of your career
After forming a consulting firm, I had the opportunity to leverage insights from the consulting operation into software products for banks. That business model allowed Carreker Corporation to go public, conduct a very successful secondary, and sell itself after a 29-year run. Following that journey, I have enjoyed the opportunity to form separate businesses and work with each of my three children. The jet service business is very different than the software as a service for the hospice business, and it is very different than the camera technology/physical security business. All three are in different verticals and different stages of their growth, but doing well. It is great to work with my two sons and my daughter.

Why is international exposure important for today’s engineers? How would they benefit from availing of study abroad opportunities?
Carreker Corporation was an international software and services company. Going international can be tricky but, it is increasingly becoming integral to business opportunities. Exposure to different cultures and ways of doing business is both interesting and essential to growth in a world that is getting smaller and smaller.
Mitch Myers received BSIE in 1995 and MBA in 1999 from Oklahoma State University. Early in his career, he served 13 years as Vice President of Operations for FW Murphy, a company that provides products and services for comprehensive equipment management and control solutions. Mitch was responsible for numerous facilities in the US and one in Hangzhou, China. Functional responsibilities included: Manufacturing, Supply Chain Management, Materials Management, Customer Service, Quality, and Information Technology. Mitch now owns a Tulsa based manufacturer, Thermal Specialties, LLC. The company provides Heat Treating Services, High Temperature Furnace Design, Fabrication and Service as well as Distribution of related materials. Thermal Specialties locations include Tulsa, Sapulpa, Oklahoma City and Fort Worth. Mitch was member and Chair of IEM’s Industrial Advisory Board. Mitch is married to Christy Myers and they have 4 children – Blaine (Junior @ OSU), Sutton (17), Brooke (14), and Kennedy (13). They reside in Owasso, OK.

**How has your IEM degree helped you?**

My IEM training taught me to be a critical thinker which has impacted every aspect of my life. In my career, I use my training to address situations systemically, applying root cause techniques – to address both process and human management issues that arise.

**What aspects of your OSU affiliation (while you were a student) or faculty interactions stand out?**

Most memorable is my involvement with IIE both as a member and a leader. The plant tours we conducted and experienced, really help me connect the concepts I was in the process of learning with real world application. Faculty could then apply these situations in class which was motivational.

**What has motivated you to stay engaged with OSU years after graduation?**

The years I spent at OSU and in the IEM program have been one of the highlights of my life. It was a time that developed my independence as an adult, experienced true fun with lifelong friends, developed key skills that I will use for the balance of my life, and ultimately built my self confidence to a place where I was poised to be successful in all aspects of my future. In many ways it is my second “Home”.

**What do you think the future holds for the IEM student?**

The future has amazing possibilities for IEM students / Future graduates. The future will demand educated, technologically proficient, motivated lifelong learners. IEM students will graduate with these qualities.

**What are a couple of highlights of your career?**

Two highlights of my career stand out – First, I was honored and really enjoyed being a key customer spokesman for Oracle / PeopleSoft / JD Edwards speaking in front of thousands multiple times in Denver & San Francisco. Second, has been my transition to being an entrepreneur and the lessons it has taught me. Running a business brings a different perspective to the world – one that has helped me understand our global economic system, the people that make it work, and the importance of being a lifelong learner.

**Why is international exposure important for today’s engineers? How would they benefit from availing of study abroad opportunities?**

I believe international experience is critical to round off a person’s knowledge of our global economic environment. Today’s engineers need to understand and respect the capabilities, cultures, and contributions that other countries and their people contribute to our world economy. Many times this exposure is initially not comfortable for US students – it wasn’t for me – but once immersed, perspectives change significantly. This is just another aspect of the critical importance of their journey of lifelong learning.
Spring 2017

Jan. 17: Stochastic Models for Strategic Sourcing in Supply Chains, Dr. Ashesh Kumar Sinha, Schneider International

Jan. 19: Sequential High-Dimensional Data Analysis for Anomaly Detection and System Monitoring, Mr. Hao Yan, Georgia Institute of Technology

Jan. 24: Data Analytics for Complex Systems: Improving the Science of Health Care Delivery, Dr. Devashish Das, Mayo Clinic

Jan. 26: Sequential Max-Min Bilevel Programming with Incomplete Information and Learning, Mr. Juan Borrero, University of Pittsburgh

March 9: SSMAC Impact-Social, Mobile, Analytics, Cloud, and the Engineer, Mr. G. Satish, Connixt

March 23: Learning Enabled Optimization: Towards a Fusion of Stochastical Learning and Stochastic Optimization, Dr. Suvrajeet Sen, University of Southern California

March 24: Modeling and Analysis for Cancer Screening, Dr. Julie Higle, University of Southern California

March 30: Optimization in Medical Analytics: From Data to Knowledge to Decisions, Dr. Art Chaovalitwongse, University of Arkansas

April 13: Internet of Things, Real-Time Decision Making, and Artificial Intelligence, Dr. James Tien, University of Miami

April 20: Optimizing Prioritized and Nesting Solutions, Dr. David Morton, Northwestern University

Fall 2017

Aug. 23: Additive Manufacturing for Surface Materials, Dr. Hitesh Vora, Oklahoma State University

Aug. 30: Sequential Bilevel Linear Programming with Incomplete Information and Learning, Dr. Juan Borrero, Oklahoma State University

Sep. 13: Reducing Simulation Model Risk Via Input Model Averaging, Dr. Barry Nelson, Northwestern University

Sep. 20: CitiBike: Planning through a Combination of Continuous, Discrete, and Simulation Optimization, Dr. Shane Henderson, Cornell University

Sep. 27: Decentralized Stochastic Gradient Descent, Dr. George Lan, Georgia Institute of Technology

Oct. 11: School Bus Routing with Stochastic Demand and Duration Constraints, Dr. Rajan Batta, University at Buffalo

Nov. 15: The Complexity of Adaptive Sampling Line Search and Trust Region Algorithms for Stochastic Optimization, Dr. Raghu Pasupathy, Purdue University

Nov. 29: Multi-objective Location Modeling and Genetic Algorithms, Dr. Mark Daskin, University of Michigan
Letter from the IAB

Greetings OSU IEM Followers and Fellow Alumni,

Another school year is upon us and with it comes the cooler Fall weather, the prospect of a very exciting Cowboy football season, and many opportunities to give. For those of you who have been impacted by Hurricanes Harvey and Irma, our thoughts and prayers are with you as the entire Cowboy nation pulls for a speedy recovery of the areas affected by these powerful forces of nature. The OSU IEM Industrial Advisory Board is energized and excited by the steady stream of great news over the summer regarding our wonderful School’s accomplishments and generous donations from our distinguished Alumni. The Board has been busy making preparations to engage with students, faculty, and alumni at our upcoming Fall Board Meeting and Alumni Tailgate Event vs. TCU on September 23rd. As a part of the Fall meeting festivities, we look forward to presenting our Second Annual IAB Scholarship Award to a deserving IEM student. Also, this semester’s five IEM Senior Design teams are working with their IAB “Coaches”, and preparing to present their Initial Problem Analysis to small groups of Board members for industry perspective feedback during the Fall meeting. Finally, we look forward to welcoming two new members to the IAB this month. Congratulations to Brenda Schumate and G. Satish! As always, we are delighted to have alumni who are interested in giving back to their alma mater join us. Until next time, Go Pokes!

Sincerely,

The OSU IEM Industrial Advisory Board

Members

Brian Adams  
Textron Aviation

Syam Anthony  
Wal-Mart Stores, Inc.

Dan Crawford  
Power Costs, Inc.

Stephanie Criner  
Lockheed Martin

Kevin Doeksen  
American Airlines

Bill Dueease  
The Coach Connection

Ashley Estes  
Michelin North America

Matt Freeman  
Burns & McDonnell

Jack Goertz  
Tandem, Ltd

Stephanie Royce  
Weamco

Brenda Shumate  
Williams Companies

G. Satish  
Connixt Inc.

Jack Watts  
The Portola Company

Jon Womack  
The Wilcox Company

“The idea of a single eureka moment is a dangerous lie. It makes us feel inadequate since we haven’t had ours. It prevents people with seeds of good ideas from getting started.”

– Mark Zuckerberg
Jack graduated from OSU in December, 1972 with a BSIE and in May, 1974 with a MSIE. After graduation, he moved to Birmingham, AL to accept a position with Southern Services (now Southern Company Services), the design arm of the Southern Company, the parent company of Alabama Power, Georgia Power, Gulf Power, and Mississippi Power Companies. He worked his way through the ranks at the Southern Company, mainly in the areas related to plant scheduling and information technology, until retiring in 2001 as a Senior Analyst in the IT department. Simultaneous to his career with Southern, in 1974 Jack joined Bob’s Bikes in Vestavia as a co-owner, then left Bob’s Bikes in the 80’s and founded Tandems, Ltd, a bike shop specializing in the sale of tandem bicycles and recumbents, with customers all over the US and literally all over the world. He still owns/operates Tandems, Ltd today, along with his wife, Susan. Also in the 1970’s, Jack purchased a wheat farm in northern OK, near where he grew up and attended high school. He is an active absentee landlord with some great tenant farmers. Jack is a registered PE in Alabama and a senior member of IIE. He also serves on the OSU IE Advisory Board and is a member of the first class inducted into the OSU IEM Cowboy Academy. He has served as the national treasurer, then national president, of the League of American Wheelmen, president of the Alabama Gymnastics Medalist Club, president of the Southern Company Retirees’ organization, and several other civic and professional organizations.

G. Satish

G. Satish is a serial entrepreneur with a successful track-record in enterprise, cloud and mobile software, and applications space in the US and international markets. He has rich experience in field services management, supply chain, manufacturing, utility and oil & gas industries. He is the co-founder and CEO of Connixt, Inc., provider of a cloud based mobile software suite for field management, asset maintenance, and supply chain management. Connixt is the fastest means to accomplish business to field integration by leveraging cloud, mobile, and iOT technologies. Connixt was among CIO Review’s most promising utility technology solution providers in its second year of operation.

Brenda Shumate

Brenda Shumate is a graduate of Oklahoma State University with a Bachelor of Science in Industrial Engineering and Management and a minor in Statistics. Her professional background and education (including her MBA) has led to a successful career of over 25 years working with Oil and Gas companies in the areas of Equipment Reliability, Safety and Supply Chain. She has crafted her career by taking positions that have developed a breadth and depth of targeted experience working with producers and Tier 1 contractors (rigs, suppliers, service providers), upstream and midstream operations, heavy oil, light oil and gas reservoirs (with various recovery techniques), and roles from individual contributor, manager/director and consultants.

Brenda brings a strong background of Lean Six Sigma and continuous process improvement to all efforts and her strong management, communication and team building skills has built a strong reputation aligning all levels of an organization - from front line operation and maintenance personnel (ensuring safe, efficient and effective execution of business processes) to executive teams (developing strategies which deliver sustainable economic outcomes). There is nothing she enjoys more than helping people achieve excellence with the minimum amount of effort needed.
William Robert “Bob” Norris, 81, of Stillwater, passed away peacefully with his family by his side on June 29, 2017 at Grace Living Center in Stillwater. He was previously featured in the Spring 2017 edition of our newsletter. Our sincere and heartfelt condolences go to his family. Please see the excerpt from his obituary below.

Anyone who had the good fortune to cross his path, knew immediately that Bob Norris was a lover of life and lived it to the fullest. That life began in Jonesboro, Arkansas when he was born to Harold Norris and Nancy Penix-Norris on May 12, 1936. He attended Broken Bow High School and went on to attend Rice University, where he played football. His Junior year, Bob transferred to OSU where he was an engineering major and became active in campus life, serving as the President of Bennett Hall. It was at OSU, where Bob met his beloved wife, Kay (Baum). The two married shortly after graduating in 1959, and Bob enjoyed a successful sales career for Caterpillar and Ingersoll Rand that took them to Chillicothe, IL, and Buffalo, NY, before moving to Idabel to open Norris’ Department Store. Bob provided a wonderful home for their children and participated in their activities ranging from coaching Little League basketball to participating in musical theatre productions with the entire family.

After retiring at 50, Bob and Kay traveled the world together, with their family, and with various groups from OSU. Bob also served on numerous boards, including Oklahoma State University’s Board of Governors and the OSU Athletic Council. In 1996, the Norris’ moved to Stillwater, and in 2000, the couple began volunteer work creating a new athletic hall of fame for OSU. Bob and Kay spent months touring collegiate and professional athletic halls of fame, and even longer gathering items and doing research for the project. In October of 2001, Heritage Hall celebrated its Grand Opening, and remains a testimony to the excellence of OSU’s athletic history, as well as a legacy of the love Bob and Kay had for their alma mater.

Bob Norris was a teller of tales, a stranger to no one, and always had a joke, funny story or anecdote to share (as long you had at least an hour or so to listen). Bob had a particular gift and passion for mentoring, and leaves behind many whose lives have been touched in a positive way from his keen guidance, insight and wisdom.

“My life has been a great ride!”
-Bob Norris

Once a Cowboy, Always a Cowboy.
Welcome! We look forward to getting to know all of you and helping you on your way to becoming successful industrial engineers!

CONGRATULATIONS GRADUATES

OSU held its commencement ceremony on May 13th 2017. We would like to congratulate the following IEM students for their hard work and dedication in completing their degree.
Oklahoma State University’s
Master of Science in Engineering and Technology Management

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The design and analysis of networks constitute one of the most important classes of problems in the field of optimization. In practice, network models are used to address such diverse applications as wireless communication, energy distribution, and conservation planning. A network consists essentially of a set of “nodes,” linked in some fashion by “arcs.” Connectedness is often a critical feature of a functioning network. However, enforcing connectivity in optimization models remains a significant computational challenge.

Dr. Buchanan's NSF-funded project aims to develop fundamental theoretical and algorithmic advances for effectively imposing these constraints in mixed integer programs (MIPs) in which the key decisions are at the vertex (i.e., node) level. Problems of this type arise when:

- designing aisle space in a high density warehouse;
- choosing contiguous pieces of land for a wildlife preservation;
- selecting contiguous census tracts to form a political district;
- searching for cohesive clusters in social and biological networks;
- intentionally splitting a power grid into self-sufficient subnetworks during a disaster to avoid large-scale blackouts.

Results from the research are expected to allow for the solution of large-scale instances of these problems (with thousands of nodes) to optimality in a reasonable amount of time. The developments may also help to solve related problems that have distance or survivability constraints.

Our nation's power system infrastructure is still facing many critical resilience challenges. In addition to the long-standing challenges from random equipment failures and operation errors, more frequent and severe natural disasters are making greater impacts on the energy infrastructure. According to assessments by the National Research Council (NRC) and the U.S. Global Change Research Program (USGCRP), U.S. energy infrastructure is increasingly vulnerable to severe weather due to climate change. To mitigate the risks of disruptions caused by component outages, the system operators are responsible for preparing the grid to enhance system resilience, taking fast corrective actions to cope with contingencies, and recovering the power system quickly and smoothly after disruptions.

This project studies distributionally robust optimization (DRO) approaches that better utilize the meteorological and transmission availability data, and provides a comprehensive framework for enhancing power system resilience, consisting of (i) risk assessment, (ii) pre-disaster power grid hardening, (iii) emergency responses and corrective actions during disasters, and (iv) post-disaster self-healing and system restoration. This project will advance the use of analytical models and scalable solution methods to assist system operators to better evaluate and mitigate disruptions.
IEM held their Spring 2017 commencement luncheon on Saturday, May 13th, at the Conoco Phillips Alumni Center. Nearly 100 hundred guests, including graduating BS, MS, and PhD students and their families were in attendance along with faculty and staff from IEM.

Drs. Kamath, DeYong, and Liu, pose with graduates!

Vandan Patel with Dr. Sunderesh Heragu

Pranav Kulkarni, Harshwardhan Rathod and Aditya Agrawal celebrate!
IEM Spring 2017 Commencement Luncheon

Joe Muralla with family

Dr. Camille DeYong

Lavanya Eswaran with Dr. Sunderesh Heragu

James Darling posing with props!

Dr. Camille DeYong with graduates
Jillian George
ETM Administrative Assistant

Jillian George is an alumna from OSU, receiving her Bachelor’s degree in Art History and her Master’s degree in History. While working on her Master’s degree, Jillian’s focus was environmental and animal history. She is married to Tyler George, who is working on his Master’s degree in Screen Studies at OSU. Her future goals are to work in a natural history museum and find a way to advocate for the preservation of national parks and the wildlife contained within. Another ambition of hers is to visit as many national parks, forests, and monuments that she can. During her free time, Jillian enjoys camping, painting, and reading historical non-fiction.

“Go into the arts. I’m not kidding. The arts are not a way to make a living. They are a very human way of making life more bearable. Practicing an art, no matter how well or badly, is a way to make your soul grow, for heaven’s sake. Sing in the shower. Dance to the radio. Tell stories. Write a poem to a friend, even a lousy poem. Do it as well as you possibly can. You will get an enormous reward. You will have created something.”

-Kurt Vonnegut

Juan Borrero
Assistant Professor

Dr. Juan Borrero received his Ph.D in Industrial Engineering from the University of Pittsburgh in summer 2017. He also received an MS degree in Industrial Engineering and a BS degree in Mathematics – both from Universidad de los Andes, Colombia. His research areas of interest include: Decision Making Under Uncertainty; Bilevel Programming; Online Optimization; Robust Optimization; and Non-linear 0-1 Optimization. Dr. Borrero has published four papers in journals including European Journal of Operational Research, Operations Research Letters, Journal of Global Optimization, and Decision Analysis. He currently teaching a Masters course in Integrated Manufacturing Control Systems.

“As long as you live, keep learning how to live”.

-Seneca
Congratulations and thank you for your excellent work!

IEM Student Awards and Scholarships

Akshay Nigade
Rack Manufacturer Institute/John Nofsinger Honor Scholarship in the amount of $2,500

Rikiyah Fletcher
Awarded Scholarship in Honor of Raye Jean Montague in the amount of $2,500

Wendy Lau Wong
Awarded Scholarship by Women for OSU at the 2017 Women for OSU Symposium

Ashutosh Atre
Awarded Storage Manufacturer Association Honor Scholarship in the amount of $3,000

Ronnie Pacheco
Awarded Lift Manufacturer Product Section Honor Scholarship in the amount of $1,500

Zechariah Shrum
Awarded Howard Berstein Scholarship in the amount of $5,000

IISE Award Recipients:

Award for Technical Innovation in Industrial Engineering
- Dr. R. Logendran, Cowboy Academy member and Professor at the other OSU (Oregon State)

George L. Smith International Award for Excellence in Promotion of Industrial Engineering
- Greg Watson, PhD candidate in IEM

Dwight D. Gardner Scholarship recipients
- Hannah Anthony, undergraduate student ($2,500)
- Wendy Lau Wong, undergraduate student ($3,000)

Gilbreth Memorial Fellowship recipient
- Lacy Greening, MS student ($3,500)

John L. Imhoff Scholarship recipients
- Babak Farmanesh, PhD student ($1,000)
- Akash Gupta, PhD student ($1,000)

President's Scholarship recipient
- McKenna Morrison, undergraduate student ($1,000)

Congratulations and thank you for your excellent work!
STUDENT CHAPTERS

APICS
The APICS OSU Student Chapter was launched on Feb 2017 in an effort to focus on enhancing the knowledge and competency of its members in the field of supply chain and operations management. APICS organized several events in the spring.

- An APICS Certification Opportunities and Benefits event was organized to make students aware of the benefits and recognition of APICS Certifications. A seminar was presented by Mr. Kunal Gandhi, VP of Education for APICS OKC Student Chapter.

- A Career Workshop: Resume Building and Application Process event was conducted to give members an insight into how the internship and full-time job application process can be tackled effectively. Ms. Breana Gallagher from OSU Career Services presented a seminar on this topic and addressed concerns of the members and provided them tips to build a powerful resume.

- An Industrial Visit: Field trip was organized to Walmart Distribution Center at Paul’s Valley for the members to gain practical knowledge in the field of Supply Chain and Operations Management. Members of the Student Chapter gained execution knowledge of the academic concepts they learnt in their curriculum.

Faculty Advisor: Dr. Tieming Liu
Committee Members:
- Ashutosh Atre, President
- Swaraj Meher, Secretary
- Mitul Pimpale, VP Education and Program Planning
- Akshay Nigade, VP Membership
- Kunal Bhosale, VP Finance
- Kartik Josyula, Webmaster

Institute of Industrial and Systems Engineers
The Institute of Industrial and Systems Engineers is happy to be back on campus. Our mission is to enrich the educational experience for our fellow industrial engineering students, provide networking opportunities with industries and students from across the region, and bring the IEM department closer together. IISE is looking to provide as many opportunities as possible. We are planning several events this semester:

- IEM Student-Faculty Panel
- IEM Student-Alumni Tailgate
- Guest Speakers from Industry
- Student Internship Presentations
- Company and Plant Tours
- Six Sigma Greenbelt Training

We would also like to recognize the students who freely gave their time and effort to make this organization great. The officers this academic year are:

- Zechariah Shrum, President
- Logan Price, Vice President
- Lindsey Dickerson, Secretary
- Alex Cannon, Treasurer
- Susan Weckler, Student Council Representative
- McKenna Morrison, PR Chair
- Stephanie Jones and Cynthia Craig, PR Committee
- Jatin Selmokar, Graduate Student Chair
- Viraj Chavan and Pritesh Wankhede, Graduate Student Representatives

There is a lot going on with IISE, and we would love for you to be a part of it! If you are an alumni or student who would like to get more involved with IISE, please feel free to reach out at our Facebook page, IISE Oklahoma State, or send an email to Zechariah Shrum at zechars@ostatemail.okstate.edu.
INFORMS

The Institute for Operations Research and the Management Sciences (INFORMS) is the largest society in the world for professionals in the field of operations research, management science, and analytics. The OSU Student Chapter of INFORMS is a student led campus organization focused on promoting student learning, professional advancement, and camaraderie with fellow students and faculty within the field of operations research and the management sciences. Our goal is to enable students to go beyond the bounds of coursework as they engage in research and extracurricular activities that lay the groundwork for their future as OR/MS professionals. The student chapter officers are in the process of organizing many opportunities for students to participate in INFORMS this semester. A few of our accomplishments since spring include:

- INFORMS student chapter at OSU took a field trip to ATC Drivetrain in Oklahoma City on March 24th, 2017. ATC is a re-manufacturing company in the auto industry more specific to transmissions, engines, and batteries. The have lately emphasized continuous improvement throughout their facilities. They also have logistics, manage an inside warehouse, and an off-site warehouse. During the field trip, our students experienced how the industrial engineering knowledge and concepts discussed in class are applied in real world.

- INFORMS student chapter at OSU organized a Python workshop on April 7th, 2017. The workshop was given by Yajun Lu, a PhD student from Industrial Engineering and Management. Python is a general-purpose language, which is great for data analysis, artificial intelligence, scientific computing, and so forth. The aim of the workshop is to give our students some experience in writing and running Python scripts and get them familiar with the basic Python grammars.

The INFORMS student chapter advisor is Dr. Kalyani Nagaraj and the Fall 2017 student officers are:

- Hao Pan, President
- Jatin Selmokar, President-Elect
- Fuzelahmed Shaikh, Graduate Vice President
- Mohit Khandelwal, Treasurer
- Miranda Almen, Secretary
- Hunter West, Public Relations Director
- Michael Moylan, Undergraduate Vice President
- Hannah Anthony, Activities Coordinator

If you have any questions or would like to connect with the student chapter, please feel free to email Hao Pan at hao.pan@okstate.edu.

Alpha Pi Mu Industrial Engineering Honor Society

The purpose of Alpha Pi Mu is to recognize students who have achieved academic excellence, promote scholarly activities, and foster an atmosphere to facilitate social interaction between students and faculty. Being a part of Alpha Pi Mu gives an individual scholarship and volunteer opportunities. The society is open to juniors, seniors, and graduate students who meet the membership requirements. Last semester, Alpha Pi Mu inducted the largest group of scholars in chapter history. This semester, Alpha Pi Mu is involved in taking senior class pictures and looking into IEM tutoring opportunities. For more information about Alpha Pi Mu, you can visit their new website at apm.okstate.edu or contact President Sai Ramesh at Saimani@okstate.edu

- Wendy Lau Wong, President Elect
- Erica Crain, Vice President
- Hannah Anthony, Secretary
- Jordan Spencer, Treasurer
Sequential Bilevel Programming with Incomplete Information and Learning

Dr. Juan S. Borrero

Bilevel programming deals with optimization problems where one part of the decisions to be made (referred to as lower-level decisions) are constrained to be solutions of an optimization problem that depend on the remaining upper-level decisions. This general structure makes bilevel programs useful to model hierarchical decision-making problems between two actors, usually cast as a leader, or an upper-level decision-maker, and as a follower, or a lower-level decision-maker (Dempe 2002). In this perspective, the leader solves an optimization problem that depends on the optimal decision of the follower’s problem, and this latter problem is, in turn, parameterized by the decisions of the leader. As such, bilevel programs have many applications in different fields such as defense (Brown et al. 2006), economics (Sherali et al. 1983), transportation (Lucotte and Nguyen 2013), among many others. See Migdalas et al. (2013) and the references therein.

The typical bilevel formulation assumes a single interaction between the leader and the follower. Moreover, it assumes that the leader knows with certainty all the parameters of the lower-level problem, or that the leader knows probability distributions over this set of parameters. However, in many practical settings, the leader and follower interact repeatedly during a given time horizon, and the leader has incomplete information regarding the optimization problem the follower solves at each period. For these problems, besides determining what is the best solution to implement at each time period, the leader faces additional questions outside the scope of traditional bilevel models such as: how to know whether a given solution is the best possible, how to force the follower to disclose new information, and how to use this newly learned information to decide at the next time period.

As an example, consider a law enforcement force (the leader) that patrols smuggling activities over a national border (see Brown et al. 2006, Morton et. al. 2007, Gift et al. 2010). In this problem, the smugglers (the follower) continuously attempt to bring inside the country illegal goods at the highest possible efficiency using different routes and means of transportation. Law enforcement, on the other hand, have to periodically reallocate their resources to patrol and block the routes used by the smugglers. The effectiveness of their decisions is limited, however, because they do not have all the information regarding some of the routes the smugglers use. As such, they have to learn about the routes used by the smugglers and their cost (i.e., the structure and parameters of the lower-level problem), by observing the smuggler’s reactions to the blocking actions.

We propose a framework to study this class of sequential bilevel problems with incomplete information and learning. The performance of any leader’s decision-making policy is measured in terms of its time-stability, which is defined as the first period by which the policy implements the optimal solution of the full-information bilevel problem from there on. The main objectives of the research are to: (i) determine sets of policies that are optimal or near-optimal with respect to time-stability; (ii) compute such policies efficiently; and (iii) provide real-time information to the leader about whether an optimal or near-optimal solution has been found.

The first part of the research studies in detail max-min bilevel linear problems, a class of bilevel problems where the leader’s objective is to maximally degrade the performance of the follower. Important examples
include network interdiction, defender-attacker, and attacker-defender problems. We analyze a set of greedy and robust policies, and demonstrate that their time-stability under particular types of feedback is upper bounded by the number of variables of the follower's problem. We show that these policies are optimal in the sense that they attain the best possible, worst-case time-stability across all possible problem instances. Furthermore, they provide a certificate of optimality in real time. Computing these policies involve solving at each time a max-min bilevel problem with lower-level robustness constraints. As such, their computation involve both bilevel and robust optimization techniques: we develop a method that first replaces the lower-level robust optimization problem by its equivalent linear programming counterpart (Ben-Tal et al. 2009), and then reformulates the resulting linear bilevel program as a one-level mixed integer program (Audet et al. 1997).

The next step in the research involves studying general bilevel linear problems where the objective of the leader is not necessarily to degrade the follower's performance. Here, the leader can cooperate with the follower, and a broader class of problems in facility location, pricing and taxing, network design, among others, can be modeled. In this setting, greedy and robust policies are not guaranteed to yield the optimal solution; furthermore, they no longer provide certificates of optimality. This has led us to analyze alternative policies, such as greedy and ‘best’-case policies, that overcome most of the limitations of the robust policies. However, the question of optimality remains open, and, importantly, this question is linked to key trade-offs between information, computational tractability, and time-stability. For instance, increasing the level by which the feedback from the follower's responses is used reduces the time-stability of the policies. However, this comes at the price of increasing the policies' computational complexity. Determining the possible solutions to these trade-offs is currently the main issue of this research.

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Papers published or accepted from 2015 to 2017


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Lecturer

**Dr. Tim Hardin**  
Lecturer and ETM Director

**Dr. Juan S. Borrero**  
Assistant Professor

**Dr. Sunderesh Heragu**  
Regents Professor and School Head  
Donald and Cathey Humphreys Chair

**Dr. Austin Buchanan**  
Assistant Professor

**Dr. Terry Collins**  
Associate Professor and Undergraduate Program Director

**Dr. Manjunath Kamath**  
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**Dr. Jennifer Glenn**  
Lecturer

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**Dr. Farzad Yousefian**  
Assistant Professor

**Dr. Chaoyue Zhao**  
Jim and Lynne Williams Chair  
Assistant Professor

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Associate Professor

**Dr. William J. Kolarik**  
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**Amber Huffman**  
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**Jillian George**  
Administrative Support Specialist, ETM
The Cowboy Academy of Industrial Engineering and Management was recently formed at OSU to:

- Recognize the accomplishments of IEM alumni;
- Harness their expertise and talent for advancing IEM so it can continue to produce distinguished alumni;
- Have Academy members serve as role models for current students;
- Help enhance IEM’s visibility;
- Serve as a sounding board for the School; and
- Help with special projects.

The School of Industrial Engineering and Management has been represented and led by many giants in Industrial Engineering, including:

- Presidents, Vice-Presidents, Chief Executive Officers, and Partners of Major Corporations;
- Inventors, Entrepreneurs, Researchers, Philanthropists, and Thought Leaders;
- Member of the National Academy of Engineering;
- Provosts, Deans, Department Heads, and Professors;
- Presidents of the Institute of Industrial and Systems Engineers (IISE), American Society for Quality (ASQ), and Association of Energy Engineers (AEE) Presidents; and
- Fellows of IISE, AEE, APICS, and ASQ.

**Current Members Include:**

Tony Bacher
Michael Bartlett
Terrance Beaumariage
Leland Blank
David Boyer
Shay Braun
Thomas Britton
Kenneth Case
Johann Demmel
Bill Dueease
John English
Jack Goertz
Don Humphreys
Behrokh Khoshnevis
Rasaratnam Logendran
Kent Powers
Jack ReVelle
Ting Nee Su

Shy Ching Tay
Lyndon Taylor
Jack Watts
Rick Webb
Lawrence Whitman
Marion Williams
Eric Woodroof
Stacie Wrobbel

**New Members Include:**

Denny Carreker
Samuel Combs III
Laura Easley
Jeff Greer

John Harrington
Stuart Keeton
David Kyle
Neal McCollom

Mitch Myers
Ron Orr
David Pratt
Bill Remy
Congratulations to the 2017 Cowboy Academy Inductees

Denny Carreker  
Samuel Combs III  
Laura Easley  
Jeff Greer  
John Harrington  
Stuart Keeton  
David Kyle  
Neal McCollom  
Mitch Myers  
Ron Orr  
David Pratt  
Bill Remy
Front cover page photo: The picture on the front cover is the famed Theta pond used at the turn of the century to water OSU’s work animals. It eventually took its name from the Kappa Alpha Theta sorority, then located nearby. Today, the beautiful pond offers the perfect setting for relaxing under a shady tree, talking with a friend, that perfect picture, or watching the ducks.

Back Cover page photo: The picture below is of the Edmond Low Library.

Photo Credits: Bob Ingersoll, IEM alumnus