PHOTO PROVIDED BY THE SOLAR CAR TEAM

Photo of Solar Car Team taken at Cresson, Texas in June 2009 at the Formula Sun Grand Prix (FSGP) Race. Left to right: Amar Shah (ME Junior), Rick Pocklington (ME Alumnus–MSME/Spring ’09), Trevor Mclean (BE Senior), Ryan Blake (ME Alumnus–BSME/Spring ’09), Lindsay Karrn (Education Junior), Joel Anderson (EE Graduate Student), Manila Ounsombath (ME Junior), Nick Schock (ME Senior), Doug Gobeski (ME Alumnus–BSME/Fall ’08). Read about the Solar Car Team on page 2.
Established over a decade ago, this team has been working on getting a car up and running to compete with competitors from all over the nation and even around the world. The MSU Solar Car Racing Team first debuted their car to the solar scene last June at the Formula Sun Grand Prix track race in Texas. Although they made their presence known to their competitors by bringing a car to the Texas race, their car suffered some technical difficulties and they had no choice but to pull out of the race. The motor controller had a glitch, causing it to read that the car was either at full throttle or completely off which was considered too dangerous to compete.

That race was new and exciting for the team, for it was the first time MSU has competed in the solar car racing world. The team has never seen such camaraderie in a competitive atmosphere and was surprised by the friendliness of the other teams such as Kansas State, Iowa State and California-Berkley, just to name a few that lent them advice, manpower, and tools. The MSU Solar Car Team is also an anomaly in the solar world, in that they have three separate teams within the team (Mechanical, Electrical and Business) and that there are more mechanical members than there are electrical members.

The team took a great step after this past year’s unveiling, and they are showing great commitment to accelerating the team forward. This past fall semester they continued to make themselves known by participating in several events. They won “Best Group” at MSU’s Fall Homecoming Parade themed, “We’ve always been GREEN.” They also presented their car/solar array at the Alumni Tailgate, Fall 2009 LEGO Tournament, and in the Engineering Building Lobby for their fall recruitment. All the while designing and putting in long hours at the shop, the team has been able to stay on the minds of the university and its associates by putting their car in every event possible.

A decision was made to sit out this summer’s race (North American Solar Challenge) in order to complete a competitive car that can race on a cross-country route. With an extra year to finish a complete solar car, they have been doing a lot of design work for their future car, which is named “Brasidius.” While the electrical and mechanical teams have been working on new plans for next year’s car, the business team has also been getting together a plan of action to help them achieve their goals. With every donation, be it in kind or monetary, the business team continues to get one more thing crossed off the wish list as they move forward to finish their dream solar car.

The mechanical team, lead by their chief, Nick Schock, has been working on improving the suspension on Brasidius along with a complete facelift on the frame design. The car for the next race is currently being designed and tweaked to work with an aluminum frame and to be lighter overall. The electrical team, spear-

**In This Issue**

- COVER STORY ........................................ 2
- Curriculum News ................................. 3
- ASME Design Project Course .............. 4
- Summer Courses ................................. 4
- Special Overrides ............................... 4
- Dean's List / May Grads .................... 5
- Associate Chair’s Corner .................... 6
- LinkedIn / Craig Gunn ....................... 7
- Study Abroad: Peru ........................... 8
- Study Abroad: Aachen ....................... 9
- Study Abroad: Edinburgh ................... 9
- Department News .............................. 9
- Dr. Tekalur’s Research ....................... 10
- Senior Elective: MSE 465 .................. 12
- Pi Tau Sigma / ASME ......................... 12
- Formula SAE/Baja SAE ..................... 13
- 2010-11 Senior Electives ................... 14
- Calendar .......................................... 16
headed by Joel Anderson, is designing a more advanced electrical system along with a working Master Power Point Tracker that can be used for both Brasidius and for future cars.

Although the team has taken the route to spend a little more time and money on engineering a sophisticated solar car, you have not heard the last from them this semester. In May they will be hosting a sponsorship day at Berlin Raceway to promote MSU’s improved solar car. Invited are MSU College of Engineering faculty, alumni, the MSU Solar Car’s sponsors and the local media. Written by Manila Ounsombath, Business Manager (ounsomb1@msu.edu / (517) 303 -1728), and revised by Jim Solce, EE Sophomore.

A concept car

MSU & Kansas State Teams

Curriculum News

• ME 280–Engineering Graphic Communications: The prerequisites for ME 280 are (EGR 100), (EGR 102 or concurrently), and (MTH 116 or concurrently). Students who took ME 180 can a prerequisite override. To request the override, go to the ME Override Request form: [Click on Forms & Handouts].

• ME 285–Computer Aided Design Tools will be offered BOTH fall and semesters. Prereq: ME 180. (If you took ME 280 instead of ME 180, request a prerequisite override at: [Click on Forms & Handouts]. Instructor: Bob Chalou. This course is an Other Elective.

• 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 423–Intermediate Mechanics of Deformable Solids & ME 828–Advanced Strength of Materials will be taught together during Fall 2010. The undergraduate and graduate students will have different assignments.

• ME 451/461 Reversed!!! Beginning Fall 2010, ME 461 will be taken before ME 451. Students were emailed about this change on February 2.

• ME 456: Students who are beginning the ME 461/451 sequence next fall, and who want to take ME 456, will need an override. To request an override, please submit the ME Override Request form on the ME website.

• 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.

• ME 491/001–Intro to Computational Fluid Dynamics will be offered Spring 2011 as a non-design intensive Senior Elective. It will taught 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 (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 1410 EB.

• ME Honors Section: ME 280H is available to Honors College students until April 16. After that, students with a 3.5+ GPAs are eligible and may request overrides for open seats.
Special Overrides

- **Transfer Prerequisite Override Requests:** If you plan to take the prerequisite for an ME course at another institution this summer, you must 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](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 Overides:** Students who transferred their first ISS course need to obtain a prerequisite override before enrolling in ISS 3xx. To obtain the override, call 517-355-9733 on Monday-Friday at 8:30 a.m.-4:30 p.m. (or you can go to 302 Berkey Hall during the same hours). Be prepared to tell them the course number and section you are requesting.
Fall 2009 Dean’s List

Congratulations to the following 219 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


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

May Graduates

Mohanad Hasan Bahshwan
Charles Andrew Baird
Derek James Baker
Stephanie Anne Bonner
Andrew Falck Cawood
Louis Loren Michael Cervone
Devesh S Chaphalkar
Dae Keun Chun
Tyler Frank Curtis
Drew Kelby Darling
Nathaniel Charles Davis
Ricardo Felix de Majo
Alexander Craig Dupay
Ryan Michael Emmorey
Christopher Neal Fairbanks
Neil Andrew Ferguson
Eric James Ford
Lucas Fratta

Amy Jo Giziicki
Joao Paulo Moura Goncalves
Clarence Young Huff
Stephen Timothy Hukill
Spiros Samuel Kakos
Brandon Michael Kelly
Kyungmin Lee
Mirsena Lekovic
Ryan Robert Lindeman
Benjamin Scott Lindstrom
Joseph Roy Marotta
Michael Jesse Mephai
Justin Torre Meeder
Marshall Henry Mendoza
Thomas Craig Michalik
Nicholas Celentino Odell
Alexandre Ribeiro Oliveira
Fernando Ribeiro Oliveira
James Steven Peers

August Graduates

Ankit K Aggarwal
Mitchell Lee

Jeffrey Manuel Movssesan
Florian Constantin Pribadi
Andrew Cory-Daryl Tonkovich

Admir Trinjanin
Eric Matthew Waggy


Academic Advising

1) ME Freshmen are advised in W-8 Wilson Hall on a walk-in basis only.
2) Most Sophomores (see item 3 below) are advised by Carmella Davis-King. To schedule an appointment, call 355-6616 x 1, or go to 1410 EB.
3) ME Sophomores who are Juniors-to-Be with a 3.0+ GPA plus All ME Juniors and Seniors are advised by Gaile Griffore. For an appointment, call 355-3338, or go to 2560 EB. (A “junior-to-be” is a sophomore who will be a junior at the end of Spring Semester 2010.)
Many years ago the faculty, students, and alumni of your mechanical engineering department contemplated the question, “What do we expect our graduates to achieve in their professional careers?” A group that included representatives from the list above and some employers of our graduates labored on this question for several months before the department approved the Program Educational Objectives shown below. We now had the foundation in place in developing a curriculum that will lead our graduates to these achievements. It also allows us to be a program that is accredited by the Engineering Accreditation Commission of ABET.

ABET accreditation is assurance that a college or university program meets the quality standards established by the profession for which it prepares its students. For example, an accredited engineering program must meet the quality standards set by the engineering profession.

(http://www.abet.org/the_basics.shtml)

ABET also requires that we periodically evaluate our Program Educational Objectives for appropriateness (are they the right set of achievements?) and achievement (are our graduates reaching these goals?). To be honest, our Program Education Objectives are a little convoluted. The department’s curriculum committee probably took about four one-hour meetings to feel comfortable with them. In order to assess the Objectives, they had to be broken down into simpler statements. Here’s what we came up with:

The graduates of the MSU Mechanical Engineering program will have demonstrated:

1a. engineering competency
1b. an ability to work in a number of different engineering activities
2a. professional growth
2b. personal growth
3a. workplace responsibility
3b. understanding of their environment
3c. understanding of their own abilities
3d. an ability to manage and acquire knowledge.
4a. independent thinking
4b. the ability to take ownership of projects
4c. an ability to identify problems
4d. an ability to determine effective and timely solutions

This is clearly a more manageable list and allows us to survey our alumni as to their attaining these goals. Every year or so, we conduct a web based survey with alumni that have graduated in the last 3-5 years. We ask a series of questions to ascertain their achievements relative to this list. A couple of examples include:

• Compared to those who graduated at about the same time as me, what level of responsibility has my company given me?

• I know how to get information for a project upon which I am working:

Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree

The results of our surveys clearly demonstrate that our alumni are attaining the achievements expressed in our Program Educational Objectives.

So you may now be asking the question, “Why is Dr. S. droning on about this?” It turns out that next year is our renewal year for accreditation. In the fall we will have a visitor who will come and evaluate our program. It is important that the students he talks to have some awareness about our Program Educational Objectives.

Program Educational Objectives for the Undergraduate Program in Mechanical Engineering
Department of Mechanical Engineering
Michigan State University
(Approved by the Department Faculty 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

Curriculum News, con’d from page 3

• 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.

• Study Abroad: The ME department sponsors or co-sponsors study abroad programs in France, Germany, Korea, Scotland, Peru and Taiwan. For more information, contact the ME Advising Office.
Why Use LinkedIn? by Jennifer Jennings

"It’s not what you know. It’s WHO you know." LinkedIn provides you an easy way to connect and stay connected with professionals from across the globe. You can search for people you know and find out how you are connected to others by means of your network. You never know who you might meet . . .

What Does LinkedIn Offer?

- Display your credentials to the world
- Search job postings and apply directly
- Connect with potential recruiters
- Research professional and company profiles
- Request recommendations and referrals to give yourself an advantage

Top Tips

Keep your profile professional and up to date. Think of it as your digital resume. Be sure that it showcases the skills that are unique to you. Post a professional picture of yourself . . . “people do business with people.” Ask colleagues and friends to critique your page.

Work your network. Request recommendations from your supervisors. You only need to display a handful of the most powerful recommendations. Employers do not want to sift through hundreds of comments from your friends. When applying for a job, take advantage of the “Request Referral” button to see if anyone in your network is in a position to get you in the door. Don’t forget to maintain your communication with your contacts . . . just because they are in your network does not mean they are obligated to remember or recommend you.

Take advantage of LinkedIn Groups. Groups allow you to connect with other professionals based on your common interests. This is a great way to meet alumni who are in a position to hire. Groups also let you view job boards, participate in discussions, and read group news.

Join These Groups

- Michigan State University Engineering
- MSU Spartan Engineering Connection
- Michigan State University Engineering Alumni
- ’09 Grads

Online Resource – LinkedIn ’09 Grad Guide

For a comprehensive video explaining the many facets of LinkedIn, visit: [http://grads.linkedin.com](http://grads.linkedin.com)

The Center for Spartan Engineering asks . . . Did you know?

Social media sites such as LinkedIn use on-line networking to connect? Whether you are job searching, networking or both, you will find over 114,000 MSU alumni on LinkedIn, and 44k of them within 75 miles of East Lansing. Join groups like the MSU Alumni Association and MSU Spartan Engineering Connection, where you will find over 15k MSU Alumni and connect with fellow professionals. Knowing people and networking with whom they know can lead to jobs and/or great connections. Check above for tips on how to log on, get connected and be involved.

For more information and tutorials stop by your career center, 1340 EB. Good Luck!

Puzzles to the Rescue! By Craig Gunn, ME Director of Communications

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

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

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

Community Engagement and Interdisciplinary Study of Global Issues in the Peruvian Andes by B.S. Thompson, Program Co-Director

The World Health Organization’s 1948 constitutional preamble asserts that “Health is a state of complete physical, mental, and social well-being and is not merely the absence of disease or infirmity.” This string of words characterizes the very heart and soul of our town-and-gown activities in the Peruvian city of Huamachuco. Enrollees in this MSU study abroad program are dedicated to the delivery of health in a remote Andean community where 85% of the population earn less than two dollars a day and 50% live in a state of extreme poverty.

During Summer Semester 2010, elite students from eight MSU colleges will undertake eight diverse interdisciplinary team projects in this Peruvian city by collaborating with NGOs and representatives from local government. These projects include the creation of affordable renewable technologies (biogas, wind, photo-voltaic, solar-thermal etc) and the delivery of workshops in Spanish to educate the community; enhanced social services for abused and abandoned women; and the development of educational programs on human nutrition for vulnerable young children in primary schools using vignettes, mime and theatrical productions.

Before this cohort of elite students and the attendant group of faculty mentors embark upon the global defense of human life in Huamachuco, they will prepare for the community development projects by enrolling in classes on Andean culture and also conversational Spanish at an institute in Cusco, close to Machu Picchu. Language competency will be enhanced further by daily interactions with each student’s host family and also during the execution of the projects.

Have you ever contemplated joining a throng of gifted students, a group of US ambassadors, for a life-transforming experience while serving the underprivileged at 11,000 feet? Have you ever contemplated your own personal growth in a remote mountainous region while functioning on an interdisciplinary team that is solving a humanitarian problem? Have you ever contemplated a societal situation where you have so much wisdom to offer the underserved, their culture, and also yourself? Yourself? Yes, YOU!

So why not join us in South America to dramatically enhance your Spanish and become a humanitarian? L.N.Tolstoy (1828 – 1910) stated “The sole meaning of life is to serve humanity.” What kind of service are YOU currently offering?

W. H. Welch, MD (1850 – 1934) founder of the School of Public Health at Johns Hopkins University wrote, ‘It is a well known fact that there are no social, no industrial, no economic problems which are not related to health.’ Therefore why not pause from your narrow, conventional, academic studies on the banks of the Red Cedar in East Lansing, Michigan, and reflect upon how you could exploit your engineering prowess to solve some of the pressing societal problems confronting Peruvian men, women and children living in abject poverty? Why not join us in the protection of health, and the saving of lives? --- Hundreds at a time!

Learn more at http://www.iia.msu.edu/Peru_study_abroad.htm
**MSU – RWTH Aachen Program** by Dr. John Foss, Program Director

An AMAZING opportunity. Imagine a program that provides an exception-ally 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 (1 preparatory credit plus 5 credits during the summer) apply to the required 12 credits of Senior Elective credits 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.

As an indication of the value placed on such a rich experience, the North American Rockwell Corporation established, in 1989, an endowment that provides scholarship support to the ME students in this Exchange Program. The endowment has grown in value such that each qualifying student can receive a substantial scholarship to defray his/her expenses.

The following observations were provided by program participants Sara Murawa and Ryan Rieck from the summer of 2007. They 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 capitol and the cathedral at the city center dates from 800 A.D. Students’ housing is prearranged 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.

**Department News**

**Chairperson Search:** Three candidates for the position of ME Chairperson have been interviewed, and it is hoped that a decision can be announced by the end of the semester.

**CORRECTION:** Drs. Baek, Choi, and Lee have been reappointed as assistant professors, not associate professors, as reported in the Fall 2009 issue of the ME Bulletin.

**Global Engineering Concentration: Scotland** 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 microfabrication.

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 will have the opportunity to take courses that fulfill their entire Senior Elective requirement (i.e., 12 credits of Senior Electives, including a 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 study abroad program, contact:

- **Gaile Griffore, ME Advisor**
  Office 2560 EB / Phone: 517-355-3338
  Email: griffore@egr.msu.edu
- **Maggie Blair-Ramsey, Coordinator**
  Engineering Study Abroad Program
  Office: 1108 EB / Phone: 517-432-2012
  Email: blairram@egr.msu.edu
In modern times, engineered materials and structures are required to withstand multifunctional loadings and service conditions. For example, an aircraft panel needs to withstand mechanical loading, thermal loading, and corrosion while maintaining a minimum weight to reduce fuel consumption. Additionally there are several efforts to make the panel self monitor and let the user know when damage will occur and render it unusable. Given the magnitude of this multi-functionality, our group focuses its attention on structures of biological systems.
and organisms that have survived the test of time amidst diverse adversities. This kind of looking into nature for design inspirations is an emerging and thriving field popularly termed Biomimetics (focus on the attributes of interest) and/or Biomimicry (focus on ways to manufacture bio-inspired materials).

As mechanical engineers, we attempt to understand nature from the point of view of engineers; specifically our group utilizes tools of analytical and experimental mechanics to understand how biological systems work under impact-like conditions (e.g. severe ramming observed in big mountain sheep, crushing of layered shells by pinchers of a crab, the ability of human bone to withstand impact, etc). This involves understanding biological material behavior and structural response under a variety of loading conditions, thus experiments are carried out in quasi-static loading up to very high speed events (like free fall, instrumented impact etc).

In order to understand the high strain-rate properties of such materials, which are of concurrent interest to the research group, existing experimental techniques need to be amplified. We develop and/or utilize some state of the art tools that are available in the area of impact/high strain rate mechanics such as

- Split Hopkinson Pressure Bar
- Instrumented drop weight tower
- High speed imaging
- Digital image correlation

The Split-Hopkinson Pressure Bar (SHPB), a commonly used loading set-up for experimental investigation of material properties at impact strain rates of 102-104/s, is typically used for cylindrical test specimens. Biological materials, being fragile, are often difficult to machine to an exact cylindrical shape. One of the current topics of investigation involves developing an optimal shape of a biological specimen, which maintains the accuracy of the test results, while reducing the effort to machine an exact cylindrical shape. To test the tensile properties of biological materials, a Split Hopkinson Tensile Bar is being designed and developed. Another useful tool in evaluating impact properties is an instrumented drop weight tower. Using such an apparatus, beam-shaped specimens are impacted in three-point bending at velocities ranging from 1 to 10m/s. The impact is filmed using a high speed camera, capable of framing up to 1 million frames/second (exposure time as low as 1000 ns). The data collected will be used to correlate the fracture toughness to the fiber size in biological composites.

A 3D finite element model (FEM) is also used to better our understanding of the mechanics associated with high energy impact events of complex biological structures. Using computed tomography (CT) scans, we obtain the porosity of the biological structures which is then loaded into a 3D CAD model. With this information, a unique FEM has been devised to help calculate the energy absorbing capabilities of biological structures.
MSE 465: Design and Application of Engineering Materials by Professor K. N. Subramaniam, CHEMS Department

- Offered in Spring Semesters
- Prerequisite: MSE 250 or equivalent

Engineers designing with materials possessing certain properties are quite often faced with service demands that warrant modifications to existing materials, or designing materials that will improve the service reliability of the structures they would like to build. The latter part is becoming more important due to ever increasing demands on the structures designed by the engineers. Environmental concerns, micro-miniaturization, severe service environments in modern applications, and those to be encountered in the future are some factors that warrant this shift.

MSE 465 addresses these needs by providing basic principles of materials science and adaptations of the same to the designing of materials. This course addresses issues such as designing of materials for (a) improved strength (b) higher specific strength, (c) high temperature structural applications, (d) wear resistance, (e) environmental stability, (f) damping, etc. The course also addresses resource and economic considerations. Materials science background needed to address each of the topics to be covered will be reviewed in the course at appropriate stages.

Carrying out a literature survey of material design for specific considerations and writing a term paper, followed by in-class presentations by groups consisting of two or three students, are integral parts of the course. Topics to be chosen for this project by the groups can be tailored to suit the interests of the students in a group.

Beginning Spring 2011, this course will be available as a Senior Elective or elective to undergraduate students majoring in ME, CE, Ch.E., and EE. Since it is a 400-level course, graduate students in these disciplines can also get credit for this course in their graduate program. All of these engineers can benefit by learning how to design material to suit the service needs (which is different from designing with materials).

NOTE: Paper work has been filed to change the prerequisite for MSE 465 to MSE 250 or equivalent. Until this becomes official, the instructor will be glad to provide an override to students wishing to enroll in this course.

Pi Tau Sigma

The Tau Epsilon chapter of Pi Tau Sigma, the Mechanical Engineering honor society, has already been busy this semester and has several more events planned. We kicked off the semester with Wing Night at Buffalo Wild Wings, an evening of socializing and all you can eat wings that has become a chapter tradition over the years. As service is one of our core values, Pi Tau Sigma has also been involved in the community, volunteering at the MSU Food Bank in February. We will also be participating in Relay for Life in April.

On Thursday March 18 Pi Tau Sigma will be hosting our annual Senior Elective Night at which students will present their experiences in the various mechanical engineering senior electives. This is a great opportunity for younger ME students to find out what these classes are really like so that they can choose the ones they really want to take. We encourage everyone to attend, especially those who will be signing up for senior level classes during registration in April.

For more information about Pi Tau Sigma or any of our events, please visit [www.egr.msu.edu/pts](http://www.egr.msu.edu/pts). Submitted by Brian Rockwell, President.
with valuable teambuilding skills, the chance to network with MSU faculty and outside industries, and opportunities 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 available only to ASME! To become a member, just visit our website, www.egr.msu.edu/asm, or go to room 2328K in the Engineering Building 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/asm for further details on meetings, event times and locations, community service, membership and more. Submitted by Louis Cervone, Newsletter Editor

Baja SAE

The MSU Mini Baja Team started this semester off with a bang at the informal Michigan Tech race, the weekend after Valentines Day. With the entire course made of ice and snow, the race was competitive this year. MSU raced to finish 6th out of almost 50 teams, including Michigan Tech., Kettering University, and U of M Ann Arbor.

It’s not too late to join up and get some real experience! This semester the team will be traveling to Carolina, Western Washington, and Rochester to get down and dirty with some of the best Mini Baja teams in the world. Not only is Mini Baja fun, but also a great way to network and meet people from all backgrounds.

With the new car under construction there are lots of things to do out at the shop on Jolly Road. From welding to laser cutting, we provide the chance to learn many skills. So get the new year started off right by getting interested in MSU’s Mini Baja team! All interested parties can e-mail michiganstatebaja@gmail.com. Submitted by Coeline Skuta.
ME Senior Electives for 2010-2011

• The following ME Senior Elective list, including instructor assignments, was accurate as of March 5, 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](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 #3 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. Somerton.
ME 422 Introduction to Combustion. 3(3-0). Prereq: ME 332 or concurrently. Lee.
ME 425 Experimental Mechanics. 3(3-0). Prereq: ME 222. Tekular.
ME 440 Aerospace Engineering Fundamentals. 3(3-0). Prereq: ME 332 or concurrently. Engeda.
ME 444 Automotive Engines. 3(3-0). Prereq: ME 410 or concurrently. Schock.
ME 456• Mechatronic System Design. 3(2-3). Prereq: ECE 345 See Override Instruction #2 on page 15. Radcliffe.
ME 465• Computer Aided Optimal Design. 3(3-0). Prereq: ME 471 or concurrently. Diaz.
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.
ECE 445 Biomedical Instrumentation. 3(2-3). Prereq: ECE 345. Mason.
ECE 491 Special Topics. Section 601. Topic: “Acoustics.” 3(3-0). See Override Instruction #5 on page 15. Course Description: Review of Laplace and Fourier transforms, waves in one dimension, the acoustic wave equation, transmission and reflection, radiation and diffraction, absorption and attenuation, cavities and waveguides, resonators and filters. Prereq: EGR 102 or CSE 131 plus ECE 345. McGough.
MSE 451 Microscopic & Diffraction of Materials. 3(2-3). Prereq: PHY 184. Recommended background: MSE 350 & 381. For more info, see Override Instruction #6 on page 15. TBA.
MSE 454 Ceramic & Refractory Materials. 3(3-0). Prereq: PHY 184. Recommended background: MSE 350 and 381. See Override Instruction #6 on page 15. TBA.
MSE 476 Physical Metallurgy of Ferrous & Aluminum Alloys. 3(3-0). Prereq: MSE 250. Recommended background: MSE 310. For more info, see Override Instruction #6 on page 15. TBA.
ME 812 Conducive Heat Transfer. 3(3-0). See Override Instruction #7 on page 15. Prereq: ME 412 plus GPA of 3.5+. Wright.
ME 860 Theory of Vibrations. 3(3-0). See Override Instruction #7 on page 15. Prereq: ME 461 plus GPA of 3.5+. Shaw.
SPRING SEMESTER


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


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


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 below. You may reenroll for a maximum of 6 credits.

ME 491 Selected Topics in Mechanical Engineering. Section 001: Intro to Computational Fluid Dynamics. See Override Instruction #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

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. Reid-Bush.

BE 445 Biosensors for Medical Diagnostics. 3(3-0). (BS 111) and (CEM 141) and (ECE 345). Biomechanical Concentration Course. Alocilja.


MSE 425 Biomaterials & Biocompatibility. 3(3-0) Prereq: PSL 250 or concurrently and MSE 250. Biomechanical Concentration Course. TBA.

MSE 426 Introduction to Composite Materials. 3(3-0). Prereq: ME 222. Xiao.

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

MSE 466 Fracture & Failure Analysis. 3(2-3). Prereq: MSE 250 and Tier I Writing. Recommended background: MSE 320 and 331. For more info, see Override Instruction #6 below. TBA.

ME 802 Advanced Classical Thermodynamics. 3(3-0). See Override Instruction #7 below. Prereq: ME 412 plus GPA of 3.5+. Engeda.

OVERRIDE INSTRUCTIONS

1) Complete and submit the ME Override Request Form: [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 456–Due to the recent reversal of ME 451 and 461 on the program, some seniors will not take ME 451 until spring semester. Dr. Radcliffe has given his approval for a prerequisite override for such students, provided that they have completed ECE 345. To request an override, submit the ME Override Request form (see link in number 1 above).

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 Option 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 Option student. (To be “on record,” you must first meet with Gaile to plan a long-term schedule.)

5) ECE 491/601–ECE Override Request form: [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.

6) 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.

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

8) MSE 465–The prerequisite for this course is being changed to MSE 250. If you have taken MSE 250, you can request an override from Dr. Subramanian (subraman@msu.edu). Read his article about MSE 465 on page 12.
Spring Semester Calendar

March 15-26  Scheduled appointments for Computer / Telephone enrollment for Summer 2010. Your enrollment appointment is posted in StuInfo.
March 18  Pi Tau Sigma Event: Senior Elective Night. Date/Time TBA
April 2  Computer enrollment begins for Fall ’10 / Spring ’11.
April 23  ASME Event: Spring Tailgate (“The Gathering”) at Dr. Somerton’s house.
April 30  Design Day in the MSU Union. See you there!
May 3-May 7  Final Exams.
May 7  University Undergraduate Student Convocation—1:00 p.m. in Breslin.
May 9  College of Engineering Undergraduate Commencement Ceremony, 12:30 p.m. in Breslin. Lasts about 2 hours.
May 17-July 1  First Summer Session.
July 6-Aug 19  Second Summer Session.
May 17-Aug 19  Full Summer Session.
August 12  First Fall 2010 Minimum Tuition & Fee payment due.
September 1  Application deadline for October FE exam.
September 1  Fall Semester classes begin.

Design Day
Friday, April 30, 2010
MSU Union
Come and see our students lead, create, and innovate
Activities include:
- Competitions
- Presentations
- Demonstrations
- Awards