New faculty member, Professor Tony Gao, works on a diverse array of problems in fluid mechanics, biophysics and materials through modeling and simulation, with a particular focus on soft matter physics. Read about his research on active fluids on pages 8-9.
ABET Accreditation – What It Means to You

by Professor Ron Averill, ME Associate Chair

Every six years, the Accreditation Board for Engineering and Technology (ABET) sends a group of visitors to our campus to review our BS program in Mechanical Engineering. This accreditation process assures that our program meets a high standard for preparing graduates to enter the engineering workplace. So this is very important to all of us – students, instructors, employers and society as a whole.

Our next visit by ABET is in the fall of 2016, less than one year away. But accreditation is much more than a once every six years event. It is an ongoing process that involves the continuous assessment and improvement of our program.

The ABET visit is like going to the dentist for a checkup. If you have eaten mostly good foods and regularly brushed and flossed your teeth since the last checkup, then chances are good that the dentist will give you a thumbs up and maybe a few recommendations for improved dental health. But if you have not done what you know you should have, the dentist has legal ways of inflicting pain and suffering with a drill, all in the name of good health. Just the thought of that second possibility is enough to cause you to brush and floss six times per day during the week before your appointment, but if you have not been diligent in keeping your teeth clean all along, your last minute efforts will likely not be enough.

“The ABET visit is like going to the dentist for a checkup.”

We have been diligent in our assessment and improvement efforts over the past five years, but we still have a lot of work to do in preparing the documents and exhibits that our ABET visitors will need to perform their evaluation. In addition, more assessment activities will take place this year.

During this academic year (2015-16), we are performing another round of assessment to determine how well our students are meeting the desired outcomes. Borrowing language from the ABET web site: “Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the program.” (http://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2015-2016).

In many of our undergraduate courses, instructors will assess one or more of these student outcomes based on student performance on a particular assignment (e.g., a lab report) or part of an assignment (e.g., a test question). In all undergraduate courses, instructors will collect samples of graded work as evidence for the ABET visitors to review during their visit. These samples are for documentation purposes only, and all materials are kept confidential.

If you hear about some of the ABET activities going on within the department this year, feel free to ask for more details. And if you are asked to participate in any surveys, group discussions or other activities related to our ABET process, I hope you will contribute in a positive way.

A successful program accreditation is and will continue to be important to all of our graduates, as it confirms that your educational experience achieves the global benchmark for mechanical engineers.
In Memoriam

Professor Craig Somerton passed away on May 9, 2015 at age 60 after a 3-year battle with cancer. He last taught in the college in fall 2014. Craig received all three of his degrees in Engineering from the University of California at Los Angeles (UCLA): B.S. 1976, M.S. 1979, and Ph.D. 1982 (heat and mass transfer). He also served as Graduate Student Body President and sang in the UCLA A Cappella Choir directed by Roger Wagner.

Craig started his academic career at Louisiana State University. In 1984 he joined the MSU ME Department where he earned the rank of Associate Professor and served as Associate Chairperson of the Undergraduate Program from 2003 to 2010. During his almost 30 years of service at MSU, he was a multiple winner of the College of Engineering’s Withrow Teaching Excellence Award. He served as the ASME Faculty Advisor for the MSU student section for over 21 years and was twice designated as the outstanding faculty advisor for the Midwest Region of ASME. He was an accomplished researcher with technical publications in the areas of heat transfer and thermal design. Craig was especially interested in improving engineering education with over 50 publications and strong activity in the American Society for Engineering Education (ASEE) including best paper and presentation awards at ASEE Annual Conferences. He was involved in curriculum development, course design, and supervising independent study research projects. His office door was always open to help students. Craig also served as an ABET Accreditation Evaluator for 12 years.

Dr. Alex Diaz, professor and chair of the ME department, said Craig’s passing is a tremendous loss. “Craig was a colleague and a friend, a booming presence in the College of Engineering. He cared deeply for our department and for our students. They recognized Craig’s genuine care and commitment, and loved him back. Craig had a tremendous dedication and unstoppable perseverance. He helped shape our program into what it is today [and] he helped shape the lives of several generations of mechanical engineering students. He will be deeply missed.”

Dr. Leo Kempel, dean of the College of Engineering, said Craig was particularly known for going out of his way to help students. “Craig Somerton helped transform the lives of Spartan Engineers as a teacher and well beyond the classroom. He was a leader in curriculum development and a proud proponent of engineering education and program evaluation. He was a favorite consultant to universities on accreditation issues because his commitment was so true.”

Dr. Laura Genik, his former student and now the director of the college’s Applied Engineering Sciences program, said Craig was a big reason she became a professor and educator. “He was an inspiring teacher and one of the kindest people I knew. We collaborated on several classes together over the years. Even when I was working on the West Coast, we would develop the curriculum together to enhance the educational experience for all our students. Not many people can count their Ph.D. advisor among their best friends, but I certainly have always placed Craig there. He sang at my wedding in 1995 and has always been known as Grandpa Craig to my children.”

Craig loved singing, theater, cooking, traveling, sports, and reading. He is survived by his mother and sister, Gerri and Diana, and preceded in death by his father, Mel. The family suggests that those wishing to make a donation in Craig’s memory consider: The Craig W. Somerton Endowed Scholarship in the MSU College of Engineering via the MSU online donation portal https://www.givingto.msu.edu/gift/index.cfm. Checks may be made payable to Michigan State University, annotated “IMO Craig Somerton Endowment A306271.”

Cont’d on pg 11

Department News

• Dr. Tong (Tony) Gao has joined the ME department as an assistant professor. He also has a joint appointment in the Department of Computational Mathematics, Science, and Engineering (CMSE). Dr. Gao obtained his Ph.D. in mechanical engineering from the University of Pennsylvania. Following the completion of his Ph.D., he took a postdoctoral position in the Applied Mathematics Laboratory of Courant Institute of Mathematical Sciences at the New York University. He works on a diverse array of problems in fluid mechanics, biophysics and materials through modeling and simulation, with a particular focus on soft matter physics. Dr. Gao and his wife, Yao Zhang, lives in Okemos. He enjoys watching movie, cooking, hiking, and traveling. Read his article on page 8.

• Dr. Mohsen Zayernouri has joined the Department of Mechanical Engineering (ME) as an assistant professor with a joint appointment in the Department of Computational Mathematics, Science, and Engineering (CMSE). He obtained his first Ph.D. in ME from the University of Utah and his second Ph.D. in applied math from Brown University. Dr. Zayernouri is the director of the Fractional Mathematics for Anomalous Transport and Hydromechanics (FMATH) research group. FMATH group aims to develop computational methods for predictive simulation of interesting engineering problems e.g., turbulent flows, reacting multi-phase flows, anomalous transport, and complex materials. Dr. Zayernouri enjoys reading, watching movies, and traveling, moreover, he is passionate about music and calligraphy.

• Dr. Daniel Segalman has joined the College
Professor Neil Wright received the 2015 Withrow Teaching Excellence Award last spring at a special awards luncheon and ceremony. He was presented with an inscribed plaque, a medallion, and a small stipend. Each year a committee consisting of student representatives from ASME and Pi Tau Sigma reviews nominations from ME juniors and seniors and makes the selection.

Dr. Neil Wright, an associate professor in the Department of Mechanical Engineering, has been described by students as, “everything a teacher should be.” Outside the classroom, Dr. Wright is just as effective and engaged. His impact in department has been tremendous. He has been instrumental in the establishment of a biomedical engineering department, served as associate chair for the ME undergraduate program, and has always been a leader in curriculum development. His connection to students and to the course material is critical. Student evaluations include: “He genuinely wants his students to learn”; “He is passionate about heat transfer”; “He is engaging and funny and reminds students that learning shouldn’t be a burden.” Comment after comment such as these can be found in a thick pile of contributions from students supporting his nomination. “He always puts his students first! He creates an excellent class environment. He convinces students that his subject is worthwhile and interesting.” Even after the semester ends, “he still remembers his students after the class.”

Dr. Wright received his Ph.D. from the University of Pennsylvania in 1992. His current research areas include heat transfer; thermophysical property measurement; parameter estimation; thermal biology. This semester Dr. Wright is teaching ME 412 and 494. In his spare time, he enjoys bicycling, hiking, reading, listening to music, and playing the piano.

Marco Vagani, Abraham Engeda, and Michael J Cave, have been selected as the winners of the 2014 Edwin Walker Award of the British Power Industries Division of the Institution of Mechanical Engineers. The award is offered to the best journal paper on a power industries mechanical engineering subject published by the Institution in the previous year and for significant contributions and achievement. The winning journal paper was: “Prediction of impeller rotating stall onset using numerical simulations of a centrifugal compressor.” The paper was based on the doctoral research work carried out by Marco at ME-MSU.

Marco Vagani is currently a Principal Engineer for Rotordynamics Design and Test in the Gas Compressor Engineering Department of Solar Turbines Inc., in San Diego, California. He joined Solar Turbines Inc. in 2012. He is responsible for the design of new technology for centrifugal compressors using rotordynamic and aerodynamic analysis, as well as activities supporting test success and vibration data analysis.

Dr. Vagani holds B.S., M.S. and Ph.D. degrees in Mechanical Engineering from Michigan State University. His research focus at MSU was in numerical analysis of rotating stall in centrifugal compressors. His MSU supervisor was Dr. Engeda.

**Academic Advising**

1) **ME Juniors and Seniors** are advised by Gaile Griffore. For an appointment, call 355-3338, or go to 2560 EB.
2) **Sophomore juniors-to-be with a 3.0 GPA** are advised by Gaile Griffore. For an appointment, call 355-3338, or go to 2560 EB.
3) **Sophomores** who do not fit the criteria in number 2 above are advised by Elizabeth Clark. To schedule an appointment with her, call 355-6616 x 2.
4) **ME Freshmen** are advised in W-8 Wilson Hall on a walk-in basis only.
87 Seniors to Graduate in December!

Congratulations to all mechanical engineering December graduates! On behalf of the ME 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 October 10. If your name is missing, please contact me immediately (Email Gaile at <griffore@egr.msu.edu> Tele: 517-355-3338).

Bara Saleh Aldasouqi  
Nassar Alhajri  
Benjamin Jay Allen  
Abdulmajed Khalid O Al Otaibi  
Michah Daniel Appel  
Angel Venkov Begov  
Alexander Theodore Bicicoff  
David Daniel Bowers  
Evan James Boyers  
Ross Gilbert Buckley  
William Scott Burek  
Jessica Lea Buschman  
Robert Michael Cenowa  
Kane Clark  
Ryan Michael Clark  
Keegan Francis Connolly  
Joshua Todd Cresswell  
Julian David Diaz  
Katherine G Donnay  
Garrett Lawrence Dunn  
Omar Elisherif  
Dylan James Etheridge  
Tyler Gregory Finse  
Evan Michael Flynn  
Man Kit Foo  
Kimberly Inez Fortenberry  
Tyler Evans Gallant  
Jay Edward Gersonde  
Nathan Bradley Gill  

Bara Saleh Aldasouqi  
Nassar Alhajri  
Benjamin Jay Allen  
Abdulmajed Khalid O Al Otaibi  
Michah Daniel Appel  
Angel Venkov Begov  
Alexander Theodore Bicicoff  
David Daniel Bowers  
Evan James Boyers  
Ross Gilbert Buckley  
William Scott Burek  
Jessica Lea Buschman  
Robert Michael Cenowa  
Kane Clark  
Ryan Michael Clark  
Keegan Francis Connolly  
Joshua Todd Cresswell  
Julian David Diaz  
Katherine G Donnay  
Garrett Lawrence Dunn  
Omar Elisherif  
Dylan James Etheridge  
Tyler Gregory Finse  
Evan Michael Flynn  
Man Kit Foo  
Kimberly Inez Fortenberry  
Tyler Evans Gallant  
Jay Edward Gersonde  
Nathan Bradley Gill  

Taylor Charles Gilliland  
John Paul Gillis  
Ryan James Glynn  
Graham Patrick Goble  
Alexander Harrison Gore  
Aimee Alexa Griffin  
James Raymond Hargrove  
Collin James Hartman  
Jeffrey Michael Hilk  
Alexander Hoover  
Joshua David Hubert  
Daniel John Ignatowski  
Ryan Michael Kutcher  
Bradly David Labaere  
Trevor William Laskowski  
Philip Michael Lecznar  
George Zachary Lewis  
Yan Li  
Qin Liu  
Michael Taylor Mckinley  
Trevor James McSweeney  
Kyle Jordan Medrano  
Evan Kristopher Meier  
Feny Patel  
Michael James Pinger  
Jonathan Chase Pishney  
Samantha Wilkins Pohlen  
Andrew William Poteracki  
Kevin Robert Pugh  
Alan Jonathan Richards  
Katelyn Sabo  
Travis Del Schafer  
Bradley S Seegert  
Daniel Aaron Seiderman  
Joseph Robert Senechal  
Ankit Sharma  
Jun Sheng  
Jiayi Shi  
Andrew Peng Shih  
Rupinder Singh  
Amanda Christine Sliney  
Andrew Mark Stieber  
Karan Raj Gopal Takkalappally  
Mark Edward Taylor  
Michael Travis Thelen  
Basil Ernst Thurston  
Shane Mikol Torecki  
Patrick Edward Vaughan  
Jacob James Vymazal  
Shenquan Wang  
Xuelai Wang  
Koreco Antwan Wilkins-Webster  
Kyle Robert Witgen  
Qin Wu  
Robert Miner Wygant  
Libin Ye  
Alex Harold Zettler  
Yijia Zhang

Tutoring

• The ME Learning Center, located in 1239 EB, has mentors for ME 201, 222, and 361. The hours for Fall 2015 are:
  
  Sunday 6-10 p.m.  Wednesday 6-10 p.m.  
  Monday 4-10 p.m.  Thursday 6-10 p.m.  
  Tuesday 6-10 p.m.  Friday and Saturday-Closed

• The Guided Learning Center (GLC), located in 1108 EB, 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: http://www.egr.msu.edu/egr/departments/dpo/academicassistance/glc/index.html

• The Cornerstone & Residential Experience (CoRe) program provides tutoring in G24 Wonders Hall on Sunday through Thursday from 6 - 10 pm. This is a “drop-in” setting, aimed at the most common first and second year engineering courses (MTH 132, 133; CEM 141, 151; PHY 183, 184). Their website can be found at: http://www.egr.msu.edu/core/residential/tutoring

• ME graduate student and Pi Tau Sigma undergraduate 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

Grammar and the ME
by Craig Gunn, Director of Communications

One of the questions I get from time to time is about how much grammar I have versus an engineer. The questions boil down to, “You English majors have lots of background in writing, grammar, and composition, so how are we engineers supposed to even compete with you? English types in our writing?”

Well, the answer involves the history of our own education. We have all gone through K-12 and taken all the same English classes that required us to learn about propositions, semicolons, complex sentences, and split infinitives. We have collected reams of paper in the form of 500 word essays, research papers, and many lines of poetry. Being an engineer did not remove you from the world of English during your K-12 life. We were all in the same boat, sink or swim. You must have done pretty well since you are here at MSU so maybe there is more to this – I know it all and you don’t – interesting quandary about all that English stuff.

I believe the problem lies in the amount of time that is necessary to get a good engineering education. Engineers feel that all efforts must be focused on only engineering and nothing else. That is well and good, but all that K-12 English education gets atrophied and eventually becomes fairly unusable. It really is important to keep your mind open when it comes to the presentation of your engineering knowledge. All that material that you learned during K-12 is important in your engineering career. Preparing documents that express your knowledge will help in your quest for the perfect jobs, promotions, and a life style that fits your desires.

So, take a little time and dredge up your grammar studies from K-12 and your memory palace. Use all the techniques you learned to create great papers and wow your instructors and your employers!
Teaching Award Nomination Form:

Form: [http://www.egr.msu.edu/me/undergraduate/forms-undergraduate](http://www.egr.msu.edu/me/undergraduate/forms-undergraduate)

If you do not have an accurate long-term schedule on file, schedule an appointment with Gaile by calling 355-3338 or stopping by 2560 EB. NOTE: May and August graduates who will have completed ME 471 and are at least concurrently enrolled in ME 410, may be eligible to take ME 481 next fall. Ask Gaile if you qualify.

ME 489–Technical Communications (2 credits) is on the spring schedule. Instructor: Craig Gunn, ME Director of Communications. IMPORTANT: This course is an Other Elective. It is not a Senior Elective.

ME 491/001–Intro to Computational Fluid Dynamics (3 credits) will be offered Spring 2016 as a non-design intensive Senior Elective. It will taught along with graduate students who will take the course as ME 840, and who will have different assignments.

Spring 2015:
Looking for an adventure? Consider a study abroad program. If you are interested in a summer experience where you can work on an applied engineering project in an advanced facility, tour fascinating sites, savor European foods and beverages, soak in the ambiance of languages and culture, and meet new people, check out the study abroad program with RWTH Aachen.

MSU ME students with a 3.0 GPA or higher have the amazing opportunity to (1) live in Aachen, Germany (mid-May to end of July 2016), (2) earn 5 credits independent study plus 4 credits German language and culture, and (3) travel in Europe with planned 3-day weekends. The experience will involve interaction with fellow engineering students from around the world at RWTH-Aachen, a premier European technical university. The city center is a blend of an old, historic European city and a modern college town. The superb rail system allows our students easy access to Munich, Paris, Amsterdam, Zurich, Rome, and many more destinations on their 3-day weekends. Scholarship funds are available through the North American Rockwell Endowment.

The Aachen Program has been very successful over the years, thanks to the enthusiastic work of Professor John Foss, who retired last spring from his professorial and Aachen-directing duties. Let us recognize Prof. Foss for his outstanding, dedicated, and decorated service in building and directing the Aachen Program over the past 32 years. Thank you Prof. Foss!

A great way to get more information is to talk to former exchange students. They enjoy sharing their experiences with the program. Former Aachen exchange students can be reached through me or Professor Foss. If you would like to find out more, please contact me at feeny@egr.msu.edu or 353-9451.

Don’t miss this opportunity!

Professor Foss on Grosskoelnstrasse in Aachen, February 2015.

PHOTO PROVIDED BY DR. FEENEY
Active fluids, the novel class of non-equilibrium materials made up of self-driven constituents, presents scientific challenges to our understanding of material properties and has the potential to provide valuable new technologies such as autonomously moving and self-healing materials. Examples of active fluids include biopolymer networks (Fig 1A), swarms of swimming bacteria (Fig. 1B), self-propelled or chemically-active colloidal particles (Fig. 1C), and liquid crystalline fluids `stirred’ by microswimmers (Fig. 1D). Typically, these active particles are capable of converting stored or ambient energy (e.g., chemical fuel) into mechanical movement.

When immersed in liquid, any particle motion will exert force onto the ambient fluid, which transmits in a “long-ranged” fashion. In other words, the particle-activity induced flow can be “felt” by the others that are relatively far-away. Such “hydrodynamic” interactions are very different from the short-ranged contact forces due to collision and may cause various relative motions between immersed particles. When the system is densely packed by the active particles that are randomly moving, the local hydrodynamic interactions can manifest themselves at macroscale to generate large-scale collective motion. The dynamics typically feature nonequilibrium ordering transitions, anomalous fluctuations and mechanical properties, accompanying turbulent-like flows (Fig. 1E) that persist, just like the flows in a whirlpool.

Hence it is important to recognize, from all these fascinating active systems, that the highly ordered dynamical systems could be constructed hierarchically from the local randomness in a small aquarium following certain physical rules!

The complex fluids group at MSU focuses on modeling and simulation of active fluids composed of various different kinds of ingredients. For example, we study the collective motion of mixtures of microtubules (MTs) and molecular motors – the building blocks of self-organized subcellular biological structures such as the mitotic spindle. Very recently, they were used to build a novel `bioactive’ liquid-crystalline fluid powered by a chemical fuel, ATP (Adenosine Triphosphate). As illustrated in the schematic in Fig. 2A, the motor complexes (multimeric kinesin-1) can bind onto the MTs and walk towards their plus-ends, which effectively drives the relative sliding motion of the connected MT pairs. When these MT groups were adsorbed onto an oil-water interface, they formed a dense, nematically ordered surface state and exhibited an active nematic phase characterized by the spontaneous generation and annihilation of disclination defect pairs in the chaotic, self-generated flows (Fig. 2B).

We have developed a multiscale method for this system. First of all,
at microscale, we use Brownian dynamics to simulate polar microtubule ensembles driven by active crosslinks, which are used to simulate the microscopic organization of filament network formation, as well as the stresses created by microtubule interactions. In this way, we are able to identify two polar-specific sources of active destabilizing stress: polarity-sorting for anti-aligned MT pairs and crosslink relaxation for polar-aligned ones. We developed a Doi-Onsager theory that captures both the MT sliding motion and the hydrodynamic flows generated by the active stresses.

As shown in Fig. 2, when simulating in regions of flow instability we find persistently unsteady flows correlated with continual genesis, propagation, and annihilation of defect pairs. When we examine simulation results at later times, from the initial data near uniform isotropy, we find dynamics that are complex and appear turbulent. The surface velocity and vorticity show formation of jets and swirls (Fig. 2C). The local MT orientation is highly correlated with the flow structures, and the surface is littered with +1/2 defects which propagate freely about the system (Fig. 2D). These defects exist in regions of small nematic order (dark blue), and are born as opposing pairs in elongated “crack” regions. These are associated with surface jets, locally decreasing nematic order, and increasing curvature of director field lines. Characteristically, the +1/2 defects propagate away along their central axis and have a much higher velocity than those of -1/2 order. More interestingly, our detailed analysis shows that the dynamics originates from a concatenation of linear instabilities that causes the “bending” of nematic field lines, and gives characteristic length- and timescales in this system.

Besides the research of active fluids, our group also works in other areas in the general category of complex fluids, such as bacterial suspensions, microgel particles, biological cells and vesicles, etc. The key aspect of my research is to understand the details of fluid-structure interactions at different length and time scales using the novel multiscale methods developed or integrated in our group. Such combined efforts of theory and simulation will break new ground in analyzing active materials that are far-away from equilibrium and, hence, will serve as powerful tools to diagnose and design new biomimetic materials.
As the economy continues to strengthen, businesses large and small are hungry for engineering talent, which has directly impacted recruitment practices on campus this fall! It has been exciting to see the level of interest that has been expressed in hiring top talent from the College of Engineering, ranging from involvement with our CoRe Program to formal recruiting events in the college and across campus.

Knowing that companies have a congested fall calendar with recruitment activities across the country, MSU jumped in line to offer engagement activities earlier in the academic year, beginning with our Partner’s Week in mid-September. Beginning the second week of class, the halls of the Engineering Building were filled with our corporate recruiting partners, who were actively seeking candidates for full-time, co-op and internship positions across the nation through luncheons, highlight presentations, resume critiques, and the first ever Partner’s Showcase!

Following the Showcase, engineering students were continuously offered a wealth of occasions to network with employers through ASK Sessions, resume critiques, and practice interviews. These activities all lead to what became the largest recruitment event that the College of Engineering has hosted on its grounds, which was the 1,300+ attendee Engineering Pre-Gallery Co-op/Intern Exchange, where over 75 companies came to hire students purely for experiential opportunities! The hallways were packed (if you attended, you know this is an understatement!), the lines were deep with talent, and the employers were ecstatic with the quality of candidates that they met throughout the day!

After the Pre-Gallery and Career Gallery, which welcomed well over 1,500 students the following day, the focus has shifted to interview preparation and salary negotiation for some with continuing employment pursuit growing for others throughout the remainder of the semester. It is important to understand that opportunities exist well beyond that one month, although September is certainly the optimum time to connect with companies, as jobs are continuously being posted and interviews are still being scheduled on campus.

Whether it is prepping for an interview, applying for positions that match your interests, or utilizing additional resources (such as LinkedIn) to connect with recruiters and alumni, The Center for Spartan Engineering (1340 Engineering Building) is available to aid in your career exploration. The staff and career peers offer an open door environment, welcoming questions and addressing concerns regarding the career search from 8:00 AM to 7:00 PM on Mondays through Thursdays and 8:00 AM to 5:00 PM on Fridays! After getting a resume critique, the staff would be happy to talk in more depth about specific interests in the industry and assist in your development and connection to efficiently build relationships with employers.

On the horizon, the Engineering Expo (February) and Spring Break Corporate Tour (March) are major events that are hosted by the college in the spring, but companies will maintain a presence on campus in the meantime. Take advantage of ASK Sessions, attend workshops and seminars, stop by The Center, and put yourself in the position to land a quality work experience!
ASME

The MSU Student Chapter of the American Society of Mechanical Engineers is a non-profit student organization, the main purpose of which is to introduce MSU students to the world of engineering. The Chapter provides a great opportunity for students to meet representatives of leading industrial companies, allowing students to learn about these companies and about possible internship and employment opportunities.

Throughout the 2015-16 school year ASME will be hosting a large variety of events ranging from company information sessions, community outreach, social events and design challenges. Through ASME, members can network with recruiters as well as their fellow students. A few examples of non-company partnered events that have been hosted by ASME in the past are: Junkyard Wars, Career Gallery How-to’s, Impressions Five exhibit participants and a trip to the North American International Auto Show.

To learn more about our upcoming events please visit our Facebook page at https://www.facebook.com/ASMEatMSU/?fref=ts and at http://www.egr.msu.edu/asme/events.html

Submitted by Taylor Forbush, Treasurer.

Pi Tau Sigma

The Tau Epsilon Chapter of Pi Tau Sigma, the international mechanical engineering honor society, has begun the fall 2015 semester with the hope of continuing its efforts in bolstering and incentivizing membership within its elite ranks.

Events for initiates and members have occurred, including the traditional Wing Night and Game Night, along with an outreach visit to the Greater Lansing Food Bank. Additional service, social, and academic events will be held throughout the semester.

Pi Tau Sigma will be hosting a Mechanical Engineering Senior Elective presentation on Wednesday, November 18th at 7:00 pm in 1345 Engineering Building. This event aims to inform students about their ME senior elective options and give them a chance to ask questions from those who have already taken the courses. This will be both fun and informative. All are welcome and encouraged to attend.

Students in the Tau Epsilon chapter of Pi Tau Sigma are eager to extend the group’s presence within the engineering college, MSU campus, and greater Lansing community. The goal is to ensure a worthwhile experience within the organization as well as provide members with exclusive benefits and opportunities. For more information you can visit the Tau Epsilon chapter’s website at www.egr.msu.edu/pts as well as the national headquarters website at www.pitau-sigma.org

Submitted by Zachary Tuller, President.

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), and 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.

Cont’d from pg 3

Dr. Alex Diaz has stepped down from his position as ME department chairperson. Dr. Manooch Koochesfahani is serving as interim chair.

Dr. Xinran (Sharon) Xiao has been promoted to Full Professor.

Happy Thanksgiving!
Michigan State’s Baja SAE team has been hard at work designing, fabricating, and assembling for this year’s upcoming race season lead by Michael Holland, Thomas Sheldon, and Ray Renaud. This year’s car will be an improvement on last year’s car, and potentially the lowest weight car in MSU Baja’s history. With generous donations by their various sponsors, the Baja team is planning on having their car completed and tested by the end of the school year.

While much of the car is already designed, many of the components still have to be fabricated, and the various systems have to be optimized. Thomas Sheldon is improving on last year’s custom gearbox with reduced weight and smaller packaging, Ray Renaud is optimizing the cg of the car by centering and lowering it, and Brad LaBaere is completely redesigning the rear suspension. With the help of returning members and new members, the Baja team will be preparing four cars from previous years to compete in a race held each year at Michigan Tech. This race, commonly known as Blizzard Baja, provides new members on the team with driving and competition experience before their SAE races in Tennessee, New York, and California this summer. Submitted by Michael Holland, Project Manager.
Formula SAE

Every year, students on the Formula SAE Racing team work hard to design, manufacture, and test an open-wheel, formula-style car. Last year, the team took 11th place out of 120 teams at the Formula SAE Lincoln Competition. The team is now working on the 2015-2016 car.

Formula SAE is the world’s largest engineering design competition with over 500 schools competing from around the globe. This year, the team will compete in two events: the first is in May at the Michigan International Speedway and the second is in June at the Lincoln Airpark in Nebraska.

Students on the team gain experience in design, analysis, manufacturing, and testing. The whole car is designed in CAD and all structural components are analyzed using Finite Element Analysis (FEA) software or physical testing. Students also run Computational Fluid Dynamic (CFD) analyses, engine performance simulations, suspension kinematic simulations, composite structure analyses, and more.

If you have any questions related to the Formula Racing Team, please reach out to Jonathan Bianchi at bianch19@msu.edu. Submitted by Jonathan Bianchi, Project Manager.

PHOTO PROVIDED BY JONATHAN BIANCHI
The following list of requirements applies to new mechanical engineering program freshmen and transfer students, **BEGINNING Fall SEMESTER 2016 AND THEREAFTER.** Program requirements are changed periodically, and consequently, each student is strongly encouraged to consult with an advisor for academic planning assistance.

**Freshmen:** Go to W-8 Wilson Hall for walk-in advising. **Sophomores:** Call 355-6616, ext. 2 or go to W-8 Wilson Hall. **Juniors and seniors** Call 355-3338 or go to 2560 Engineering Building.

The application for upper school is located at: [http://www.egr.msu.edu/undergraduate/academic/admission-engineering](http://www.egr.msu.edu/undergraduate/academic/admission-engineering)

It is available between the 3rd and 15th week of each semester. Applications are reviewed at the end of each semester after final grades have been posted.

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**Mechanical Engineering students may fulfill an alternative track to the Integrative Studies requirement in Biological and Physical Science (ISB & ISP) by completing one of the following courses:**

- BS 161
- ENT 205
- MMG 201
- PLB 105
- **PSL 250**
- ZOL 141 (Course in bold has 4 credits.)

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### DEGREE REQUIREMENTS

#### I. UNIVERSITY REQUIREMENTS (23)

- Writing (WRA 110-150) 4
- Integrative Arts & Humanities (IAH) 8
- Integrative Social Science (ISS) 8
- Integrative Biol. & Phys. Sci. (ISB/ISP) 3

#### II. COLLEGE REQUIREMENTS (32)

- EGR 100 Intro to Engineering Design 2
- CSE 231 Intro to Programming I 4
- MTH 132 Calculus I 3
- MTH 133 Calculus II 4
- MTH 234 Multivariable Calculus 4
- MTH 235 Multivariable Calculus II & Differential Equations 3
- CEM 141 General Chemistry I 4
- PHY 183 Physics for Scientists & Engineers I 4
- PHY 184 Physics for Scientists & Engineers II 4

#### III. MAJOR REQUIREMENTS & ELECTIVES (75)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 221</td>
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</tr>
<tr>
<td>CEM 161</td>
<td>1</td>
</tr>
<tr>
<td>ECE 345</td>
<td>3</td>
</tr>
<tr>
<td>ME 201</td>
<td>3</td>
</tr>
<tr>
<td>ME 222</td>
<td>3</td>
</tr>
<tr>
<td>ME 280</td>
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<tr>
<td>ME 300</td>
<td>1</td>
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<tr>
<td>ME 332</td>
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<td>ME 361</td>
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<td>ME 371</td>
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<td>ME 391</td>
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<td>ME 410</td>
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<td>ME 451</td>
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<td>ME 461</td>
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<td>ME 471</td>
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<tr>
<td>MSE 250</td>
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</tr>
<tr>
<td>STT 351</td>
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### MAJOR REQUIREMENTS (Cont’d)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ME 416 * Computer Assisted Design of Thermal Systems</td>
<td>3</td>
</tr>
<tr>
<td>ME 417 * Design of Alternative Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>ME 422 * Introduction to Combustion</td>
<td>3</td>
</tr>
<tr>
<td>ME 423 * Intermed. Mech. of Deformable Solids</td>
<td>3</td>
</tr>
<tr>
<td>ME 425 * Experimental Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 426 * Intro to Composite Materials</td>
<td>3</td>
</tr>
<tr>
<td>ME 433 * Intro to Computational Fluid Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>ME 440 * Aerospace Engineering Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>ME 442 * Turbomachinery</td>
<td>3</td>
</tr>
<tr>
<td>ME 444 * Automotive Engines</td>
<td>3</td>
</tr>
<tr>
<td>ME 445 * Automotive Powertrain Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 464 * Intermediate Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>ME 465 * Computer Aided Optimal Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 475 * Computer Aided Design of Structures</td>
<td>3</td>
</tr>
<tr>
<td>ME 477 * Manufacturing Processes</td>
<td>3</td>
</tr>
<tr>
<td>ME 478 * Product Development</td>
<td>3</td>
</tr>
<tr>
<td>ME 490 * Independent Study</td>
<td>1-3</td>
</tr>
<tr>
<td>ME 491 * Selected Topics</td>
<td>1-4</td>
</tr>
<tr>
<td>ME 494 * Biofluid Mechanics &amp; Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>ME 495 * Tissue Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 497 * Biomechanical Design in Product Development</td>
<td>3</td>
</tr>
</tbody>
</table>

*The above list of Senior Electives may be augmented with other courses that have been approved by the department. They can be found in the ME Bulletin (undergraduate newsletter.)*

**Concentrations are available in automotive powertrain, biomedical, manufacturing, mechanics, energy, computational design, and global engineering. Contact the ME Advising Office for information.**

### Other Electives

- **8**

### TOTAL

- **128**
SPRING SEMESTER SENIOR ELECTIVES

The asterisk (*) after a course number indicates that it has been officially designated as “Design Intensive.”

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 442 Turbomachinery. 3(3-0). Prereq: ME 332.

ME 445 Automotive Powertrain Design. 3(3-0). Prereq: ME 444.

ME 464 Intermediate Dynamics. 3(3-0). Prereq: ME 361.

ME 465 Computer Aided Optimal Design. 3(3-0). Prereq: (ME 222 and 280) and (ME 371 or concurrently).

ME 477 Manufacturing Processes. 3(3-0). Prereq: ME 222, MSE 250, and Tier I Writing.

ME 478 Product Development. 3(3-0). Prereq: ME 477.

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

ME 491 Selected Topics in Mechanical Engineering. Section 001: Intro to Computational Fluid Dynamics. See Override Instruction #2 Below. Course Description: Theory and application of finite difference and finite volume methods to selected fluid mechanics and heat transfer models including a potential flow model, a compressible flow model and an incompressible Navier-Stokes model. Prereq: ME 410.

This course will be taught with graduate students who will take the course as ME 840, and who will have different assignments. If you have questions, contact the instructor.

ME 491 Selected Topics in Mechanical Engineering. Section 603: Automotive Noise and Vibration. See Override Instruction #2 Below. Course Description: Automobiles are one of the most complex and expensive machines that an individual will purchase and use. Vibrations in a vehicle can affect vehicle durability, safety, performance, customer comfort, and even the decision of whether or not to purchase the vehicle. This course will focus on the engineering application of mechanical vibrations to vehicles including: different sources of vehicle vibrations, how these can affect different vehicle systems, driver perception of noise and vibration, and engineering approaches to control vehicle noise and vibration. Prereq: (ME 461 or concurrently).

Tissue Mechanics. 3(3-0). Prereq: ME 222. Biomechanical Concentration Course.

ME 497 Biomechanical Design in Product Development. 3(3-0). Prereq: ME 371 or concurrently. Biomechanical Concentration Course. Bush.

BE 445 Biosensors for Medical Diagnostics. 3(3-0). Prereqs: (BS 161) and (CEM 141) and (ECE 345). Biomechanical Concentration Course. Alocilja.

CE 492 Selected Topics in Civil Engineering. Section 001: Materials Engineering: Properties, Selection, and Processing. See Override Instruction #3 Below. Course Description: Students will learn general categories of materials, mechanical and physical properties of materials, materials selection by utilizing bubble chart, thermal properties of materials, and materials processing method and environment. Prereq: None. Lu.

EN 422 Applied Hydraulics. 3(2-2). Prereq: ME 332. Pokhrel.


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 2016 include ME 814, 825, 861, and 872. See Override Instruction #4 below.

OVERRIDE INSTRUCTIONS

1) 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.

2) Complete and submit the ME Override Request Form: http://www.egr.msu.edu/form/me-override-request Please note that the ME department cannot overfill required courses to resolve conflicts with Senior Electives, Other Electives, Integrative Studies courses and employment schedules.

3) CE 492/001–To request an override, submit the CEE Override Request form: http://www.egr.msu.edu/form/request-cee-course-override-100-499

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

November 13  Deadline for Withrow Teaching Award Nominations. The nomination form is located at: [https://www.surveymonkey.com/r/9L7XFL8](https://www.surveymonkey.com/r/9L7XFL8)

November 13  All currently enrolled students who have not enrolled by 8 p.m. in at least one course for Spring will pay a $50 late fee.

November 18  Senior Elective Night at 7:00 p.m. in 1345 EB. Sponsored by ASME.

Nov 26-27  Thanksgiving recess

December 11  Last day of classes & Design Day.

December 19  Undergrad Commencement Ceremony-Breslin at 2 pm. Lasts about 2 hours. No tickets required.

Dec 14-18  Final Exams

Dec 19-Jan 10  Semester Break

January 15  On-line Open Add Period for Spring 2016 ends at 8 p.m. **ALSO**, deadline for May 2015 and August 2015 graduates to apply for graduation.

March 14  Scheduled Computer/Telephone Enrollment period for summer semester begins.

April 1  Computer Enrollment period for fall/spring 2016-2017 begins. Your enrollment access date will be posted on StuInfo in mid-March.

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.