The systems that Dr. Khasawneh studies include Lattice structures like the ones shown in the picture. These structures are desirable in many applications due to their high strength to weight ratio. When embedded with resonators and excited over a range of frequencies, these structures show a unique ability to attenuate vibration over a large frequency range. Dr. Khasawneh is interested in understanding the response of these structures using novel predictive models as well as tools from Topological Data Analysis (TDA). Read more about his research on page 8.
The Ethics of Studying
by Professor Ron Averill,
ME Associate Chair

Is it possible for studying to be unethical? The answer depends on your intent. If your goal is to fully understand key concepts and to master problem-solving techniques, for example, then your intent is most certainly ethical. Keep up the great work. But there are times when this is not the case.

Based on discussions with hundreds of students, it is clear that the goal of many students is to “maximize partial credit.” This often looks like:

1. Memorize problems from the homework, in-class examples, or previous exams.
2. Match each problem on the exam to one of the memorized problems that most closely resembles it.
3. Write down the memorized solution, making adjustments along the way so that the solution looks more relevant to the exam problem.
4. Hope for lots of partial credit.

Despite sometimes being effective at “getting through” some types of classes, this strategy has almost no value in terms of creating knowledgeable and capable engineers.

Engineering requires an ability to apply key concepts to a variety of problems that have not been seen before (or memorized). So, the approach of maximizing partial credit is counter to the goals of an engineering education.

Back to the question of ethics. Let’s consider a few key statements in the National Society of Professional Engineers (NSPE) Code of Ethics for Engineers. Under the heading II. Rules of Practice, the code states:

5. Engineers shall avoid deceptive acts.
   a. Engineers shall not falsify their qualifications or permit misrepresentation of their or their associates’ qualifications …

Further, under the heading III. Professional Obligations, the code says:

1. Engineers shall be guided in all their relations by the highest standards of honesty and integrity.
   a. Engineers shall acknowledge their errors and shall not distort or alter the facts.

Does trying to maximize partial credit mean that students are dishonest, or that they will not make ethical decisions as engineers? Well, I certainly don’t mean to suggest that students don’t know the difference between an academic exam and a true engineering assignment involving “protection of the public health, safety, and welfare.” But, ethical behavior is not easily turned on and off like a switch.

Developing a culture around a set of core values requires consistency. A culture of ethical behavior requires muscle memory that is developed over years of consistently making ethical decisions and observing the effects of those decisions.

Each decision, be it good or bad, reinforces future ones.

Practicing deception on an exam regarding one’s engineering competence cannot be considered “adherence to the highest principles of ethical conduct.” Practicing it for four years, even in an academic setting, certainly does not build the right kind of muscle memory for acting ethically in the future. Neither does it build the skills and knowledge required to be a competent engineer.

There is a big difference between getting the wrong answer on an exam problem and trying to make an instructor believe you know how to solve a problem when you don’t. The former is an expected and necessary part of the learning process. The latter is unethical behavior, especially for an aspiring engineer.

References
https://www.nspe.org/resources/ethics/code-ethics

Send all correspondence to:
Gaile Griffore, Newsletter Editor
Dept. of Mechanical Engineering
Michigan State University
2560 Engineering Building
East Lansing, MI 48824-1226
(Telephone: 517-355-3338)
(E-mail: ggriffore@egr.msu.edu)
Curriculum News

Co-op Students: BEFORE you leave for your Summer or Fall 2019 co-op rotation, please be sure to discuss your schedule for next Fall 2019/Spring 2020 with your academic advisor.

ME 222–Mechanics of Deformable Solids (3 credits): The Fall and Spring schedules will be changed for this course before March 29 when enrollment begins for next fall and spring. Watch the Schedule of Courses for the new days and times:

- Fall 2019
  - Section 001: Monday/Wednesday at 12:40-1:30 plus Thursday at 10:20-12:10.
  - Section 002: Monday/Wednesday at 3:00-3:50 plus Thursday at 10:20-12:10.
- Spring 2020
  - Section 001: Monday/Wednesday at 11:30-12:20 plus Thursday at 10:20-12:10.
  - Section 002: Monday/Wednesday at 4:10-5:00 plus Thursday at 10:20-12:10.

ME 370–Heat Transfer (3 credits) has had a prerequisite change effective Fall 2019. The new prerequisites are: (ME 222), (ME 300 or concurrently), (ME 391 or concurrently) and completion of the Tier 1 Writing Requirement.

ME 399/101–Fundamentals of GD&T (3 credits) will be offered during the first summer session. It is an Other Elective. Find more info on page 4.

ME 410–Heat Transfer (3 credits) will be offered both on campus and online this summer. The on-campus version is a First Session course, and the online version is a Full Session course.

ME 451–Control Systems requires department approval before you can enroll. If you have an accurate long-term schedule on file in the ME Advising Office, request approval by submitting the ME 451 Approval Form: https://me.msu.edu/me-451-enrollment-approval-form. If you do not have an accurate long-term schedule on file, schedule an appointment with Gaile by calling 517-355-5163 or stopping by C108 WIL.

ME 456–Mechatronic System Design (3 credits) will be offered next spring. It is a design-intensive senior elective. Find more info on page 4.

Mechanical Engineering Launches Online Master’s Degree Program

The Michigan State University College of Engineering has launched its first online master’s degree program to help graduate students in mechanical and electrical engineering advance their technical knowledge without needing to come to East Lansing. Registration is now open for the two programs that begin when MSU opens its 2019-20 academic year on Aug. 28, 2019. The new online delivery platform was designed and reviewed by a multidisciplinary group of faculty members and online learning experts.

The Department of Mechanical Engineering at Michigan State University has a strong commitment to life-long learning for working professionals, and the new online advanced degree in mechanical engineering leverages the college’s extensive research programs and industry connections in Michigan and the Midwest. Online students will be able to access our core disciplines, including solid and fluid mechanics, energy, dynamics and control, robotics, advanced manufacturing, design, heat and mass transfer, and biomechanics. The two initial tracks in mechanical engineering are: 1) thermal fluids science and engineering and 2) mechanics, dynamics, and manufacturing.

Online students will receive the full support of a faculty advisor so they can tailor their education to their interests. The new online master’s degree program will provide a platform to access MSU’s elite graduate education from anywhere at any time.

For more information on MSU’s online master of mechanical engineering, visit: https://online.egr.msu.edu/online-masters-me/

ME 481–ME Design Projects requires department approval before you can enroll. If you have an accurate long-term schedule on file in the ME Advising Office, request approval by submitting the ME 481 Approval Form: https://me.msu.edu/me481-approval-form. If you do not have an accurate long-term schedule on file, schedule an appointment with Gaile by calling 517-355-3338 or stopping by 2560 EB.

Concentration Changes: The Aerospace and Energy concentrations have been changed slightly to provide more flexibility. You can view the new versions by going to: https://me.msu.edu/concentrations

Class Standing: ME juniors and seniors can obtain this information in 2560 EB. Sophomores should go to W-8 Wilson. Be prepared to show your MSU I.D.

Job Search Advice: The Center is available to answer questions about your job search. To ask a question or schedule an appointment, go to C108 WIL or call 517-355-5163. Or, you can email the office at: careers@egr.msu.edu

Prerequisites: The ME department expects all students, including members of the Honors College, to observe all course prerequisite requirements. If you have a question about prerequisites, contact the ME Advising Office.

Mechanical Engineering Launches Online Master’s Degree Program
Cryogenic Engineering Courses for Next Year
by Dr. Peter Knudsen

Cryogenic system applications are found in aerospace, industrial gas and energy processes, and particle physics experimental facilities. This includes space vehicle propulsion systems, space simulation facilities, air separation plants, LNG systems, and helium cryogenic systems for particle accelerators.

In conjunction with the MSU-FRIB Cryogenic Initiative, the Department of Mechanical Engineering is offering ME 414—Mechanical Design of Cryogenic Systems Fall 2019. The prerequisite is ME 470 or concurrently. The course introduces the engineering mechanical design of cryogenic refrigeration systems, and includes topics on the design, analysis and introduction to ASME codes pertaining, piping systems/components, vacuum insulated transfer-lines, cold boxes, and super-conducting magnet cooling. This is a design-intensive course, intended to provide students a basic foundation for the mechanical design of these systems, in which material properties vary considerably.

ME 413—Cryogenic Thermal Systems will be offered Spring 2020. The prerequisite is ME 410 or concurrently. This course is an introduction to the thermal and fluid aspects of cryogenic systems, including low temperature properties of materials and fluids, an introduction to cryogenic liquefaction and refrigeration cycles, separation and purification systems, instrument systems for low temperature measurement, fluid storage and distribution, and vacuum technology.

ME 456 – Mechatronic System Design
Spring 2020

Learning Objective: Understand the entire process of developing mechatronic system, including system modeling, PID control, control implementation to the Arduino platform using Simulink, and experimental validation; understand the principles of commonly-used mechatronic system hardware, including gyro and accelerometer sensors, DC motor actuators, micro-controllers, etc.; develop basic Simulink programs for Arduino compatible hardware; analyze system output performance and tune PID controller to satisfy certain output performance in simulations and experiments.

Lab mechatronic system: An Arduino-based Mini Segway robotics figure) will be provided to each student who may use his/her own laptop (with installed Matlab/Simulink and Arduino library developed by MSU) to interface with the Mini Segway through Wi-Fi network. Students will program the Arduino microcontroller in Simulink (taught in class) and compile the Simulink-based software into Arduino automatically. Please use this link (https://youtu.be/fa6hp2grxrk) for a Mini Segway demo.

IAH/ISS Diversity Requirement

Each IAH and ISS course emphasizes a form of diversity: national diversity (designated “N” at the end of the course title), international and multicultural diversity (designated “I” at the end of the course title), or both (designated “D” at the end of the course title). Students must include at least one “N” course and one “I” course in their Integrative Studies programs. A “D” course may meet either an “N” or an “I” requirement, but not both.
Dr. Robert Hubbard passed away on February 5 at age 75 from complications of Parkinson’s Disease. Dr. Hubbard received his Ph.D. from the University of Illinois in 1970. During the 1970s he worked for General Motors, studying crash-related injuries and developing early crash-test dummy technology. He joined the MSU faculty in 1977 where he conducted research and taught courses, including ME 497, in the areas of biomechanics and biomechanical product design. He retired in 2006 after 29 years at MSU. Dr. Hubbard invented the life-saving Head And Neck Support (HANS) device that revolutionized motorsports safety and has been called the most important safety advance since the seatbelt. He developed the HANS in the 1980s in collaboration with brother-in-law Jim Downing. Countless racers around the world avoid injury or worse by using this device. The HANS and related artifacts will be installed in the Smithsonian Museum in 2021. Honoring his pioneering work in racing safety, Bob received the inaugural (2016) SAE John Melvin Motorsport Safety Award and many other accolades.

Dr. Brian Thompson has retired after 36 years on the faculty. Dr. Thompson received his B.Sc. and M.Sc. in mechanical engineering from the University of Newcastle upon Tyne, England and his Ph.D. in mechanical engineering from the University of Dundee, Scotland. He arrived at MSU in 1982 after serving 4 years on the faculty at Wayne State University. Prior to his academic career he was a senior design engineer at British Aerospace. Dr. Thompson’s accomplishments are in the areas of International Humanitarian Engineering, high speed machinery, composite materials, smart materials, and design methodologies. For his work and academic activities, he was honored with a both a Withrow Exceptional Service Award (2006) and a Withrow Award for Teaching (2013), the Michigan Campus Compact Faculty/Staff Service-Learning Award (2006), the Engineering Outreach Award (1999), the South Pointing Chariot Award (1993), and the Applied Mechanisms and Robotics Conference Award (1993). He was also an MSU Outreach and Engagement Senior Fellow (2005). In retirement from MSU Brian and his wife, Anne, hope “to cling tenaciously to their health so that they can contribute to the public good in the USA and also Kenya. Indeed, to be; or not to be...."

Dr. Michele Grimm has joined the ME department as an associate professor, and she will serve as the Wielenga Creative Engineering Endowed Professor. Dr. Grimm received her Ph.D. from the University of Pennsylvania in 1995. She has been a faculty member in Wayne State University’s Department of Biomedical Engineering since 2002, but most recently she has served as program director for the National Science Foundations’s Engineering of Biomedical Systems Program and Disabilities & Rehabilitation Engineering Program. A significant portion of Dr. Grimm’s research has involved injury biomechanics focused on the biomechanics of neonatal brachial plexus injuries. She has worked with obstetricians to develop computer models of a process for which patient-based clinical studies are not appropriate. The work has provided an understanding of the pathomechanics of this injury, supporting the results that have been found through epidemiological and case study-based research. She recently served on the American College of Obstetricians and Gynecologists Task Force on Neonatal Brachial Plexus Palsy, which was charged with compiling the current state of evidence in the area of NBPP (with a focus on the cause of the injury) and identifying key gaps in knowledge in the area. Dr. Grimm enjoys traveling with her husband and adult children. She has been involved with auto racing, both technical inspection and timing & scoring, since she was a child and worked her first Formula 1 race — the Detroit Grand Prix - at the age of 14.

Dr. Joerg Petrasch has joined the ME department as an associate professor. Dr. Petrasch received his Ph.D. from ETH Zurich, Switzerland in 2007. He has worked as a project engineering for Poyry Infra AG in Zurich, and he has been a faculty member at the University Florida and Vorarlberg University of Applied Science in Austria. His research interests are: chemical storage of renewable energy, tomography-based numerical and experimental methods for energy applications, micro-structured functional materials for energy applications as well as demand side management, control, and short-term buffering of sustainably generated energy. He loves spending time with his wife and kids, reading, skiing, running, and fencing. Currently, however, most of his exercise comes from running after his one year old daughter.
Department of Mechanical Engineering

Shoppin’ with the Ladies by Dr. Tamara Reid Bush

Vice President of the Society of Women Engineers, Lindsay Fricano, and Mechanical Engineering (ME) Associate Professor Tamara Reid Bush hosted a workshop for women engineers in the Manufacturing Teaching Lab, also known as the machine shop. The primary goal of the event was for women to learn how to use the machinery and to become familiar with the shop environment prior to beginning their design classes.

The event included shop safety training as well as hands-on work with the drill press, band saw, lathe and mill. Each piece of machinery was taught by a senior level mechanical engineer. Four stations were formed so that attendees received exposure to the most commonly used machinery in the shop with small groups of women at each station. Over 20 women attended the event which received excellent feedback.

A big thanks to Rick Castaneda, Brianna Forsthoeefel, Ruiwei Sui and Jack Michalski - all helped with safety and machine training!!

PHOTOS ON THIS PAGE PROVIDED BY DR. REID BUSH
**RWTH – Aachen Program**

by Dr. Brian Feeny, Program Director

MSU ME students with a 3.0 GPA or higher have the extraordinary opportunity to spend a summer in Germany.

Participants in the MSU-RWTH Aachen exchange program will earn 9 credits via a 5-credit independent study plus a 4-credit German class, and travel in Europe on 3-day weekends. The program runs from mid May to late July. The experience involves interaction with fellow engineering students from around the world at RWTH-Aachen, a premier European technical university. Significant scholarships through the North American Rockwell Endowment can help defer the cost.

Project topics are in the areas of automotive engineering, plastics, advanced and composite materials, textiles, manufacturing technology and automation, bio and chemical processing, wind energy, and aerodynamics. The program enjoys a cooperation with RWTH’s Undergraduate Research Opportunities Program, through which students will have access to tours, trips, and workshops.

Aachen is a blend of an old, historic European city and a modern college town. A well-maintained bike path allows easy intimate access to the nearby small towns, forests and farmlands. An outstanding rail system provides our students easy access to Munich, Paris, Amsterdam, Zurich, Rome, the Alps, the Mediterranean, and many more cultural and natural destinations on their 3-day weekends.

To find out more, please contact me at feeny@egr.msu.edu or 353-9451. This is truly a great opportunity — don’t miss it!

**ME Students Honored at “Networking With Executives Event” on Feb 20!**

**Outstanding Diversity Programs Award:**

Sterling White (ME Senior).

**Frank J. Hatfield “Build it Better” Award:**

Erin Mettler (ME Senior).

**High Achieving Student Recognition:**

Studying Signals of Dynamical Systems Using Topological Data Analysis

by Dr. Firas Khasawneh

Dynamical systems is a term broadly used to describe processes whose state changes in time. Sometimes it is possible to derive a model, i.e., a set of equations that can capture to some degree the evolution rule of these systems. The hope is that these models will be simple enough but will still faithfully reproduce the important phenomena observed in the physical system. It can be surprising to find that certain modeling decisions that utilize atypical mathematical operators can actually yield more tractable models.

For example, consider the simple, but not easy, act of balancing a stick on the palm of your hand. One approach to modeling this balancing act is to delve into the governing equations for the propagation of electric signals in the brain, through the spinal cord and onto the muscles, and couple that with the mechanical movement of the stick and the visual sensory signals from the eyes. Clearly even if this approach is successful, it will yield extremely complicated equations that are difficult to interpret. On the other hand, if we acknowledge that the mechanical movement of the stick is affected by delays due to the time it takes between observing the stick position and the hand movement, we can greatly simplify the model by incorporating delay terms such as x(t-tau), where tau is the delay. These terms basically establish the dependence of the system’s response to its past history without exactly describing the physics of this dependence.

Similar delay models are used widely in science and engineering, including modeling of the muscle tremors in Parkinson’s disease, communication/processing delays in control systems, and human balance. Therefore, there is a need for understanding how to analyze these models, and more generally, how to analyze systems with complicated dynamics from their signals even if there are no available models for their evolution.

Motivated by the usefulness of time-delay models, part of Dr. Khasawneh’s work focuses on studying the effect of varying the delay value or the other model parameters on the stability of the system with applications to the modeling and analysis of metal cutting processes. During discrete manufacturing operations, such as turning or milling, machinists have observed the occurrence of large amplitude, detrimental oscillations called chatter. Since chatter can lead to tool breakage or scrapped workpieces, predictive models are extremely valuable because they can help choose cutting parameters that will steer the machine away from chatter. These models often involve delay terms that capture the dependence of the cutting forces on the cutting marks left on the surface of the workpiece from previous cutting cycles. Dr. Khasawneh is interested in enhancing the models of machine tool chatter by incorporating random effects, and expanding these models to more complicated processes such as micro/nano-machining.

Models are very useful because they enable the prediction, optimization, and simulation of the system response. However the underlying processes, e.g., the collection of firing neurons in the brain, are often too complicated or too large to be captured by a set of mathematical equations. In this case, we often resort to using a variety of sensors to collect...
data that can reveal more information about possible patterns or shifts in the system behavior. The sensory data is called a time series and it is often a record of a measurable quantity such as position in time. In many cases, it is possible to utilize this record to build a high dimensional representation of the system’s dynamics via a process called embedding. The result of embedding is a structure that can provide insight into the system’s behavior without having a mathematical model for it. It turns out that the shape of this structure can convey important information about the underlying, model-free system.

For example, an embedding of a circular structure indicates the existence of repeatability in the data. However, there are two challenges with using the shape to extract useful information: 1) While humans are good at identifying hidden structure, the goal is to automate the process of information extraction especially when the size of the data is large and it is not desirable to use human power for data analysis. 2) Sometimes the resulting embedding cannot be visualized, i.e., it is in 4 or higher dimensions. Therefore, it is necessary to have a tool that can quantify the shape of the data, and summarize it in a human-readable way. Luckily, this tool is provided by a novel field with many mature tools: Topological Data Analysis (TDA).

Dr. Khasawneh’s research focuses on developing TDA-based tools for studying dynamical systems. Specifically, Fig. 2 shows a pipeline for studying signals of dynamical systems using a tool from TDA called the persistence diagram. This framework embeds the time series into possibly a high-dimensional point cloud, and then studies the shape of the resulting embedding using TDA. Dr. Khasawneh’s work also investigates developing machine learning tools using the topological summary provided by persistence diagrams, for example. Most existing machine learning tools utilize features extracted from a Euclidean space. The challenge in

Consider Your Creativity by Craig Gunn, Director of Communications

Sometimes when I sit down to put together ideas on communication and engineering, I wonder at what point in time people went off track and thought that ENGINEERING had only to do with math and science and technology. Before the mid 1700’s people who could be called engineers also painted as artists; wrote poetry; and were conversant in Greek, Italian, French, and a multitude of other languages. The term used to describe these engineers was Renaissance Man. Now some might be upset with the term Renaissance Man, but one has to be honest because it is history and that is what they were called. There was no right or wrong in the title. Today, we have grown in our outlooks on people, and we could easily and more rightly call these people who exist today Renaissance People.

Think of yourself quietly sitting in your residence hall, apartment, or house doodling on your pad as you ponder that difficult equation. Does your roommate really look that way? Think of yourself taking time out to write a poem to that favorite someone. Did you already do that on Valentine’s Day? Think of that short story, novel, or play that you wrote about apocalyptic Zombies foraging across the countryside looking for brains. Did you think that any of these creative activities were wrong because you ARE an engineer? When you take up a brush to do a quiet landscape or an abstract idea or your favorite pet, do you get a feeling that you are violating an engineer’s code only to concentrate on the Third Law of Thermodynamics or equilateral triangles. Do you get a cold shiver when you compose a song and the shiver comes not from the creation but because you actually think that it is WRONG to create?

Now is the time to become a true Renaissance Person. Let your mind spread itself over all the things that you do; all the things that you think, say, and do. Let those creative juices flow from the words you write to the canvases you paint to the fantastic reports you create in all of your technical subjects. Creativity is not about a particular subject or another. It is about the much broader and deeper aspects of your own being. If you haven’t opened the door to your own creativity, it is simply waiting for you to turn the knob.

"Creativity is not about a particular subject ... It is about the much broader and deeper aspects of your own being"

utilizing these tools with TDA is that the resulting topological features live in a non-Euclidean space; therefore, there is a need for transforming these features in a meaningful way into a suitable input for machine learning. Dr. Khasawneh’s work has shown that utilizing topological features for identifying chatter in vibration signals often provides a higher rate of success than existing methods. However, there is a lot of work that needs to be done before TDA features are a standard toolbox in the leading machine learning packages.
Dean’s List

Congratulations to those 537 ME majors who made the Dean’s List after Fall 2018. To be on the Dean’s List, you must have a semester GPA of 3.5 or better. This list is from January 23. For updates, go to: https://reg.msu.edu/ROIInfo/GradHonorDeansList.aspx

157 Seniors to Graduate in May and August!

Congratulations and best wishes to all ME graduates! On behalf of the faculty, I wish you the greatest happiness and success in your careers, graduate studies, and personal lives. The following students had applied for graduation by March 2. If your name is missing, please contact me immediately at griffore@egr.msu.edu (Tele: 517-355-3338).—Gaile

May Graduates

Alec Douglas Adgate
Shariq Ameer
Anthony Melvin Anason
Benjamin Charles Anklion
Jamal Nicholas Marquise Ardister
Mimi Boatemaa Asante
Alexandra Joan Austin
Andrew Dean Barnett
Jenna Marie Beauregard
Jacob Michael Bloom
Ryan Parker Bohr
Niklas Jens Boisten
Ryan Mitchell Bousfield
Stephen Arlyn Branch
James Stinson Breen
John Andrew Brinkley
Ryan Alan Britain
Zachary Craig Brokaw
Xingyu Cai
Connor Campbell
Andrew Gene Capaldi
Trevor Daniel Chamberlain
Lauren Elizabeth Chance
Jillian Leigh Chandler
Sydney Michelle Clark
Sarah Marie Daugherty
Rosalie Marian Deliz
Jessica Lynne Derkacz
Qianhui Dong
Changyi Dong
Analeeza Michele Dubay
Caitlyn Nicole Dubie
Carly Nicole Dugan
Caitlynn Nicole Dubie
Qianhui Dong
Hang Zhao
Hansheng Zhang
Gary V Zakarian
Chenxi Yin
Zachary Alexander Wurtz
Ross Steven Wolniakowski
Jay Patrick Wideman
Xiaohang Wei
Robert Wei Jr
Sarah Margaret Wegert
Robert Wei Jr
Xiaohang Wei
Jay Patrick Wideman
Ross Steven Wolniakowski
Zachary Alexander Wurtz
Chenxi Yin
Gary V Zakarian
Ross Steven Zalewski
Hansheng Zhang
Hang Zhao

August Graduates

Brooks Robert Reno
Joseph Elmer Ritter
Vincent Angelo Rogers
Derek John Roggenbuck
Paul Scott Schultman
Kai Hannah Selwa
Nicole Michelle Shaffer
Austen Yo-Suo Shiu
Jordan Thomas Sosnoski
Frank Paul Spica
Jared McCoy Steen
Taylor Marie Stensen
Jordan David Thayer
Branton J Toback
Nicholas William Tottis
Theodore Matthew Urdea
Brian Patrick Valentine
Ethan L Vassallo
Marc Middleton Veihl
Johnathan Michael Vetter
Julia Denise Waelchi
Travis Rocket Wahl
Brock Alexander Walquist
John Connor Walters
Philip J Wando
Xiaoe Wang
Shenyu Wang
Bryan Gregory Warholak
Sarah Margaret Wegert
Robert Wei Jr
Xiaohang Wei
Jared McCoy Steen
Robert Wei Jr
Xiaohang Wei
Jay Patrick Wideman
Ross Steven Wolniakowski
Zachary Alexander Wurtz
Chenxi Yin
Gary V Zakarian
Ross Steven Zalewski
Hansheng Zhang
Hang Zhao

Academic Advising

1) ME Juniors and Seniors are advised by Gaile Griffore. For an appointment, call 517-355-3338, or go to 2560 EB.

2) ME Sophomores with a 3.1 or higher GPA who will be juniors at the end of this semester are advised by Jeffrey Tsang. Schedule an appointment online during fall and spring semesters: https://msu.campus.eab.com.

3) ME Sophomores who do not fit the criteria in number 2 above are advised by Jeffrey Tsang. Schedule an appointment online during fall and spring semesters: https://msu.campus.eab.com/me-learning-center [Click on scheduled hours]

4) ME Freshmen are advised in W-8 Wilson Hall on a walk-in basis only.

Tutoring

• The ME Learning Center, located in 1237 EB, has mentors for ME 201, 202, and 203. The hours for Spring 2019 can be found here: https://me.msu.edu/me-learning-center [Click on scheduled hours]

• The Guided Learning Center (GLC), located in 1108 EB, offers freedrop in tutoring for MTH 234 and 235 and many core engineering courses. To request assistance, go to: https://www.egr.msu.edu/dpo/academics/guided-learning-center

• The Cornerstone & Residential Experience (CoRe) program provides tutoring in courses required for admission to the College of Engineering. Their “drop-in” hours are Sunday through Thursday from 6 - 10 pm in G24-Wonders Hall.

• ME graduate student can be contacted through the ME Advising Office. These tutors charge a fee, which you can negotiate with them. Email Gaile Griffore at griffore@egr.msu.edu.
Baja SAE

The MSU Baja Racing Team is an official SAE Collegiate Design Team which designs, builds and competes with an off-road Baja buggy each year. The team, which is student led, provides a unique opportunity for engineers to develop crucial hands on designing and manufacturing experience preferred by many companies, as well as leadership opportunities. The team has been hard at work this year and will soon be unveiling our car for this year. Starting in the fall, students have learned how to use NX and FEA on a real world application and consider the manufacturing methods to make each part. After that, students are taught how to operate the machines in our shop to make their parts and how to interact with companies to order parts. The Baja team is a great opportunity for developing skills learned in the classroom and for building a professional network. Contact us at baja@msu.edu. Submitted by Zac Brei, Project Manager

Spartan Aerosystems

Spartan Aerosystems has three active clubs: MSU Rocketry, Unmanned Systems, and AIAA.

MSU Rocketry is continuing work on their first ever hybrid rocket propulsion system and is set to begin testing by late March to early April. Over the summer they are set to compete in the Space Port America Cup in Las Cruces, New Mexico against hundreds of other college teams from across the world. Last year, MSU Rocketry placed 12th overall at the same competition.

MSU’s Unmanned Systems Team is working on a hybrid fixed-wing quadcopter design for this year’s Student Unmanned Aerial Systems Competition at the Patuxent River Naval Air Station in Maryland.

Their CSE sub-team has been hard at work writing image recognition code to enable the drone to autonomously navigate a lengthy course. In the mean time, mechanical sub-team has been engineering a small wheeled vehicle and parachute system that must drop from the drone and itself navigate a ground course.

In addition to these activities AIAA is also in the process of having Rob Weiss, a former Lockheed Martin engineer, give a presentation on his former experiences in the aerospace industry. Submitted by Anthony Anason, AIAA President.
American Society of Mechanical Engineers

The American Society of Mechanical Engineers is an organization that enables collaboration, knowledge sharing, career enrichment, and skills development across all engineering disciplines, specifically geared toward mechanical engineers.

ASME here at MSU gives mechanical engineers the opportunity to connect with each other and get involved. Each semester we host student design competitions, such as junkyard wars or a 3D printing competition. We also, volunteer at community schools to help young people get interested in engineering, and host corporate information sessions for our members to learn more about industry and connect with employers. ASME is a great way for mechanical engineers to build their resumes and make an impact on the community.

We are hosting a festival called E-Fest North April 5th-7th and we are going to need a lot of volunteers. Please visit our website or Facebook to learn more about the event and how to get involved. Submitted by Matthew Good, Publicity Chair.

SAE Formula

SAE Formula is a collegiate design series where students design, build, and race a small formula styled racecar. State Racing is coming off one of our best seasons yet with the SR-18! Some of our highlights include: 4th place, out of 120 teams, in the autocross event at Michigan International Speedway, 2nd place in the Design and Endurance events at the competition in Lincoln, Nebraska along with our best finish in team history at a sanctioned FSAE event of 2nd place overall, out of 80 teams.

With the design phase completed, the team is now wrapping up our manufacturing phase. The team is looking forward to testing soon to get ready for our first of two competitions this year. The first will be at Michigan International Speedway (May 8th-11th), and the second at Lincoln Airpark (June 19th-22nd). Both competitions are FREE admissions! We’re looking to unveil the SR-19 in April (TBD). To stay connected and get updates from the team, follow us on social media @msuformularacing on Facebook and Instagram. Submitted by Christian Abbate, Chassis Member.
ME Senior Electives for 2019-2020

• The following ME Senior Elective list was accurate as of March 2, but it is subject to change. Important changes will be emailed to you with “ME Bulletin Update” on the subject line.
• Design Intensive courses have an asterisk (i) after the course number.
• Descriptions are provided for courses that are not in the catalog. All others can be found by going to https://reg.msu.edu/Courses/Search.aspx.
• The ME department cannot overfill a required course or section to solve a Senior Elective schedule conflict.
• Instructor assignments had not been finalized when the newsletter went to press. They will be posted later on the Schedule of Courses website.
• Course override instructions can be found in the shaded box on page 15.

SUMMER SEMESTER

ME 490 Independent Study. 1-4 credits. See Override Instruction #2 on page 15. You may reenroll for a maximum of 6 credits.
ME 465i Computer Aided Optimal Design. 3(3-0). Prereq: (ME 222 and ME 280) and (ME 370 or concurrently).
  Online Course.

FALL SEMESTER

ME 414i Mechanical Design of Cryogenic Systems. 3(3-0). Prereq: (ME 470 or concurrently).
ME 416i Computer Assisted Design of Thermal Systems. 3(4-0). Prereq: (ME 410 or concurrently).
ME 422 Introduction to Combustion. 3(3-0). Prereq: (ME 332 or concurrently).
ME 423 Intermediate Mechanics of Deformable Solids. 3(3-0). Prereq: (ME 222).
ME 425 Experimental Mechanics. 3(2-3). Prereq: (ME 222).
ME 440 Aerospace Propulsion. 3(3-0). Prereq: (ME 332).
ME 444 Automotive Engines. 3(3-0). Prereq: (ME 222).
ME 475i Computer Aided Design of Structures. 3(3-0). Prereq: (ME 370).
ME 477 Manufacturing Processes. 3(3-0). Prereq: (ME 222 and MSE 250).
ME 490 Independent Study. 1-4 credits. See Override Instruction #2 on page 15. You may reenroll for a maximum of 6 credits.
ME 494 Biomechanics and Heat Transfer. 3(3-0). Prereq: (ME 410 or concurrently). Biomedical Concentration Course.
CHE 472 Composite Materials Processing. 3(2-3). Prereq: (ME 332).
CHE 483 Brewing and Distilled Beverage Technology. See Override Instruction #6 on page 15. Class meeting on Mondays is scheduled in ANH 1279 and the hours arranged are located at MBI, 3815 Technology Blvd., Lansing, MI. Prereq: (Age 21 or higher) and (Senior standing) and (ME 410 or concurrently).
ECE 415 Computer Aided Manufacturing. 3(2-3). Prereq: (ME 451). See Override Instruction #3 on page 15.
MSE 425 Biomaterials & Biocompatibility. 3(3-0) Prereq: (MSE 250). Recommended Background: (PSL 250). Biomedical Concentration Course. For more info, see Override Instruction #4 on page 15.
MSE 476 Physical Metallurgy of Ferrous & Aluminum Alloys. 3(3-0). Prereq: (MSE 250). Recommended background: MSE 310. For more info, see Override Instruction #4 on page 15.
ME 812 Conductive Heat Transfer. 3(3-0). See Override Instruction #5 on page 15. Prereq: (ME 412 plus GPA of 3.5+).
ME 830 Fluid Mechanics I. 3(3-0). See Override Instruction #5 on page 15. Prereq: (ME 332 plus GPA of 3.5+).
ME 860 Theory of Vibrations. 3(3-0). See Override Instruction #5 on page 15. (Prereq: ME 461 plus GPA of 3.5+).
SPRING SEMESTER

ME 413 Cryogenic-Thermal Systems. 3(3-0). Prereq: (ME 410 or concurrently).
ME 417E Design of Alternative Energy Systems. 3(3-0). Prereq: (ME 410 or concurrently).
ME 426 Introduction to Composite Materials. 3(3-0). Prereq: (ME 222).
ME 433 Introduction to Computational Fluid Dynamics. 3(3-0). Prereq: (ME 410 or concurrently).
ME 441 Aerodynamics and Aircraft Performance. 3(3-0). Prereq: (ME 332).
ME 442E Turbomachinery. 3(3-0). Prereq: (ME 332).
ME 445E Automotive Powertrain Design. 3(3-0). Prereq: (ME 444).
ME 456E Mechatronic System Design. 3(2-3). Prereq: (ECE 345 or concurrently) and (ME 391 or concurrently).
ME 464 Intermediate Dynamics. 3(3-0). Prereq: (ME 361).
ME 465E Computer Aided Optimal Design. 3(2-3). Prereq: (ME 222 and 280) and (ME 370 or concurrently). Online Course.
ME 477 Manufacturing Processes. 3(3-0). Prereq: (ME 222 and MSE 250).
ME 478E Product Development. 3(3-0). Prereq: (ME 477).
ME 490 Independent Study. 1-4 credits. See Override Instruction #2 below. You may reenroll for a maximum of 6 credits.
ME 495 Tissue Mechanics. 3(3-0). Prereq: (ME 222). Biomedical Concentration Course.
ME 497E Biomechanical Design in Product Development. 3(3-0). Prereq: (ME 370 or concurrently). Biomedical Concentration Course.
BE 444 Biosensors for Medical Diagnostics. 3(3-0). Prereq: (BS 161) and (CEM 141 or 151) and (ECE 345). Biomedical Concentration Course.
CHE 483 Brewing and Distilled Beverage Technology. See Override Instruction #6 Below. Class meeting on Mondays is scheduled in ANH 1279 and the hours arranged are located at MBI, 3815 Technology Blvd., Lansing, MI. Prereq: (Age 21 or higher) and (Senior standing) and (ME 410 or concurrently).
ENE 422 Applied Hydraulics. 3(2-2). Prereqs: (ME 332).

Graduate Level Courses: Honors College members and/or students with 3.5+ GPAs might consider taking a graduate course as a senior elective. Before enrolling, several signatures, including that of the instructor, are required. Possible choices for Spring 2019 include ME 825, 861, and 872. See Override Instruction #5 below.

OVERRIDE INSTRUCTIONS

1) Submit the ME Override Request Form: [https://me.msu.edu/me-override-request](https://me.msu.edu/me-override-request)

2) ME 490—Independent Study Enrollment Procedure: Find a professor who is willing to supervise your independent study, and discuss your plans with him/her. Complete an ME 490/490H Enrollment Contract (independent study form), available in the ME Advising Office in 2560 EB. After you and your professor have completed and signed both sides, return the form to the ME Advising Office for the remaining signatures, override, and enrollment.

3) Six seats in ECE 415 have been allocated for MEs who are on record as Manufacturing Concentration students. To be “on record,” you must meet with Gaile to plan a long-term schedule. To request an override, email Gaile [griffore@egr.msu.edu](mailto:griffore@egr.msu.edu) and be sure to include your PID number with your request. NOTE: A prerequisite override will be given to students who will need to take ECE 415 & ME 451 concurrently.

4) ME majors do not need to have taken the Recommended Background courses, but you will probably need to do some additional background reading. Contact the instructor for more information.

5) Complete the Graduate Course Override form, available in the ME Advising Office in 2560 EB. This is a paper form.

6) CHE 483—To request an override, submit the CHE Override Request form: [https://www.egr.msu.edu/chems/override/index.php](https://www.egr.msu.edu/chems/override/index.php)
Spring Semester Calendar

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 11</td>
<td>Scheduled appointments begin for enrollment for Summer 2019. Your enrollment access date is posted in StuInfo.</td>
</tr>
<tr>
<td>April 26</td>
<td>Design Day in the EB. See you there!</td>
</tr>
<tr>
<td>April 29-May 3</td>
<td>Final Exams.</td>
</tr>
<tr>
<td>May 3</td>
<td>University Undergraduate Student Convocation—1:00 p.m. in Breslin.</td>
</tr>
<tr>
<td>May 5</td>
<td>College of Engineering Undergraduate Commencement Ceremony, 12:30 p.m. in Breslin. Lasts about 2 hours.</td>
</tr>
<tr>
<td>May 13-June 27</td>
<td>First Summer Session.</td>
</tr>
<tr>
<td>July 1-Aug 15</td>
<td>Second Summer Session.</td>
</tr>
<tr>
<td>May 13-Aug 15</td>
<td>Full Summer Session.</td>
</tr>
<tr>
<td>August 8</td>
<td>Initial Fall 2019 Minimum Tuition &amp; Fee payment due.</td>
</tr>
<tr>
<td>August 28</td>
<td>Fall Semester classes begin.</td>
</tr>
</tbody>
</table>

MSU is an affirmative action, equal opportunity employer. MSU is committed to achieving excellence through cultural diversity. The university actively encourages applications and/or nominations of women, persons of color, veterans and persons with disabilities.