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SR-20, the vehicle slated for competition this May, during its first test drove in Florida over a year ago. Read more about SAE Formula on page 3!
Curriculum News

Co-op Students: BEFORE you leave for your Summer or Fall 2021 co-op rotation, be sure to discuss your schedule for Fall 2021/ Spring 2022 with your academic advisor.

ME 280—Graphic Communications will be offered this summer as a full semester course.

ME 433—Intro to Computational Fluid Dynamics will be offered this summer as a second session course. ME 433 is a non-design senior elective.

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 517-355-3338.

ME 456—Mechatronic System Design will be offered next spring. ME 456 is a design intensive senior elective.

ME 465—Computer Aided Optimal Design will be offered this summer as a full session course. ME 465 is a design intensive senior elective.

ME 456 is a design intensive senior elective.

ME 477—Manufacturing Processes will be offered this summer as a first session course. ME 477 is a non-design senior elective.

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.

Class Standing: ME juniors and seniors can obtain this information by emailing Gaile (griffore@egr.msu.edu).

Job Search Advice: The Center is available to answer questions about your job search. To ask a question or schedule an appointment, go to https://www.careers.egr.msu.edu or email them at:

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.

Prerequisites: The ME department requires all students, INCLUDING MEMBERS OF THE HONORS COL- LEGE, to observe all course prerequisite requirements. If you have a question about prerequisites, contact the ME Advising Office.

Department News

Dr. James Klausner, ME chairperson has left MSU to assume the role of dean of the College of Engineering at United Arab Emirates (UAE) University. UAE University, in Al Ain, is that nation’s flagship university.

His new college offers seven bachelor’s degrees, Architectural Engineering, Chemical Engineering, Civil Engineering, Communication Engineering, Electrical Engineering, Mechanical Engineering, and Petroleum Engineering, all of which are recognized nationally by the Ministry of Higher Education and Scientific Research, and accredited by ABET. PhDs are offered in all of the engineering disciplines.

During Dr. Klausner’s tenure as chairperson, the ME department grew

ME Bulletin

The ME Bulletin is published twice a year (fall & spring) for sophomores, juniors, seniors, faculty, and staff of the Department of Mechanical Engineering. Photographs were taken by Craig Gunn unless noted otherwise.

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to its largest enrollment in the history of the college. According to Dr. Leo Kempel, dean of the College of Engineering, “Mechanical engineering students generally represent 25 percent of our 6,000 undergraduates. Faculty members have collaborated on an impressivooooee array of grants and have been recognized by leading awards that add national stature to the department and its talented mechanical engineers. Through his leadership and guidance, our Spartan Engineers are building a better world while also teaching the next generation to do likewise. On behalf of the faculty, staff, and students of the college and MSU, I would like to thank James for his dedicated and inspirational service.”

Dr. Tamara Reid Bush has been named interim chair of the ME department. She is an associate professor of mechanical engineering, an ASME Fellow, and currently the College of Engineering Faculty Excellence Advocate. Dr. Reid Bush’s mentoring, teaching and research have earned her national recognitions and been featured on the Big Ten Network. Dr. Reid Bush joins the college’s management team to guide the ME department in its continued growth during the time until a settled chairperson is appointed. She will work collaboratively with the Dean’s office and other departments in her new role.

“Tammy has been a valued member of our faculty in mechanical engineering since 2009. She has been recognized for her leadership in not only research, but also in efforts to enhance diversity and accessibility for our faculty and students,” said Dean Kempel.

In 2018, Dr. Reid Bush was awarded the “Inspirational Woman of the Year” honor by the MSU Center for Gender in the Global Context. Most recently, she received a 2020 Founders Award from the American Society of Biomechanics in recognition of her significant research contributions in the area of biomechanics. She is also viewed as a dedicated and inspiring teacher, and she has been selected twice by ME students to receive the Withrow Teaching Excellence Award.

RWTH – Aachen Program by Dr. Brian Feeny, Program Director

The MSU–RWTH Aachen Program is an extraordinary opportunity for juniors and seniors to spend a summer abroad in Germany. MSU ME students with a 3.0 GPA or higher eligible to apply.

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, giving students 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 connections to Munich, Paris, Amsterdam, Zurich, Rome, the Alps, the Mediterranean, and many more cultural and natural destinations on their 3-day weekends.

While the pandemic has disrupted the program for the summers of 2020 and 2021, we are hopeful that the program will return to normal in 2022. Plan ahead, and feel free to contact me at feeny@egr.msu.edu. This is truly a great opportunity—don’t miss it! A former participant, Jason, says, “the trip was the best experience of my life.”

As the spring semester rolls onward, the MSU Formula Racing Team slowly begins to ramp up manufacturing with the hopes of competing for a championship this May. With only two team leaders allowed to work in the engineering building’s machine shop under strict time constraints, it will prove to be very difficult, but if the world situation continues to improve, team members are determined to fight for a win at Michigan International Speedway this spring.

“Despite us having the least amount of shop access out of any university in the state, we believe that we have what it takes to do very well at competition this year after finishing up last year’s vehicle,” explains Nick Kopec, the team’s Chief Engineer. “We were able to test the vehicle early last spring, and it was certainly the fastest we’ve ever built. Additionally, the business team already did extremely well during the first part of virtual competition back in February, scoring in the top ten of 140+ universities across the world.”

The team’s performance in the virtual static events proves how serious they are about securing Michigan State’s first FSAE victory—an incredibly challenging and rare feat of dedication and hard work. Submitted by Dave Yonkers, Project Manager

Michigan State University

SAE Formula

Michigan State University
Formula Racing Team

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Additive Manufacturing, more commonly known as 3D Printing, has become very popular in the last 10 years. From time-to-time, we are witnessing interesting demonstrations and application of additive manufacturing techniques. These range from 3D printed chocolate to life-saving skull and sternum implants, and to the widely publicized fuel injector by GE Aviation. The capabilities of AM technologies are rising and with it are their potential applications.

MSU’s Laboratory for Advanced Manufacturing Processes (LAMP) is one of the nation’s most capable 3D Printing laboratories with nearly every 3D printing technology available for research and development. Dr. Himanshu Sahasrabudhe of the ME Department, works with a metallic 3D printing technology called “Laser Directed Energy Deposition” or Laser-DED. The process is carried out in a glove box that contains inert argon gas and is virtually free of oxygen and moisture to prevent contamination and eliminate the fire hazard associated with metal powders. Due to this glove box, laser-DED AM machines don’t really look cool. A person simply sees at a large glove box with green tinted windows and inflated rubber gloves (See Figure 1).

Back in 2011, as a young graduate student, Dr. Sahasrabudhe remembers being unimpressed after seeing the laser-DED machine for the first time. However, the process is quick to grab your attention once the powder flow is initiated and the laser is “fired.” This process uses a high power laser that melts a focused stream of metallic powder. Using CNC motion control, the stream of metallic powder is melted and deposited on a metallic substrate in a raster scanning fashion. As the laser moves away from the molten area, it rapidly solidifies. Raster scanned deposition of consecutive layers of materials eventually leads to
a 3D part. During deposition, the supplied powder and the laser beam lead to a glorious pool of molten metal, which the laser-DED AM community affectionately calls “the sun” (See Figure 2).

The laser-DED technology is one of the simplest metal AM processes in operation but is highly versatile. It can process a range of metallic alloys and melting point of a material is never an issue. For if the material absorbs laser radiation, it melts; even if is tantallum (melting point of ~5463°F) or a regular stainless steel (melting point of ~2600°F). The laser-DED AM process is also one of the fastest AM processes. Perhaps the most important feature of the laser-DED technology is its ability to fabricate multi-material structures in a near single operation. Since the process uses a stream of externally fed powder, one can vary the composition of this supply powder. You can develop an alloy while fabricating a part, or fabricate a metallic structure with more than one alloy in it. Dr. Sahasrabudhe spends a good chunk of his time contemplating the problems with multi-material fabrication, their possibilities and their potential. One can envision a structure fabricated with multiple materials such that it is lightweight and has good corrosion resistance and high strength. But select regions of this part could also be resistant to high temperature if a specialty alloy is strategically used in such places through a multi-material fabrication route. This would simplify the part, make systems efficient by deploying high performance materials more easily, and use the earth’s limited resources very judiciously. Needless to mention, this would also be a significantly faster manufacturing operation. Over the last several years, researchers at MSU have been studying multi-material structures with stainless steels, titanium alloys, nickel-based superalloys and cobalt-based high performance alloys. The potential applications are diverse: aerospace, nuclear, oil & gas and even load-bearing biomedical devices. The laser-DED technology has also proven to be an excellent tool for materials discovery in the last two decades. Once again, because the chemistry of the depositing powder can be precisely controlled, new material compositions can be rapidly explored. At present, MSU researchers, with generous support from the US Department of Energy, are developing alloys for operating in high temperatures, high pressures, corrosive and carbon dioxide rich environments. The laser-DED process has helped to accelerate materials development by rapid prototyping test coupons from different alloy compositions and also develop alloys that are fabricable. Furthermore, the versatility of this technology allows it to be used in a wide range of industrial applications, for fabricating new components as well as overhauling and refurbishing older components. This would not only benefit future mechanical systems but also prevents waste from current installations.

Overall, numerous researchers all over the world are engaged with the different additive manufacturing technologies and tackling the numerous shortcoming that any new technology faces. The gap between laboratory demonstrations and large-scale applications seems to be steadily narrowing.

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**Communication is Greater Than Words**

by Craig Gunn, Director of Communications

The first time I wrote these words was a little after most of you were born. This article came out in 2002. It may seem like a long time ago to you, but the interesting thing is that I believe that it still applies to all that we do and does not grow old. See if you agree.

Probably one of the last things that you might think about when it comes to communication in the engineering world is the issue of dealing with the people with whom you come in contact. Now, I am not talking about those communication skills that you have been developing within your 16 or so years of formal education: the written and spoken language that you have hopefully cultivated over those years. I am talking about those cultural nuances that will set you apart from your colleagues from other institutions who perhaps believe as Americans did in the distant past that when someone didn’t understand their words, they simply talked louder. Those people learned all the words and knew how to shout them and write them, but they failed to understand that communication is a whole lot more than just words uttered out loud or scratched on a paper. Communication involves a belief in people and their worth and cultivating language to both inform and respect those to whom you must report and oversee.

As you begin to look forward to those days not far away where you will no longer be in the classroom listening to and repeating information that is presented to you, start to evaluate how you communicate to others beyond the words that you use. Take a good evaluative look at how you normally communicate to people in the real world and in the classroom. How do you treat the waiter and waitress who have to contend with a room full of inebriated college students? How do you react to someone whom you think has a job not equal to yours? What methods do you use to try to ingratiate yourself to people who may be important to your career ladder climbing? How do you tell friends that they must step aside in order to make way for others who may be more important in your career path? How do present yourself as an engineer and what do people say about you when you turn your back?

Communication has never been just words. Communication is life itself. It is the technical knowledge that you think about and speak. It is...
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.

As an organization, we have been making the most of our virtual experience this spring. We’ve had the pleasure of welcoming three new student officers (Nicole Kowalski, Val Vargas, Evan Lamb) to our group, as well as several new members ranging from freshmen to seniors. Via Zoom, we were lucky enough to receive an informative presentation from Borg-Warner, organized by our Corporate Relations officer, Michael Trajkovski. Several employees discussed the history of the company, what their individual roles at BorgWarner consist of, and provided insight as to how students should go about landing internships, co-ops, or full-time positions.

To continue our history of community service, Natalie Knisley, our Community Relations officer, put together an online interactive event for 5th grade students from Berkley, MI to learn about the field of mechanical engineering and ASME. The students had fun competing with one another to build the tallest tower made of paper and tape.

We have more events planned to conclude the semester, so if you’re interested in getting involved please message us on Facebook (@ASMEatMSU). And of course, we look forward to resuming some in-person events and activities in the fall! Submitted by Tommy Coughlin, President.

American Institute of Aeronautics and Astronautics

The American Institute of Aeronautics and Astronautics is a professional organization that forwards inquiry, collaboration, and career enrichment in aerospace-related fields. Meetings are held on a biweekly basis to discuss various aerospace-related topics and club activities, with the potential to host guest speakers within the field of aerospace. This semester we will be competing in a design competition where members will be able to perform theoretical work to gain real-world experience in the design process. The goal of this project will be to design a robotic mission to the surface of Mars with the goal of returning ice core samples back to Earth.

In addition to growing knowledge and experience, members of the American Institute of Aeronautics and Astronautics are provided opportunities to grow their professional network within the aerospace field. The AIAA hosts speakers from numerous companies where members can learn about aerospace-related topics, company culture, career opportunities, and more.

Please contact heinedou@msu.edu for membership and meeting information. Meetings are held biweekly on Fridays at 7:00 PM. We hope to see you there! Submitted by Michael Hayward, Outreach/Social Chair.

Baja SAE

The MSU Baja Racing team designs, builds, and tests an off-road Baja buggy every year, and competes at competitions across the nation. Club members gain valuable experience in design, professionalism, shop etiquette, teamwork, the engineering cycle, and real-world application of classroom skills. The Baja Racing team invites individuals from any background to join the team, from those who have never even held a wrench to those who could build the car on their own.

This semester, the team has doubled down on the design stage, and have spent drastically more time and effort in predicting and simulating the dynamics of the car. With more and better simulations, it will reduce the amount of time that needs to be dedicated after the car is built to solely tuning the dynamics, allowing for that time to be spent on more rigorous testing of the vehicle to determine any revisions or fixes needed prior to competing. Along with that, new innovations to the car have been made to comply with the racing series’ new rules that require cars to have 4-wheel-drive by 2022. With this new constraint, it has allowed the team to drastically alter the fundamental principles of the car and its assembly, from high-level concepts such as packaging to more technical alterations such as rotating the engine to reduce drivetrain losses. Submitted by Max Stull, Project Manager.
About Cryogenic Engineering
by Dr. Pete Knudsen

Cryogenic engineering involves the mechanical and thermal-fluids design of systems that operate at temperatures from liquefied natural gas down to helium (from -260 to -452 degrees Fahrenheit).

These systems are necessary nationally and internationally for the aerospace, industrial gas, power industries, and for government and private organizations performing sub-atomic particle and low-temperature research. And, they will be critical for the hydrogen economy. These are complex systems, and their design requires a firm understanding and application of thermodynamics, heat transfer, fluid mechanics, and mechanical design, while taking into account non-ideal fluid and material properties. In addition, thermal-mechanical optimization and integration is inherent in their design.

MSU’s College of Engineering and its Mechanical Engineering Department, in collaboration with the Facility for Rare Isotope Beams (FRIB) at MSU, offer three cryogenic engineering courses to introduce students to various aspects of the field. Available courses:

ME414 (Mechanical Design of Cryogenic Systems) is offered during fall semesters. It focuses on:
• Mechanical design of cryogenic piping systems
• Analysis of stresses due to process conditions such as pressure, temperature, and momentum
• Optimization and trade-off of the thermal and mechanical design
• Incorporation of non-constant material properties
• ASME design codes (to give students an understanding of what is required in the industry)

ME413 (Cryogenic Thermal Systems) is offered during spring semesters. It focuses on:
• Thermodynamics of cryogenic process cycles
• Ideal cycles and real cycles
• The concept of exergy (or availability)
• Modeling of components
• Cryogenic distillation (how gas mixtures with boiling points substantially below the environment are separated)
• Vacuum systems (integral to the thermal insulation)
• Instrumentation

Every other fall, the graduate class, ME 940-Cryogenic Process Engineering, is offered. This class continues where the previous two classes left off, focusing in greater detail on the thermal-fluid process design and analysis aspects of cryogenic systems. The next course is planned for Fall 2022.

The MSU Cryogenic Initiative (frib.msu.edu/cryoinitiative) is a collaboration between FRIB and MSU’s College of Engineering. It offers opportunities for graduate students interested in applied research in cryogenic engineering. Contact Dr. Venkatarao Ganni (ganni@frib.msu.edu), Dr. Pete Knudsen (knudsen@frib.msu.edu), or Dr. Nusair Hasan (hasann@frib.msu.edu) for more information.
Dean's List

Congratulations to these 532 ME majors who made the Dean’s List after Fall 2020. To be on the Dean’s List, you must have a semester GPA of 3.5 or better. This list is from January 27. For updates, go to: https://reg.msu.edu/ROInfo/GradHonor/DeansList.aspx

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 . If your name is missing, please contact me immediately at griffore@egr.msu.edu (Tele: 517-355-3338).—Gaile

May Graduates

Ahmed Abdulla Alhosani
Jack Michael Aman
Junchi An
Sarah Reilly Angold-Stephens
Garrett Daniel Armock
Vikram N Athreya
Alec Michael Bailey
Arjan Balakrishnan
Carl Banerian III
Julia Beach
Jamie Lauren Beck
Denny Edward Blaschko II
Natalie Renee Bobowski
Matthew Davison Bradford
Thomas Richard Brandell
Michael James Brooks
Jacob Harold Bruner
Brody Sager Burke
Taylor Joseph Burris
Nathan Douglas Cascarelli
Cody Patrick Chalk
Adam Hall Childress
Luke Richard Chrisman
Joshua David Ciaccio
Thomas Andrew Corner
Thomas Richard Coughlin III
Jack Walsworth Dailey
Jenna Paige Dalrymple
Marissa Rose DePolo
Alexandria Marie Dewey
Matthew Robert Donahue
Derek Christopher Donnelly
Mark Richard Esper
Ryan Gregory Garman
Haram Gil
Kole Anthony Gilbert
Anna Joy Graffeo
James Matthew Graham
Marissa Beth Grazioli
Robert John Gustke
Brett Thomas Hahne
Samantha Lauren Halaby
Evon Lovell Hardy
Zachary W Harwood
Michael John Hayward
Houduo Austin He
Michelle Mae Herrin
Nicholas Andrew Holda
Nathan Robert Holloway
Enrique Infante
Hannah Marie Jacobs
Christopher Matthew Jakubik
Daniel Uriah Jansen
Colton Charles Jennings
Griffin Eric Jones
Nattida Jubju
Sloan Naomi Kanat
Aaron Samuel Kaplan
Nicholas Kevin Kerby
Nathan Hugh Kinner
Devin David Kotal
Tyler Jacob Krawczyk
Nicholas Hunter LaCross
Jenny Zi San Lam
Ethan Joshua Lau
Emily Rose LeBlanc
Anson Perkin Leung
Scott Alan Lohman
Dominique Austin Long
Adam Kurvin Lyons
Michael William Maes
Jacob Arthur Martin
Nolan Anthony Martin
Abner Jorge Martiniano Barbosa Junior
Shaya Lenae Master
Savanah Rachel Matras
Matthew William Mayer
Patrick Steven McCormick
Reid Jordan McDonnell
Autumn Kirsten McLane-Svoboda
Jarod Robert Miller
Dante Joseph Minatel
Annah Marissa Mullinax
James Israel Muscato
Daniel Raymond Nicklowitz
Sarah Elizabeth Nold
Kyle Christopher Nouhan
Bryce James O’Neill
Jacob Jay Nelson
Jacob W Palmer
Michael Anthony Pastoria
Kyle James Peters
Zachary Robert Petroelje
Brandon Minhduc Phan
Scott Tyler Pinkham
Sarah Reilly Piotrowicz
Adam Joseph Piper
Zhiyuan Qu
Premost Ross Rashkov
Derek Joseph Raymond
Matthew Camron Razz
Carter Thomas Reeds
Sydney Alissa Rehr
Austén Lee Rhodes
Adam Paul Richards
Jacob Tyler Richmond
Chase Carson Rojeck
Joshua Adam Saluk
Andrew Michael Sare
Gavan Alexander Sarrafin
Shalvi Manish Save
Blake Matthew Schmidt
Hannah Rose Scott
Kyle George Schreur
Yutao Shen
Alexander William Sicklesteel
Mark Anthony Sicoli
Andrew Jacob Skedel
Alexander Francis Smerage
Calvin Thomas Won Woo Smith
Adam Lawrence Speaks
Abdullah Mahmood Sribaya
Jacob Thomas Staal
Christian Paul Stack
Ryan Kendall Stawara
Christopher Crane Steers
Connor Jay Steffens
Anthony Su
Emily Elizabeth Suchoski
Nathan D Sudek
Matthew Stephen Terry
Heidi Beth Theisen
Harjasraj Thind
Kyle Jerome Tomaszewski
Katelyn Elizabeth Treloar
Patrick Quain Tucker
Jacob Christopher Turner
Emily Rose Valentine
Mark Joseph VanBuskirk
Alaura Skye VanNest
Ryan Anthony Wade
Jacob James Wallace
Julia Christina Walter
Qinda Wang
Yiming Wang
Nathan Robert Ward
Grace Katherine Warmann
Madeline Audrey Warner
Travis David Wesley
Lena Nicole Wuensch
Brian William Yem
Yingfan Zhang
Siqi Zhao
Evelyn Virginia Zielinski
Valentin Zilkovski
Cody Craig Zorn

August Graduates

Aimee Piyush Desai
Emily Rose Fitzsimons
Santiago Jose Hermida
David Andrew Lawless
Sicheng Ni
Bryce Reid Sutton
Bryan D Wilson
Department of Mechanical Engineering

ME Senior Electives for 2021-2022

• 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 (⋆) after the course number.
• 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 11.

SUMMER SEMESTER (►All online for 2021)

ME 490 Independent Study. 1-4 credits. See Override Instruction #2 on page 11. You may reenroll for a maximum of 6 credits.
ME 433 Introduction to Computational Fluid Dynamics. 3(3-0). Prereq: (ME 410 or concurrently). Second Session.
ME 465⋆ Computer Aided Optimal Design. 3(3-0). Prereq: (ME 222 and ME 280) and (ME 370 or concurrently). Full Session.
ME 477 Manufacturing Processes. 3(3-0). Prereq: (ME 222 and MSE 250). First Session.

FALL SEMESTER

ME 414⋆ Mechanical Design of Cryogenic Systems. 3(3-0). Prereq: (ME 470 or concurrently).
ME 416⋆ 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 410 or concurrently).
ME 475⋆ 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 11. You may reenroll for a maximum of 6 credits.
ME 491⋆ Selected Topics in Mechanical Engineering. Section 001. Topic: Integrated Systems Design. See Override Instruction #1 on page 11. Students should consider taking this course for three semesters to receive a total of 3 credits and fulfill the design intensive senior elective requirement. This is a project based course and students should be available outside of class for team meetings, project work, and design reviews. Prereq: None. Recktenwald/ Resh.
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 11. Class meeting on Mondays is scheduled in ANH 1279 and the hours arranged are located at MBI, 3815 Technolgy 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 11.
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 11.
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 11.
ME 812 Conductive Heat Transfer. 3(3-0). See Override Instruction #5 on page 11. Prereq: (ME 412 plus GPA of 3.5+).
ME 830 Fluid Mechanics I. 3(3-0). See Override Instruction #5 on page 11. Prereq: (ME 332 plus GPA of 3.5+).
ME 860 Theory of Vibrations. 3(3-0). See Override Instruction #5 on page 11. (Prereq: ME 461 plus GPA of 3.5+).
SPRING SEMESTER

ME 413 Cryogenic-Thermal Systems. 3(3-0). Prereq: (ME 410 or concurrently).
ME 417 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 442 Turbomachinery. 3(3-0). Prereq: (ME 332).
ME 445 Automotive Powertrain Design. 3(3-0). Prereq: (ME 444).
ME 456 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 465 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 478 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 491 Selected Topics in Mechanical Engineering. Section 001. Topic: Integrated Systems Design. See Override Instruction #1 below. Students should consider taking this course for three semesters to receive a total of 3 credits and fulfill the design intensive senior elective requirement. This is a project based course and students should be available outside of class for team meetings, project work, and design reviews. Prereq: None. Recktenwald/Resh.
ME 495 Tissue Mechanics. 3(3-0). Prereq: (ME 222). Biomedical Concentration Course.
ME 497 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 2021 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

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), which you can obtain by emailing Gaile griffore@egr.msu.edu. After you and your professor have completed and signed both sides, return the form to Gaile 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, 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 from Gaile griffore@egr.msu.edu.

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

March 15
Scheduled appointments begin for enrollment for Summer 2021.

April 2
Computer enrollment begins for Fall 2021 / Spring 2022.

May 2-May 6
Final Exams.

May 2-May 6
Commencement Ceremony-Date/Time TBA

May 16-June 30
First Summer Session.

July 5-Aug 18
Second Summer Session.

May 16-Aug 18
Full Summer Session.

August 1
Initial Fall 2021 Minimum Tuition & Fee payment due.

September 1
Fall Semester classes begin.

Academic Advising

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

2) ME Sophomores with a 3.1 or higher GPA who will be juniors at the end of this semester are advised by Gaile Griffore. For an appointment, call 517-355-3338.

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: student.msu.edu.

Communication is Greater Than Words, Cont’d from pg 5

the education that you have gained in the classroom and in the workplace. Communication allows you to speak within yourself about the world and all those things important to you. It grants you the avenue upon which to spread your ideas and beliefs to others. It lives with you from the moment of your birth until the last breaths you take. But truly good communication moves to a higher plane, transcends the common words of existence and epitomizes a belief that we live in a society where all people make a difference. You as an engineer will make a difference in the world of tomorrow, but that difference can be even greater if you consider how your words and thoughts affect all those individuals around you.

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.