Dr. Galit Pelled is shown in her lab which has several aquariums, each of which has an octopus. She is studying neural circuits associated with octopus arm movement with the goal of developing “smart prosthetics” that can be controlled by the brain. Read about her research on pages 6 & 7.
On Monday, Feb 20th I was preparing for class. Just the week before, an active shooter on MSU’s campus had taken the lives of three students and injured more. MSU shut down the campus for one week to give space for students to mourn, gather, pray, reflect, reset, and begin to recover. On this Monday, the question was, “how do we move forward?” It is an important question, because tragedies and challenges are part of life. Some events, like this one, are big, others are small, but still significant. What defines us is not the challenges we face, but how we face them.

When I arrived at class, I saw students eager to return to normalcy. They were responding to the tragedy in the best way possible. They were reclaiming MSU as a place of learning and inquiry, one equation at a time. It may have felt strange, it might have seemed out of place, but it was moving forward. While this road of recovery will be a journey, we have taken the first steps. As a Spartan, I am proud of the determination, grit, and resilience in our engineering students. I commend you.

One way we move forward is to reclaim our space. The other way we move forward is to reclaim our time. Not the past but the future. Events like this remind us that life is valuable, that each minute is a gift. They ask us to reflect on how we are using that gift. When we reflect on values, we can set goals that are meaningful. When we reflect on our goals, we can re-align our life-choices and daily decisions with what we believe is important. Doing this gives us purpose and fulfillment in life.

“WHAT DEFINES US IS NOT THE CHALLENGES WE FACE, BUT HOW WE FACE THEM.”

What do you value? What has meaning and purpose in life? What is worth spending your reclaimed time to achieve? Some of us have never asked that question. We’ve stepped along a path from high school to college and job offer taking each one in stride but not asking where they are leading. Others have found the answer in careers, hobbies, relationships, faith traditions, or serving others. Whatever your goal, make sure it is bigger than yourself!

Do your decisions reflect your values? When I was a student, a professor often used a term, “the tyranny of the urgent,” to express the idea that immediate problems or concerns often distract us from pursuing our values. When we reclaim our time, we are making space to pursue the things that we value most. This can be hard with a busy course schedule, but making space always requires active intent.

Do your friends share your values? One of my favorite quotes is, “Show me your friends and I’ll show you your future.” Having friends that share your values will help you achieve them. This doesn’t mean living in an echo chamber. It means that you make sure you spend time with people who remind you of your values when life gets busy or distracting. Find a community that shares your values and can help you maintain them as a priority.

What defines us is not the challenges we face, but how we face them. So how do we move forward? By reclaiming MSU and by resolving to reclaim our time by living with purpose. Can we do this? Yes, Spartans will!
**Curriculum News**

**IMPORTANT RE: Concentrations:** If you decide to do a concentration, you **MUST** meet with Gaile and arrange for the concentration code to be added to your record before you apply for graduation so that the concentration statement will appear on your final transcript. To make an appointment, call 517-355-3338.

**Co-op Students:** BEFORE you leave for your Summer or Fall 2023 co-op rotation, be sure to discuss your schedule for Fall 2023/ Spring 2024 with your academic advisor.

**ME 416—Computer Aided Optimal Design** will be offered this summer as an online asynchronous full session course. ME 416 is a design intensive senior elective.

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

**ME 451—Control Systems** requires department approval before you can enroll for fall or spring. If you have an accurate long-term schedule on file in the ME Advising Office, you already have approval. 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 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, you already have approval. If you do not have an accurate long-term schedule on file, schedule an appointment with Gaile by calling 517-355-3338.

**CHE 483—Brewing and Distilled Beverage Technology** requires an override from the CHE department. The override form is located here: [https://www.egr.msu.edu/chems/index_login.html](https://www.egr.msu.edu/chems/index_login.html)

**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/](https://www.careers.egr.msu.edu/) or email them at: careers@egr.msu.edu

**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 COLLEGE**, to observe all course prerequisite requirements. If you have a question about prerequisites, contact the ME Advising Office.

**Career Peers**

The Career Peer Program serves as a way for Spartan Engineers to receive high-quality career advice from their peers in a timely manner. Links to ME career peers can be found here: [https://www.careers.egr.msu.edu/career-peer](https://www.careers.egr.msu.edu/career-peer)

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**Academic Advising**

1) Most ME Juniors and Seniors are advised by Gaile Griffore. For an appointment, call 517-355-3338. EFFECTIVE SPRING 2023: Juniors and seniors who were admitted to ME as of Spring 2023, and whose last names begin with the letters A-K, will be advised by Jeffrey Tsang. Instructions for making an appointment with him can be found here: [https://docs.google.com/document/d/1R8UbpqjZNgM5vDTeRcPfz7Fh5RooD1Y0cfpUe-WU-I/edit](https://docs.google.com/document/d/1R8UbpqjZNgM5vDTeRcPfz7Fh5RooD1Y0cfpUe-WU-I/edit)

2) ME Freshmen and Sophomores are advised by Jeffrey Tsang. Instructions for making an appointment with him can be found here: [https://docs.google.com/document/d/1R8UbpqjZNgM5vDTeRcPfz7Fh5RooD1Y0cfpUe-WU-I/edit](https://docs.google.com/document/d/1R8UbpqjZNgM5vDTeRcPfz7Fh5RooD1Y0cfpUe-WU-I/edit)
Department of Mechanical Engineering

181 Seniors to Graduate in May and August!

Congratulations and best wishes to all May & August ME graduates! This list was accurate as of March 3. If your name is missing, please contact me immediately at griffore@egr.msu.edu (Tele: 517-355-3338).—Gaile

May Graduates

Al Aiyash
Zaid Almodhi
Xiaoqiu An
Connor Anderson
John Andres
Mickey Atnafe
Ryan Bartlett
Shane Beers
Jack Beison
Taku Benson
Ashley Bolt
Valentin Borjas
Thomas Burgess
Brittany Bush
Bashhar Byrouthy
Conner Cadieux
Beth Caldwell
Faith Call
Matt Candela
Zachary Carpenter
Alejandro Castillo
Artik Chowdhury
Erin Chynoweth
William Cilia
Garrett Colasinski
Nicholas Coubard
Jacob Cristofori
Augusto Cucala
Jake Cuffaro
Andrew Culver
Ryan-Cristofer Curamen
Ross Davis
Erin Denby
Aidan Dettweiler
Kathleen Dewan
Brendan Doane
Nick Dodge
Eric Douglas
Jon Droste
Jaclyn Duff
Van Duong
Brett Earnest
Jonathan Elias
Mitchell Essenmacher
Scott Fingeroth

Ben Finkbeiner
Arianna Finn
Andrew Flight
Adam Fox
Christian Giggy
Noah Gilman
Jack Girling
Noah Goldman
Parker Grover
Sarthak Gupta
Sohan Gupta
Derek Hanson
Edmond Hashem
Parker Hatherley
Kyle Hellems
Vaibhav Himthani
Aaron Hopson
Henry Horak
Sepehr Hosseinkhani
Nolan Houghteling
Bryce Houser
Aaron Humphries-Dolnick
Jacob Huskin
Alexandra Iorga
Nathan Jansen
Christian Jaraczewski
Jonathan Jenkins
Jacob Keller
Hailey Kelley
Edward Kim
John Klein
David Knapp
Greg Koenigsknecht
Jack Konitsney
Srikeerthi Kothapally
Joe Kouchoukos
Nathan Kramer
Zachary Kranstz
Kylie Kuskowski
Chak Sing Kwok
Olivia Lage
Zachary Lang
Nicholas Lauinger
David Levasseur
Jeffrey Li
Sean Lickfold
Richard Lin
Matthew Lipscomb
Dawu Liu
Zhe Liu
Austin Lowien
Cole Lutkenhoff
Thanh Mai
Faizan Malik
Eyob Mamo
Justin Miller
Ravi Mody
Lukasz Morales
Noah Moyer
Patrick Mullaly
Joe Nelson
Minh Nguyen
David Olawale
Peter Olszewski
Brady O’Shea
Mert Ozmete
Tyler Paparella
Anjali Patel
Rachel Paul
Kyle Pawlowski
Ryan Pawlowski
Ricardo Paz Weber
Anthony Pero
Evan Petersen
Emily Peterson
Matt Phelan
Nathan Phelps
Jordan Piatek
Matthew Price
Zoe Quinn
Najmi Rahim
Ayaan Rajabali
Jessica Ray
Andrew Reddy
Ciara Regan-Moore
Olivia Reyes
Joey Rheume
Frank Rhoades
Kevin Roche
Kyle Roland
Lucas Russell
Jake Rutkowski
Jack Salisbury
Nicholas Sarver
Tom Seaman
Mitchel Semeyn
Noah Shephard
Austin Shepp
Eui June Shim
David Smith
Jihoon Song
Jake Stanesa
Michael Strong
Sarvesh Subramanian
Haosen Sun
Austin Tait
Stephen Tamboer
James Tanay
Kai Thin
Connor Trask
Cole Treece
Gus Tsalas
Ryleigh Turner
Kevin Upcott
Val Vargas
Wade Varney
Calum Walton
Joe Watza
Sophie Weitzel
Logan Wells
Tommy Wierzbicki
Paul Williamson
Connor Witham
Showgo Yoshida
Siyuan Zhang
Zihan Zhang
Mark Zum Mallen

August Graduates

 Paxton Angliss
Jyotiraditya Chavan
Dylan Gumbinger
Jericho Herblet
Dylan Huck
Tommy McGowan
Jordan Robinson
Jacob Rupprecht
Gus Scheier

Mark Zum Mallen
Puzzles to the Rescue!
by Craig Gunn, Director of Communications

Often when it comes to preparing that lengthy lab report; your latest resume; that massive formal report for professor X, Y, or Z; or a time when your mind seems to go flat there exists a moment, or sometimes a longer period, when you are so stumped that you find yourself staring at the wall with not a thought in your head. You could talk to a neighbor, get a cold brew, or shut your eyes and simply nod off for a while. These are all good ideas to get you refreshed and ready to continue the process of writing the report, but there is another activity that might help with giving you a little relaxation, a break from the action, and a way to pull you away from the pressure of trying to come up with ideas to write about. The activity is working puzzles.

Puzzles have been around for thousands of years. They have been printed on cave walls and tombs, placed on tablets and in books; they have continued to exist because people like to be “puzzled.” The enjoyment of trying to figure out the words that need to be chosen for the New York Times Crossword Puzzles has fascinated intellectuals for over one hundred years. The pursuit of words never grows old, but then Sudokus came around and took the words out of the picture and replaced them with numbers. In a different direction, puzzle makers provided a set of pictures that needed to be interpreted, translated, or figured out in order to get the correct message. All of these gave individuals a chance to test their abilities in solving puzzles and more over to relax.

Here is where you come in. Take a moment to collect some simple, medium, and complicated puzzles. Maybe a few word finds, a couple of Sudokus, a crossword puzzle here or there, and some really difficult logic puzzles. Keep them around for those times when you need a complete detour from what you are doing. Work as many as you need to clear the cobwebs from your head. Refreshed, take off on the continued adventure of text production. Try it, you’ll like it!

Dean’s List

Congratulations to these 314 ME majors who made the Dean’s List after Fall 2022. To be on the Dean’s List, you must have a semester GPA of 3.5 or better. This list is from February 10. For updates, go to: https://reg.msu.edu/ROInfo/GradHonor/DeansList.aspx


Michigan State University


Spring 2023 | ME Bulletin 5
Dr. Galit Pelled’s research is dedicated to neuro-performance which is the practice of improving motor function that will lead to higher levels of speed and strength, and cognitive function that will lead to optimize learning. Through capitalizing on advances in neuroengineering, neuroimaging and neuromodulation technologies, the lab develops new strategies to increase neuro-performance. Dr. Pelled’s aim is to develop marine-inspired technologies for artificial sensing and adaptive-prosthetics; restoring sensory-motor and cognitive performance after traumatic brain injury (TBI), spinal cord injury, and peripheral nerve injury; and improving athletic performance and cognitive capabilities by using genetic-based neuromodulation and non-invasive brain stimulation. The Pelled research group works with several animal models of neurological disorders using multidimensional measurements including electrophysiology, wearable sensors, behavioral tests, gait and motion testing, and neuroimaging to gain a comprehensive understanding on neuro-performance.

One of the team’s main goals is to restore neuro-performance after brain injury. TBI is a major cause of death and disabilities in the US and even mild TBI, known as concussion, often leads to long-lasting motor, cognitive and neurological complications. In order to characterize the behavioral and the pathophysiological sequela and to find MRI biomarkers that are specific to TBI, it is essential to work on an animal model that recapitulates the phenotype associated with the injury. Dr. Pelled and her research team developed a translational model of closed-head injury in pigs to determine the long-lasting complications induced by TBI and to test novel therapies. This study provides a unique and unparalleled opportunity to attain comprehensive and longitudinal measurements of brain function after TBI by identifying the behavioral sequela of TBI, the neuroimaging changes associated with TBI, and to test if neuromodulation can improve TBI outcomes. The team is currently testing if non-invasive brain stimulation in the form of Transcranial Magnetic Stimulation is effective in reducing symptoms associated with post-TBI complications. This neuromodulation treatment protocol could be readily translated into clinical practice.

Dr. Pelled is also studying neural circuits associated with octopus arm.
Tutoring

• The ME Learning Center ([https://me.msu.edu/me-learning-center](https://me.msu.edu/me-learning-center)) has free mentors for ME 201, 222, and 361. It is open at 6-10 p.m. on Sunday through Thursday.

• Paid Undergraduate Tutors are available for many ME courses. Students in need of tutoring help for a particular course are matched with fellow students who have performed well in that course. Payment is negotiated privately between the tutor and the student within appropriate limits. For help go to: [https://sites.google.com/view/msu-tbp-pts-tutoring-database/home](https://sites.google.com/view/msu-tbp-pts-tutoring-database/home)

• The Guided Learning Center (GLC) offers free drop in tutoring in math up to differential equations, science courses (chemistry, physics, etc.), and many core engineering courses. To request assistance, go to: [https://www.egr.msu.edu/dpo/academics/guided-learning-center](https://www.egr.msu.edu/dpo/academics/guided-learning-center) [Scroll down and click on application form]

• The Cornerstone & Residential Experience (CoRe) Program offers free tutoring on Sunday through Thursday from 6 - 10 pm. It provides help for MTH 132, 133, 234, and 235, CEM 141, and PHY 183 and 184. It is located here: [https://core.egr.msu.edu/#section3](https://core.egr.msu.edu/#section3) [Scroll down to CoRe Tutoring]

• ME Graduate Student Tutors can be contacted through the ME Advising Office. These tutors charge a fee, which you can negotiate with them. If you are interested, email Gaile Griffore at griffore@egr.msu.edu

Cont’d from pg 6

movement. Grasping, is the most desirable movement that patients who lost a limb or had a spinal cord injury would like to have. The octopus is extraordinary in many ways, one of them is its distributed neural control where each of its arms functions as an independent and adaptive unit. Inspired by octopus’s arm decision-making mechanism the team is working towards identifying fundamental sensorimotor circuits associated with goal-oriented grasping movement by using high-dimensional biological, analytical, computational and robotics technologies. This innovative cross-disciplinary research aims to study the complex movements of the octopus to understand how it controls its arms could advance the development of “smart prosthetics” that can be controlled by the brain. The Pelled research team uses electrode arrays to study the impulses that dictate the octopus’ movements, which are tracked and analyzed by artificial intelligence software and video cameras. Machine learning tools are applied to build computational models that can predict movement and to validate these algorithms by computationally reproducing octopus arm movement and fashioning new movements. The bio-logically-inspired algorithms will be used by evoking gripping movement in a soft material-based biorobotic arm. This innovative research that has been highly publicized through various media channels at MSU and beyond is designed to make a substantial contribution to biomedical sciences to transform lives.

New technologies to remote-control brain performance are also being developed in the Pelled lab. Pelled and colleagues previously discovered and cloned a gene that encodes to a protein that responds to electromagnetic fields. This new technology could transform the future of neuromodulation, complement existing neuromodulation tools, and considerably contribute to the understanding of complex neural circuits. This genetic-based magnetoreception technology opens a whole new set of possibilities to remote-control brain function through non-invasive magnetic field and the lab tests its effectiveness in several animal models.

Dr. Pelled is a Professor in the Departments of Mechanical Engineering, Radiology, and Neuroscience. More information on Dr. Pelled’s research projects can be found at: [https://www.pelledlab.org/](https://www.pelledlab.org/).
Cryogenic engineering involves the mechanical and thermal-fluids design of systems that operate at very low temperatures, normally starting at liquid natural gas down to liquefied hydrogen and helium (i.e., from -260 to -452 degrees Fahrenheit).

Cryogenic engineers are employed in aerospace, the energy and industrial gas industry, and at government lab and research centers (e.g., NASA, DOE, DOD). And, they will be play a critical role in the hydrogen economy. Cryogenic systems are complex, 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:**

**ME 414–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
- Examples in the optimization and trade-off of the thermal and mechanical design
- Consideration of non-constant material properties
- Introduction to ASME design codes (to give students an understanding of what is required in the industry)

**ME 413–Cryogenic Thermal Systems** is offered during spring semesters. It focuses on:

- Thermodynamics and modeling of cryogenic process cycles
- Modeling of components (e.g., rotating machinery, heat exchangers, separators, etc.)
- Cryogenic distillation and adsorption (i.e., how gas mixtures with boiling points substantially below the environment are separated and purified)
- Introduction to vacuum systems (which are integral to the thermal insulation)
- Instrumentation used in these systems

Every other fall, the graduate class **ME 940–Cryogenic Process Engineering** is offered. This class continues where ME 413 leaves off, focusing in greater detail on the thermal-fluid process design and analysis aspects of cryogenic systems. The next course is planned for Fall 2024.

The MSU Cryogenic Initiative (frib.msu.edu/cryoinitiative) is a collaboration between FRIB and MSU’s College of Engineering. It offers research assistantships (RA’s) and opportunities for graduate students interested in applied research in cryogenic engineering. It also offers opportunities for undergraduate students to be exposed to cryogenic systems design. 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.
Baja SAE

The MSU Baja Racing team is looking forward to a great 2023 competition season. MSU Baja is an offroad racing team that designs, manufactures, and competes in an offroad vehicle against schools from around the world. Spring semester for the team consists of a focus on manufacturing and testing as we get our car ready for competitions in May. Manufacturing takes place at the Jolly Rd. facility where we have access to the tools and space necessary for building our buggy. For 2023 the team will be competing in Oshkosh, Wisconsin and Washougal, Oregon. Competitions are the proving grounds for teams across the country as we all get together and test our engineering and manufacturing skills by putting our vehicle up against numerous difficult tests. To prepare for competition, our team spends time at our off-campus test track where we put our vehicle through its paces so we can learn about weak points and make tuning adjustments. The team will test the car until the last moment possible to ensure we get to our competitions with the most competitive car. The Baja Racing team is looking forward to another successful competition season this summer of 2023. Submitted by Jack Hannon, Project Manager.

Pi Tau Sigma

Pi Tau Sigma, the International Honor Society for Mechanical Engineers, will be hosting a Senior Elective Night for all mechanical engineering juniors and seniors! The event will discuss all the ME senior electives available for the coming Fall and Spring semesters. Students currently taking senior electives will be there to talk about the different courses and the professors that teach them. The event will be held on Tuesday, March 14 at 7:00 PM in 2243 EB. Free pizza will be available!
ME Senior Electives for 2023-2024

• The following ME Senior Elective list was accurate as of March 4, 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 Class Search website.
• Course override instructions can be found in the shaded box on page 11.

SUMMER SEMESTER

ME 433 Introduction to Computational Fluid Dynamics. 3(3-0). Prereq: (ME 410 or concurrently). Second Session. Online Asynchronous.

ME 416 Computer Assisted Design of Thermal Systems. 3(4-0). Prereq: (ME 410 or concurrently). Full Session. Online Asynchronous.

ME 490 Independent Study. 1-4 credits. See Override Instruction #2 on page 11. You may reenroll for a maximum of 6 credits.

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 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 room TBD 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). Restricted to Manufacturing Concentration students. See Override Instruction #3 on page 11.

ECE 445 Biomedical Instrumentation. 3(2-3). Prereq: ECE 345. Biomedical Concentration Course.

ECE 449 Fundamentals of Acoustics. 3(2-3). Prereq: (ME 391).

MSE 425 Biomaterials & Biocompatibility. 3(3-0) Prereq: (MSE 250). Recommended Background: (PSL 250). Biomedical Concentration Course.

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.

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 2024 include ME 812, 830, and 860. See Override Instruction #5 on page 11.
### SPRING SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 413</td>
<td>Cryogenic-Thermal Systems</td>
<td>3(3-0)</td>
<td>Prereq: (ME 410 or concurrently).</td>
</tr>
<tr>
<td>ME 417</td>
<td>Design of Alternative Energy Systems</td>
<td>3(3-0)</td>
<td>Prereq: (ME 410 or concurrently).</td>
</tr>
<tr>
<td>ME 426</td>
<td>Introduction to Composite Materials</td>
<td>3(3-0)</td>
<td>Prereq: (ME 222).</td>
</tr>
<tr>
<td>ME 433</td>
<td>Introduction to Computational Fluid Dynamics</td>
<td>3(3-0)</td>
<td>Prereq: (ME 410 or concurrently).</td>
</tr>
<tr>
<td>ME 441</td>
<td>Aerodynamics and Aircraft Performance</td>
<td>3(3-0)</td>
<td>Prereq: (ME 332).</td>
</tr>
<tr>
<td>ME 442</td>
<td>Turbomachinery</td>
<td>3(3-0)</td>
<td>Prereq: (ME 332).</td>
</tr>
<tr>
<td>ME 445</td>
<td>Automotive Powertrain Design</td>
<td>3(3-0)</td>
<td>Prereq: (ME 444).</td>
</tr>
<tr>
<td>ME 456</td>
<td>Mechatronic System Design</td>
<td>3(2-3)</td>
<td>Prereq: (ECE 345 or concurrently) and (ME 391 or concurrently).</td>
</tr>
<tr>
<td>ME 464</td>
<td>Intermediate Dynamics</td>
<td>3(3-0)</td>
<td>Prereq: (ME 361).</td>
</tr>
<tr>
<td>ME 465</td>
<td>Computer Aided Optimal Design</td>
<td>3(2-3)</td>
<td>Prereq: (ME 222 &amp; 280) and (ME 370 or concurrently). CANCELED.</td>
</tr>
<tr>
<td>ME 477</td>
<td>Manufacturing Processes</td>
<td>3(3-0)</td>
<td>Prereq: (ME 222 and MSE 250).</td>
</tr>
<tr>
<td>ME 478</td>
<td>Product Development</td>
<td>3(3-0)</td>
<td>Prereq: (ME 477).</td>
</tr>
<tr>
<td>ME 490</td>
<td>Independent Study</td>
<td>1-4</td>
<td>credits. See Override Instruction #2 below. You may reenroll for a maximum of 6 credits.</td>
</tr>
<tr>
<td>ME 495</td>
<td>Tissue Mechanics</td>
<td>3(3-0)</td>
<td>Prereq: (ME 222). Biomedical Concentration Course.</td>
</tr>
<tr>
<td>ME 497</td>
<td>Biomechanical Design in Product Development</td>
<td>3(3-0)</td>
<td>Prereq: (ME 370 or concurrently). Biomedical Concentration Course.</td>
</tr>
<tr>
<td>BE 444</td>
<td>Biosensors for Medical Diagnostics</td>
<td>3(3-0)</td>
<td>Prereq: (BS 161) and (CEM 141 or 151) and (ECE 345). Biomedical Concentration Course.</td>
</tr>
<tr>
<td>CE 407</td>
<td>Materials Engineering: Properties, Selection and Processing</td>
<td>3(3-0)</td>
<td>Prereq: (CE 221 and ME 222). Recommended background: MSE 250.</td>
</tr>
<tr>
<td>CHE 483</td>
<td>Brewing and Distilled Beverage Technology</td>
<td></td>
<td>See Override Instruction #6 below. Class meeting on Mondays is scheduled in 1145 EB 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).</td>
</tr>
<tr>
<td>ECE 448</td>
<td>Modeling and Analysis of Bioelectrical Systems</td>
<td>3(3-0)</td>
<td>Prereq: (PHY 184). Biomedical Concentration Course.</td>
</tr>
<tr>
<td>ENE 422</td>
<td>Applied Hydraulics</td>
<td>3(2-2)</td>
<td>Prereqs: (ME 332).</td>
</tr>
</tbody>
</table>

**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 2023 include ME 810, 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), which you can pick up in the ME Department office (2555 EB). After you and your professor have completed and signed both sides, return the form to the ME department 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 [griffre@egr.msu.edu](mailto:griffre@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 (griffre@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](https://www.egr.msu.edu/chems/override/index.php)
Important Dates

March 13
Computer enrollment by appointment begins for Fall 2023. (Enrollment for Spring 2024 will begin in October.)

March 14
Senior Elective Night at 7:00 p.m. in 2243 EB, sponsored by Pi Tau Sigma.

May 1-May 5
Final Exams.

May 5
Spring Convocation-1:00 p.m. in Breslin. No tickets required. Lasts about 1 hour.

May 7
Engineering Commencement Ceremony-3:30 p.m. in Breslin. Lasts about 2 hours.

May 15-June 29
First Summer Session.

July 5-Aug 18
Second Summer Session.

May 16-Aug 18
Full Summer Session.

August 28
Fall Semester classes begin.

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.