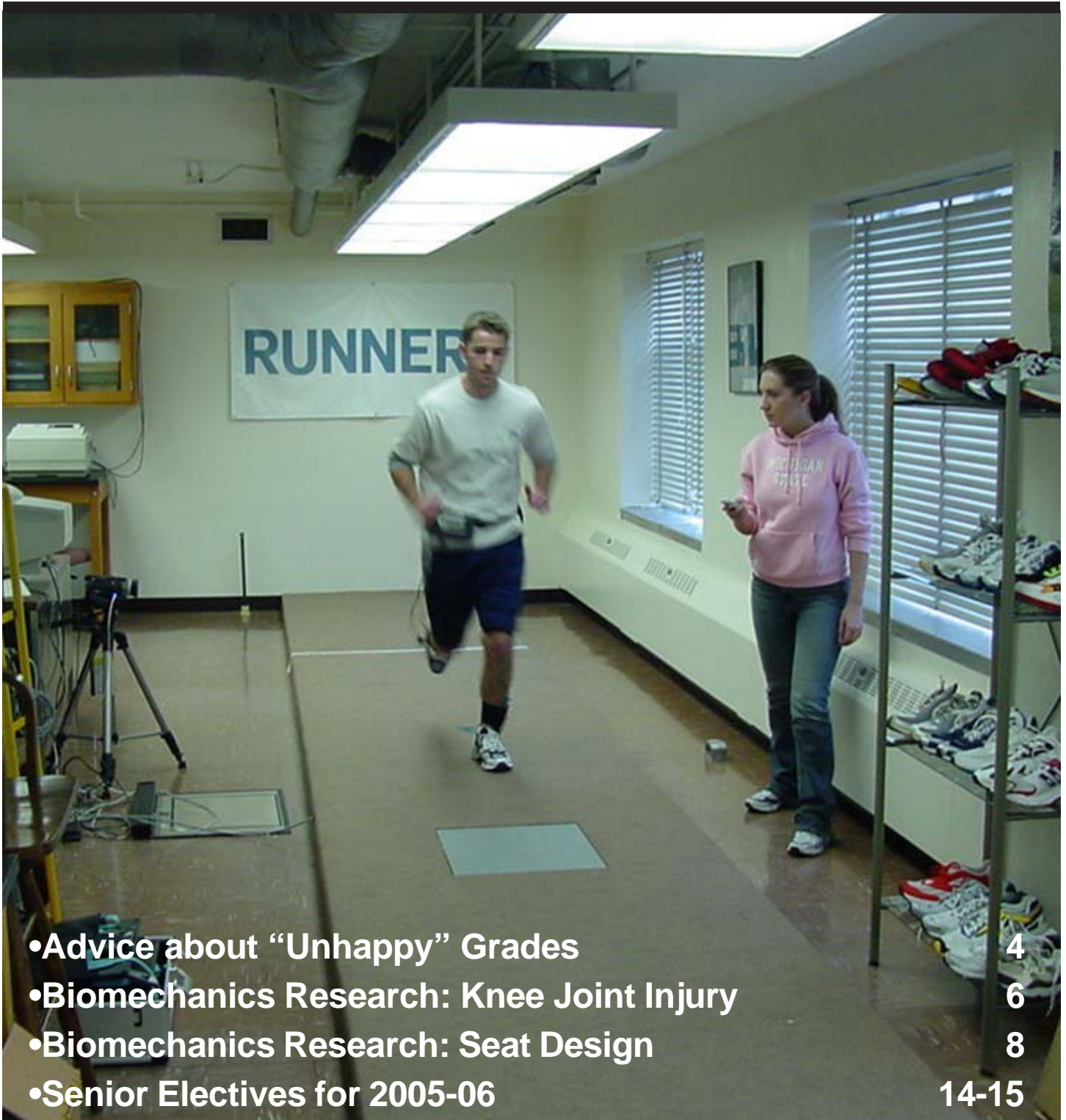


ME Bulletin

News for
Mechanical
Engineering Majors

Vol. 42, No. 2 ME Advising Office • 2560 EB • 355-3338 Spring, 2005



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ME juniors, Michelle Foncannon and John Quackenbush, evaluate an athletic shoe in the Orthopaedic Biomechanics Laboratories (OBL).
Be sure to read Dr. Haut’s article about “The Traumatic Knee Joint Injury” on pages 6 & 7!

PHOTO PROVIDED BY DR. HAUT

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Academic Advising

1) *Mechanical Engineering Freshmen and Sophomores* are advised by **Sean Fochtman**. To schedule an appointment, call 355-6616 x 1, or go to 1415 EB.

2) *Mechanical Engineering Juniors and Seniors* are advised by **Gaile Griffore**. To schedule an appointment, call 355-3338, or go to 2560 EB.

Curriculum News

•**ME 221–Statics** *has been changed* to CE 221 effective Fall 2005.

•**ME 285–Computer Aided Design Tools** will be offered fall semester. Prereq: ME 180. Instructor: **Bob Chalou**. This course may be used as an Other Elective.

•**ME 372–Machine Tool Lab** will be offered both fall and spring semesters. Instructor: **Roy Bailiff**. ME Manufacturing Option students receive priority.

•**ME 465–Computer Aided Optimal Design** has been approved as a design intensive Senior Elective. This is a fall semester course.

•**ME 491/101–Refrigeration** will be offered this Summer 2005. It will count as a Senior Elective (non-design intensive).

•**ME 491/601–Technical Communications** (2 cr.) will be offered Spring 2006. Instructor: **Craig Gunn**, ME Director of Communications. Email **Craig Gunn** (gunn@egr.msu.edu) to request an override. *Does NOT count as a Senior Elective.*

•**ME Honors Sections:** ME 180H and 222H are only available to Honors College students until April 15. After that, students with a 3.5+ GPA may request overrides for open seats.

•**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 cannot overfill required courses to resolve conflicts with Senior Electives, Other Electives, and Integrative Studies courses.*

•**Class Standing** information for ME juniors and seniors is available in the ME Advising Office. You will need to present your MSU I.D. card. ME sophomores can obtain this information in 1415 EB.

•**ME 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.

•**Job Search Advice:** **Jim Novak** from Career Services & Placement can answer your questions about job searching. To schedule an appointment, go to <http://www.csp.msu.edu>, click on Career Advising, and then Active/registered students. *NOTE: Jim does NOT take walk-ins.*

ME Bulletin

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

Photos were taken by Craig Gunn unless noted otherwise.

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The 21st
M.E. Design Day
Friday, April 29th
MSU Union Building

- >> Competitions
- >> Awards
- >> Presentations
- >> Live Demos



COLLEGE OF ENGINEERING | DEPARTMENT OF MECHANICAL ENGINEERING

Enjoy free food and network with industry reps. Skip 400-level ME classes! (They're cancelled). Come and enjoy an eye-opening time and maybe gain some inspiration!

Department News

Professor Robert Hubbard has received the University's Distinguished Faculty Award. Dr. Hubbard has achieved international acclaim for his bioengineering research on human spinal mechanics and product development to improve seating posture and reduce human injury. His contributions clarify human musculoskeletal function as it relates to teaching and research in biomechanics, physical medicine, rehabilitation, and human factors. Recognizing that real bioengineering problems are essentially interdisciplinary, he has collaboratively developed unique enabling technologies in human biomechanics, office and automotive seating, and life-saving devices for racing crash safety. He has written a significant number of publications, holds many patents, and has been awarded research grants for his work.

Professor John Lloyd and **Mr. Timothy Hinds** have accepted, on behalf of faculty from MSU and the University of Texas Pan American, one of the four 2004 ASME Curriculum Innovation Awards. The award was for the EGR 475 International Networked Teams for Engineering Design course that some of you have taken. EGR 475 was co-taught with the University of Texas Pan American with lectures alternating between the two schools. Twenty-four MSU engineers teamed with 18 students on six teams from the University of Texas Pan American, and also with six students on two teams from Monterrey Tech in Monterrey, Mexico. Alps Automotive, TRW, and GM sponsored the eight projects. There were more than thirty applications from around the world for the awards, and the Michigan State University/University of Texas Pan American and the Stanford University/Tokyo Metropolitan Institute of Technology programs were the only two selected for their international curriculum innovations.

Brian Olson, ME graduate student, has received the University's Excellence in Teaching Citation. This University award is given annually to six graduate students who have achieved distinction in their teaching and classroom responsibilities, and who exhibit scholarly promise as a graduate students. Brian challenges his students in some very difficult classes, and encourages their learning. His students say, he "genuinely cares about his students, and it shows," and he "is without doubt one of the best instructors I have ever had."

91 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 (Email: griffore@egr.msu.edu / Tele: 517-355-3338). — Gaile

May Graduates

| | | |
|----------------------------|------------------------|------------------------------|
| Katherine Schneider Allen | Robert Scott Griese | Mark Benjamin Orłowski |
| Matthew David Ashmore | Marlon A Griffin | Michael Robert Primeau |
| Dino Emanuel Barile | Brandon John Guelde | Robert Ramin Rachedi |
| Matthew James Baur | Jason Andrew Habeger | Keith Wendell Redmond |
| Joshua David Biggart | Derrick William Harris | Tara Natasha Shepherd |
| Douglas Sheldon Bingham | Daniel John Hefel | Steven Daniel Shubert |
| Jeffrey Adam Bosscher | Jason Richard Hockstra | Derek Sikora |
| Bernard Patrick Brown | Dale Patrick Hopkins | Matthew E Silvey |
| Bryan Scott Burkhart | Timothy Richard Horbal | Douglas Elwyn Sleep |
| Brennan Patrick Cagney | Alex Paul Huber | Daniel James Smith |
| Adam Vincent Caruso | Dennis Jeng | Kristen Rae Smith |
| Adrienne Elizabeth Cleland | Clint Robert Jones | Ryan Edward Staudacher |
| Joseph Daniel Conquest | Shaza N Katrib | Tyson Lee Stewart |
| Ryan Thomas Corby | Peter C Kehbein | Kyle David Sutton |
| Jonathan Denis Crowe | Steven Blake Kelly | Yi-Chieh Tsai |
| Emily Anne Davis | Richard James Klop | Philip Adam Vogelsberg |
| Jonathan R Denton | Joshua William Koch | Krista Lynn Weigand |
| Michael David Drake | Lisa M Krakosky | Gabrielle Marie Weldon |
| Jill Renee Drexler | Nicholas James Lane | Kelly Leigh Wells |
| Jeffrey Robert Dupuis | Nicholas John Lapinski | Jonathan Frank White |
| Daniel L Eaton | Mark Francis Lepech | Blair Thomas Wight |
| Benjamin Michael Ekola | Cassandra Lee Little | Nathan Robert Wolf |
| Ryan James Farris | Jacob Charles Lyon | Gregery Everett Yeaster |
| Patrick Michael Fay | Brent William Martin | Kraig Steven Yeck |
| Nicole Mary Fick | Alan Mond | Adam Llynell Zink |
| Ryan Thomas Flynn | Jason Bradley Nowak | Stephen Michael Zygmuntowicz |
| Nelson Jay Franco | | |

August Graduates

| | | |
|-----------------------|----------------------|----------------------|
| Omar Eid Al Johani | Robert W. Gustafson | Lia Lupin O'Black |
| Jose Obed Bobren-Diaz | Rabi Hakeem | Kelly Ann Stahley |
| Kyle John Bochenek | Sean Elliott Harness | Hang Thi Tran |
| Scott P. Coulier | Kyle Robert Munro | Adam Frederick Zemke |

College of Engineering Scholarships

The 2005-2006 College of Engineering Scholarship application is available at:

<http://www.egr.msu.edu/egr/programs/bachelors/scholarships.php>

Students with a 3.5+ GPA are encouraged to apply.

HURRY! The Deadline is March 18.

Associate Chair's Corner – Advice about “Unhappy” Grades

by Professor Craig W. Somerton



Occasionally, a student is not happy with the grade he or she received in a course. If you genuinely believe that a grade you received is not representative of your class performance, then you ought to do something about it, but what? First, you really need to do some self examination and be convinced that your grade was not what you deserved. If, after following this self examination, you are still convinced that your grade was not deserved, your next step is to visit the professor who taught the class.

Professors have absolute authority over the assignment of grades and hence, when needed, they take absolute responsibility for explaining them. Though these meetings are always difficult, it is paramount that the student behaves professionally. Before your appointment, you need to prepare your argument concerning the grade. This should include gathering and reviewing all your graded assignments, reviewing the course syllabus, and calculating your grade based on this information.

After the meeting, if you are still not comfortable with your course grade, it is time to come see the ME department's Associate Chair. In my role as Associate Chair, I will try to informally resolve the issue. I have developed a list of procedures for these instances and it is shown at the end of this article. In addition to sharing these procedures, I urge each student to go to the MSU Ombudsman's web site at www.msu.edu/unit/ombud/ to become familiar with the academic policies associate with a grade dispute. If a student remains dissatisfied following the completion of the Associate Chair's procedure, then he or she may wish to file a

formal grievance. But, as the Ombudsman's web site states:

“In most formal grade appeals, you must be able to demonstrate to the department/school hearing board that your instructor used what the AFR [Academic Freedom for Students at Michigan State University document] calls “inappropriate or irrelevant factors” in determining your final course grade—as opposed to a “good faith” judgment of your performance. Such factors might include race, sex, or personal animosity. Possible grievances also may proceed from alleged violations of the grading policy, as stated in the course syllabus. You cannot contest a grade based on allegations of faculty incompetence.”

So that's what I have to say about the unhappy grade. My door is almost always open and I thoroughly enjoy talking students, so please feel free to stop by my office (2439 EB) whether it's just to say hello or to ask a question about the program or discuss a problem.

Associate Chair Grade Dispute Procedures

- 1) Any student who comes to the Associate Chair with a grade dispute will be requested to first meet with the course instructor in an attempt to resolve the dispute without the involvement of the Administration.
- 2) The student will be informed that the prerogatives available to the Administration in handling grade disputes are quite limited. For the Associate Chair to become involved, the student must provide a convincing argument in writing that one of the following three conditions has occurred.

- *There is a disagreement between the student and the instructor in what is recorded as the grade for an assignment.*
- *There is disagreement between the student and the instructor on how the course total was calculated.*
- *There is disagreement between the student and the instructor that the course grade was assigned consistent with the instructor's grading policy, the University policy on grading, and with what was done for all students in class.*

3) If the Associate Chair determines that the student has standing in the grade dispute case, a meeting between the Associate Chair and student will be held at which the student will present his/her case.

4. The Associate Chair will then conduct an investigation into the student's charges that must include a meeting between the Associate Chair and the instructor involved.

5. Based upon this investigation the Associate Chair will make a recommendation to the department Chairperson that will be provided to both the student and the instructor. If the Associate Chair's investigation finds the student's case is unproven, the student shall be informed that the option of a formal grievance hearing is available to them.

Enroll Now for Summer Semester!

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

- **First Session:** ME 221, 361, 391, 410; 491/101; MSE 250, 426; STT 351.
- **Second Session:** ME 180, 201, 222, 471; STT 351.
- **Full Session:** ECE 345; ME 332, 412, 451, 461 and 490.

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

A number of extension courses, including ISS and IAH, will be offered in the Detroit, Flint, and Grand Rapids areas. STT 351 will be available as an extension course in Farmington Hills. In addition, ISS 310 and 315 will be offered online.

The enrollment numbers as of March 25 will be used by the ME department to determine whether there are enough students to offer each course. So, it is in your own best interest to enroll in your summer courses by March 25!

LOW ENROLLMENTS CAN MEAN CANCELLED COURSES!

Aachen Program

by J. F. Foss, Director

Information is available regarding the 2006 program. It is expected that the 10 students will be selected for 2006 before the end of March 2005. Requests for application materials may be made to **Ms. J. Bielawski** at bielawsk@egr.msu.edu. Note that three letters of reference: two technical (prof. or employer) and one character (will you be a good ambassador for MSU) are required.

Eleven MSU/ME students are currently studying German (102 or higher) and ME 410 and carrying out independent study projects (ME 490) in Aachen. They are also using their 3-day weekends to travel in Europe! Their projects are located in the Biomedical Institute (3), the Aerodynamics Institute (3), the Automotive Institute (3), the Plastics Institute (1) and an automotive engines company with university affiliation (1). These institutes form the core, but not all, of our possible placement opportunities.

Two students: **David Gasparovich** and **Andy Hartsig**, are receiving scholarship support from the German company, ZF Industries. They will also have summer internship positions with ZF as a part of this support package.

Comments on their current experience have been received from the 2005 group:

•**Dear Dr. Foss,**

Germany is going well; this is a lot different from school at MSU. The project I am working on is quite interesting. I am actually spending more time working with MATLAB and writing programs for the position files that a robotic arm will use for testing patients for arm movement. The robot has 5 degrees of freedom, and goes through motions similar to those of a human arm. A patient will sit opposite the robot and mimic the movements. The patient has targets placed over their arms and chest, and 6 infra-red cameras are used to capture the movements. We had a patient in recently, and I was able to participate



PHOTO PROVIDED BY KELLY STAHLEY

Erica Villegas, Kelly Stahley, and Martha Smith.

in taking measurements and operating the equipment.

If there is anything that you would like to know, or if there are any questions that you would like to ask, feel free to e-mail. –*Thanks, Jordan Fountain*

•**Dear Dr. Foss,**

My study abroad experience has turned out to be much more than I ever expected. The research I am doing is in biomechanical engineering. When you asked me 12 months ago to pick a field in which I had research interest, I never would have thought it could lead to this. I chose heart valves as my topic of interest, and you put me in contact with the head of the Cryobiology and Biomechanics Institute in Aachen. You arranged for her to meet me at MSU before the Aachen program started, and this was a most valuable contact for me. She has been nothing but helpful and enthusiastic whenever I talk to her. She assigned me to a research host, under whom I would carry out my research. Once I arrived in Aachen I recognized a familiar face, thanks to the contact you provided in the States.

Now, I am learning and researching about the calcification of porcine heart valves. Specifically, the project I am working on is called “Patras.” This is a study of five porcine heart valves that we will be calcifying and then evaluating the results. The purpose is to determine where in the

leaflets of the heart valves calcification occurs, how long it takes and by what means, and whether each valve is being calcified in the same way. Using microradiographic x-rays, SEM analysis, as well as computerized topography we will be able to observe and quantify our results. After being in Germany for just five weeks, I have touched actual porcine aortic heart valves, taken x-rays of the valves, worked with SEM analysis, and helped suture the valves into silicone sleeves to prepare them for calcification. The hands on experience, coupled with the team of researchers and doctors that I work with, make my days fully educational and worthwhile.

Aside from the research, the city of Aachen is beautiful. I spend some afternoons walking around the city admiring the architecture and history. Having class and research just four days a week has made it possible for me to visit other European destinations like Paris, France and Helsinki, Finland. Having the opportunity to travel has made and enhanced my overall learning experience. I look forward to going to my institute to do research because everything I learn is new and exciting. I look forward to going to class to see the ten other MSU students to hear about their research, travels, and experiences.

I have met a lot of nice, new people since arriving here. The people I encounter and interact with have been friendly and helpful, and the meaning of relationships has become even clearer to me. If it wasn't for you establishing many contacts and relationships abroad, many students would not have the opportunities they currently do. Thank you for realizing what a useful and meaningful experience study abroad really is. It has been a rewarding pleasure representing Michigan State in Aachen, Germany. It has been an experience I will cherish and share with friends of mine for a lifetime to come. –*Most sincerely, Kelly Stahley*

COVER STORY

Biomechanics Research: The Traumatic Knee Joint Injury

by Professor Roger C. Haut

How many of you have ruptured a knee ligament or torn a meniscus, or know of a friend or a family member that has had this injury and is now feeling the aftermath with limited joint mobility and pain? Well, this type of injury is probably more common than you might think. Twenty-nine million Americans, nearly 1 out of every 10, suffer a musculoskeletal injury each year. Musculoskeletal injuries occur in a variety of settings, including automobile accidents, sports/athletic activities, and in the home. Participation in sports, recreation and exercise (SRE) is increasingly popular in American culture. The generally accepted view is that participation in SRE increases the odds of a musculoskeletal injury. People who injure a knee before the age of 22, for example, have a greater than 3-fold increased risk of a diagnosed joint disease by the age of 50. And, these types of injuries are not necessarily limited to the young, as there are estimates of more than 30 million middle-aged persons, "weekend warriors," participating in recreational sports in the U.S. alone. A primary mission of the Orthopaedic Biomechanics Laboratories (OBL) is to reduce the burden of musculoskeletal injury in the U.S. The labo-

ratories' director, **Dr. Roger C. Haut**, and a host of graduate and undergraduate students from Mechanical Engineering and other disciplines across campus (including students from biology, physiology, animal science, veterinary orthopaedic residents and osteopathic medical students) have been working together in the OBL for approximately 18 years on this problem.

So what goes on in the OBL? One project, funded by the Centers for Disease Control, the National Center for Injury Prevention and Control, involves the study of posttraumatic osteoarthritis (OA). OA is a chronic disease that is manifested clinically by the loss of soft tissue on the ends of long bones and joint pain. Impact trauma to a joint is thought to be one mechanism for the initiation of this disease. The OBL is studying the disease initiation and its progression using animals, human cadaver joints and mathematical models. Tissue culture studies are also being conducted in the laboratory to help uncover some of the early events in traumatic injury to articular cartilage, the soft tissue covering the ends of long bones, which may initiate the chronic disease process in joints.

Blunt trauma can result in surface lesions (or cracks) on the surface of joint articular cartilage. These can be viewed during arthroscopic surgery of the traumatized joint. The OBL, and other researchers around the country, have shown that adjacent to these surface lesions there is a significant number of dead chondrocytes, cartilage cells. This is problematic as there aren't many cells in cartilage to begin with, and there is no blood supply in articular cartilage to help feed and nourish the viable cells after a severe blunt impact. The OBL has been developing a pharmacological intervention to help "save" or "repair" damaged cells in cartilage. The non-ionic surfactant, P188, can be injected into the knee joint capsule shortly after insult to selectively "patch" mechanically injured cell membranes, until they can repair themselves naturally. In another study the OBL is studying the efficacy of a combination over-the-counter nutraceutical, glucosamine and chondroitin sulphate, to help reduce mechanical damage to articular cartilage by its administration prior to and/or shortly after a blunt impact trauma. While this

PHOTOS FOR THIS ARTICLE PROVIDED BY DR. HAUT



Figure 1 ME junior, Zachary Kaltz, prepares a test sample for a tissue culture experiment.

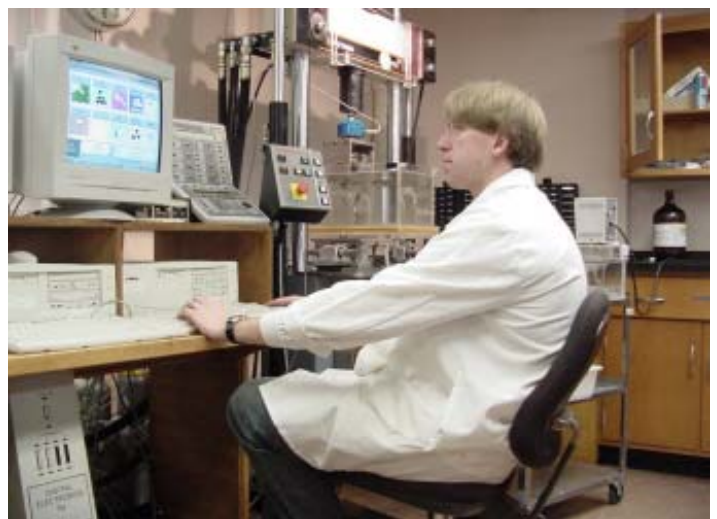


Figure 2 ME graduate student, Eric Meyer, sets up for a knee joint experiment in the Instron machine.

Spring 2005 Dean's List

dietary supplement is currently being sold in stores for the symptomatic OA patient, Haut believes it may be beneficial for protecting athletes during competitive and recreational athletics. Recent laboratory studies show that this combination of nutraceuticals can help synthesize articular cartilage and inhibit inflammatory reactions that may be secondary to a joint injury. OBL studies have shown in the laboratory setting that the supplement glucosamine can help reduce damage to joint cartilage from a blunt impact by stiffening the tissue and protecting cells from the damaging shear stresses that are developed adjacent to impact-induced surface lesions. [See Figure 1, pg. 6]

The OBL also conducts studies with human cadaver joints to investigate the acute injury to knee joint ligaments, articular cartilage lining the joint, as well as the underlying bone. [See Figure 2, pg. 6] Each year, for example, approximately 80,000 anterior cruciate ligament (ACL) tears occur in the U.S. This ligament is a primary supporting structure in the knee that can often be injured in football, basketball, soccer and volleyball. You might also know a friend or family member who "caught a tip" while skiing and ruptured their ACL. Recent studies show that the incidence of a secondary osteoarthritis developing in the injured joint does not significantly decrease with surgical repair of the ligament. Dr. Haut and his students hypothesize that one reason for the high incidence of OA in these patients can be explained by a static analysis of joint forces developed during the accident. As the ACL, or any other joint ligament for that matter, is tensioned prior to its failure, compressive forces are generated in the joint, as dictated by static equilibrium of joint forces. These compressive forces can result in acute damage to articular cartilage lining the joint surface and the underlying bone. In fact, in over 80% of ACL injury cases bone bruises (microfractures) under-

lying the joint articular cartilage are documented in magnetic resonance images (MRI) of these traumatized joints. Haut believes these bone bruises in the ligament-injured patient indicate injury to overlying articular cartilage in the joint providing a basis for the development of a long term, chronic joint disease such as OA. Future clinical interventions that address injury to the joint cartilage itself may lead to a better prognosis for the knee ligament injured patient.

The OBL is also home to the "Runner's World" shoe laboratory. Mechanical engineering students in the OBL regularly evaluate the impact cushioning and flexibility of athletic shoes sold in the U.S. These data, along with "wear test" data from approximately 350 local area runners, are collected by a consulting firm, Sport Biomechanics, Inc., and used to evaluate athletic shoes from all the major manufacturers. The results are published quarterly in Runner's World magazine. The OBL also performs gait studies with insole pressure devices and a force plate in the ground to help evaluate shoes and insole products for various manufacturers. [See photo on front cover, pg. 1] These data are also used by the OBL to help study mechanisms of OA from blunt trauma, as recent studies have shown that symptomatic knee pain can be associated with abnormally high rates of impact loading on the heel during gait. The OBL is conducting experiments showing that a good pair of "cushioned" athletic shoes can help reduce these high rates of impact load that act on your lower extremities while walking, running, or landing from a jump. To check out the latest and greatest athletic shoes before your next purchase, get a recent issue of *Runner's World* magazine and see what the OBL says! If you want to know more about the OBL and its current personnel, just log onto its website at OBL.MSU.EDU or E-mail Dr. Haut at Haut@msu.edu.

Congratulations to the following 204 mechanical engineering majors who made the Dean's List after Fall Semester with a semester GPA of 3.5 or better. *These names were taken from the Registrar's official website (<http://www.reg.msu.edu/ROInfo/GradHonor/DeanList/DeanList.asp>) on February 25. For updates, please consult the website.*

Jason Aerts, Katherine Allen, Kathryn Anderson, Kenneth Anderson, Matthew Andree, Andrew Armstrong, Matthew Ashmore, Nicolette Baier, Andrew Ball, Matthew Baur, Matthew Beacom, Nicholas Beechnau, Jonathan Bendert, Michael Bethuy, Brian Bishop, Ryan Boak, Stephen Boice, Neil Bokemeier, Christopher Bolin, Christopher Bolten, Agatha Bone, Chad Boone, Jerrod Braman, Adam Brannan, Adam Brennan, Mikal Brewer, Bernard Brown, Keith Bury, Alex Cairns, Melissa Carrier, Daniel Cassar, Adrienne Cleland, Joel Cook, Bryan Cooper, Michael Cooper, Ryan Corby, Kaid Cousineau, Jonathan Crowe, Amanda Danielson, Mitchell Dejonge, Nicholas Derra, Kevin Derrick, Pinal Desai, Daniel Diebolt, Christopher Doyle, Michael Drake, Emily Duszynski, Kevin Dye, Daniel Eaton, Laurie Emerson, Bassey Eno-Idem, Afolabi Esan, Patrick Fay, Nicole Fick, Michelle Foncannon, Teresa Franklin, Adam Fredericks, Nobuyuki Fujiwara, Kalpen Gandhi, Gregory Gartland, Eric Gawel, Shawn Gelisse, Derek Gessert, Chad Glinsky, Blake Gower, Seth Grua, Brandon Gulker, Robert Gustafson, Jason Habeger, Seung Han, Patrick Harrington, Matthew Hartman, Mohammad Hashim, Jordan Hauser, Zachary Heidemann, Richard Henderson, Johannes Hertrich, Joshua Heyden, John Hirschey, Jason Hockstra, Matthew Holley, Timothy Horbal, Jeremy Horgan, Aaron Huber, Alex Huber, Richard Humphries, Jason Hunter, Eric Irving, Fran Jewison, Kyle Jose, Zachary Kaltz, Shaza Katrib, Peter Kehbein, Justin Ketterer, Matthew Kimball, Kacy King, Shawn Klann, Chad Kleinow, David Klipfel, Richard Klop, Neal Koenig, Joseph Kondratek, Andrew Kosinski, Eric Krajewski, Lindsay Kreda, Thomas Kret, Andrew Kruk, Michael Kusner, Nicholas Lane, Jennifer Langridge, Matthew Lassiter, Megan Lawrence, Jerome Leboeuf, Samuel Leitkam, Gabriel Lepeak, Mark LePech, Daniel Little, Jacob Lyon, Armon Mahajerin, Matthew Marriott, Erik Marshall, Brent Martin, Mary Martin, Daisuke Matsuura, Michael Maurer, Matthew McCartney, Nicholas McClain, Ryan McCollum, Justin Mciver, Michael McKimmy, Andrew McMaster, Patrick Meagher, Kevin Miller, Nicholas Miller, Mohd Mokhtar, Ryan Monroe, Kyle Munro, Raymond Naglik, Adam Nankee, Gregory Nelson, Cheuk Ng, Michael Nicley, Devin O'Connor, Basak Oguz, Mark Orlowski, Thomas Pabst, Jason Payne, Ryan Penfold, Daniel Petlicki, Canek Phillips, Bethany Pickett, Keith Pigeon, Heather Placek, Kate Presnell, Jeffrey Prevost, Martin Priess, Heather Pung, Caryn Pytleski, Jill Randall, Joy

Dean's List cont'd on pg 16

Biomechanics Research: Leap into your seat! by Dr. Tamara Reid-Bush

Part of Dr. Tamara Reid-Bush's work involves "sitting down on the job" – she conducts research in the area of seating biomechanics. Dr. Reid-Bush assisted in the development and testing of Steelcase's Leap office chair which contains a feature called the "live back." The "live back" is named for its ability to move with and support occupants as they change postures. It is this movement, or postural change, that has been shown to play an important role in maintaining a healthy back. [See Figure 1]

More recently, Dr. Reid-Bush worked with Johnson Controls to develop an automotive seat with a "live back" component. Currently,

occupants in automobiles are confined to a single posture. Some car seats may allow for small deviations in posture with the addition of a lumbar support. However, with the live back, Dr. Reid-Bush's testing has shown that the seat back flexes with the occupant, allowing spinal movement and providing continuous support, reducing the need to stuff a small pillow behind your back for support. [See Figures 2 & 3]

Testing of both the Steelcase and JCI seats was performed in the Biomechanical Design Research Laboratory. This testing included measures of motion and pressure distribution. The figure below [See Figure 4] is a subject sitting in a Leap

office seat, and both the person and seat are targeted with reflective balls. These targets are used to capture three-dimensional movements, which when examined with the pressure measurements provide information about the subject and the seat.

Recently, PBS's DragonFly television came to MSU to videotape Dr. Reid-Bush and some of her seating research. The show, which is designed to get young students excited about science, will link biomechanics research performed by a "real-scientist," to a trebuchet contest held at Mason Middle School. The episode is scheduled to air at the end of March/ beginning of April.

Special Overrides

1) Transfer Override Requests: If you plan to take an the prerequisite for an ME course at another institution this summer, complete a *Transfer Override Request Form*, which can be found at <http://www.egr.msu.edu/me/programs/ugrad/Forms/TranOvr2.pdf>. You will be given a prerequisite override so that you can enroll in the next course in the sequence.

2) ISS 3xx Overrides: Transfer students who transferred their first ISS course will need a prerequisite override before enrolling in ISS 3xx. Prerequisite overrides for ISS 3xx will be available in 302 Berkey Hall on Monday-Friday at 8:30-11:00 a.m. and 1:00-4:00 p.m. ***Be sure to take your transfer credit evaluation with you!!!!***

3) ME 410 and 412 may be taken concurrently during Summer Semester *only*, but you will need a prerequisite override for ME 412. To obtain the override, first enroll in ME 410. Then, complete the *ME Override Form* (see link above). Select "Other" for Reason for Request and write that you are taking ME 412 concurrently with ME 410 this summer.



Figure 1 Leap Office Seat Figure

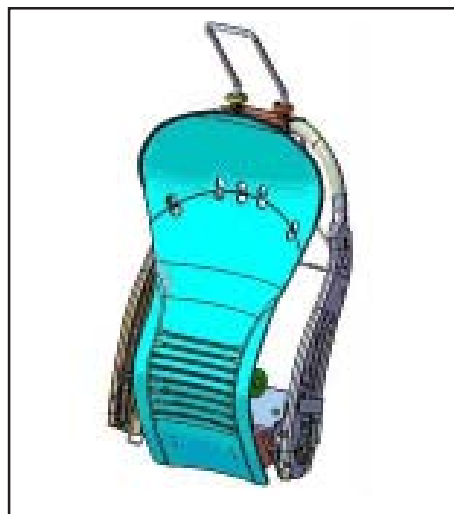


Figure 3 Leap Mechanism



Figure 2 Car Interior



Figure 4 Subject being testing with targets

May Madness is Coming! Are You Ready?

No, this headline doesn't contain a typo. We do mean *May Madness!* It has nothing to do with college basketball play-offs, though the same excitement, anxiety, tension, triumph, and upset associated with the final four and championship game can grip its participants.

May Madness describes the period between now and the last day of Spring Semester. It includes your efforts to find a Co-op, internship, or full-time permanent employment, while you juggle papers, projects and finals on your way to academic success. Are you ready?

New & Improved Resources for You

Mark your calendars and watch your e-mail for messages about the following programs that will help you achieve your career goals by May:

March 18 – Attend the Michigan Collegiate Job Fair

This fair is schedule for 9 a.m. - 3 p.m. at Burton Manor in Livonia, Michigan. Go to <http://www.mcjf.org> for more information.

March 23 – Attend the CAREER NETWORKING EXPO

This is scheduled for Wednesday, March 23 at 6 - 8 p.m., outside the ECE and CSE departments. You will have an opportunity to meet with MSU engineering alumni and employer representatives to further your careers. A Career Expo format provides an environment for you to make valuable industry contacts, learn more about technologies in use at specific companies and discuss potential career opportunities. While NOT a career fair, some companies will be accepting resumes and are actively hiring full-time and internship positions, so please be prepared with a resume. As the date draws near, visit the official website at <http://www.acm.cse.msu.edu/expo> to learn which companies will be on hand.

Checklist for Career Expo Preparation:

- ✓ Do spend time conducting company RESEARCH to enable productive conversation.
- ✓ Dress is Business formal. If you don't have a suit, please dress appropriately.
- ✓ Bring at least five copies of your resume. (You may want to consider using a portfolio to carry your resume copies.)

March 28 – “Virtual Conversation with Jim Novak

Visit www.eng.csp.msu.edu for “Your College of Engineering/Career Services & Placement Corner” featuring career development and job search information. The CECSPC is designed as a virtual conversation to meet your needs as a technical major.

May Madness cont'd on pg 16

Program Update: MSU Study Abroad Program in Russia by Dr. Darren Mason

Mechanical engineering undergraduate students have a great opportunity to study abroad in Russia during the first half of summer 2005! This continuing program, now called “A Multidisciplinary Study Program in Russia: Engineering, Education, and Russian Language,” offers classes from a wide variety of disciplines. Most relevant to ME majors are the technical courses *ME 221 – Statics*, *ME 361 - Dynamics*, and *STT 351 – Statistics for Engineers*.

New for 2005, the program has two different options for students fulfill their IAH requirements. In addition to *IAH 221(C) – Russian Language and Culture*, and various courses in the Russian Language, there is a new IAH course dedicated to the role Russia played during the evolution of World War II. This course, called *Mobilizing Mother Russia: The Soviet Union, Germany, and the Great Patriotic War*, takes special advantage of the fact that the primary instructional location of the program is Volgograd, Russia.

This city, formerly known as Stalingrad, is where one of the most important battles between the Russians and the Germans took place during the winter of 1942-1943. Indeed, the German's defeat in this city is widely regarded by historians as the beginning of the end of German domination of Europe during World War II.

Enrollment in the program last summer reached an all-time high of 68 students, including five from Mechanical Engineering, and representing all but one department in the College of Engineering. So far, over 55 students have completed applications to participate in summer 2005, leaving room for at least 20 more students.

The deadline for applications is March 1, 2005.

Interested students are encouraged to contact **Dr. Thomas Maleck** in CEE (maleck@egr.msu.edu), **Dr. Craig Somerton** (somerton@egr.msu.edu) in ME, or **Ms. Gaile Griffore** (griffore@egr.msu.edu) in ME as soon as possible.

Additional information about the program is available online through the study-abroad office at <http://studyabroad.msu.edu/programs/russtrans.html> and through **Dr. Mason's** website at <http://www.albion.edu/mathcs/dmason/russia.htm> where you can download a PowerPoint presentation with numerous pictures from previous trips.

MSE Courses Enhance ME's Understanding of the Role of Materials for Innovation

by Prof. Tom Bieler, CHE/MSE Dept.



Many ME majors obtain jobs that involve material processing, or identification of materials for innovative new products. What would be the impact of modifying processing equipment on a material or a product? With a kazillion flavors of materials to choose from, how does a designer make optimal choices? The numbers associated with material properties in handbooks can be overwhelming, and added to the fact that a change in processing path can alter material properties significantly, it is not surprising that non-optimal choices are frequently made due to a lack of understanding of unanticipated pros and cons. This can lead to problems that frustrate design, slow down development, or can even shut down a plant until a problem is fixed.

Because all products are made of materials, perhaps the most innovative approach to developing new products is to go beyond officially available materials, to identify modifications in a material process history to obtain properties/cost that are appropriate for a new product. However, once an innovative process is figured out, most high performance or cost efficient parts have the material process history embedded into the specification. But, this is also a recipe for killing innovation, because after 10 years, the reasons for specifying the process may be forgotten (people who figured out the process are no longer available). Then, one is stuck with a specification that prevents further optimization or hinders innovation because the rationale for the existing process is either unknown, or cannot be altered without violating the specification. Thus, materials based challenges are always present . . .

While it is not possible to obtain a dual major in ME and materials science in four years, you could develop the ability to communicate effectively with materials engineers, and give yourself an advantage when you face a baffling materials challenge. By taking an MSE senior elective course you could learn more about what materials engineers know and do. Several 400 level MSE courses are accessible to ME majors, and they are recommended to you if you enjoyed MSE 250 and did well in the course. Most would require some additional background reading of material covered in other MSE courses. They are described briefly in

"Non-optimal [material] choices . . . can even shut down a plant until a problem is fixed."

ME friendly language below, and further information can be obtained from **Prof. Bieler** (bieler@egr.msu.edu):

To start with, **ME 426–Composite Materials** and **ME 477–Manufacturing Processes** are co-listed courses with MSE, so you will interact with MSE students in these classes. *The following courses are listed in order of likely interest to ME majors:*

•**MSE 425–Biomaterials and Biocompatibility**, offered Spring of every year, for 3 credits. Prerequisite: (PSL 250 or concurrently and MSE 250). Catalog Description: Materials science of human implants. Design requirements imposed by the human body, and need for bodily protection.

This course has two major thrusts: to identify materials selection and interfacial reaction constraints for biocompatibility, with examples on how these constraints are overcome to make practical biomedical products. Secondly, because this field is an emerging area of technology, a large emphasis is put on identifying the most recently developed innovations in the form of

literature search based project. MSE students often take this course in their junior year.

•**MSE 451–Microscopic and Diffraction Analysis of Materials**, offered next Spring for 3 credits (2hr lecture, 2hr lab). Prerequisites: MSE 250 and PHY 184 and senior standing. Catalog Description: General properties, generation and detection of x-rays. Interaction with solids. Crystallography, reciprocal lattice, diffraction analysis and techniques. Single crystal methods, stereographic projection. X-ray microanalysis.

This course is technically accessible, but may be over the line of ME interest. If you have a latent physics curiosity in you that you can't shout down, you would be welcome. This course examines atomic structure and the elementary quantum physics associated with generation of x-rays and diffraction phenomena. The techniques studied are profoundly important for identifying the atomic scale structure of materials and alloys, and it is used to measure anisotropic material properties, residual stresses, and heterogeneous strains that are often associated with failure.

•**MSE 454–Ceramic and Refractory Materials**, offered Spring of every year, for 3 credits. Prerequisite: MSE 250 and senior standing. Recommended background: MSE 310 and 350. Catalog Description: Ceramic and glassy materials. High temperature processes. Mechanical and physical properties of technical ceramics.

This course would interest MEs who have interest in either high temperature products or electronic products. The largest \$ fraction of ceramics are used in the electronics industry, where thermal stresses in complex assemblies (the world's most complex composite materials) have to be anticipated in design to prevent failure. MEs would have to study some materials based thermodynamic topics on entropy of mixing and phase separation that are covered in MSE 310. This course is not recommended if you hated PHY 184 (electricity, magnetism, optics).

•**MSE 466–Design and Failure Analysis** offered next Fall for 3 credits (2hr lecture, 2hr lab). Prerequisite: MSE 331, Recommended background: MSE 381. Catalog description: Modes and causes of failure in materials, components, structures, and the role of

design. Nondestructive evaluation. Deformation and fracture mechanisms. Legal and economic aspects of materials failure. Analysis illustrated in student projects requiring integration of prior course work.

This course provides a hands-on opportunity to figure out why something broke, and to identify what changes could be made in the design of the part (shape, processing, material choice). This is the MSE design capstone course, and the prerequisites prevent ME students for signing up for it; you could get in on an override basis only, so please talk to the instructor if you are interested. Here is why you might be interested: Many designs fail due to problems in the interface between different materials, or due to a lack of understanding of the interface between solid mechanics and material properties. Therefore you could enhance your ability to design if you had deeper understanding of failure and fracture mechanisms. A few of you will have the opportunity to do ME 481 design projects that involve materials issues, and possibly have a MSE student as part of your team who is taking the course as a technical elective. It is desirable to develop interfacial communication skills so that you can more effectively understand expertise that others have that can help you, so we would welcome a few MEs to provide desirable skills that MSE students don't have, for some of the failure analysis projects.

•MSE 476–Physical Metallurgy of Ferrous and Aluminum Alloys, offered Fall of every year for 3 credits. Prerequisite: MSE 250. Recommended background: MSE 310, 360, 370. Catalog Description: Heat treatment and properties of ferrous and aluminum alloys. Casting and solidification. Effects of alloying elements, high strength low alloy steels, hardenability, case hardening. Joining of materials, welding.

Probably more components that carry a load are made from steel and aluminum than anything else. This course examines the underlying process variables (that are generally not understood by MEs) that account for the huge range of possible material properties of steel, cast iron, and aluminum alloys. The strategies and reasons for alloy additions, controlling and designing the time, temperature and deformation history are explained. MEs would have to study some materials based thermodynamics on entropy of mixing and phase separation that are covered in MSE 310, and some extra reading in the text to pick up on topics covered in MSE 360 and 370.

Graduate Study in ME

by I. S. Wichman, ME Graduate Coordinator



As the graduate coordinator in the ME department, one of the common questions undergraduates have is: *am I eligible for graduate study?* The answer has two parts.

First the Master's Degree (M.S.):

Generally, students who like the technical side of their work and wish to stay in technical engineering R&D after they leave MSU should think seriously about pursuing the M. S. This is especially true if the student is strong academically, somewhere in the above-3.5 realm in terms of GPA, and he or she does not mind courses with serious mathematical content. Graduate school places a larger emphasis on theory, and it is important that students realize this before applying. There is a lot of "hands on" work that a student can and will do while pursuing the M.S. degree (e.g., lab thesis work), but graduate classwork is more sophisticated than undergraduate classwork (and the problem sets are longer!).

An additional consideration is that working on a Master's degree "part-time" or in the "evenings," as engineers working in companies are encouraged to do, since "you are being paid to do it," is really not a great career/life strategy. First, there's the time factor: Who wants to work all day and then go to school and study every night? Second, the "night" engineering schools are simply not of the same high caliber as MSU and other top universities. Third, this is a good time in your life to expand your horizons by reading and traveling and attending meetings, by getting to know international students, and by really learning how to pose and solve a problem (your thesis!). I heartily recommend the M.S. to students looking for the

experiences outlined here. I have never heard of an MSU student later in life regretting the M.S. degree!

Second, the PhD: Here, the student should be top-notch, interested in theory behind applications, willing to apply years of dedicated effort and hard work to follow his or her research pursuits and dreams. Many PhDs go on to have notable careers in industry, the military, and academe. All of my former PhD students, for example, have excellent, high-paying jobs in industry or academe. The PhD does not "pigeonhole" the recipient unless the recipient wants to be pigeonholed. As for all choices in life, a PhD closes some doors while opening others, but usually the ones it closes are the ones that were not going to be taken anyway. If you ever want to teach, the Ph.D. is almost a must.

You should start thinking about grad school a year in advance, because an application requires the GRE, letters of recommendation, transcripts, etc., and assembling this package takes time. We admit students for both Fall and Spring. (Some universities admit graduate students only in the Fall.)

As tangibles, the following types of persons should apply: (1) high overall GPA; (2) great GPA "trajectory"; (3) great technical GPA. Intangibles are: (1) strong work ethic; (2) good focus; (3) firm commitment; (4) consistent and consuming interest, and (5) a passion for engineering. A typical M.S. degree takes 2 years, a PhD about 4-5 years. One of the very nice things about our ME graduate program is that all students receive a high degree of personal attention. This is a good thing for everyone involved.

I would be happy to discuss possible graduate studies with you! Please send me an email (wichman@egr.msu.edu) or call me (353-9180).

American Society of Mechanical Engineers



ASME offers many events throughout the year. You can expect speakers or presentations from General Dynamics, Roush Racing, Caterpillar, Stryker Medical,

DaimlerChrysler, Ford, **Dr. Hubbard** and the HANS device, Harness Dickey & Pierce, and many more.

ASME would like to welcome **Dr. Patterson** our new co-faculty advisor. Without Dr. Patterson, many of these events would not be possible. We would also like to thank the Shell Corporation and Eli Lilly for their generous donations to our society. Their donations make many of our events possible.

Joining ASME is a great way to get involved, and with job placement becoming more of an issue everyday, joining a student group gives you a competitive edge. All ASME members are considered for a range of scholarships to help take the load off rising tuition bills.

It is easy to become a member. **Applications** are available outside the ASME office (2328K EB) and online (www.egr.msu.edu/asme). Please remember to fill out the national application and the MSU chapter application.

The Regional Student Conference is being held at the University of West Virginia on March 31 - April 2. The ASME officers and the top ME 471 groups will be traveling there to meet with the other regional student chapters, and the 471 groups will be competing for a chance to go to the national competition.

Do you want to become even more involved? Would you like your voice to be heard both within the society and college of engineering? Run for office! There is currently one position open on the executive board. Come make the most of your MSU education. Helping run an organization like ASME gives you a tremendous amount of real-world experience and looks great on a resume. With ASME, you can help new programs come to life that will benefit ME students. To find out how to become a part of the organization, contact **Adam Zemke**.

Visit www.egr.msu.edu/asme for details on meetings, events, membership and more.

| | |
|-----------------------------|--|
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| Web-Master: Saleel Pradhan | pradhans@msu.edu |

Pi Tau Sigma



Pi Tau Sigma, the Mechanical Engineering honor society, is very excited about this semester. We have gotten off to a great start. Our first social event was kicked off with a wing-filled night at BW3's. We helped our community by volunteering at the Ronald McDonald House on Saturday, February 19.

PTS also got involved with the college by holding information sessions during SET day.

We are looking forward to the many remaining events this semester. If you are looking for a break from classes, join us Thursday, March 24 for bowling at Holiday Lanes at 9pm. Come and see what the ME senior elective courses are all about from students who have taken them on Thursday, March 31 at 6 p.m. in room 2243 during our annual Senior Elective Night. On Saturday, April 2, we will be visiting the Lansing Area Rescue Mission. We will be enjoying a burger-filled night at Crunchy's on Tuesday, April 5. A guest speaker from Ford will be here Thursday, April 7. We will be helping our community by volunteering at the Soup Kitchen on Saturday, April 16. PTS officer elections will be held on Tuesday, April 19. Our largest event each semester, the Golf Outing, will tee off on April 23. If you would like to join in on the fun, send an email to baurmatt@msu.edu. We will also have members speak to groups of junior high and high school students at Design Day on April 29 in the Union.

For more information about any of our events, please check out our new and improved website at <http://www.egr.msu.edu/pts/>. We hope to see you at our upcoming events! — *Submitted by Katie Allen, Secretary.*



PHOTO PROVIDED BY ASME

ASME Officers and Dr. Somerton at the 2004 Regional Student Conference at The Ohio State University.

Formula SAE 2005



The MSU Formula Racing team is proud to announce the completion of Car # 24. Team members worked extremely hard to achieve the grueling task of designing, fabricating, and assembling every system on the vehicle before the Spring Break testing trip to Gainesville, Florida. We would like to thank our sponsors, the faculty and staff who helped us reach our goal.

Every system on the car has significantly improved with respect to last year's car. **Ben Levesque** (electrical engineering sophomore), Electrical System Team Leader, developed a solid state electronics system that substitutes the use of fuses with transistors and diodes. Levesque also optimized the wiring harness to reduce weight and increase the electrical system's efficiency. Chassis Team Leader **John Lankes** (mechanical engineering junior) designed a frame with a torsional rigidity of 1100 ft-lb/deg, which is twice as much as last year's vehicle. The powertrain system on Car 24 features a carbon fiber intake, which is 60% lighter than last year's aluminum intake and provides an improved surface finish to increase air flow quality through the 20 mm mandated restrictor. Suspension Team Leader **Kevin Douglas** (mechanical engineering Senior) incorporated customized shock absorbers to maximize the performance of the vehicle under steady state cornering, non-uniform road inputs (bumps), and ride. Chief Engineer **Nick Periat** (mechanical engineering senior) supervises the design and ensures the integration of every system on the car. Periat said, "I am very impressed with this team; we have a very promising future ahead of us."

The 2005 Formula SAE competition will take place at the Pontiac Silverdome from May 19 - May 23. There will be 140 schools from Europe, Asia, Australasia and the Americas all competing to win the competition. This year, MSU Formula Racing has an extremely solid team and I invite everyone who is interested to come to our competition and witness Michigan State take the World Championship title home to East Lansing. Please feel free to e-mail me with questions.

*Submitted by Alan Mond, MSU Formula Racing Project Manager
(mondalan@msu.edu)*



PHOTO PROVIDED BY SAE FORMULA



PHOTO PROVIDED BY SAE MINI BAJA

Mini-Baja: MSU Spartan Offroad Racing



The MSU Mini-Baja team is gearing up for their annual competitions. This year, the team will be traveling to Tinaja Hills, Arizona and Troy, Ohio.

Mini-Baja is a Society of Automotive Engineers Collegiate Design Series competition. This event challenges teams of students to design, build, test, promote and race a single-person off-road vehicle.

Three annual competitions consist of both static events involving the design, cost and production of the vehicle as well as several dynamic, or driving, events. The dynamic events include Acceleration, Maneuverability, Hill Climb, Sled Pull, Rock Crawl and Endurance.

In 2004, the team finished 29th out of 90 teams, in Portland, Oregon; and 38th out of 140 teams, in Milwaukee, Wisconsin. Despite a top ten design score, an accident in the endurance race damaged the driveline of the vehicle, hurting the final score.

The 2005 vehicle boasts an improved driveline and suspension as well as a lowered center of gravity and a new steering and braking system to improve handling. The team will also enter two vehicles per competition for the first time in the team's history. *More information? <http://www.egr.msu.edu/baja/> email: lockerti@msu.edu*

Submitted by Pete Schupka, Mini Baja Chief Engineer

ME Senior Electives for 2005-2006

- 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://ntweb1.ais.msu.edu/j4100/scripts/CatalogSearch.asp>
- The ME department cannot overfill a required course section to solve a Senior Elective schedule conflict.
- Course override instructions can be found in the shaded **BOX** on page 15.

SUMMER SEMESTER

- ME 491 **Refrigeration.** Section 101 ONLY. 3(3-0). *Requires Override*→See #1 in box. Prereq: ME 410 or concurrently. *Description:* Refrigeration systems, including vapor-compression, absorption, and thermoelectric; the major components of refrigeration systems (heat exchangers, compressors, and expansion valves) and how to select them to achieve a specified refrigeration system performance. Practical issues, such as pressure switches, lubricants, and piping systems, will be addressed. *Kilicarlan.*
- ME 490 **Independent Study.** 1-4 credits. *Requires Override*→See #4 in box. You may reenroll for a maximum of 6 credits.
- MSE 426 **Introduction to Composite Materials.** 3(3-0). Prereq: ME 222. *Lucas.*

FALL SEMESTER

- ME 416* **Computer Assisted Design of Thermal Systems.** 3(4-0). *Requires Override*→See both #1 & 2 in box. Prereq: ME 410 or concurrently. *Somerton.*
- ME 422 **Introduction to Combustion.** 3(3-0). Prereq: ME 332 or concurrently. *Wichman.*
- ME 423 **Intermediate Mechanics of Deformable Solids.** 3(3-0). Prereq: ME 222. *TBA.*
- ME 425 **Experimental Mechanics.** 3(2-3). Prereq: ME 222. *Cloud.*
- ME 440 **Aerospace Engineering Fundamentals.** 3(3-0). Prereq: ME 332 or concurrently. *TBA.*
- ME 444 **Automotive Engines.** 3(3-0). Prereq: ME 410 or concurrently. *Schock.*
- ME 456* **Mechatronic System Design.** 3(2-3). *Requires Override*→See both #1 & 2 in box. Prereq: ECE 345, ME 451 or concurrently. *Radcliffe.*
- ME 465* **Computer Aided Optimal Design.** 3(3-0). *Requires Override*→See both #1 & 2 in box. Prereq: ME 471 or concurrently. *Diaz.*
- ME 477 **Manufacturing Processes.** 3(3-0). *Requires Override*→See #1 & 3 in box. Prereq: ME 222 & MSE 250. *TBA.*
- ME 490 **Independent Study.** 1-4 credits. *Requires Override*→See #4 in box. You may reenroll for a maximum of 6 credits.
- ME 494 **Biomechanics and Heat Transfer.** 3(3-0). Prereq: ME 410 or concurrently. *BME Option Course.* *Wright.*
- CHE 472 **Composite Materials Processing.** 3(2-3). Prereq: ME 332. *Jayaraman.*
- ECE 415 **Computer Aided Manufacturing.** 3(2-3). *Requires Override*→See #5 in box. Prereq: ME 451. *Xi.*
- EGR 475 **INTEnD—International Networked Teams for Engineering Design.** Section 001. 3(1-5). *Requires Override*→See #6 in box. Prereq: Senior standing and ME 471 or concurrently. *Description:* Groups of MSU students are teamed with students from other universities around the world to work on an international team design problem for an industrial sponsor. They participate in the INTEnD project which couples international engineering design with cross-cultural team building and communication techniques. *Lloyd/Hinds.*
- MSE 454 **Ceramic & Refractory Materials.** 3(3-0). Prereq: PHY 184. Recommended background: MSE 350 and 381. *For more info*→See #7 in box. *Case.*
- MSE 466 **Fracture & Failure Analysis.** 3(2-3). Prereq: MSE 250. Recommended background: MSE 320, 331, and 381. *For more info*→See #7 in box. *Lucas or Crimp.*
- MSE 476 **Physical Metallurgy of Ferrous & Aluminum Alloys.** 3(3-0). Prereq: MSE 250. Recommended background: MSE 310 and 360. *For more info*→See #7 in box. *Crimp or Bieler.*
- ME 802 **Advanced Classical Thermodynamics.** 3(3-0). *Requires Override*→See #8 in box. Prereq: ME 412 plus GPA of 3.5+. *TBA.*
- ME 812 **Conductive Heat Transfer.** 3(3-0). *Requires Override*→See #8 in box. Prereq: ME 412 plus GPA of 3.5+. *TBA.*
- ME 830 **Fluid Mechanics I.** 3(3-0). *Requires Override*→See #8 in box. Prereq: ME 332 (ME 432 recommended) plus GPA of 3.5+. *TBA.*
- ME 860 **Theory of Vibrations.** 3(3-0). *Requires Override*→See #8 in box. Prereq: ME 461 plus GPA of 3.5+. *TBA.*

SPRING SEMESTER

- ME 432 **Intermediate Fluid Mechanics**. 3(3-0). Prereq: ME 332. *Foss*.
- ME 442* **Turbomachinery**. 3(3-0). *Requires Override* → See #1 & 2 in box. Prereq: ME 332. *TBA*.
- ME 445* **Automotive Powertrain Design**. 3(3-0). *Requires Override* → See #1 & 2 in box. Prereq: ME 444. *TBA*.
- ME 457 **Mechatronic System Modeling and Simulation**. 3(3-0). Prereq: ME 451 or concurrently. *Rosenberg*.
- ME 464 **Intermediate Dynamics**. 3(3-0). Prereq: ME 361. *TBA*.
- ME 475* **Computer Aided Design of Structures**. 3(2-3). *Requires Override* → See #1 & 2 in box. Prereq: ME 471 or concurrently. *Diaz*.
- ME 477 **Manufacturing Processes**. 3(3-0). *Requires Override* → See #1 & 3 in box. Prereq: ME 222 & MSE 250. *TBA*.
- ME 478 **Product Development**. 3(3-0). *Requires Override* → See #1 & 3 in box. Prereq: ME 361, 477 & Tier I Writing. *Kwon*.
- ME 490 **Independent Study**. 1-4 credits. *Requires Override* → See #4 in box. You may reenroll for a maximum of 6 credits.
- ME 417* **Design of Alternative Energy Systems**. 3(3-0). *Requires Override* → See #1 & 2 in box. Prereq: ME 410 or concurrently. *Bénard*.
- ME 495 **Tissue Mechanics**. 3(3-0). Prereq: ME 222. *BME Option Course*. *Haut*.
- ME 497 **Biomechanical Design**. 3(3-0). Prereq: None for ME majors. *BME Option Course*. *Hubbard*.
- BME 401 **Quantitative Human Biology**. 3(4-0). Prereqs: CEM 141, MTH 235, PHY 184, PSL 250 or concurrently, ANTR 350 or concurrently. *BME Option Course*. *Paganini*.
- CE 422 **Applied Hydraulics**. 3(2-2). Prereqs: ME 332 and 391. *Wallace*.
- MSE 425 **Biomaterials & Biocompatibility**. 3(3-0) Prereq: PSL 250 or concurrently and MSE 250. *BME Option Course*. *Baumann*.
- MSE 426 **Introduction to Composite Materials**. 3(3-0). Prereq: ME 222. *Liu*.
- MSE 451 **Microscopic & Diffraction of Materials**. 3(2-3). Prereq: PHY 184. Recommended background: MSE 350 & 381. *For more info* → See #7 in box. *Bieler or Crimp*.
- ME 825 **Experimental Mechanics**. 3(2-3). *Requires Override* → See #8 in box. Prereq: ME 425 or permission plus GPA of 3.5+. *Cloud*.

OVERRIDE INSTRUCTIONS

- ① Submit the ME *Override Request* form → <http://www.egr.msu.edu/egr/programs/bachelors/overrides.php>
- ② Design Intensive Senior Electives: On a space available basis, graduating seniors, who have not yet taken a design intensive course, will receive an override for the first one they request. All other requests will be placed on a waiting list. Leftover seats will be assigned to waiting list students at a later date.
- ③ Priority for both ME 477 and 478 is given to MEs who are on record as Manufacturing Option students. (To be “on record,” you must meet with Gaile to plan a long-term schedule.) ME 477 is officially restricted to AES and MSE majors, but MEs have been allocated 25 seats for Fall and 45 seats for Spring. More seats may become available later.
- ④ 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 pages, return the form to the ME Advising Office for the remaining signatures, override, and enrollment.
- ⑤ 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 meet with Gaile to plan a long-term schedule.)
- ⑥ Email Dr. Lloyd (lloyd@egr.msu.edu) and request an override for EGR 475/001.
- ⑦ ME majors do not need to take the Recommended Background courses, but there will likely be a need for some additional background reading. Please refer to Dr. Bieler’s article on page 10 for more information.
- ⑧ Complete the *Graduate Course Override* form, available in the ME Advising Office in 2560 EB. This is a paper form. NOTE: Instructor assignments for most ME graduate courses were not available at press time, but should be available in May.

Spring Semester Calendar

| | |
|----------------------|--|
| March 14-25 | Scheduled appointments for Computer/Telephone enrollment for Summer 2005. Your enrollment appointment will be posted in Stulnfo. |
| March 18 | Engineering Scholarship deadline. See page 3. |
| Apr 1 | Computer/Telephone enrollment begins for Fall '05/Spring '06. |
| April 22 | ASME Event: Spring Tailgate ("The Gathering") at Dr. Somerton's house. |
| April 29 | ME Design Conference in the MSU Union. See you there! |
| May 2-6 | Final Exams. |
| May 6 | University Undergraduate Student Convocation—1:00 P.M. in Breslin. |
| May 8 | College of Engineering Undergraduate Commencement Ceremony, 1:30 p.m. in Breslin. Lasts about 2 hours. |
| May 16-Jun 30 | <u>First</u> Summer Session. |
| Jul 5-Aug 18 | <u>Second</u> Summer Session. |
| May 16-Aug 18 | <u>Full</u> Summer Session. |
| August 11 | First Fall 2005 Minimum Tuition & Fee payment due. |
| August 29 | Fall Semester classes begin. |
| September 1 | Application deadline for FE exam in October. |

Dean's List cont'd from pg 7

Reichenbach, Eryn Richmond, Brent Rowland, Matthew Ryerkerk, Mohd Salim, Thomas Sanders, Ryan Scheidies, Erik Schubert, Michael Schultz, Peter Schupska, Jared Sickles, Daniel Smith, Kristen Smith, Martha Smith, Tracey Smith, Anita Solitro, Benjamin Souder, Charles Spaniola, Troy Staten, Jeffrey Steele, Brian Steffes, Scott Stieber, Paul Strefling, Nicholas Strevel, Ryan Stull, Kyle Sutton, Kyle Szytykiel, Jin Tam, Keith Tenbusch, Jessica Theis, Joseph Tideswell, Elliot Tippmann, Yi-Chieh Tsai, Richard Utrup, Marco Vagani, Brendan Vidmar, Nicole Vidro, Bryan Wagenknecht, Jacob Wagner, Richard Wahl, Andrew White, Scott Williams, Wayne Williams, Matthew Winkley, Jeremy Zehr.

May Madness cont'd from pg 9

This site will enable you to learn . . .

- "*All of the Right Moves*" for positioning yourself for success in engineering, upon graduation.
- *Job Search Basics* to help you articulate how you can fill an employer's needs.
- *All of the tool* which Career Services & Placement puts at your disposal for career achievement.
- *How to look beyond the Internet* for jobs in your field.
- *And more...*

Instant Messaging Advising will be available through the site at posted times!

April 4-15: The Michigan Collegiate Virtual Job Fair

This VIRTUAL career fair will give you an ON-LINE last chance to bid for Co-ops, internships and full-time jobs. Visit <http://www.mcvjf.org> (After March 4) to learn when and how you can submit your resume to over 100 employers. So, be prepared. May Madness is coming!

Written by Jim Novak, Field Career Consultant, College of Engineering, 3502 Engineering Building, novakja@msu.edu

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Dept of Mechanical Engineering

ME Advising Office

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