

ME Bulletin

News for
Mechanical
Engineering Majors

Vol. 50, No. 2 ME Advising Office • 2560 EB • 355-3338 Spring, 2013

COVER STORY

ME senior builds a working steam engine! Read his story on page 8.



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Russ Tindall, who finished his BSME degree in December 2012, shows off the steam engine he built during his last semester. Read about his remarkable experience on page 8!

HARLEY SEELEY

Associate Chair's Corner

by Professor Neil T. Wright

Senior Electives



The required courses of the mechanical engineering curriculum provide a broad background to solve many real-world problems and lay the foundation for many

exciting careers. Senior electives allow you to tailor your education to match your interests (or even to fit a schedule). Some students work towards a specific concentration in ME: Biomechanical Engineering, Engineering Mechanics, Manufacturing Engineering, or Global Engineering. Completing one of the concentrations yields official recognition on your transcript, at the cost of constricting elective choices somewhat. Yet, the mechanical engineering degree itself, even without a concentration, opens doors in each of these subdisciplines.

As you know by developing a curricular plan with **Ms. Gaile Griffore** (oh yeah! I should do that!), a student must take a minimum of 12 credits of senior electives, with at least three of these credits being a design-intensive elective. The design intensive courses

are *ME 416-Computer Assisted Design of Thermal Systems*, *ME 417-Design of Alternative Energy Systems*, *ME 442-Turbomachinery*, *ME 445-Automotive Powertrain Design*, *ME 456-Mechatronic System Design*, *ME 465-Computer Aided Optimal Design*, and *ME 475-Computer Aided Design of Structures*. (You can take more than three credits of the design-intensive electives – each qualifies as a senior elective.) The other senior electives are *ME 422-Introduction to Combustion*, *ME 423-Intermediate Mechanics of Deformable Solids*, *ME 425-Experimental Mechanics*, *ME 426-Introduction to Composite Materials*, *ME 440-Aerospace Engineering Fundamentals*, *ME 444-Automotive Engines*, *ME 457-Mechatronic System Modeling & Simulation¹*, *ME 464-Intermediate Dynamics*, *ME 477-Manufacturing Processes*, *ME 478-Product Development*, *ME 494-Biofluid Mechanics and Heat Transfer*, *ME 495-Tissue Mechanics*, and *ME 497-Biomechanical Design in Product Development*. *ME 491-Selected Topics in Mechanical Engineering* is sometimes offered, most recently as a Computational Fluid Mechanics course offered in conjunction with a graduate version and, last spring, as a course in International Development. *ME 490-Independent Study* is a special

case that can be offered when a student and professor agree on a topic of mutual interest.

So, if you are interested in product development you might choose *ME 465*, *ME 477*, *ME 478*, and *ME 497*. Maybe you'd like to design a better turbine and decide on *ME 417*, *ME 442*, *ME 475*, and *ME 491* (CFD). Some folks might see the *ME 475* as out-of-bed with the thermofluid courses, but the structure of a turbine blade and shaft is important to the design, too. Or maybe you substitute *ME 425* for *ME 475* because you are interested in measuring the loads in a turbine blade. There are many winning combinations of these courses.

A professor tends to develop an elective based on a favorite topic. If that professor retires or leaves, there may not be someone sharing the excitement about this class, and such a class may no longer be offered, although it takes a while to disappear from the official records. The hope is, of course, that as new faculty members join the department, new classes will be offered. This is one way in which the curriculum is refreshed and kept modern.

ME Bulletin

The *ME Bulletin* is published once each semester for sophomores, juniors, seniors, faculty and staff of the Department of Mechanical Engineering. It is also published as a PDF file at the following location:
<http://www.egr.msu.edu/me/undergrad/newsletter>

Photos were taken by Craig Gunn unless noted otherwise.

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Correction

The photo of Dr. Lee on page 5 of the Fall 2012 *ME Bulletin* was incorrect. The correct photo is shown below and also in the Fall 2012 online version. The *ME Bulletin* sincerely regrets the error.



Curriculum News & Reminders

- **ME 280—Graphic Communications** will not have an Honors section for 2013-14. If you would like to do honors work in this course, you should speak to the instructor about arranging an Honors Option.
- **ME 372—Machine Tool Lab** will be offered fall and spring semesters. Instructor: Roy Bailiff. *Manufacturing Concentration students are given priority for seats in this course.*
- **ME 440—Aerospace Engineering Fundamentals** has been moved from fall to spring semester for 2013-14 only.
- **ME 456—Mechatronic System Design** will not be offered next fall due to the retirement of Dr. Radcliffe.
- **ME 464—Intermediate Dynamics** has been moved from spring to fall semester for 2013-14 only.
- **ME 465—Computer Aided Optimal Design** will be offered online next fall as a pilot program to a small group of students. If you are interested in taking this class, see Override Instruction number 2 on page 15.
- **Class Standing (Rank)** information for ME juniors and seniors is available in the ME Advising Office. You will need to present your MSU I.D. card. ME sophomores can obtain this information in 1415 EB.
- **ME 481—ME Design Projects:** ME department approval is required before enrolling in ME 481. To obtain approval, submit the *ME 481 Enrollment Approval Form* located in the Forms/Handouts link on the ME undergraduate website. ME 481 must be taken during your last semester (or spring semester for August grads). If you do not have a long-term schedule on file, or if your old one needs to be updated, please call 517-355-3338 and schedule an appointment with Gaile.
- **MSE 426—Intro to Composite Materials** has been changed to ME 426.
- **ME Graduate Courses:** If your GPA is 3.5 or higher, you may be able to take a graduate-level course and apply it to your Senior Electives. To obtain permission, complete a *Graduate Course Override* form, available in the ME Advising Office. This is a paper form.
- **Prerequisites:** The ME department expects all students, *including members of the Honors College*, to observe all course prerequisites. If you have a question, contact the ME Advising Office at 355-3338.
- **Schedule Conflicts:** The ME department will assist students with conflicts between required courses. *However, the department does not overfill required courses to resolve conflicts with Senior Electives, Other Electives, Integrative Studies courses and employment schedules.*

Graduate School Linked BS-MS Program for Juniors

If you are interested in graduate school, it's already time to consider using the Linked BS-MS option. You can apply for the Linked BS-MS program in order to use up to 9 credits of qualifying 400-level (and above) classes to count toward the credit requirement of the master's degree. This effectively reduces the duration of a master's degree by one semester (or more sometimes). It is important to apply now to allow flexibility in scheduling the three courses during your senior year. This can be combined with a summer research internship in a lab to get a head start on your research.

Stop by the ME department office (2555 EB) where Ms. Aida Montalvo can make an appointment with Prof. Ahmed Naguib, ME graduate advisor, to discuss your options at MSU. Much information about pursuing graduate school at MSU can be found at www.egr.msu.edu/me/graduate

Special Overrides

- **Transfer Prerequisite Override Requests:** If you plan to take the prerequisite for an ME course at another institution this summer, you need to submit a *Transfer Override Form*, so that you can receive a prerequisite override and enroll in the next course in the sequence. The form can be found at: <http://www.egr.msu.edu/me/undergrad/forms>.
- **ME 410 and 412** may be taken concurrently during Summer Semester *only*, but you will need a prerequisite override for ME 412. First enroll in ME 410. Then, submit the *ME Override Form* on the ME undergraduate website. Select "Other" for Reason for Request and write that you are taking ME 412 concurrently with ME 410 this summer.
- **ISS 3xx Overrides:** Students who transferred their first ISS course need a prerequisite override before enrolling in ISS 3xx. To obtain the override: Go to 302 Berkey Hall on Monday-Friday at 8:30 a.m.-4:30 p.m. Say that you transferred your first ISS and you need a prerequisite override to take the 300-level course. *Be prepared to tell them the course number and section you are requesting. ➔ You must select a section that has an open seat. You will NOT receive an override for a full section!*

Academic Advising

- 1) **ME Juniors and Seniors** are advised by **Gaile Griffore**. For an appointment, call 355-3338, or go to 2560 EB.
- 2) **Sophomores with a 3.0 GPA who will be juniors at the end of this semester** 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 Carmellia Davis-King. To schedule an appointment, call 355-6616 x 2.
- 4) **ME Freshmen** are advised in W-8 Wilson Hall on a walk-in basis only.

Engineering and Entrepreneurship

By Jonathan DiClemente, ME Senior



Entrepreneurship is portrayed as the sexy alternative to the structured corporate grind. It is commonly associated with the extremely successful players like **Bill Gates, Steve Jobs**, and MSU Alum

Dan Gilbert whose finished products make it look easy. However, the reality is that it is not easy. You never see the struggles that were necessary to reach the finished product. Nevertheless, I would encourage every student, especially engineers, to start their own venture.

As engineers we have a unique ability to dissect a problem and provide a solution with a systems' approach. We always have ideas about how to make things faster, safer, or more enjoyable. The problem is that many simply do not know how to bring the solution to scale, so we don't do anything. This is exactly the opposite of what you should do. I can say from experience that the best way to make a difference is to just do something! Anything! What many students don't know is that there's help available.

Once you have an idea, the first step as a student entrepreneurial engineer is to apply for the Gerstacker Entrepreneurial Grant. This grant forces you to work out your idea into a viable business model, and it will give you access to one of the hidden gems just off campus called, The Hatch. The Hatch is a start up incubator managed by **Paul Jaques** of Spartan Innovations. He says, "The Hatch is a great place for students to work on their business idea and collaborate with like-minded individuals that may not be in the same major but can bring some great insight to the idea." You instantaneously have an entire business team at your disposal.

My first venture is Current Tidal¹ which now has two main focuses in offshore tidal and dam retrofitting using hydrokinetic systems to generate energy. We recently competed in the Michigan Clean Energy Venture Challenge with these two products and won the award for Best Renewable Energy Generation Venture out of 76 teams. Another MSU team, Green Coal², won the award for Best Team Assembled. Current Tidal is now in talks with various investors and power companies interested in licensing the technology.

**ONCE YOU HAVE AN IDEA,
THE FIRST STEP . . . IS TO
APPLY FOR THE GERSTACKER
ENTREPRENEURIAL GRANT.
THIS GRANT . . . WILL GIVE
YOU ACCESS TO THE HATCH.**

In January, I started a second venture that is a web service with the goal to eliminate all barriers to help creative people get their ideas developed and into a mass-market setting. (I am in need of more web developers... contact me!)

As students, now is the best time to take risks, try something new, and begin your venture. I could go on to say why employers or graduate schools will find you more attractive, but that is obvious. Your heart should be in your work; and if you are passionate about something, go do it. You will face enormous challenges; but if you stick to it, your passion will be infectious and help will find its way to you.

¹ Students currently in the COE that are participating in Current Tidal: **Jonathan DiClemente** (ME), **Justin Mrkva** (ME/CSE), **Zack Hoyle** (ME).

² Students currently in the COE that are participating in Green Coal: **Jinsha Li, Kristen Henn, Jamie Yeyung, Kaitlin Ward** (All Biosystems Engineering).

Study Abroad in Edinburgh by Gaile Griffore & Craig Somerton

Founded in 1582 the University of Edinburgh is one of Europe's finest universities with a great tradition of producing outstanding scholars, including such giants as **Charles Darwin** and **Sir Arthur Conan Doyle**. With respect to engineering, there is **William John Macquorn Rankine**, who proposed both the Rankine cycle (primary in the operation of steam power plants) and the Rankine temperature scale (the absolute scale used in English units).

Even with this history, the mechanical engineering facilities are very modern, allowing the faculty and students to pursue research topics varying from wave energy to micro-fabrication.

The city of Edinburgh, whose downtown is a short bus ride from the university's engineering buildings, is listed as a World Heritage Site. In addition, for students seeking leisure activities the city has a terrific night life with many activities for young adults.

Students can take courses that fulfill their entire Senior Elective requirement (12 credits of Senior Electives, including a 3-credit design intensive course). Examples of courses include:

- **Sustainable Energy Group Design Project (Design Intensive)**
 - Marine Energy
 - Manufacturing Technology
 - Engineering for Renewable Energy
 - Wind Energy
 - Polymers and Composite Materials
- For more information, contact:*
- *Gaile Griffore, ME Advisor*
Office 2560 EB / Phone: 517-355-3338
Email: grieffore@egr.msu.edu
 - *Maggie Blair-Ramsey, Coordinator*
Engineering Study Abroad Program
Office: 1108 EB / Phone: 517-432-2012
Email: blairram@egr.msu.edu

Are You Careful to Avoid Bloopers?

by Craig Gunn, Director of Communications



Every three or four years, I drag out a few documents that I believe are intended simply for relaxation and humor. You may have seen some of these examples before; but hopefully, I have found some that will raise a chuckle or two. As you read them, I hope that you will consider what these "Bloopers" could do to a serious piece of technical text that you are trying to create. Inserted in all the wrong places they will destroy any credibility that you have.

Think about the student who wrote these passages about history for his dissertation. "Delegates from the original 13 states formed the Contented Congress. **Thomas Jefferson**, a Virgin, and **Benjamin Franklin** were two singers of the Declaration of Independence. Franklin discovered electricity by rubbing two cats backwards and declared, 'A horse divided against itself cannot stand.' Franklin died in 1790 and is still dead."

"Maybe better," **Abraham Lincoln** became America's greatest Precedent. Lincoln's mother died in infancy, and he was born in a log cabin which he built with his own hands. Abraham Lincoln freed the slaves by signing the Emancipation Proclamation. On the night of April 14, 1865, Lincoln went to the theater and got shot in his seat by one of the actors in a moving picture show. The believed assassin was **John Wilkes Booth**, a supposedly insane actor. This ruined Booth's career."

"And lastly," **Beethoven** wrote music even though he was deaf. He was so deaf he wrote loud music. He took long walks in the forest even when everyone was calling for him. Beethoven expired in 1827 and later died for this."

Submit your poem to the 2012-2013 College of Engineering Poetry Forum

Celebrating a year's worth of poetry from April 1, 2012 to April 12, 2013. All poets are welcome!

JOIN the excitement of creating a lasting poetical endeavor!

SEE <http://www.egr.msu.edu/fses/2012-2013.pdf> for rules

SEND all poems to poetryforum@egr.msu.edu

Submissions will be printed!

37 ME Students Receive Awards

Congratulations to thirty-seven ME students who were honored at the Evening with Industry Awards Banquet on February 20! The names of those receiving high achieving student recognition are italicized on the Dean's List on page 7. Eleven students were presented with the following awards:

Outstanding Women in Engineering (WIE)Awards:

- Amanda Boyd (ME Senior), presented by Bosch.
- Aerin Klump (ME Senior), presented by ArcelorMittal.
- Andrea Vedrody (ME Freshman), presented by TAC Manufacturing, Inc.
- Miriam Chege (ME Sophomore), presented by Consumers Energy.

Outstanding Diversity Programs Awards:

- David Spears (ME Senior), presented by Whirlpool Corporation.
- Noelle Kahunguba (ME Junior), presented by Johnson Controls.
- Darius Barrett (ME Senior), presented by Nucor Steel.

Exceptional and Distinguished Service Awards:

- Christopher Baldwin (ME Senior), nominated by Raymond Peterson (ME Senior).
- Benjamin Bosworth (ME Senior), nominated by Dr. Gary Cloud.
- Jessica Buschman (ME Sophomore), nominated by Dr. Tamara Reid Bush.
- Cody Little (ME Senior), nominated by Mr. Drew Kim.



Just think about the effect of these bloopers on the reader who sits and gets a good laugh from what you have written. It may be good enter-

tainment, but the cost may be great if what you wrote was supposed to gain a better job, a promotion, or a prestigious degree.

Career Regrets? Really!

by Bernadette Friedrich, Director of Student Advancement



I am sure most of you are at the point in your college career where you have chosen your final major and are working towards receiving your diploma. Some of you may have changed your major once or twice or more, but now you are methodically attacking your course work for a degree in Mechanical Engineering. Oh the decisions, the anxiety, the questions you may have encountered along the way.

Now that you know what degree you are pursuing you may begin asking yourself other questions. What is it that mechanical engineers really do? Am I going to be happy working in an engineering environment? Do I want to work for a large organization? A small one? Do I want to work for myself? There are a lot of decisions to be made, all in good time. I recently read an article by **Dan Gulati**.¹ Dan is a tech entrepreneur and is a coauthor of the book *Passion & Purpose: Stories from the Best and Brightest Young Business Leaders* and a contributor to the *HBR Guide to Getting the Right Job*. Dan writes about the top five career regrets people have identified. As you move towards graduation it might be a good idea to hear what some individuals learned after graduation.

1) I wish I hadn't taken the job for the money. Wow! So the moral of the story is, money isn't everything. Consider all of your options carefully, what is going to make you happy? How do you want to spend your time at work? What other benefits may be involved that aren't necessarily wrapped up in your financial package?

2) I wish I had quit earlier. You may be staying in your position to pay off those student loans, get a down payment for your first house. All really good idea, but can you make more money or be happier with taking longer to reach some of your other life goals, but doing something you really want to do.

3) I wish I had the confidence to start my own business. Most often, this rests on the ability to maintain a personal financial status quo while investing a lot of time, hard work, and money into something that you may not be sure is going to work in the long run. Take a chance, seek assistance from local small business development agencies or start up groups. Don't just think about this, but do some research. What does it really take to start your own business?

4) I wish I had used my time at school more productively. Well, of course, everyone at MSU thinks that this one should be first! Don't be in such a hurry to get your coursework done. There are a number of other experiences that you can have at college that will help you fine tune your career goals, explore business opportunities, and develop some skills that will benefit you as you build up to your career.

5) I wish I had acted on my career hunches. Sometimes options are scary, moving to another location may mean changing your social activities but it may also mean a faster promotion, or a better location choice for your next position. Trust your instincts, they are usually right!

So as you continue on in The College of Engineering at Michigan State University, spend some time thinking about what it is you really want to do, what do you need to get there, and how do you get what you need! For more advice like this follow @danielgulati on Twitter!

¹ http://blogs.hbr.org/cs/2012/12/the_top_five_career_regrets.html

Enroll in Your Summer Classes ASAP!

The summer enrollment period begins on March 11, and your enrollment date is posted in StuInfo. The ME department will be reviewing the summer enrollments in April, and underenrolled courses may be cancelled.

• *It is in your own best interest to enroll in your summer courses as soon as you have access to the enrollment system.*

• *Low summer enrollments could mean canceled courses.*

The following courses are on the summer schedule and will be of interest to ME majors:

• **First Session:** CE 221; ME 361, 391, 410; MSE 250; STT 351.

• **Second Session:** ME 201, 222, 471; STT 351.

• **Full Session:** ME 412 and 490.

You will also find several Integrative Studies and Bioscience courses, plus courses that can be used as Other Electives.

Some extension courses will be offered in Detroit, Grand Rapids, and other areas. In addition, many online courses, including Integrative Studies, will be offered.

► **IMPORTANT:** if you decide to take the prerequisite for an ME course at another institution this summer, you must follow the Special Override instructions for Transfer Prerequisite Override Requests (see Special Overrides on page 3).

Fall 2012 Dean's List

Congratulations to the following 264 mechanical engineering majors who made the Dean's List after Fall Semester with a semester GPA of 3.5 or higher. This list was taken from the Registrar's official website, which is updated regularly: <http://www.reg.msu.edu/ROInfo/GradHonor/DeansList.asp>

Yeldar Abitayev, Reema Al Dhaneem, Hasan Alali, *Bara Aldasouqi, Bashairi Alsinan*, Adam Anderson, Corey Anderson, Kevin Andreassi, Katherine Arends, *Sanders Aspelund*, Jason Avedesian, Zachary Averill, Matthew Bach, Garrett Baughman, Mhna Bawzzeer, Angel Begov, Scott Belonge, Benjamin Bennetts, Angela Bertolini, Kevin Betts, Jefferey Bishop, Ryan Blancke, Megan Blaszak, Joshua Boerger, Jordan Bowman, Amanda Boyd, Evan Boyers, Christopher Brady, John Brady, Evan Bryant, Toby Buckley, Matthew Bur, Michael Burger, Stephen Camilletti, Michael Campbell, Stephen Campbell, David Caples, Benjamin Carruthers, Zhiheng Cen, Renee Chabon, Nicholas Chase, Chen Chen, Yuhao Chen, *Christopher Churay*, Brian Cobus, Brinn Cochrane, Gabrielle Colby, Keegan Connolly, Kyle Corey, Curtis Coscarelli, David Crouse, *Caitlyn Cubba*, Harrison Cummings, Eric Darin, Mark Davison, Benjamin Dean, Nicholas Decker, Louis Dionise, Daniel Dokter, Emma Drenth, William Driscoll, David Dudley, Max Dunigan, Garrett Dunn, Danielle Durocher, John Ellbogen, Brian Farber, Justin Fauntleroy, Bradford Fillion, Kathleen Fitzsimons, *Patrick Frahm*, Alexander Friedman, Tianyi Fu, Tyler Gallant, Brittany Galliers, Steven Gerdeman, Cameron Gibson, Taylor Gilliland, Alexander Gore, Todd Graham, Laura Gumpper, Tunan Guo, Joseph Hage, Shaoyu Han, Sean Hand, William Hanley, Camden Harp, Lauren Hart, Matthew Hart, Juntai He, *Yu He*, Reace Head, Jarrod Heck, *Paul Heeder*, Matthew Heimonen, Jennifer Henige, Shane Hessling, Brett Hewitt, Steven Hilliard, Matthew Hoffdal, Daniel Holmes, Ji Hong, *Peter Howes*, Mark Hoyer, *Zhangying Hu*, Jiewen Huang, Joshua Hubert, Leah Iseler, Ryan Jacobs, Robert Jakubowski, Katherine Jansen, Croix Jastrow, John Jess, Xue Jiang, Yichu Jin, Lucas Johnson, Trent Johnson, Marcus Johnston, Jennifer Jones, Ryan Juntunen, Yousib Kammo, Yash Kankaria, Anthony Kazenko, Hong Kim, Joseph Kim, Matthew Klooster, Aerin Klump, Adam Kluz, Frank Kmet, *Matthew Knudtson*, Joseph Koterba, Lukasz Kurczab, Sarah Kurtz, Bradly Labaere, Anthony Lacross, Adam Lang, Wesley Lanigan, Nicholas Lannes, Danielle Lapointe, Constantine Lecos, Jared Lee, George Lewis, Tianlun Liang, Theodore Linabury, Benjamin Linde-mulder, William Lindstrom, Haoqi Liu, Raul Maghia, Matthew Malek, Angela Marinich,

86 Seniors to Graduate in May and August!

Congratulations and best wishes to all ME graduates! On behalf of the faculty, I wish you the greatest happiness and success in your careers, graduate studies, and personal lives. The following students had applied for graduation by March 1. If your name is missing, please contact me immediately at giffore@egr.msu.edu (Tele: 517-355-3338).—Gaile

May Graduates

Hasan Amier Alali	Joshua Michael Hill	Ross William Otten
Benjamin Joseph Ambrose	Andrew Davis Hine	Carly B Patterson
Corey David Anderson	Daniel David Holmes	Raymond John Peterson
Kevin Vincent Andreassi	Yueyao Hu	Isaac Joseph Platte
Matthew Luke Bach	Kyle David Hyst	Timothy Allen Polom
Caitlin Taylor Bailey	Yichu Jin	Nicholas Michael Putman
Jonathan Ryan Bancroft	Marcus James Johnston	Andrew Joseph Putz
David Jennings Barrent	Kihun Kang	Sylvia Diane Reiser
Shaun Michael Bezinque	Kameron James Kline	Eric Gordon Rightor
Kyle Robert Biega	Joseph Carl Koterba	Landon Christofer Riker
Nicholas Andrew Blancke	Elizabeth Anne Kurcz	Corey Michael Silvis
Brendan Ring Brown	Lukasz Kurczab	Michael Christopher Skierski
Brian Christopher Cheadle	Nicholas Raymond Lannes	Scott Barton Smith
Sean Michael Crump	Paul Andrew Laymon	Cory Edward Snowdin
Jonathan James DiClemente	Raul Mihai Maghiai	Paul Joseph Snyder
Brian Eric Farber	Taylor Robert Mantey	Isaac James Steinbrunner
Charles Andrew Ferriera	John J K McCarthy	Kyle Eiseler Sweet
Bradford James Fillion	Brian Patrick McClure	Andrew William Stuckwisch
David Michael Gaunt	Evan Patrick McCune	Zachary Charles Timpf
Douglas Joseph Geiger	Olukeemi Chrissie Mejabi	Yizheng Wang
Steven Thomas Gorney	Kevin Ernest Miller	Andrew Lawrence Wheatley
Todd Matthew Graham	Justin Francis Mrkva	Matthew Rusk Wiggans
Christopher Gerald Griffith	Ming Mu	Yan Wu
Thomas Evans Hallahan	Chenaimoyo Charles Mushiri	Evan Thomas Yoder
Rebecca Lynne Hannon	Phat M Nguyen	Tianyu Zhao
	April Marie Oesterle	

August Graduates

Daniel Michael Dreliozis	Jun Li	Shivakumar Ramasami
Ross Edward Dudgeon	Jiao Luo	Xiangyu Wang
Robert Clayton Caldwell	Kyle Alan Melzer	Yue Xu
	Stephen Joseph Owczarek	



Michael Marshall, Eric Matych, John McCarthy, Ian McGregor, Erik McGuire, Ryan Mcintyre, Michael McKinley, Arric McLauchlan, Zakary McLennan, Trevor McSween, Michael Mehall, Olukeemi Mejabi, Noelle Miles, *Craig Miller*, James Miller, Kevin Miller, Natasha Mital, Alexander Morita, Jordan Most, Ming Mu, Melanie Mullett, Conor Muntin, Timothy Najar, Jacob Neubecker, Anna Nham, Jessica O'Brien, Scott Oldham, Eric Olsen, Ryan Osullivan, Steven Palmeri, *Harsh Patel*, Shenli Pei, Colin Perrault, Brooke Peruski, Eric Peters, Matthew Pingel, Ashley Pommerville, *Steven Price*, Kevin Pugh, Andrew Putz, Daniel Pylar, Jinyang Qiu, Michael Ray, Travis Reinhart, Sylvia Reiser, Daniel Riggs, Benjamin Rittinger, Madeline Roe, Lance Roth, Michael Ryerkerk, *Michael Sanchez*, Joseph Savage, Elizabeth Schaepe, Scott Schimpf, Mark Schneider, Daniel Schwartz, Michael Schwartz, Joseph Senechal, Jun Sheng, *Kyle Sherman*, Andrew Shih, Abhimanyu Singh,

Michael Skierski, Philip Skinkle, Scott Smith, Cory Snowdin, Paul Snyder, Stephen Sommerlot, Guangchao Song, David Spears, Christopher Stanos, Alexander Starbird, Jamie Steinberger, Isaac Steinbrunner, Thomas Stevenson, Daniel Summers, Haocheng Sun, Daniel Surmann, *Matthew Sutter*, Kyle Sweet, Karan Takkallapally, Kuan-Ying Tao, *Nicholas Theis*, Mariya Titova, Austin Tokarski, David Torres, Davis Trapp, Michael Trotter, Zachary Tuller, Steven Utz, Hanna VanderMoere, Aleksandr Vartanian, Andrea Vedrody, Jason Wagnitz, Eric Waldron, Elisabeth Warner, Brittany Walton, Ethan Welzbacker, Michael Wicker, Alexander Williams, Barrett Winrick, *Renee Wirsing*, William Wojcik, Tong Wu, Yan Wu, Evan Yoder, *Lian Yuan*, Nicholas Yuhasz, Tingyuan Zhang, Yijia Zhang, Tianyu Zhao, Yifan Zhao, Courtney Zimmer, Garret Zuk.

NOTE: Academic Award recipients' names are italicized.

COVER STORY

How and Why I Built a Working Steam Engine by Russ Tindall

The advent of the steam engine is the pinnacle of all modern technology. Without it mankind would still be reliant on manual labor. Over the decades, the mechanical design improvements to the steam engine created a foundation for the engines we know today. While the energy source, electronics, and optimization of the modern internal combustion engine are quite complicated, the basic components, piston, crankshaft, connecting rods, etc. share the same inherited skeletal identity of the steam engine.

In my junior year I was pondering what courses to schedule to complete my engineering degree. A conversation with **Professor Thompson** sparked my interest in building something that would demonstrate the applied side of my college experience. The concept of building a steam engine came to light. I started with the plans for a small model and scaled it up to a size that could actually do useful work. There were dozens of parts to be fabricated and it all started from solid blocks of cast iron.

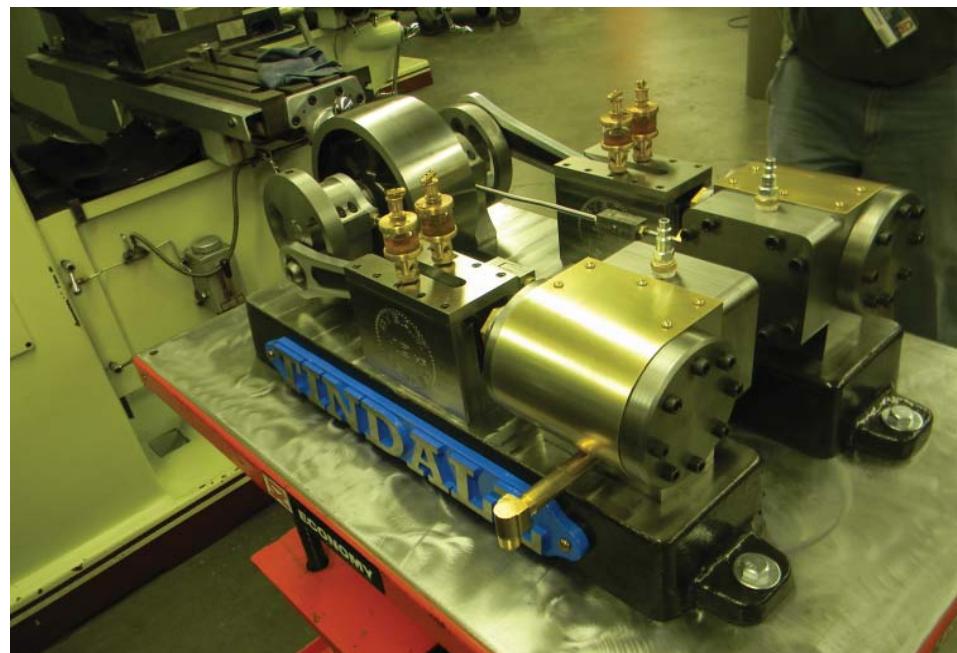
The machine shop within the college of engineering had acquired a Computerized Numerical Controlled milling machine (CNC). I was able to model many of the parts with Uni-graphics NX software, and then utilize a post processor to produce a program for the CNC mill.

This project posed many challenges and involved a huge time investment to complete. One of the greatest challenges was developing a means for fixturing (securing) parts during the machining processes. For simple square block geometry parts a vice was a very easy, safe, and efficient method for holding the part. Other parts with radial geometry were difficult and required custom designed and machined fixtures to secure the part for manufacture. Being inexperienced in fixturing I utilized the experience of the machine shop



HARLEY SEELEY

Russ Tindall (Left) & Roy Bailiff (Right) perform the final inspection on the valve components prior to assembly.



RUSS TINDALL

Completed steam engine

Another article about Russ's steam engine can be found at:

http://www.egr.msu.edu/sites/default/files/publications/ME_MSU_fall2012.pdf

staff to review design ideas and make suggestions. A great take away from that experience was how vital relationships across disciplinary lines are to the success of any project. It would be impossible to know everything about manufacturing or mechanical engineering. The key skill set is learning how to ask intelligent questions to learn what you need to know to complete a project with great results.

Another task that was a challenging aspect of the project was the cast iron base and name plates. Sand casting is a process that entails the use of a pattern to produce the geometry of the part in a resin sand mix. The pattern must have a draft angle on all perpendicular surfaces to ensure that the pattern can be removed from the sand prior to pouring. I had to read into the rules of thumb for pattern making, which in a sense is more of an art than a science. Extensive communication was conducted with the foundry to ensure that the patterns could be casted successfully.

The steam engine was completed and demonstrated at Design Day this past December. The ability to take a project from concept to reality is a key skill that employers are looking for. Hands on experience is essential to a competitive engineering program in today's market. Students who have hands on manufacturing experience are able to design parts with manufacturability in mind. Other advantages to such a program are engineers who can relate their hands on experiences with technicians and skilled tradesmen and women in their future careers. One thing I have found is the better you can relate with the challenges of someone else's job the more effective you can be as a leader. You will be able to forecast where problems and challenges may arise before they even happen and you can act proactively to prevent them.

Special Thanks to:

Roy Bailiff, Dr. Thompson, Ken Bartlage,
Cory Snowdin, Landon Riker, and Mike
Koschmider.

MSU – RWTH Aachen Program by Dr. John Foss, Program Director

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 2013), 2) carry out 5 credits independent study plus 4 credits German language, and 3) travel in Europe with planned 3-day weekends. The ME 490 experience will be 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 to easily reach Munich, Paris, Amsterdam, and many more cities on their 3-day weekends.

Former students are the best sources of information for this program; they can be reached through **Professor J. Foss, Program Director**. Please don't hesitate to talk to former students! They are more than willing

to share experiences and information about the program. The 2013 organizational meeting will be held soon after the publication of this *ME Bulletin* issue. Make contact at foss@egr.msu.edu or 355-3337. This is an opportunity you don't want to miss!

Study Abroad in France (ECAM in Lyon) by Professor André Bénard

The Department of Mechanical Engineering offers a month-long study abroad program for junior-level students in Lyon, France each summer. The students stay at ECAM, a French engineering school located in the old part of Lyon, for the entire month of June. Students can obtain equivalent credits for ME 201 or ME 410, both of which are taught in English. Students also take a French language course (taught in French). If you are interested in this program, please contact:

Ms. Maggie Blair-Ramsey
<blairram@egr.msu.edu> or
Professor André Bénard
<benard@egr.msu.edu>



Pi Tau Sigma Presents

SENIOR ELECTIVE NIGHT!

March 13 at 7:00 p.m. in 1145 EB



Students will describe and answer questions about their experiences in mechanical engineering senior electives.

This is a once-a-year opportunity for you to learn about class topics, professors, and requirements – beyond what is printed in the course descriptions.



Don't miss this great event!



Origins and Development of the Centrifugal Pump by Abraham Engeda

Next to the electric motor, pumps are the most widely produced and used machines of our time. Centrifugal pumps are estimated today, to form 80–85% of the whole pump production.¹ The field of application for centrifugal pumps has been continually widening, as they are developed for handling a wider range of liquids at higher pressures and temperatures, and most industries, service providers, utilities and engineering processes are becoming more and more dependent on them. There are quite a number of comprehensive books about centrifugal pump technology covering all aspects of the machine, but three that are widely referred to are the *Die Kreiselpumpe* by C. Pfleiderer, *Centrifugal and Axial Flow Pumps* by A.J. Stepanof, and *The Pump Hand Book* by I. Karassik.

The first centrifugal pump with ten wooden double curved blades, dating back to the fifth century, was found in 1772 in an abandoned Portuguese copper mine in San Dominigos.¹ Centrifugal fans have been used for mine ventilation since as early as the sixteenth century and are described by **Agricola** (G. Agricola, *De re metallica*, 1556).¹ The invention of the centrifugal pump is a disputed issue, whether the credit goes to **Leonardo Da Vinci** (1452-1519), who suggested the idea of using centrifugal force for lifting liquid, or to **Johann Jordan** in about 1680.² Most place the origin of the centrifugal pump impeller with **Denis Papin** in 1689³ (Figure 1). The importance of Papin's contribution lies in his understanding of the concept of creating a forced vortex within a circular or spiral casing by means of blades. Following Papin, **Le Demour** in 1732 and **Gabriel Fahrenheit** in 1736 described other designs for centrifugal pumps, but there is no evidence of their practical use.⁴

Leonhard Euler (1707-1783) was the greatest mathematician of the eighteenth century and one of the



Figure 1: Denis Papin

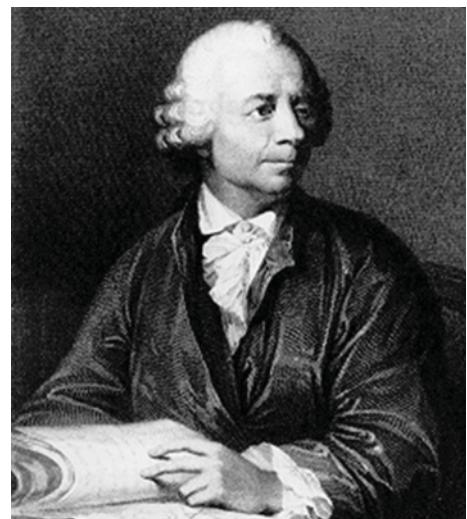


Figure 2: Leonhard Euler

most prolific of all time; his publication list of 886 papers and books fill about 90 volumes. Euler (Figure 2) showed that the conservation of energy can be directly related to the conservation of momentum (torque from moment of momentum and rotational effect) on a centrifugal pump impeller when treated as a flow control-volume. In his 1754 memoir, he presented an idealized theoretical application of Newton's law to centrifugal pumps. The resulting equation became known as the Euler turbomachinery equation. His publication caused a great development of hydraulic turbines in the eighteenth century, but did little to influence the development of centrifugal pumps, which developed gradually through tedious cut-and-try methods. The one thing Euler contributed was to initiate a true mathematical inquiry into the employment of centrifugal force as a means of raising water.¹

About the same time as Euler, **Smeaten** introduced in 1752 the study of pumps and turbines by models. He also defined power as equivalent to the rate of lifting of a weight, a concept that is still fundamental in today's thermo-fluids.³

In 1785 **Skeys** patented a pump with an interesting design, which was the prototype of the propeller pump, thus foreshadowing the comparatively modern development of the centrifugal pump.³ **Harris**² declares the year 1818 as a landmark in the history of the centrifugal pump. In that year commercial production of the pump began in the USA by the Massachusetts Pumps Company and saw a return to the original conception of Papin after a century of interruption by other forms of the pump. The "Massachusetts Pump" had an open impeller with straight tangential vanes which revolved in a casing of rectangular section, and roughly of volute form.¹ The first pumps were designed to run submerged, but later pumps were fitted with suction pipes. They had an axial flow in at the eye and tangential flow out at the discharge, thus forming the beginning point of the centrifugal pumps of today.¹ In 1831 **Blake** of Connecticut brought out a design of a vertical pump, employing a horizontal disc with a series of radial vanes attached to the underside and running just clear of the casing, thus introducing the semi-open pump impeller design. In 1838 **Combs** presented a paper on curved vanes and the effect of curva-

ture which subsequently proved to be an important factor in the development of the centrifugal pump. In 1839 **Andrews** introduced the proper volute casing and used a fully shrouded impeller.⁴

In 1846 **Johnson** introduced the first three-stage centrifugal pump, followed in 1849 by **Gwynne** who produced multi-stage centrifugal pumps and began the first systematic examination of these pumps. At about the same time **Appold** conducted an exhaustive series of empirically

directed experiments to determine the best shape of the impeller, which culminated in his discovery that pump efficiency depends on blade curvature.⁴ (Figure 3) In about 1850 **Thomson** suggested the use of a whirlpool chamber which enabled the single-stage centrifugal pump to be used economically for higher lifts. A test of the status of centrifugal pump technology took place at the Great Exhibition of 1851 at the Crystal Palace in Great Britain, where several design

types were presented and compared. Appold's pump with curved blades showed an efficiency of 68%, more than three times better than any of the other pumps present, which attracted much attention, due to its simplicity, compactness and high efficiency. From this date onwards the development and use of the centrifugal pump was very rapid. In 1887 the first pumps were built with vaned diffusers (Figure 4) and patented by British physicist **Osborne Reynolds** (better known for the "Reynolds Number").

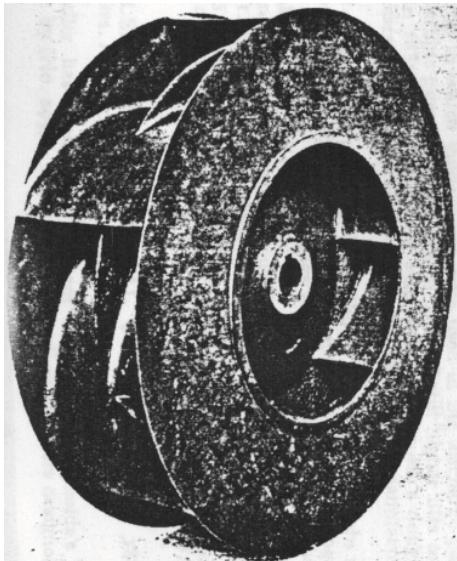


Figure 3: Centrifugal Impeller of 1852⁵

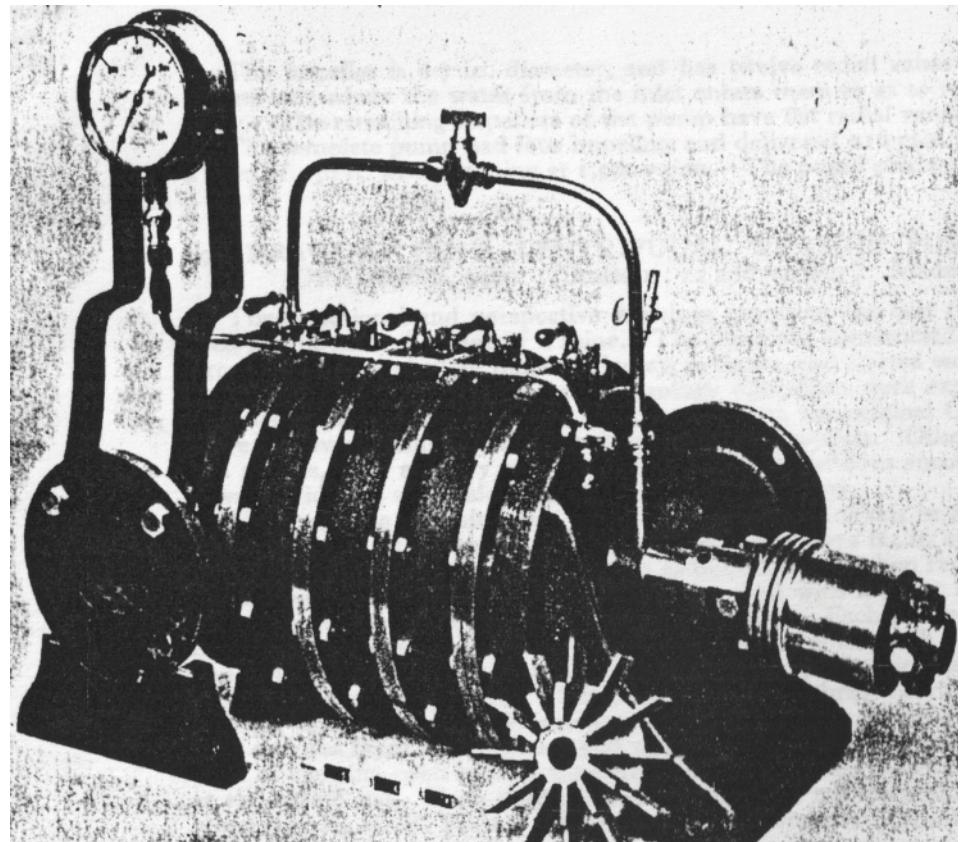


Figure 4: 4-Stage Centrifugal Pump of 1887⁵

¹ Engeda, A., (1999), "From the Crystal Palace to the pump room". Mechanical Engineering Magazine, ASME.

² Harris, L. E. (1952), 'Some Factors in the Early Development of the Centrifugal Pump', 1689 to 1851.' TNS, 28, 187.

³ Engeda, A., (1998), "Early historical development of the centrifugal impeller", ASME 98-GT-22, 1998 International Gas Turbine & Aeroengine Congress & Exhibition, Stockholm-Sweden.

⁴ Raabe, J., (1987), "Great names and development of Hydraulic machinery", IAHR 50 Years, 1935-1985, Hy-

draulics and Hydraulic Research – A historical review, Jubilee volume, A.A. Balkema.

⁵ Westcott, G.F., (1932), "Handbook of the collections illustrating pumping machinery", Science Museum – South Kensington

ALL PICTURES FOR THIS ARTICLE WERE PROVIDED BY PROFESSOR ENGEDA



Baja SAE



The Michigan State Baja team recently got back from racing in the snow in the Upper Peninsula. Michigan Tech held their annual Blizzard Baja race where teams from around the country come to Houghton, Michigan to compete in a more relaxed four hour endurance race completely made out of snow and ice. With some early mechanical issues and engineering by the seat of our pants we were able to finish 14th out of more than 50 plus cars.

Our next race will be the first official SAE event of the year so we will be buckling down and finishing our redesign work on last year's car. Anyone interested in joining or coming out for a weekend to see what we are about and get a little greasy, please contact **Erik Dudek** (baja@msu.edu). No previous knowledge is required as we teach you everything you might need to know. *Submitted by Austin Tokarski, Chief Engineer.*



PHOTO PROVIDED BY AUSTIN TOKARSKI

Briita Wanhala gets some air as she holds off the competition!

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 Formula Team took 6th place out of 85 teams in the Formula SAE Nebraska competition, and they are now finishing up the 2013 race car. Formula SAE is the world's largest engineering competition with over 300 schools competing from around the globe.

This year, 7 of the 8 returning members from last year are graduating, so recruitment and knowledge transfer has been huge. The new members really stepped up and took charge, and the team is stronger than ever. Members not only learn advanced manufacturing, but also the design, theory, and analysis that go into building a car. The members are known for their dedication, working upwards of 40 hours a week to complete the car with plenty of time for testing before competitions. From the excitement of competition, to the honor of having a large display among prestigious companies at the North American International Auto Show, to the camaraderie established through building an entire race car from the ground up, the Formula SAE experience is one of a kind. Learn more about us at <http://www.egr.msu.edu/~fsae/wordpress/>

Submitted by Jocelyn Modelska, Operations and Chassis Team Member.

American Society of Mechanical Engineers



ASME offers many events throughout the year. This semester has been busy for ASME. During E-Week we were more active than ever. We showed kids the fun of engineering at Impressions 5, saw our Spartan Engineers' innovation at Junkyard Wars, battled the Wolverines at broomball, and much more.

Soon 14 of our members will be going to Toronto to represent MSU at the ASME District B Conference. Additionally, several members will be delegates at the National Association of Engineering Student Councils Conference at the University of Illinois. All active members are eligible to attend conferences such as these.

We also like to have fun. ASME hosts a number of social events throughout the year. So far this semester we have hosted Lasertag and Vegas Nights. We have more in the works for later this semester including the 2nd Annual Golf Outing. These events are a great way to get to know your fellow ME's. We hope to see you at our next event.

ASME would also like to thank the people that have made our club possible. **Dr. Shaw**, our faculty advisor, has been a great contributor to our activities. We would also like to thank our generous sponsors, Dow Chemical, Whirlpool Corporation, Marathon Petroleum, and BP.

It is easy and beneficial to become a member. With job placement becoming more of an issue every day, joining a student group gives you a competitive edge. To sign up, please visit the "Membership" section of our website, <http://www.egr.msu.edu/asme/membership.html>. The cost is only \$30 per year, and free for freshmen. *Submitted by Christopher Baldwin President.*

MSU Solar Car



Last summer, the MSU Solar Car Team successfully qualified for and competed in the American Solar Challenge 2012, a 1600-mile cross-country competition from

Rochester, New York to Minneapolis, Minnesota. Although the young crew composed of **Miles Turrell, Dan Howarth, Steve Zajac, Ethan Akerly, Scott O'Connor, Meng Cao, and James Miller** did not complete the ASC 2012 due to a motor malfunction, crucial experience was gained.

After two consecutive summers of first-ever competitions in the Formula Sun Grand Prix 2011 and the American Solar Challenge 2012, the MSU Solar Car Team has attained the experience necessary to move on to the next daunting challenge.

MSU is currently designing Leonidas, its second car in team history. Leonidas is presenting an exciting challenge for the innovative students of MSU, as it allows members to take part in the design, fabrication, testing, and racing of a brand new car over a two-year period. The goal of Leonidas is to push the solar team further than ever before by qualifying for and completing the American Solar Challenge 2014.

Building a fantastic car capable of completing the ASC 2014 will require the commitment of a team of focused, dedicated students who want to do something big. It needs a cross-section of talented students from multiple disciplines across campus. Fellow Spartans, if you have a desire to leave a lasting mark on MSU, please consider joining the MSU Solar Car Team. Interested students should email michiganstatesolar@gmail.com for more information. *Submitted by James Miller, Team Leader.*



PHOTO PROVIDED BY JAMES MILLER

Pi Tau Sigma



The Tau Epsilon chapter of Pi Tau Sigma, the international mechanical engineering honor society, has had a busy start to the semester. We started the semester off with our traditional "Wing Night" at Buffalo Wild Wings. We enjoyed all-you-can eat

wings and had a good time socializing with each other. We invited all eligible members to join us and learn more about our organization. We have also volunteered with MSU Food Bank and Vex Robotics, and participated in ASME's Junkyard Wars during E-week.

We will be hosting a Mechanical Engineering Senior Elective presentation on Wednesday, March 13 at 7:00 pm in 1145 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.

Later in the semester, we will meet up for dinner at Crunchy's, another of our fun social traditions. Finally, we will hold initiation in April to induct new members into our chapter, followed by a complimentary dinner at Olive Garden. For any more information on Pi Tau Sigma or any of our events, please visit our website at www.egr.msu.edu/pts. *Submitted by Kevin Andreassi, President.*



Department of Mechanical Engineering

ME Senior Electives for 2013-2014

- The following ME Senior Elective list, including instructor assignments, was accurate as of February 28, 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.
- Descriptions are provided for courses that are not in the catalog. All others can be found by going to <http://www.reg.msu.edu/Courses/Search.asp>
- The ME department cannot overfill a required course or section to solve a Senior Elective schedule conflict.
- Course override instructions can be found in the shaded **BOX** on page 15.

SUMMER SEMESTER

ME 490 Independent Study. 1-4 credits. See Override Instruction #2 on page 15. You may reenroll for a maximum of 6 credits.

FALL SEMESTER

- ME 416*** Computer Assisted Design of Thermal Systems. 3(4-0). Prereq: ME 410 or concurrently. *Bénard*.
- ME 422** Introduction to Combustion. 3(3-0). Prereq: ME 332 or concurrently. *Toulson*.
- ME 423** Intermediate Mechanics of Deformable Solids. 3(3-0). Prereq: ME 222. *Loos*.
- ME 425** Experimental Mechanics. 3(2-3). Prereq: ME 222. *Tekular*.
- ME 444** Automotive Engines. 3(3-0). Prereq: ME 410 or concurrently. *Schock*.
- ME 464** Intermediate Dynamics. 3(3-0). Prereq: ME 361. *Shaw*.
- ME 465*** Computer Aided Optimal Design. 3(3-0). Prereq: ME 471 or concurrently. *Averill*. ►**Online Course: See Override Instruction #2 on page 15**.
- ME 475*** Computer Aided Design of Structures. 3(3-0). Prereq: ME 471 or concurrently. *Díaz*.
- ME 477** Manufacturing Processes. 3(3-0). Prereq: ME 222, MSE 250, and Tier I Writing. *Thompson*.
- ME 490** Independent Study. 1-4 credits. See Override Instruction #3 on page 15. You may reenroll for a maximum of 6 credits.
- ME 494** Biomechanics and Heat Transfer. 3(3-0). Prereq: ME 410 or concurrently. *Biomechanical Concentration Course*. *Wright*.
- CHE 472** Composite Materials Processing. 3(2-3). Prereq: ME 332. *Jayaraman*.
- ECE 415** Computer Aided Manufacturing. 3(2-3). Prereq: ME 451. See Override Instruction #4 on page 15. *Dong*.
- MSE 454** Ceramic & Refractory Materials. 3(3-0). Prereq: PHY 184. Recommended background: MSE 370 and 381. See Override Instruction #5 on page 15. *Nicholas*.
- MSE 476** Physical Metallurgy of Ferrous & Aluminum Alloys. 3(3-0). Prereq: MSE 250. Recommended background: MSE 310. For more info, see Override Instruction #5 on page 15. *Bieler*.
- ME 812** Conductive Heat Transfer. 3(3-0). See Override Instruction #6 on page 15. Prereq: ME 412 plus GPA of 3.5+. *TBA*.
- ME 830** Fluid Mechanics I. 3(3-0). See Override Instruction #6 on page 15. Prereq: ME 332 plus GPA of 3.5+. *Jaberi*.
- ME 860** Theory of Vibrations. 3(3-0). See Override Instruction #6 on page 15. Prereq: ME 461 plus GPA of 3.5+. *Feeny*.

SPRING SEMESTER

- ME 417*** Design of Alternative Energy Systems. 3(3-0). Prereq: ME 410 or concurrently. *Bénard*.
- ME 426** Introduction to Composite Materials. 3(3-0). Prereq: ME 222. *Loos*.
- ME 440** Aerospace Engineering Fundamentals. 3(3-0). Prereq: ME 332 or concurrently. *Engeda*.
- ME 442*** Turbomachinery. 3(3-0). Prereq: ME 332. *Engeda*.
- ME 445*** Automotive Powertrain Design. 3(3-0). Prereq: ME 444. *Schock*.
- ME 465*** Computer Aided Optimal Design. 3(3-0). Prereq: ME 471 or concurrently. *Averill*.
- ME 477** Manufacturing Processes. 3(3-0). Prereq: ME 222, MSE 250, and Tier I Writing. *Thompson*.
- ME 478** Product Development. 3(3-0). Prereq: ME 477 and Tier I Writing. *Kwon*.
- ME 490** Independent Study. 1-4 credits. See Override Instruction #3 on page 15. 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 #1 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. *Jaberi. ▶ This course will 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 495 Tissue Mechanics.** 3(3-0). Prereq: ME 222. *Biomechanical Concentration Course. Haut.*
- ME 497 Biomechanical Design.** 3(3-0). Prereq: ME 371 or concurrently. *Biomechanical Concentration Course. Reid-Bush.*
- CHE 483 Brewing and Distilled Beverage Technology.** *See Override Instruction #7 Below.* Course Description: Raw materials for fermentation and basics of alcohol fermentation, beer and cider production; basics of distillation; brandy and eau de vie production; whiskey production; vodka, gin and flavored spirits production; flavor chemistry. All lectures and laboratories will take place at 2000 Merritt Road, East Lansing. Prereq: (Age 21 or higher) and (Senior standing) and (ME 410-Heat Transfer or concurrently). *Berglund.*
- BE 445 Biosensors for Medical Diagnostics.** 3(3-0). (BS 161) and (CEM 141) and (ECE 345). *Biomechanical Concentration Course. Alocilja.*
- ENE 422 Applied Hydraulics.** 3(2-2). Prereqs: ME 332. ▶ This used to be CE 422. *TBA.*
- MSE 425 Biomaterials & Biocompatibility.** 3(3-0) Prereq: MSE 250. Recommended Background: PSL 250. *Biomechanical Concentration Course. Baumann.*
- MSE 451 Microscopic & Diffraction Analysis of Materials.** 3(2-3). Prereq: PHY 184. Recommended background: MSE 260 & 381. *For more info, see Override Instruction #5 below. Lunt, Bieler, or Morelli.*
- MSE 465 Design & Application of Engineering Materials.** 3(3-0). Prereq: MSE 250. *Subramanian.*
- ME 802 Advanced Classical Thermodynamics.** 3(3-0). *See Override Instruction #6 below.* Prereq: ME 412 plus GPA of 3.5+. *Wichman.*

OVERRIDE INSTRUCTIONS

- 1) Complete and submit the ME Override Request Form: <http://www.egr.msu.edu/me/undergrad/forms> [Click on Forms & Handouts]. Please note that the ME department cannot overfill required courses to resolve conflicts with Senior Electives, Other Electives, Integrative Studies courses and employment schedules.
- 2) ME 465—Computer Aided Optimal Design will be offered online next fall as a pilot program to a maximum of 10 students. Priority for overrides will be given to December 2013 graduates who need a design intensive senior elective. If you are interested in taking this online class, submit the ME Override Request Form (see link above in number 1) by no later than **Friday, April 5**. You will be notified if you receive an override.
- 3) 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.
- 4) Six seats in ECE 415 have been allocated for MEs who are on record as Manufacturing Concentration students. If you are one of those students, send an email to Gaile.griffore@egr.msu.edu and request your override. Be sure to include your PID number and mention that you are on record as a Manufacturing Concentration student. (To be “on record,” you must first meet with Gaile to plan a long-term schedule.) ALSO, a prerequisite override will be given to students who will need to take ECE 415 & ME 451 concurrently.
- 5) ME majors do not need to have taken the Recommended Background courses, but there will probably be a need for some additional background reading. Contact the professor for more information.
- 6) Complete the *Graduate Course Override* form, available in the ME Advising Office in 2560 EB. This is a paper form.
- 7) CHE 483—To request an override, go to 2527 EB, and be prepared to show them your I.D. to prove that you are 21 or higher.

Department of Mechanical Engineering

**MICHIGAN STATE
UNIVERSITY**

ME Advising Office

Michigan State University

Engineering Building

428 S. Shaw Lane

Room 2560

East Lansing MI 48824

Spring Semester Calendar

March 12	Scheduled appointments begin for enrollment for Summer 2013. Your enrollment access date is posted in StuInfo.
March 13	Senior Elective Night, 7:00 p.m. in 1145 EB. Sponsored by Pi Tau Sigma.
March 30	Computer enrollment begins for Fall 2013 / Spring 2014
April 5	DEADLINE to request override for ME 465 for Fall 2013. See number 2 in box on pg 15.
April 26	Design Day in the MSU Union. See you there!
April 29-May 3	Final Exams.
May 3	University Undergraduate Student Convocation—1:00 p.m. in Breslin.
May 5	College of Engineering Undergraduate Commencement Ceremony, 1:00 p.m. in Breslin. Lasts about 2 hours.
May 13-June 27	<u>First</u> Summer Session.
July 1-Aug 15	<u>Second</u> Summer Session.
May 13-Aug 15	<u>Full</u> Summer Session.
August 9	Initial Fall 2013 Minimum Tuition & Fee payment due.
September 1	Approximate application deadline for October FE exam. Deadline will be posted at http://ncces.org/exams/state-pages/michigan-engineering-exam-registration/
August 28	Fall Semester classes begin.

The MSU College of Engineering Design Day

**Friday, April 26, 2013
Engineering Bldg
►Note change of location.**

**Come and see our students lead,
create, and innovate!**

Activities include:

- Competitions
- Presentations
- Demonstrations
- Awards

