University of Dayton

Mechanical and Aerospace Engineering

Annual Report 2017-2018

From the Chair

2017-2018 was another strong year for the department. Our combined undergraduate and graduate enrollment is 1,077 students. In 2017, we enrolled our largest first-year class ever. We are the 31th largest undergraduate mechanical engineering program in the country and the fourth largest among private schools. More than one in ten UD students calls our department home.

Our students continued to excel. They were honored with research and service awards and NSF Fellowships. 185 students garnered professional engineering experience by working co-op terms. Graduation rates remain exceedingly high. Within six months of graduation, 96% of our students found full-time employment or enrolled in graduate school.

Our faculty continue to innovate in the classroom. Juniors in Manufacturing designed, manufactured and raced toy cars using both metal-machined and additive-manufactured parts. Sophomores in Mechatronics learned circuits, sensors and controls by building autonomous "Sumo Bots" that competed against each other. Seniors in Engineering Analysis learned data analytics by helping to predict book orders for a non-profit that delivers books to kids for free. Students at the University of Dayton China Institute in Suzhou, China, learned Making (& Moving) Machines in MATLAB. Seniors in Capstone Design made the first steps to form a start-up company by developing an Electric Bike.

Our faculty continued to excel in scholarship and service. The faculty published 61 peer reviewed papers and conducted $1.3M in sponsored research. Six faculty serve as Associate Editors of major research journals. Faculty were honored as Fellows, Adjunct Professors and with research awards. Two faculty serve as Visiting Professors in Asia. Moreover, faculty were active in community service by helping to modify toy cars for children with special needs.

Please continue to follow our progress at go.udayton.edu/mae.

Sincerely,

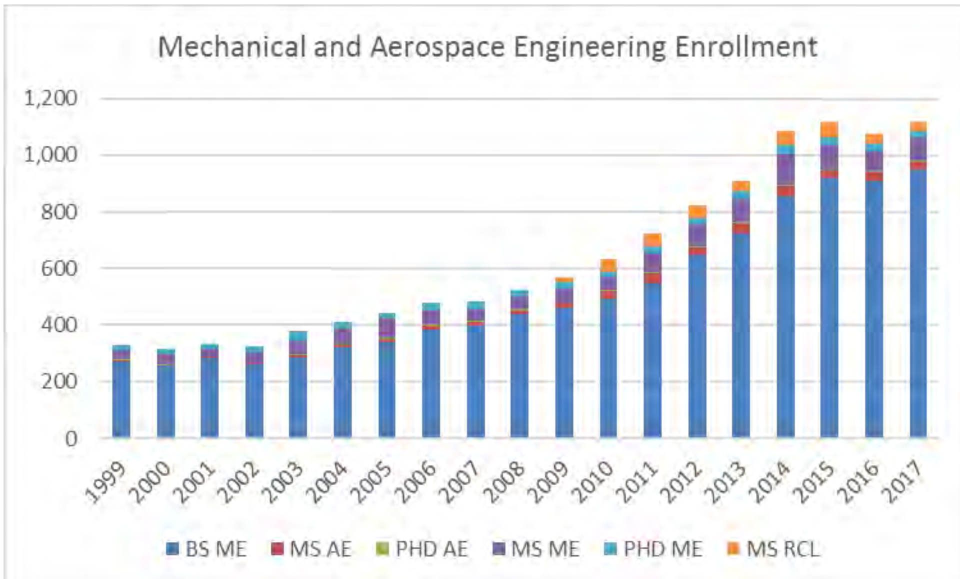
Kelly Kissock

J. Kelly Kissock, Ph.D., P.E.
Chair, Department of Mechanical and Aerospace Engineering / Renewable and Clean Energy

Students

Enrollment and Graduation Data

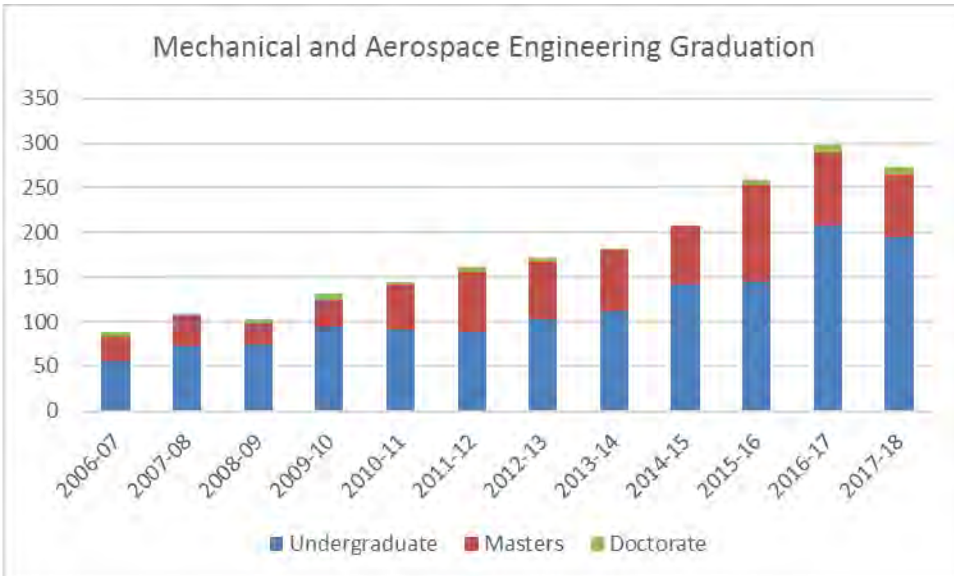
After several years of significant growth, both undergraduate and graduate enrollment have leveled off. We remain the single largest department in the University of Dayton and one of the few that offers B.S., M.S. and Ph.D. degrees. The Mechanical and Aerospace Engineering Department accounts for over 10% of all enrollment at UD.



Enrollment by MEE program is shown below:

	2010	2011	2012	2013	2014	2015	2016	2017
BS ME	493	546	648	725	852	916	909	948
MS AE	28	36	27	36	39	29	30	29
PHD AE	4	4	4	3	5	6	5	5
MS ME	46	66	74	81	106	84	70	79
PHD ME	16	27	23	26	31	29	26	23
MS RCL	45	45	48	37	53	51	37	31
MEE G	139	178	176	183	234	199	168	167
Total	632	724	824	908	1,086	1,115	1,077	1,115

The number of students graduating has increased with enrollment. In 2017-2018, we granted 195 BME degrees, 70 MS degrees and 9 PhDs. The program graduation rate is very high; a detailed study of the 2006-2009 cohorts showed that 66% of undergraduate students who enrolled in MEE graduated with a BME degree from UD, and 14% graduated with another UD degree. 97% of our MEE students graduate in 9 semesters or less. We are the 31st largest undergraduate Mechanical Engineering program in the country, and the 4th largest among private universities, based on number of students graduating (ASEE Engineering By the Numbers: 2016-2017).



Fall 2017 First-Year Class

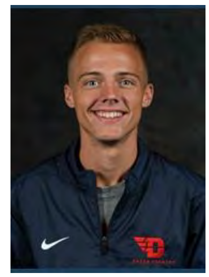
In Fall 2017, 189 students enrolled in our department as first-year students. This was our largest first-year class ever. Statistics from the entering class are shown below. Typically, our first-year class grows by about 50 students after students who initially enroll in Discover Engineering select Mechanical Engineering as their major. The Fall 2018 entering class has 179 students, over 50% of whom are in the Honors program.

Fall 2017			
Total	189	Average GPA	3.87
Male	155	Average ACT	
Female	34	Number with AP	86
Frac Female	0.18	Fraction with AP	0.46
International	1	Number from OH	124
Honors	25	Fraction from OH	0.66

Student Achievement

- Sophomore Alex Seither received the Soap Box Derby's President's Youth Volunteer Service Award. Seither was the driving force behind the creation of the new Collegiate Engineering Design Challenge Competition.
- The UD Supermileage Team, led by Ryan Hoyt, Eric McGill, Daryl Osterloh and Hannah Olson, placed 7th in the 2017 SAE Supermileage Competition at the Eaton Proving Grounds in Marshall, MI, by almost doubling our fuel economy from last year and finishing with a result of 529 MPG!
- RCL program welcomed another Fulbright Scholar, Ms. Nur Faiza Azizan, from Malaysia in 2017.
- RCL students Zach Siefker, Louis DeGruy and Daniel Ulbreicht won a U.S. Department of Energy 2017 Excellence in Applied Engineering Research Award for their work in energy-efficient cooling tower control.
- Asa Palmer received an Ohio Space Grant Consortium Grant for 2017-2018. Asa will be working on "Manipulating Wing Aerodynamic Efficiency through Three-Dimensional Surface Contours and Fences."

- Hunter Johnston and Jacob Korczyk won Best Project Presentation for their Crop Duster at the June 2017 It Flies! Competition at University of Manchester, UK.
- Kayla Pariser won the Undergraduate "Old Guard" Competition at the ASME DESS in October 2017 for her Honors Thesis work, "Reducing Passive Muscle Force: A Process for Patient-Specific Muscle Model Parameter Calibration in RTSA Patients."
- Nick Koch, Madalyn Beban, Drew Hasenkamp and Alex Geiger, U.D. ASHRAE Club members, won scholarships from Dayton ASHRAE on November 13, 2017, to support careers in energy-efficient heating, ventilation and air conditioning.
- MEE Capstone Design students, Zachary Siefker, Prasanna Murlidharan, Bandr Alsubaie, Zaid Shaikh, Daryl Osterloh and Adam Puccetti, were named on Patent Wo2018017643, "Batch-Type Warewasher With Energy Retaining Curtain."
- Senior mechanical engineering major and men's cross country team captain, Tyler Adgalanis, was honored with the Presidential Outstanding Scholar-Athlete Award at the Scholar-Athlete Awards Reception on February 12, 2018. The award is the event's most prestigious and recognizes student-athletes who best demonstrate academic excellence, qualities of leadership and service to the community.



- 26 MEE students made technical posters and presentations at the April 18, 2018, Standers Student Research Symposium.
- Andrew Truszkowski won 2nd place in the Undergraduate Paper/Presentation Category at the recent AIAA Region III Regional Student Conference.
- Graduating senior, Kayla Pariser, was awarded a National Science Foundation Graduate Research Fellowship. The fellowship gives Kayla 3 years of a stipend and tuition to support her graduate education.

- Asa Palmer won Best STEM Junior Poster at the 2018 NASA/Ohio Space Grant Consortium Student Research Symposium at Cleveland.
- Andrew Truszkowski won a AIAA 43rd Dayton-Cincinnati Aerospace Sciences Symposium Best Presentation Award.
- WIll Cammack and Lewis Forman swept the Flight Handling category at the ItFlies competition held at UD on April 14, 2018. The competition hosted teams from Manchester, Swansea, Mississippi State and UD.
- The 2018 Spring Capstone Design Symposium included 74 technical presentations for external sponsors.
- MEE Spring 2018 Graduation Awards
    - The Bernard F. Hollenkamp '39 Memorial Award-Outstanding Senior: Eric McGill and Madeline Lickenbrock
    - The Martin C. Kuntz, Award of Excellence–Outstanding Junior: Bridget Dues and Katherine Opacich
    - The Class of 1902 Award-Outstanding Mechanical Engineering Achievement: Kayla Pariser and Benjamin Ziegler
    - The Brother Andrew R. Weber, S.M., Award Outstanding Service & Achievement: Amanda Delaney and Lauren Rivera
    - Professor Henry Chuang Award-Energy Conservation & Waste Management: Zach Siefker
    - The Leland Nicolai Aerospace Engineering Award-Greatest Contributions to the Aerospace Program: Eric Insana





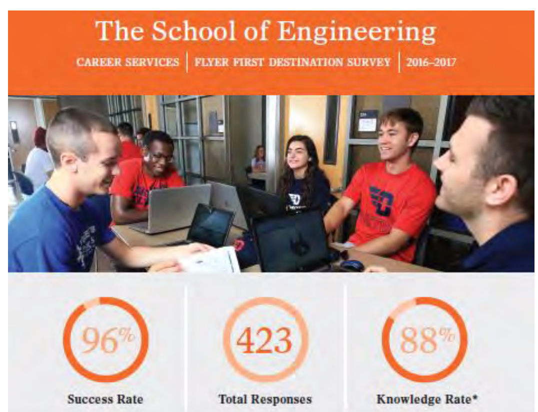
Cooperative Education

Our cooperative education program enables students to learn to succeed in a professional engineering environment. We continue to have more demand for our co-op students than we can fulfill. From Summer 2017 through Summer 2018, 185 undergraduate students and 12 graduate students worked co-op terms. Our top 14 co-op employers are shown below.

GE Aviaiton	Midmark
Emerson	UDRI
DRT Holdings, Inc.	Johnson Electric
GE Appliances, a Haier Co.	Parker Hannifin Corp.
Silfex Inc.	Crane Pumps & Systems
Tenneco	Freudenberg NOK
Johnson & Johnson	Honda

Flyer First Destination 2015-2016

The success rate for recent graduates is 96%; six months after graduation, 76% of our undergraduate students had full time jobs and 19% went to graduate school.



Teaching Innovation

- Juniors in Jun-Ki Choi's revised MEE 344 Manufacturing class designed, manufactured and raced toy cars using both metal-machined and additive-manufactured parts.
- Sophomores in Tim Reissman's new MEE 298 Mechatronics class learned circuits, sensors and controls by building autonomous "Sumo Bots," which competed against each other.
- Seniors in Kevin Hallinan's MEE 460 Engineering Analysis class learned data analytics to predict book orders for next year based only upon book information and enrollment demographics by helping Kids Read Now, a non-profit that delivers books to kids for free. Kids Read Now is ecstatic about the results.

- Eleven MEE students in Drew Murray's January 2018 intersession class at the University of Dayton China Institute in Suzhou, China, learned "Making (& Moving) Machines in MATLAB."
- Seniors in Dave Perkins MEE 432L Capstone Design course made the first steps to form a start-up company by developing an electric bike. The project was student initiated and may lead to a start-up company — a model we would like to grow.




Alumni Achievement

Sue Gilbert, Principal Engineer at GE Aviation won a GE Technical Mentoring Award. Mary Susan Stander (now Gilbert) graduated from UD in 1977 with a degree in mechanical engineering. The Technical Mentoring Award recognizes individuals who provide outstanding technical guidance and coaching to individuals or teams with less experience or expertise. Sue is the leading fracture mechanics expert for GE Aviation, with 39 years of experience in the business. She has mentored countless engineers and future engineering senior leaders, and always does so with a positive attitude and unyielding patience.

Faculty and Staff

Faculty and Staff Listing

The Department has grown to 23 full-time faculty members and four staff members. We plan to add three assistant professors in fall 2019.

	Full-Time Faculty	Position	Expertise
1	Lowe, Robert	Assistant Professor	Engineering mechanics
2	Reissman, Tim	Assistant Professor	Controls and biomechanics
3	Reissman, Megan	Visiting Professor	Biomechanics
4	Gunasekaran, Sidaard	Assistant Professor	Aerospace
5	Chiasson, Andrew	Assistant Professor	Biomechanics
6	Kinney, Allison	Assistant Professor	Biomechanics
7	Heyne, Josh	Assistant Professor	Combustion
8	Perkins, Dave	Lecturer	Mechanical systems
9	Choi, Jun-ki	Associate Professor	Design for envrionment
10	Henrick, Andrew	Lecturer	Thermal/fluids
11	Rumpfkeil, Markus P.	Associate Professor	Computational fluid dynamics
12	Bigelow, Kimberly E.	Associate Professor	Biomechanics
13	Altman, Aaron	Professor	Aerospace
14	Pinnell, Margaret F.	Associate Professor	Materials
15	Murray, Andrew P.	Professor	Mechanical systems
16	Kissock, Kelly	Professor and Chair	Energy
17	Kashani, Ahmad R.	Professor	Dynamic systems and controls
18	Ervin, Jamie S.	Professor	Thermal/fluids
19	Myszka, Dave.	Associate Professor	Mechanical systems
20	Hallinan, Kevin P.	Professor	Energy
21	Petrykowski, John C.	Associate Professor	Thermal/fluids
22	Jain, Vinod K.	Professor	Mechanical systems
23	Fehrman-Cory, Emily	Prof of Practice	Makers space, design
	Staff	**Position**	
1	Eric Grimm	Lab Manager	
2	Lindsey Temple	Administrative Assistant	
3	Sherri Alexander	Administrative Assistant	
4	Larry Collins	Flight Simulation Tech	

Faculty Achievement

- Markus Rumpfkeil presented the plenary talk on “CFD in Undergraduate Engineering Courses” at the CFD Society of Canada (CFDSC) Annual Conference at the University of Windsor on June 20, 2017.
- Jun-Ki Choi received the 2017 School of Engineering Vision Award for Innovation. The Vision Award for Innovation recognizes faculty and staff whom have made significant contributions to the education of our students through innovative (unique, high-risk, interdisciplinary, etc) teaching strategies, providing unique experiential learning experiences for students, record of continued demonstrated success in the classroom or engagement in the scholarship of teaching and learning. Choi was nominated for this award because of his integration of innovative teaching techniques, particularly in the Design for Environment Course. The award will be presented during the fall School of Engineering Faculty and Staff meeting on August 16.
- Megan Reissman, Tim Reissman and Allison Kinney organized two “Go Baby Go” events with Dayton Children's Hospital to modify toy cars with push-button controls, headrests and more for toddlers with mobility challenges. The April 21, 2018, event at United Rehabilitation Services engaged 40 UD students and 4 MEE faculty to modify 12 cars to fit individual children’s needs.
- Jun-Ki Choi worked as a visiting professor at Korea Advanced Institute of Science and Technology (KAIST) during Summer 2017. KAIST is the #1 STEM research university in South Korea. He taught "Climate Change and Green Business" to 17 students in the graduate school of Green Growth at the KAIST College of Business."

- Kelly Kissock gave a series of invited lectures on energy efficiency at Dalian University of Technology in Dalian, China, and was appointed for a three-year term as Visiting Professor.
- Markus Rumpfkeil was elected as Associate Fellow to the American Institute of Aeronautics and Astronautics. AIAA Associate Fellows are individuals of distinction who have made notable and valuable contributions to the arts, sciences or technology of aeronautics or astronautics.
- Sid Gunasekaran's teaching was featured in an article in the *KEENzine* magazine called "Getting Entrepreneurial Minded Learning Off the Ground."
- Kim Bigelow was appointed as an Adjunct Associate Professor at the University of Nebraska at Omaha.
- Jun-Ki Choi was promoted to Associate Professor with tenure.
- Drew Murray presented invited lectures entitled "Designing with Many (& Sometimes Too Many) Links" on January 15, 2018, at Southeast University, Nanjing, China, and January 17, 2018, at Changzhou University, Changzhou, China.
- Pi Tau Sigma selected Tim Reissman as the 2018 MEE Professor of the Year.
- Bob Lowe was a 2018 UD/UDRI Research Fellowship Program awardee conducting research on "Modeling and Simulation of Composite Properties Under High Strain Rates."
- Markus Rumpfkeil was a 2018 UD/UDRI Research Fellowship Program awardee conducting research on "Computational Optimization of Combustors for Turbine Engines."
- Kelly Kissock and his students won a U.S. Department of Energy 2017 Excellence in Applied Engineering Research Award conducting research on energy-efficient cooling tower control.

Faculty and Staff Additions

Dr. Emily Fehrman-Cory joined the department as Faculty of Practice in Innovation and Entrepreneurship. Dr. Cory received her Ph.D. in Electro-Optics from the University of Dayton in 2014. Since then, she was Chief Technology Officer of America Makes, the National Additive Manufacturing Institute and founded the Air Force Research Laboratory's first makerspace. Dr. Cory is also co-founder of the Dayton Maker Faire and Make It Dayton. She sits on the Mayor of Dayton's Manufacturing Task Force and is the founder of the Southwest OhioMakerspace Alliance. She teaches our seminars and capstone design courses and develops and integrates entrepreneurial engineering activities across the School of Engineering.

In July 2018, Dr. Jamie Ervin was named Associate Department Chair. Dr. Ervin will assume the Department Chair position in July 2019. Professor Ervin joined our department in 1991 after receiving his Ph.D. from the University of Michigan. He held the Hans Von Ohain Endowed Chair in Mechanical & Aerospace Engineering from 2014-2017, and was Group Leader for the Modeling & Simulation, Energy and Environmental Engineering Division at the University of Dayton Research Institute from 2003 to 2018.

Faculty Scholarship

The faculty published 23 archival journal articles and 38 peer-reviewed conference articles. This equates to an average of 3.1 and a median of 2.0 peer-reviewed publications per tenure-track faculty member. They delivered 6 invited lectures. Six faculty serve as Associate Editors of major journals. FY 2017 faculty research expenditures were $1,268,835. Average research expenditures per tenure-track faculty member were $63,442 and median expenditures were $56,959. Research sponsors include:

American Society of Biomechanics	Kettering Health Network
Chrysler Corporation	Melink Corporation
City Of Dayton	National Science Foundation
Dayton Area Graduate Studies Institute	Oak Ridge Institute for S & E
Dayton Power and Light	Sandia National Laboratories
Emerson Climate Technologies	State of Ohio Dept of Development
Entriq Solutions LLC	Tailoring DOE Modeling Tools
Evenflo Company	United Technologies Corp
Flairsoft LTD LLC	University Of Tennessee
General Motors	U.S. Department of Energy
Goodwill Easter Seals	U.S. Department Of Energy
Ideation Techniques	U.S. Environmental Protection
Initial Transient Simulation	U.S. Federal Aviation Administration
Innovative Scientific Solutions	Vectren Energy Delivery
Kern Family Foundation	VEGA Americas Inc