Last March two ME 481 teams traveled to Guatemala to build and test a prototype solar refrigerator for use in the developing world. You can read about their experience on page 8! Left to Right: Ryan McPhee, Brent Rowland, Eric Tingwell, Dr. Somerton, Brian Kunkel, “Jose” (a technician at AIDG), Nabeel Aslam, Keven McPhail, and Ben Barrie.
**Teaching Award Nomination Form:**

- **Academic Advising**
  - **ME Freshmen** are advised in W8 Wilson Hall on a walk-in basis. They do not need to schedule an appointment.
  - **ME Sophomores (except for Junior-to-Be’s with a 3.0 or higher)** are advised by Carmella Davis-King. To schedule an appointment with her, please call 355-6616 x 1, or go to 1410 EB.
  - **ME Juniors and Seniors plus Juniors-to-Be’s with a 3.0 or higher GPA** are advised by Gaile Griffore. To schedule an appointment, please call 355-3338, or go to 2560 EB.

- **Tutoring**
  - The Guided Learning Center (GLC), located in 1180 EB, offers free drop in tutoring in math up to differential equations and science courses (chemistry, physics, etc.), as well as many core engineering courses. To request assistance, go to:
    - [http://www.egr.msu.edu/egr/departments/dpo/academicassistance/glclist.htm](http://www.egr.msu.edu/egr/departments/dpo/academicassistance/glclist.htm)

- **ME graduate student and Pi Tau Sigma undergraduate tutors** can be contacted through the ME Advising Office. These tutors do charge a fee, which you can negotiate with them. If you are interested, email Gaile Griffore at griffore@egr.msu.edu.

**Curriculum News**

- **Co-op Students:** Before you leave for your Spring 2010 co-op rotation, please be sure to discuss your schedule for next Fall 2010 / Spring 2011 with your academic advisor.

- **ME 481—ME Design Projects** requires department approval before you can enroll, and you must take this course during your last semester (or spring for August graduates). To obtain approval, schedule an appointment with Gaile to finalize your long-term schedule. Call 355-3338 or stop by 2560 EB to make an appointment.

- **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 2010 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. For more information, see page 15.

- **Class Standing.** ME juniors and seniors can obtain this information in 2560 EB. Sophomores should go to 1410 EB. Be prepared to show your MSU I.D.

**Job Search Advice:** Jennifer Jennings from Career Services & Placement is available to answer questions about your job search. To schedule an appointment with her, go to the Center in 1340 EB, or go to: [http://careernetwork.msu.edu/students/advising](http://careernetwork.msu.edu/students/advising)

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

**IAH/ISS Diversity Requirement**

Many courses in the Arts and Humanities area and in the Social, Behavioral, and Economic Sciences area, emphasize national diversity (designated “N” at the end of the course title), or international and multicultural diversity (designated “I” at the end of the course title). Some emphasize both national diversity, and international and multicultural diversity (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.**
Department News

• **Dr. Eann Patterson** has been appointed Director of the Composite Vehicle Research Center (CVRC). He has served the ME department chairperson for the last five years.

• **Professor Alex Diaz** has been appointed as interim Chairperson of the ME department.

• **Drs. Patrick Kwon** and **Farhang Pourboghrat** have been promoted to the rank of Full Professor.

• **Professor Norbert Mueller** has been promoted to Associate Professor with tenure.

• **Drs. Seungik Baek**, **Jongeun Choi**, and **Tonghun Lee** have been promoted to the rank of Associate Professor with tenure.

• **Professor Ranjan Mukherjee** received the Fulbright Research Scholarship in 2009. He spent the spring semester in the Department of Mechanical and Informational, University of Tokyo, Japan, where he worked on mobile robots for transporting wheelchair-bound persons in long-term-care facilities.

• **Dr. David L.S. Hung** has joined the ME department as an Associate Professor. He received his Ph.D. from Carnegie Mellon University. Before joining MSU, he was employed in the automotive industry for over a decade where he was responsible for developing a gasoline direct injection system and optical diagnostics for in-cylinder fuel mixture preparation and combustion measurements. His research focuses on spray atomization, flow sensing diagnostics, and sustainable energy systems, including areas such as internal combustion engines, alternative power systems, and renewable fuels for vehicle and aviation applications. Dr. Hung and his wife, **Ling**, enjoys outdoor sports and activities with their son, **Enoch** (age 7). He also plays classical guitar at his leisure and serves in the music ministry in his church.

• **Dr. Tammy Reid-Bush** has been appointed as an Assistant Professor in the tenure stream. Dr. Reid-Bush received her Ph.D. from Michigan State University. Her research area is biomechanics, including medical, body adaptations, seating, sports, and hand function. She has taught undergraduate courses for a number of years as an Academic Specialist. Dr. Reid-Bush grew up near Lake Huron and spent much of her time on the water. She enjoys all types of water sports including swimming, water-skiing, and wind-surfing. She also enjoy hiking with her family and photography.

• **Professor Gaetano Restivo** has joined the ME department as an Assistant Professor. Dr. Restivo received his Ph.D. from the University of Palermo in Italy. His research focuses on experimental stress analysis, optical methods, digital speckle pattern interferometry, digital photoelasticity, 3-D applications, mechanics of composite materials, and non-destructive evaluation. Dr. Restivo has taught ME undergrad courses for several years. He likes to spend his free time traveling and visiting new places. He also enjoys swimming and listening to music (including Italian opera).

New Senior Elective!

**ME 491/001—Intro to Computational Fluid Dynamics**

See page 15 for more information

Dean’s List

Congratulations to these 164 ME majors who made the Dean’s List after Spring and Summer 2009. To be on the Dean’s List, you must have a semester GPA of 3.5 or better. This list is from September 22.


**SUMMER 2009:** Nassar Alhajri, Nilutpol Basumatari, Jeongseop Lee, Kyungmin Lee, Jason Lyman, Derek Mayoros, Mathieu Rich, Yongjiao Yu

For updates, go to: [http://www.reg.msu.edu/R0Info/GradHonor/DeansList.asp](http://www.reg.msu.edu/R0Info/GradHonor/DeansList.asp)
So how are professors assigned to their classes? Why does Professor Somerton always teach ME 416? Why isn’t Dr. Genik teaching ME 410? One of my duties as Associate Chair is to set the teaching assignments for the department. Though it sometimes appears to the students that I pull names out of the hat, let me assure you that it is a very complicated process. In fact, it is very much a design problem in that there are multiple right answers and the best answer is very dependent on who’s being asked the question. What might be a great set of teaching assignments for Professor Diaz, may be the pits for Dr. Somerton. Let me share with you what goes into this decision.

There are several goals that are to be achieved. First, we want the best teaching possible for our courses. Second, we want a teaching assignment to be effective for a faculty member. That is, we want to provide him/her with not only the opportunity to do a great teaching job, but also the time to be a great researcher. I begin the process by setting up a spreadsheet that lists the courses we are teaching for the academic year. Next I meet with the department chair to determine the teaching load for each faculty member. Not all faculty teach the same amount. Outstanding researchers may only teach one course a year, while faculty doing little research may teach 4 courses a year. The average teaching load in our department is 2 courses a year. Faculty are then surveyed for their preferences. They are asked to identify the courses they really want to teach and those courses they don’t want anything to do with. With all this information, I then begin the assignment process. It is very much driven by who can teach what. There are courses that only one or two faculty can teach, for example, Dr. Somerton and ME 416. There are faculty that only have one or two courses in their comfort zone. Other considerations deal with section size. Some faculty are great with classes of 20 students, but are much less effective with classes of 60. It is an iterative process, and I would say one the most challenging optimization problems I have ever worked on. I always know one thing. When I release the assignments to the faculty, not everyone will be happy and I’ll hear from them.

So I hope I have provided you with a glimpse of how are teaching assignments are made. Just remember that no matter how good or bad the teaching is, it is still your responsibility to do the learning.

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**ME Advisor Receives Withrow Student Service Award**

Ms. Gaile Griffore, ME Adviser, has received the 2009 Withrow Student Service Award.

This award is presented to an adviser, academic specialist, or non-tenure-track instructor for outstanding service to students in the college. Nominations are submitted to the dean, and the selection of the winner is made by the Engineering Undergraduate Studies Committee.

The award citation reads as follows. For more than 25 years, Gaile Griffore has served as academic adviser to students in mechanical engineering. She has touched the lives of thousands of students—likely more than any other adviser in the college’s history. Of particular note is her diligence in guiding students through the requirements of the program and its unwritten realities (what to take when, and what not to take concurrently!). She double-checks everything and students who follow her guidance graduate on schedule, without complications. If she cannot directly assist a student, she will not give up until she finds the person or resource to assist. As noted by a colleague, “Gaile constantly amazes me with the lengths to which she goes to make sure her students have every advantage, while still staying within the bounds of rules and procedures.” Said another, “When Gaile is on a quest for an answer to a pressing advising or policy question, she is reminiscent of Woodward and Bernstein…” One colleague says, “Within the Undergraduate Studies Office, we think of Ms. Griffore as ‘bulletproof.’ Her diligence in advising is second to none; problems with her degree certifications are nearly non-existent. Because of her lengthy experience and systems thinking, she has developed many ‘tips and tricks’ over the years. In weekly adviser meetings, her ‘thinking outside the box’ and willingness to question ‘the system’ has led to many constructive discussions leading to improvements in our work with students.”

Ms. Griffore has a bachelor’s degree in English from Central Michigan University and an M.B.A. from Michigan State. She is a former teacher, and she served for two years as an academic adviser for the College of Veterinary Medicine. In her spare time, she enjoys reading and performing on her flute as a soloist and as a member of several area music ensembles.

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**Associate Chair Corner**

by Professor Craig W. Somerton

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**ME Bulletin | Fall 2009**
Professor Tonghun Lee received the 2009 Withrow Teaching Excellence Award last spring at a special awards luncheon and ceremony. He was presented with an inscribed plaque, a medallion to wear at commencement ceremonies, and a small stipend. Each year a committee consisting of the last three faculty award winners, plus student representatives from ASME, SAE, and Pi Tau Sigma, makes the selection after reviewing nominations from ME juniors and seniors.

Dr. Lee joined the ME department in 2006 after receiving his Ph.D. from Stanford University. His current research interests include laser imaging of advanced propulsion, combustion, and alternative energy conversion systems.

Dr. Lee cares deeply about the quality of his teaching and invests substantial effort in providing the best experience possible for his students. He creates an environment where the material becomes understandable to the students and important for them to learn—qualities that are critical in the classroom. This engenders both respect and admiration from his students. “He makes sure that students understand the theory behind the application,” says one student. Another student says: “We had heard all these horror stories about thermo … but it was not that bad, thanks to the teacher.” He is described as “a great and fair teacher!” and “an excellent teacher who has a bright mind and a good way of transferring knowledge to his students.” Simply put by another student, Dr. Tonghun Lee is a professor who “really is amazing!”

Dr. Lee is teaching ME 422-Introduction to Combustion this semester, and he is scheduled to teach ME 201-Thermodynamics during Spring 2010. In his spare time, he enjoys swimming and playing tennis and spending time with his 3-year old son, Taehan.

The Withrow Teaching Excellence Award Nomination Link is NOW LIVE!

Nominate your favorite prof for the 2010 Withrow Teaching Excellence Award! It’s easy! Just go to:

https://stuedms.msu.edu/withrow.php

Deadline: Friday, Nov. 20
Graduate School in Mechanical Engineering
by Professor Brian Feeny, Associate Chair for Graduate Programs

Did you ever think about going to graduate school? There are some good reasons to consider getting an advanced degree.

• **Higher salary.** Engineers with advanced degrees earn more money than those with BS degrees only. According to the Bureau of Labor and Statistics Occupational Outlook Handbook [http://www.bls.gov/oco](http://www.bls.gov/oco), the entry pay for an MS in mechanical engineering is about $9000 more than that of a BS. So an MS pays for itself in a few years. PhD entry salaries go up further. Not only that, but you can...

• **Get paid to attend grad school.** That's right--many of our grad students qualify for teaching or research assistantships. An assistantship covers a student's tuition, health care, and a salary, which together may have a value of about $30,000 per year. Teaching assistantships for MS applicants are sometimes somewhat competitive, so it is worthwhile to look for research assistantships in advance. See the “prepare now” section below.

• **Job quality.** On the whole, the engineers with advanced degrees have more interesting and creative jobs. An advanced degree puts an engineer in positions of greater leadership, and therefore enables an engineer to have more say in his or her responsibilities. Thus, an advanced degree is an effective way to propel an engineer into a flourishing career. If a research oriented career sounds attractive, a PhD may be the way to go.

• **Grad school is fun.** The graduate school experience is a bit different from that of the BS degree. There is a little less emphasis on lectures and exams, although those are still a strong part of the program. But a graduate student also has a chance to do some teaching and research. Most MS students, and all doctoral students, do a thesis, whereby the student is involved in a long term project to investigate a bit of the unknown, and discover how things work, or how to make things work. For more information, see the Graduate Program Office (2418 EB), or email her at meggradad@egr.msu.edu.

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

Paul McCarthy Allen
Michikazu Aono
Timothy Michael Aspinall
Amber Rae Beebe
Amy Justine Bittinger
Harold Lee Black
Joel Bradley Darin
Joseph Paul Brent
Matthew John Burdick
Elizabeth Anne Carroll
Christopher Reynaldo Cater
Anthony Christian Dellicolli
Kaitlin Michele Donoughue
Allen Warner Eyler
Christopher James Ezop
Timothy Wayne Francisco
James Patrick Guitar
Brittany Ellen Haberstroh
Jacob Ellwood Haf

Stephen Daniel Hammack
Brandon Robert Hengesbach
Michael Anthony Hines
Caitlin Jean Hojnicki
Michael Patrick Karoub
Jeffrey William Laforge
David Richard Lantzy
Benjamin Thomas Llewellyn
Phillip Michael Marino
Bryan Daniel Maxwell
Derek James Mayoros
Eric Richard McElmurry
Christopher Patrick Meyers
Raghav Nanda
Matthew James Owens
Ankita D Patel
Kunjun Vasant Patel
Matthew John Perelli

Kelly Marie Peterson
Eva Marie Reiter
Mathieu Edward Rich
Andrew Scott Rogers
John Robert Sachs
Syed Umer Jalil Saleem
Joshua Michael Samp
Mackenzie Jo Schmidt
Shangyun Shi
Shaheen Shidifar
Ryan Lawrence Smith
John Brian Stukel
Thomas Michael Theisen
Samuel Elliot Tkac
Case Michael Vandenkieboom
Eric Matthew Vine
Krishna Chaitanya Vistarakula
Marissa Ann Wiltz
Ryan Robert Wood

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As you develop interest in certain technical areas, identify faculty who do research in those areas, and talk to them. Become a member of a research group. Seek independent studies or paid undergraduate research projects. Watch for the summer internship program, and apply. Also, students can sometimes find external fellowships from government institutions like the National Science Foundation or NASA. Look around.

Applications for graduate school can be made at any time. Although there are stated deadlines, we do take last-minute applications from our MSU undergraduates. The sooner you apply, however, the better your chances of getting an assistantship.

For more information, see the Graduate Secretary, **Aida Montalvo** in the ME Graduate Program Office (2418 EB), or email her at meggradad@egr.msu.edu.
Preventing Catastrophic Failure of Composite Structures by Professor Soonsung Hong

Due to recent shift of emphasis from test-based confidence to simulation-based confidence in engineering designs, the capability to predict performance and reliability of advanced materials has become a crucial component in many engineering fields. Especially, predicting and thereby preventing catastrophic failure of heterogeneous materials, such as composite materials, has become one of the most challenging engineering problems.

In heterogeneous materials, complex multiphase microstructure provides numerous sites and paths for nucleation and propagation of micro-cracks. As a result, macroscopic crack growth occurs in such a complex way that its understanding requires knowledge of many competing failure mechanisms operating in multiple length-scales. In addition, the size of the fracture-process zone in the heterogeneous material is significantly larger than that of typical homogeneous engineering materials. Conventional fracture mechanics models are, therefore, not applicable to predict fracture processes in heterogeneous materials, mainly because the condition of small-scale yielding cannot be easily satisfied. When large-scale bridging prevails, the engineering design practices based on single-parameter fracture criteria are no longer valid such that fracture toughness values obtained from laboratory tests cannot be transferred to predict fracture in actual structural components. Consequently, in large-scale bridging problems, the prediction of fracture must be accomplished by a full-scale numerical simulation of crack growth in actual components with realistic failure models.

The cohesive zone model is a nonlinear fracture model that is particularly well-suited for the aforementioned task. In the model, various complex fracture processes are represented by unified descriptions of traction-separation relations. The model is proven to be effective when simulating crack propagation in computational fracture mechanics studies. There are, however, two major experimental challenges in accomplishing truly predictive modeling and simulation of crack growth in heterogeneous materials using the model.

First, there is no established experimental method yet to determine the traction-separation relations, so called cohesive zone laws, in a systematic and rigorous way. The problem is an inverse boundary value problem that seeks unknown cohesive-zone constitutive laws from far-field experimental measurements. To make matters worse, the inverse problem is severely ill-conditioned because extracting source parameters from rapidly decaying field is extremely sensitive to the noise in the input data.

On the other hand, the second major obstacle comes from the fact that there is very little discussion on how to design and conduct systematic experimental validation of fracture simulation based on the cohesive zone model. A key element in such experimental validation is to eliminate “fiddle” parameters in the simulation by providing well characterized input parameters. Another key element for the systematic validation is to establish well-designed benchmark experiments coupled with advanced diagnostic tools in order to provide well-defined metrics for quantitative comparison between numerical predictions and experimental measurements.

Motivated by these critical needs, Dr. Hong is developing integrated experimental, analytical and numerical approaches based on full-field optical measurements and inverse analysis. The primary goal of the research is to establish systematic and rigorous methods to determine cohesive zone laws from full-field measurements, and to design and conduct independent benchmark experiments specifically aimed to validate cohesive-zone modeling of crack-growth in heterogeneous materials, such as composite materials and foam materials.

As an alternative engineering solution to prevent catastrophic failure in composite structures, Dr. Hong is also developing self-diagnostic composite materials as a member of the Composite Vehicle Research Center at MSU. The goal of this research is to develop smart composite structure that can diagnose its own structural health by monitoring progression of damages within itself. This can be achieved by embedding a network of fiber optic sensors, similar to the human nervous system, in composite structures where structural integrity must be maintained. The benefits of this approach include real-time update of structural reliability for making informed decision of repair or replacement. Preventing catastrophic failure of the composite structures in air, marine and ground vehicles without costly tear-down inspection is also key.

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**Graphic Provided by Dr. Hong**

Structural health monitoring of composite structures in aircraft and ground vehicle using the sensor network similar to the human nervous system.
An ME 481 Project: Vaccine Refrigerator for Developing Nations By Craig W. Somerton

According to the World Health Organization, nearly half of the vaccines in developing countries go to waste every year due to temperature spoilage. Current transportation and storage methods in remote regions rely on ice packs that last just a few days. In order to maintain the optimal temperature range of 2°C to 8°C for vaccine preservation, these regions need reliable long-term refrigeration where electricity is not consistently available. Solving this problem was the challenge made to two ME 481 design teams during the 2009-2010 academic year. Each semester one team worked on the project that resulted in a novel, solar powered refrigerator that can be manufactured in a developing country. To spread the technology, the design and manufacturing instructions have been posted on the World Wide Web as an open source distribution to allow anyone in the world to utilize the technology.

This project was brought to the ME Design Program by the Appropriate Technology Collaborative (ATC). Founded by John Barrie, ATC is a non-profit organization with the goal “to design, develop, demonstrate and distribute appropriate technological solutions for meeting the basic human needs of low income people in the developing world.” ATC works in collaboration with clients and other non-government organizations to create technologies that are culturally sensitive, environmentally responsible, and locally repairable in order to improve the quality of life, enhance safety, and reduce adverse impacts on their environment. All of the designs, which are created through the ATC, are distributed freely online to anyone who wants to use or improve upon them.

The technology employed in this refrigerator is based on an activated carbon-ethanol adsorption cycle. The refrigerator has six main components: a cold space (where the vaccines are kept), an evaporator (which provides the cooling of the cold space), an activated carbon bed, a solar collector, a condenser, and a wooden structure (to hold all of the components). A computer rendering of the refrigerator is shown in Figure 1.

Figure 1 CAD rendering of the refrigerator.

An important part of this project was a trip to Guatemala where the team built and tested a prototype refrigerator. This was an essential experience for such a project that results in a machine intended for use in the developing world. The design team must understand the culture of the end user, as well as materials and manufacturing methods available in the country where the machine will be used.

With design drawings and manufacturing directions in hand, the trip began with a flight from Detroit to Guatemala City. After arriving in Guatemala City, the team traveled to Quetzaltenango (known commonly as Xela). It had been arranged that the team would use the workshop of the Appropriate Infrastructure Development Group (AIDG). The workshop (Figure 2) was not what the team had expected. The team had expected something like the Engineering Building machine shop, but instead found something more like the Industrial Project Lab. That is, no machine tools, just hand tools. A welding system had to be borrowed from a local trade school and had to be transported via taxi, since the AIDG truck was out of service.

The first task of the team was to buy the materials required for the build. These included sheet metal, copper tubing and fittings, paint, various screws, bolts and nuts, and an ice chest to be used for the cold space of the refrigerator. The purchasing was quite an experience as the team went from shop to shop buying materials and supplies, with Ben Barrie of ATC translating for the team and Professor Somerton making the payments. To transport some materials a local driver would be hired.

With materials in hand, the team began making their oven. With limited machine tools available, they had to modify its manufacturing process. For example, they had to use a circular saw to cut the sheet metal (Figure 3). What took an hour in the Engineering Building machine shop, took 16 hours at the AIDG workshop! Since the AIDG workshop was only available during the day, the team even resorted to cutting and assembling copper tubing for the condenser and evaporator of the refrigerator on the front steps of its hostel in the evening (Figure 4).

At the end of four days, the team had completed the refrigerator,
charged it with the ethanol, and left it over night to complete its cooling process (Figure 5). Early the next morning, about 6 a.m., two team members could wait no longer and took the 2-mile walk to the workshop to find that the refrigerator had cooled the ice chest down to 1.3°C. The team was elated with its success.

With its time at the ADIG workshop completed, the team had the extraordinary opportunity to visit the Mayan ruins at Tikal. For those of you who have seen Star Wars, this was the locale used for the rebel bases in Episode IV. It was truly spectacular to see the ruins of an enormous city that existed from 200 to 900 AD. It covers about 6 square miles, with over 3000 structures, and was estimated to be the home to 90,000 people. This experience gave the team unique insight into Guatemalan culture.

At the end of the trip to Guatemala, the team returned to East Lansing, where it built a new and improved prototype based on what it had learned in Guatemala. Testing on the new prototype demonstrated that the technology was feasible and would be able to maintain vaccines at the desired temperatures. As a final acclaim, the Spring 2009 team won the Edison Award as the best ME 481 design project.

NOTE: All photos for this article were provided by Dr. Somerton.
Horace Mann (1796 – 1859), that great American education reformer, wrote “Be ashamed to die until you have won some victory for humanity.” This compelling string of words resonated with the administration of Antioch College in Yellow Springs, Ohio and they adopted the sentence as the school’s motto.

At Harvard University, the Social Enterprise Club is currently the most popular student club on campus. This popularity clearly demonstrates that a large percentage of gifted students at this elite school possess a voracious appetite for serving impoverished people rather than pursuing the ostentatious lifestyle of a Wall Street baron.

In November 2008, the publication, Business Week, published an article on the Millennial Generation at US business schools. It described how a significant percentage of graduates were attracted to employment opportunities that would enhance the lives of the 70 percent of the world’s population that currently live in poverty . . . micro-financing in Africa, renewable energy projects, health issues, and operating food banks in Latin America.

As a member of the Millennial Generation, do you possess Mann’s yearning to have “won some victory for humanity”? Do you possess the desire to make a difference, now? Have you been swept away by this tsunami of social enterprise that’s currently flooding our nation? Do you want to help the world’s poor, but you are uncertain how? Have you ever contemplated learning about yourself . . . yes, YOU . . . while transforming the lives of vulnerable under-represented people?

Why not vigorously insert a brand new semester-long Peruvian humanitarian program into your class schedule next summer? In South America you will work with very poor indigenous people that earn about two US dollars each day. Why not offer these powerless people the gift of dignity and emancipation through your application of engineering knowledge to lift them out of poverty? Why not make a profound difference, NOW?!

This innovative program of community development in the Andes is co-sponsored by six MSU colleges and it requires inter-disciplinary teams of students to collaborate with local NGOs (nongovernmental organizations) on development projects that will make a profound difference to communities living in a state of poverty while transforming your own life too. The co-sponsoring colleges are Agriculture & Natural Resources, Arts & Letters, Engineering, Social Science, the James Madison College and the Residential College of Arts & Humanities.

This semester-long summer program of 13 credits will begin in Cusco, near Machu Picchu, where students will attend five weeks of ISS classes on Andean culture and simultaneously classes in conversational Spanish at a language institute. Language competency will be enhanced further by daily interactions with each student’s host family and during the execution of the five weeklong community development project. These faculty mentored projects will classify as MSU directed studies.

During the 2009 program, the following projects were undertaken at 10,000 feet in the northern Andean town of Huamachuco where 87 percent of the population live on less than two dollars a day and 45 percent live on less than one dollar a day (officially classified as extreme poverty):

1) Refinement of educational programs for child workers in silver mines.
2) Development of appropriate social services for parents.
3) Assessment and promotion of tourism.
4) Development and installation of a solar water heater at the town’s hospital.
5) Creation of a domestic solar water heater for poor families. It services children with special needs at their school and it also serves as a teaching aid when this new technology is being taught to community groups.

–See PERU on next page.
Aachen Program

An AMAZING opportunity. Imagine a program that provides an exceptionally substantive experience (that will resonate at a job interview or graduate school admission time) as well as the opportunity to explore Europe during three-day weekends. Even better, consider applying for it.

The substance comes from the opportunity to carry out 5 MSU credits of ME 490 by doing research in one of the institutes of the RWTH-Aachen and studying the German language, 4 MSU credits, in an environment where you can readily hear, read and respond to their native language on a daily basis. RWTH is recognized as a world-class technical university and its reputation is very well deserved. The two parts of the academic program means that: 1) our students are given the opportunity to join a research team and to execute their own project with subsequent bragging rights for what they have accomplished using state-of-the-art equipment, and 2) the language class makes an important statement about one’s willingness to adopt a significant intellectual challenge by engaging a foreign language in the country of its origin.

A preparatory 1-credit ME 490 effort is carried out in the spring before the summer in Aachen. This provides a directed running start for the summer experience. These 6 credits of ME 490 apply to the required 12 credits of technical electives that are required for graduation. The 4 credits of German 101 and the 4 credits of German 102 (or a higher level German language course in Aachen for students with enhanced preparation) apply to the requirement for “other electives” that are a part of the MSU graduation requirements.

The following observations were provided by program participants Sara Murawa and Ryan Rieck from the summer of 2007. These observations succinctly identify several of the program’s benefits.

Daily life in the student-oriented city of Aachen is very pleasant. Daily living costs such as food and entertainment are comparable to, if not cheaper than, those in East Lansing. There’s plenty of history. Aachen was one of Charlemagne’s capitols and the cathedral at the city center dates from 800 A.D. Students’ housing is rearranged and included in the program cost. The MSU students are placed in private rooms in the dorms where they are integrated with other German and international students. The research hosts and German students are very comfortable in English, as well as is much of Germany’s population. The people are friendly and accommodating; Aachen makes a great environment for international students.

In all, this program offers independent research in a nurturing environment with plenty of European culture exploration opportunities. To apply for the program, contact Professor John Foss (foss@egr.msu.edu)

Submitted by Professor Foss, Program Director.

• Polymers and Composite Materials
• Wind Energy
• Engineering for Renewable Energy
• Manufacturing Technology
• Marine Energy
• Sustainable Energy Group Design Project (Design Intensive)
• Marine Energy
• Manufacturing Technology
• Engineering for Renewable Energy
• Wind Energy
• Polymers and Composite Materials
• Sustainable Energy Group Design Project (Design Intensive)

For more information about this exciting new study abroad program, contact Gaile Griffore, ME Advisor, 2560 EB, 517-355-3338 (griffore@egr.msu.edu)

Study Abroad at the University of Edinburgh

Consider spending a spring semester studying abroad at the University of Edinburgh in Scotland! This recently established exchange program has already attracted an Edinburgh student who is taking MSU courses this year.

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. In 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).

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 nighttime life with many activities for young adults.

You will be able to take courses that fulfill your entire Senior Elective requirement (i.e., 12 credits of Senior Electives, including the 3-credit design intensive course). Possible courses to be taken while studying at the University of Edinburgh 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 about this exciting new study abroad program, contact Gaile Griffore, ME Advisor, 2560 EB, 517-355-3338 (griffore@egr.msu.edu)

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https://stuedms.msu.edu/withrow.php (Deadline: Nov 20)

The sole meaning of life is to serve humanity.” –L. N Tolstoy (1828 – 1910)
Pi Tau Sigma

Pi Tau Sigma is the National Mechanical Engineering Honor Society and has chapters in nearly every University offering a mechanical engineering program. Pi Tau Sigma recruits from the top 25% of juniors and 35% of seniors in mechanical engineering and members are recognized as the elite students in their class, who often excel in industry.

Traditionally, Pi Tau Sigma is involved in a variety of activities that are academic, social, and in service to the community. Events through this honorary society provide an excellent medium for networking, not only with other mechanical engineering students and the community, but employers as well. For new members to become acquainted with each other and to gain familiarity with the program, “Wing Night” is a social event held near the beginning of every semester. Service events include volunteer work at The Ronald McDonald House, Relay for Life, Soup Kitchens, and Pet Adoptions. One of Pi Tau Sigma’s most recognized events is our semi-annual initiation meeting followed by a complimentary dinner at Olive Garden. This event is scheduled for Thursday, November 10th of this semester.

If you are eligible to become a member of Pi Tau Sigma, you will be notified in the beginning weeks of every semester. We believe you have a lot to gain from this society, so keep those grades up and we hope to see you in the spring! Submitted by Louis Cervone, Secretary.

It’s Resume Time!
by Craig Gunn, ME Director of Communications

It is that time of the semester when one starts to go into high gear concerning the preparation for employment, whether it be a co-op, a summer stint, or the ultimate full-time adventure. The new clothes are purchased. The hair is cut to resemble the industrial style. People start practicing the right moves in front of the bathroom mirror.

And low and behold, resumes are dragged out of whatever dingy place they have been residing, and a frantic search is made for anyone who can offer a few guiding principles on text production, a production that will lead to an interview, an interview that will cement the chances for that desired job. As blood pressure increases and the need to do the best job possible on those written documents looms, it is important to spend some valuable time on creating documents that will WOW the reader and put the writer far ahead of the competition.

The information that follows is not new and the comments are not hallowed words from on high. But sometimes we forget the simple things. We fail to realize that these simple things may be very critical in our lives. So what are the things that you need to have as completely under your control as possible in that spectacular resume?

If you haven’t touched your resume in a year or so, then it needs to be reviewed, first by you and then later by others. Pick up the hard copy or gaze at the screen and look at how the information flows down the page. Does a reader immediately know who wrote the resume, what the writer wants, his/her degree progress, and the jobs he/she has held? If the reader is confused maybe they won’t give it a second glance.

The next step involves the words you have used. Have you been careful to pick just the right words to describe the jobs you have done? Did you say, “worked 9-5” or “Developed the algorithms needed to boost rocket efficiency 350% in the Alburdine 2355.” Probably the second wording creates a better picture of you. As you create the wording for the resume, have you given the reader enough detail to really want to talk to you about employment?

Remember the resume opens the door. If it only moves the door a crack, you may never get a positive reply to your inquiry. Remember to make yourself human by including activities that you enjoy doing, but be careful. Bicycling and painting might be relatively safe and comfortable to talk about in an interview, but belonging to a group that bungee jumps with cords made of crepe paper may not impress an employer who needs to know that you will be alive on Monday to do the jobs assigned. You don’t need to lie about things, but be wise in your selection of activities.

After you have done your best to form a clear picture of what you have done in your life, pass those resumes on. Find as many people as you can who will pretend to be employers making judgments on you simply from the words provided. Make sure that the group you select is willing to provide constructive comments that will make the resume better. A simple, “I like it or I don’t like it.” doesn’t offer much to the writer. If they can explain why, then they can continue as a reader.

In closing, remember to think of your resume as a living document that needs your continuous attention. Keep looking at elements that may be added to the resume or modified to make it more explicit of your qualities. Then make every effort to gather a group of readers who will give needed comments on how well you have accomplished the task of telling about yourself. Evaluate their comments and use those comments wisely. With those efforts you will always have an up-to-date, exciting, and valuable document to make the best case for your interview and future job.
Are Social Media for You and Your Job Search?

Social media can help you define interests, remain current/updated on news and trends while staying on track with your job search. So, make sure you try, join, use, and participate your way to a great network and successful job search!

Check out these social media sites:

LinkedIn (www.linkedin.com) allows you to use on-line networking to connect and expand your reach to friends, contacts, employers, jobs and more. And, over 60,000 MSU alumni are on LinkedIn. But, it is more than just signing up . . . you need to be involved in your network. Join and contribute to groups (like MSU Alumni and MSU Engineering) and connect with fellow professionals. Knowing people and networking with those whom they know can lead to jobs.

For more information on using LinkedIn try: http://jobsearch.about.com/b/2009/04/21/linkedin-seek-week.htm

For a video explanation of the LinkedIn services visit your Spartan Engineer YouTube site: http://www.youtube.com/spartancareer

Try Twitter (http://www.twitter.com). This is the “Hottest” Job Search Tool. You can create an account in two minutes and follow lots of career information sources. To get you started, follow us at: MSU_egr_job or MSU_egr_intern. We streamline a number of great opportunities and tips for you to connect with. Twitter is evolving as another resource for both job searching and recruiting check out: http://www.twitterjobsearch.com

You should then follow with a number of other sources including:

@EngineerJobsUSA (Hottest and Best Jobs for Engineers across the USA)
@JobsDetroit (Keeping you up to date with available jobs in Detroit)
@ChicagoEngJobs (Engineering jobs in the greater Chicago area)
@cashforcareers (MSU Career Advice, Events, and Connections)

Blog about it! Follow what others with your skills and interests are up to and learn from them! You have a few SpartanEngineers that are currently sharing their stories:

A Spartan in Spain: http://bowenkev.wordpress.com
Eva McSpartan’s Job Search: http://www.spartanjobseeker.blogspot.com

Keep in mind that social media provide one resource (but a powerful one) and should be used in combination of all available resources to maximize your networking and job search.

All of these resources are at your finger tips, and we are here too! Don’t hesitate to contact us. Submitted by Jennifer Jennings, Field Career Consultant, The Center, 1340 EB, 517-355-5163, careerers@egr.msu.edu

Summer Job Tips

Construct a resume. Send it, along with a cover letter to companies in your home town or other preferred locations. Do not overlook small and medium sized companies. Be politely persistent and follow up with another letter, telephone call, or a personal visit. Type all correspondence.

Register with MySpartanCareer (my.spartan-career-login). Click on MySpartanCareer and register. MySpartanCareer provides electronic event updates, want ads for internships, summer, full-time, on-campus and off-campus jobs and a tracking system so you can keep it all organized. MySpartanCareer also allows you to sign up for on-campus interviews.

Visit The Center/SpartanEngineering, in 1340 EB, across from Sparty’s.

Consult these sources: professors, relatives, friends, ME seniors, telephone books, manufacturers’ directories from local chambers of commerce, Peterson’s Guide, and the College Placement Annual.

Watch your email for summer job notices from the ME Advising Office.

American Society of Mechanical Engineers

The American Society of Mechanical Engineers (ASME) is dedicated to helping students network outside the classroom and give them a jump start in the work place. ASME sponsors many events and is known for bringing in big name companies to speak. So far, ASME has brought in Dow Chemical, Shell, Harness Dickey & Pierce, Unisolar, Nestlé, and Eaton Corporation. If you would be interested in attending the next presentation hosted by ASME, visit the ASME website at www.egr.msu.edu/asme to find the date.

Company presentations aren’t the only events hosted by ASME. During E-Week of every year, ASME hosts its annual Broom Ball game, and MSU students take to Munn Ice Arena in their shoes. However, ASME’s biggest event every year is “Junk-Yard-Wars.” Last year, five different engineering groups, including one graduate team, had one hour to build and test a wooden car that could hold at least one student and be pushed by two other team members. The teams raced for seven laps around the IM West tennis courts, where cart durability and weight were the deciding factors. Don’t forget: Junk-Yard-Wars is an annual event, so we look forward to seeing you there in the spring. One of ASME’s most notable events is “The Gathering.” This social event is hosted by Professor Somerton and is an opportunity for student and faculty to mingle outside the classroom while enjoying some of East Lansing’s finest cuisine. “The Gathering” is scheduled for December 4.

Considering joining ASME? Becoming a member of ASME is beneficial and easy to do. ASME membership links you to great career opportunities that other engineering students don’t have. ASME members gain valuable teambuilding skills.

See ASME next page
ASME, cont’d from page 13

and provide members with the chance to network with MSU faculty and outside industries. Being a member gives you the chance to speak directly with company presenters. Having trouble lining up an internship or a co-op for the summer? Joining a group like ASME is a great resume builder that sets you apart from the rest. One of the best benefits of joining ASME is access to over $100,000 in scholarship money that only ASME members have access to! To become a member, just visit our website, www.egr.msu.edu/asme, or go to room 2328K EB to pick up an application. Membership is FREE for freshmen, so don’t wait until next year to join. Not a freshman? Membership to join the MSU chapter is only $35 per year. Further questions can be answered at ASME general meetings by our E-board members. Aside from the networking opportunities and scholarships, ASME members also receive a free subscription to the Mechanical Engineering magazine.

Want to get your voice heard around the panel, other clubs and societies, or even the faculty in the College of Engineering? Then you should consider running for an officer position. Helping run a society like ASME gives students the real-world experience employers are looking for. Officer elections are held in the spring semester, and these positions need to be filled when graduating officers leave. So get involved with ASME and the College of Engineering and make the most out of your MSU education. ASME members help create new programs that benefit not only current MSU students but future MSU students as well. Visit www.egr.msu.edu/asme for further details on meetings, event times and locations, community service, membership and more. Submitted by Louis Cervone, Newsletter Editor

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“That’s the first sign I’ve seen that the recession may be ending.”

©1991, 1994 HENRY MARTIN

Teaching Award Nomination Form:

The Michigan State Baja SAE team is looking for new members! All years are welcome, no experience is required, and it is never too late to get involved! This semester, the team will be hard at work designing and building a new off-road vehicle to race against other teams from around the world. If you are looking to have a good time and gain practical engineering skills, Baja is the perfect team for you.

Travel through the entire design process as you and your teammates brainstorm, design, and create the all-new Baja car for this year’s competitions. Practical skills such as machining and fabrication experience, teamwork, and problem solving skills not available in the classroom are priceless and you get them all by joining the MSU Baja Racing Team. This semester is the perfect opportunity to come out and get involved in an exciting new season! To learn more about the team, visit www.michiganstatebaja.com or email any questions you might have to michiganstatebaja@gmail.com. Submitted by Caroline Skuta, Safety Coordinator.

Solar Car

The MSU Solar Car Team is gearing up for the upcoming competition, the American Solar Challenge (ASC), in July 2010. The competition is aimed to design, build and race solar-powered cars in a nationwide event. Also in 2010, the team will be racing from Dallas, Texas to Chicago, Illinois.

Last June, the team travelled to Dallas to compete in the Formula Sun Grand Prix challenge, which was the team’s first competition. Although the vehicle could not be competitive due to a few technical difficulties in the motor, it was a very solid educational experience where the team got to share knowledge and experience with 10 other teams and test drive the first MSU solar car ever made.

Currently, the team focuses on achieving two major goals. The first involves final adjustments to the car both on the mechanical and electrical sides for it to be ready for the upcoming challenge in 2010. The second goal is to start designing MSU’s next solar car. The mechanical team is working on several finalizing adjustments on the car’s frame to reduce its weight and improve its efficiency. The electrical team on the other hand is currently focusing on upgrading from the lead acid battery system that was initially used in the race to a lithium ion pack. For more information and updates about the team, please visit: http://www.egr.msu.edu/solar. Submitted by Mohanad Bahshwan, Senior Mechanical Engineer.
SPRING SEMESTER SENIOR ELECTIVES

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

ME 442❉ Turbomachinery. 3(3-0). Prereq: ME 332. Engeda.
ME 445❉ Automotive Powertrain Design. 3(3-0). Prereq: ME 444. Novak.
ME 464 Intermediate Dynamics. 3(3-0). Prereq: ME 361. Shaw.
ME 475❉ Computer Aided Design of Structures. 3(2-3). Prereq: ME 471 or concurrently. Averill.
ME 477 Manufacturing Processes. 3(3-0). Prereq: ME 222 and MSE 250. PLEASE NOTE that the ME department cannot change your ME lab section in another course to fit the ME 477 schedule. Thompson.
ME 478 Product Development. 3(3-0). Prereq: ME 361, 477, and Tier I Writing. Kwon.
ME 490 Independent Study. 1-4 credits. Requires Override–See #1 Below. You may re-enroll for a maximum of 6 credits.
ME 491 Selected Topics in Mechanical Engineering. Section 001: Intro to Computational Fluid Dynamics. Requires Override–See #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. Jaberi
ME 495 Tissue Mechanics. 3(3-0). Prereq: ME 222. Biomechanical Concentration Course. Haut.
ME 497 Biomechanical Design. 3(3-0). Prereq: None for ME majors. Biomechanical Concentration Course. PLEASE NOTE that the ME department cannot change your ME lab section in another course to fit the ME 497 schedule. Reid-Bush.
BE 445 Biosensors for Medical Diagnostics. 3(3-0). Prereqs: BS 111 and CEM 141 and ECE 345. Biomechanical Concentration Course. Alocilia.
CE 422 Applied Hydraulics. 3(2-2). Prereqs: ME 332 and 391. Wallace
MSE 425 Biomaterials & Biocompatibility. 3(3-0). Prereqs: PSL 250 or concurrently and MSE 250. Biomechanical Concentration Course. Baumann.
MSE 426 Introduction to Composite Materials. 3(3-0). Prereq: ME 222. Loos.
MSE 466 Fracture and Failure Analysis. 3(2-3). Prereq: ME 250. Recommended background: MSE 320 and 331. Lukas.
ME 802 Advanced Classical Thermodynamics. Requires Override–See #3 Below. 3(3-0). Prereq: ME 412 plus GPA of 3.5+. Genik.

OVERRIDE INSTRUCTIONS

ME Override Form Link: http://www.egr.msu.edu/me/undergrad/forms

1) ME 490–Independent Study: Find a professor who is willing to supervise your project, and discuss your plans with him/her. Complete an ME 490/490H Enrollment Contract, available in the ME Advising Office in 2560 EB. After you and your professor have signed it, return the form to the ME Advising Office for the remaining signatures and override.
2) Complete and submit the ME Override Request form: http://www.egr.msu.edu/me/undergrad/forms
3) Complete the Graduate Course Override form, available in the ME Advising Office in 2560 EB. This is a paper form.

Undergraduate Program Educational Objectives
Department of Mechanical Engineering
Michigan State University
(Approved by the ME Department Faculty on February 17, 2005)

Objective 1: Our graduates will be competent engineers practicing in a diverse range of activities.

Objective 2: Our graduates will use their mechanical engineering education as an impetus for personal & professional growth.

Objective 3: Our graduates will have achieved a noteworthy level of workplace responsibility through understanding their environment and capabilities, including the importance of knowledge management.

Objective 4: Our graduates will be independent thinkers who take ownership in identifying problems and determining effective solution strategies in a timely manner.
### Fall Semester Calendar

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
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<tbody>
<tr>
<td>November 13</td>
<td>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.</td>
</tr>
<tr>
<td>November 20</td>
<td>Deadline for Withrow Teaching Award Nominations. The nomination form is located at: <a href="https://stuedms.msu.edu/withrow.php">https://stuedms.msu.edu/withrow.php</a></td>
</tr>
<tr>
<td>Nov 26-27</td>
<td>Thanksgiving recess</td>
</tr>
<tr>
<td>December 4</td>
<td>“The Gathering” (fall social) at Dr. Somerton’s house. All ME student, faculty, and staff welcome! Sponsored by ASME.</td>
</tr>
<tr>
<td>December 11</td>
<td>Last day of classes &amp; Design Day.</td>
</tr>
<tr>
<td>December 12</td>
<td>Undergrad Commencement Ceremony-Breslin at 2 pm. Lasts about 2 hours. No tickets required.</td>
</tr>
<tr>
<td>Dec 14-18</td>
<td>Final Exams</td>
</tr>
<tr>
<td>Dec 19-Jan 10</td>
<td>Semester Break</td>
</tr>
<tr>
<td>January 15</td>
<td>On-line Open Add Period for Spring 2010 ends at 8 p.m.</td>
</tr>
<tr>
<td>March 1</td>
<td>Approximate application deadline for April FE exam</td>
</tr>
<tr>
<td>March 15</td>
<td>Scheduled Computer/Telephone Enrollment period for summer semester begins. (Open enrollment begins on March 27.)</td>
</tr>
<tr>
<td>April 2</td>
<td>Computer Enrollment period for fall/spring 2010-2011 begins. Your enrollment access date (the first time you can log on) will be posted on StuInfo in mid-March.</td>
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</tbody>
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### Design Day

**Friday, December 11, 2009**

MSU Union

Come and see our students lead, create, and innovate

Activities include:
- Competitions
- Presentations
- Demonstrations
- Awards

**MICHIGAN STATE UNIVERSITY**

**ME Advising Office**

Dept of Mechanical Engineering

2560 Engineering Building

East Lansing MI 48824-1226

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