



# Alpha Eta Mu Beta

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NATIONAL BIOMEDICAL ENGINEERING HONOR SOCIETY

## National News Letter

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### MESSAGE FROM THE E BOARD



Alpha Eta Mu Beta would like to extend a very warm welcome Dr. Marcia A. Pool, who will be serving as our executive director. An alumni of Louisiana Tech, Marcia graduated Magna Cum Laude with her Bachelors of Science in biomedical engineering. She continued her education at LaTech, pursuing a doctorate in biomedical engineering. The title of her dissertation is "Acquisition of the Cardiac Control Parameters from Whole Nerve Vagus Recordings". Dr. Pool has an established reputation in teaching and mentoring students, and has strong ties to both academic institutions and professional societies. She is currently a faculty member at the department of Biomedical Engineering at Purdue University. Dr. Pool is actively involved with coordinating upper level undergraduate labs and mentoring senior design capstone projects. In addition, she also serves as the technical liaison with Purdue University's Biomedical Engineering Undergraduate coordinator to actively develop industry relationships.

We are truly honored to have Dr. Marcia Pool as our Executive Director and are excited to be working hand in hand with her.

## ADVISOR FOCUS

**Name** : John D. Gassert  
**Position** : Professor and Program Director  
Dept. Biomedical Eng.  
Milwaukee School of  
Engineering (MSOE)  
**Education** : **BS** Electrical Engineering,  
Marquette University  
**MS** Electrical Engineering, Marquette  
University  
**PhD** Biomedical Engineering, Marquette  
University



John D. Gassert is currently a Professor of Biomedical Engineering at the Milwaukee School of Engineering and an Adjunct Professor of Biophysics at the Medical College of Wisconsin. Gassert graduated from Marquette University with a BS followed by an MS, both in Electrical Engineering. He began his career as an engineer for Marquette Electronics Inc, (now GE- Medical Systems) and later became the Manager of Clinical Engineering at St. Luke's Hospita. With his strong industry experience, and engineering knowledge coupled with his unwavering entrepreneur spirit, Gassert formed his own company, Milwaukee Micro, Inc. This company provides consulting in the fields of clinical and computer engineering. Milwaukee Micro is still in successful operations today and Gassert continues to be actively involved on a part-time basis. In September of 1989, Dr. Gassert joined MSOE's full time faculty and in his continued pursuit of knowledge graduated from Marquette University in 1995 with a PhD in Biomedical engineering. His dissertation, focused on a cutting edge area where he used digital signal processing methods to analyze blood flow in patients with a total artificial heart. As a professor, Dr. Gassert has developed and taught numerous courses at both the graduate and undergraduate level in areas of Biomedical, electrical and computer Engineering, Medical Informatics, Perfusion, and Electrical Engineering Technology. His dedication to the field extends beyond the classroom and Dr. Gassert has been actively involved with AEMB. He was instrumental in establishing the MSOE chapter in 1994 and has served as the chapter advisor. His contributions to the BME field have been widely recognized as he is an AIMBE Fellow, a Senior Member of the IEEE, and a member of Sigma Xi. He is an ABET EAC program evaluator for Biomedical Engineering and ABET TAC program evaluator for Biomedical Engineering Technology. As an active member of BMES, Dr. Gassert is currently serving as the chair of the Accreditation Activities Committee for BMES.

## GRADUATE STUDENT FOCUS

**Name** : Katharine Hamlington  
**School** : Tulane University  
**Research** : Cardio Therapy  
**Education** : BS Biomedical Engineering  
PhD Candidate in  
Biomedical Engineering



Katharine Hamlington is a graduate student in the Biofluid Mechanics Lab led by Dr. Don Gaver at Tulane University. She began her biomedical engineering studies as an undergraduate at Tulane, completing an honors thesis on energy dissipation in Fontan-type modifications. Kate decided to remain at Tulane to pursue her PhD and received the Louisiana Board of Regents Fellowship and the IBM Corporation Fellowship in Computational Science to support her graduate work. Kate's doctoral research involves developing both computational and experimental methods to evaluate the design of a microfluidic mixing chamber for a portable antibody-based sensor. This type of device is useful for on-site environmental monitoring, food testing, and medical diagnostics at the point of care. Providing a method to analyze the transport processes within in the device allows informed design modification to enhance rapid detection of harmful biological or chemical agents. This project began as part of a larger collaborative project between several universities in the state of Louisiana funded by NSF EPSCoR, and Kate has gained valuable experience working with experts in computational science, biochemistry, and micromanufacturing. She regularly presents her work at Biomedical Engineering Society and Louisiana EPSCoR meetings. Kate is nearing completion of her doctorate and expects to graduate in spring 2012.

In addition to research, Kate is very involved with student activities on campus. An active member of both AEMB and BMES, Kate started a joint graduate student seminar series with the Chemical and Biomolecular Engineering department to provide a welcoming environment for students to share research among peers and practice presentation skills. She also serves as president of the Graduate Association of Biomedical Engineers at Tulane and is a representative to the university wide Graduate Studies Student Association. Kate enjoyed her experience as a teaching assistant and her research as a graduate student. She hopes to pursue teaching and mentorship opportunities in the future and also a career as a biomedical researcher, applying her extensive experience in computational modeling and fluid mechanics to medically relevant problems.

## UNDERGRAD STUDENT FOCUS

**Name** : Sarah Schmiedel  
**Education** : BS Biomedical Engineering  
**School** : Marquette University



Sarah Schmiedel is currently an undergraduate student in the department of Biomedical Engineering at Marquette University. Sarah's concentration in biomechanics is in an area that she is passionate about. Constantly striving for excellence, Sarah consistently balances her academics, work, social and curricular activities well. As a diligent student, she has been on the Marquette University Dean's list since her freshman year.

Sarah has been instrumental in being an active leader of the Marquette University AEMB chapter. She has sought out innovative community service projects and chapter activities, in addition to fund raising and working hard to ensure continuity and direction of the chapter. The Marquette University AEMB chapter has a strong presence in the Engineering College and also on campus, thanks to Sarah's leadership and the unwavering support of her executive board. Through their hard work, the chapter won 2 national awards, the Best Community Service Award and Best Chapter Activity Award (2011).

In addition to AEMB, Sarah is also very involved with the local community. She has been an active volunteer with the Big Brothers/Big Sisters group where she served as a tutor and mentor for third grade students at the Bruce Guadalupe Elementary school, since her freshman year at Marquette University. Sarah has also volunteered every year with the Annual Harvest Fest celebration. This event is a family centered community event in which over 1000 attendees gather at the Milwaukee central library to participate in many activities ranging from pumpkin carving, cookie decorating, story telling and live music. This event is aimed at bringing the local community closer and fostering unity.

Not one to sit still, Sarah's thirst for knowledge has found her constantly seeking educational opportunities outside the class that would enhance her biomedical engineering skills. She served as a co-op engineer at Baxter Healthcare. In this position she worked on several projects, one of them verifying and validating a novel infusion pump system. She has also interned in the Solid and Fluid Mechanics Division of the Food and Drug Administration. Sarah will be graduating in May 2012 and looks forward to pursuing a career in which she will be able to utilize her engineering and managerial skills.

## ALUMNI FOCUS

**Name** : Tracy Borkovetz  
**Education** : BS Biomedical Engineering (Honors)  
**School** : Milwaukee School of Engineering



Tracy became involved with Alpha Eta Mu Beta when she enrolled at the Milwaukee School of Engineering (MSOE) for a BS in Biomedical Engineering. Prior to MSOE, Tracy was a student at UW-Madison where she studied Genetics. A heavy course load did not hold Tracy back from community service and she was an active member of the Home-Chore Coalition. Through this organization, Tracy helped an elderly disabled lady with yard work and other housekeeping chores on a weekly basis and spent time keeping the elderly lady company, as she had no family and very few friends.

At MSOE, Tracy played a significant role on campus by being involved with AEMB, serving as president of the MSOE AEMB chapter (2008 - 2009). She had actively worked on expanding AEMB presence on the MSOE campus by encouraging members of the chapter to participate at various events such as Healthcare without Borders and other local groups from the Milwaukee community to raise funds to provide relief to the Red Cross for disaster relief in Haiti during the Tsunami tragedy. Tracy successfully led a large group of students from MSOE to the 2009 national BMES Conference in Pittsburgh where she represented her school. Tracy is also an active member of the Eta Kappa Nu and Tau Beta Pi where she served as a volunteer tutor at the drop in tutoring center for math and science. An outstanding scholar, Tracy was on the Dean's list her entire time as a student at UW Madison and also at MSOE and graduated with honors in 2010.

Tracy is currently a Technical Support Analyst at Merge Healthcare, in Milwaukee. Merge Healthcare is a leading provider of enterprise imaging and interoperability solutions in a wide range of modalities and applications that span radiology, cardiology and orthopaedics. Tracy actively collaborates with a diverse group of customers in the field to solve challenging problems and develop innovative solutions for each of their custom needs.

An avid fan of the outdoors, Tracy enjoys fishing, hunting, camping and skiing during her free time, with her family and friends in beautiful upper Wisconsin.

## Researchers at the Optical Imaging Laboratory See the Human Body in a Different Light

Optical imaging is an emerging technology that uses **near-infrared light** to non-invasively “see” inside the body. It is a relatively inexpensive method that provides functional (physiological) information (similar to nuclear imaging) but uses non-ionizing radiation which is not harmful to the body. Additionally, the use of external contrast agents can be used to molecularly target the tumors at the early stage.

Breast cancer affects 1 in 8 women in the United States and is a leading cause of cancer death worldwide. Many cancers are undetected or misdiagnosed by the current imaging modalities (i.e. x-ray mammography and ultrasound). Magnetic resonance imaging is being implemented recently, however it is prohibitively expensive. The Optical Imaging Laboratory at Florida International University focuses on using the optical imaging technology toward breast cancer diagnosis and functional brain mapping. The head of the research group, Dr. Anuradha Godavarty, has performed research in optical imaging for the past 13 years. Her team has developed a novel hand-held optical imager (or device) for breast cancer diagnosis that is portable and patient comfortable

The device has potential to aid in early diagnosis which is crucial in order to save lives. It is designed as a bedside imaging device that operates similar to an ultrasound device. It is also unique in that it is the only hand-held optical device capable of acquiring three-dimensional images of the breast tissue. The device has been developed and tested in the laboratory over the past seven years, and in the past year studies are carried out to test the device on actual breast cancer patients as well as benign and normal cases. “This is a very exciting stage of the research to see how the device performs in the clinical setting after years of design and development,” says Dr. Godavarty. “Our initial results are very promising and our collaborating clinicians are eager to implement this new technology-at-hand.” The figure on the top right shows the hand held device and the figure on the bottom rights shows real data acquired from an examination.

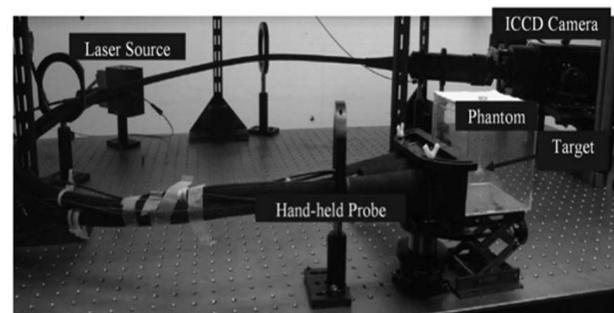
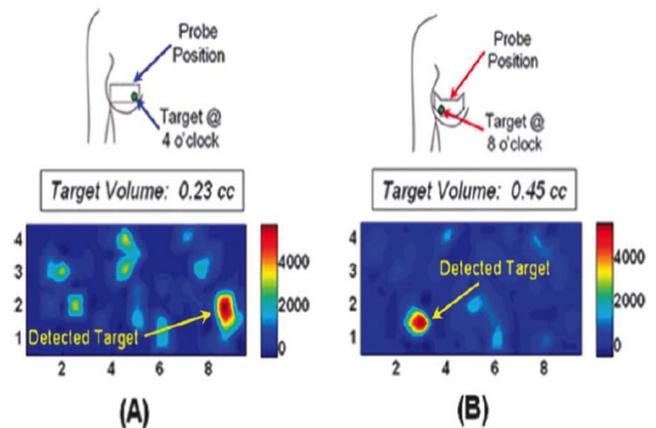


Figure: Hand-Held Probe-Based Optical Imager



Another major research focus at the Optical Imaging Laboratory is using optical imaging technology toward functional brain mapping in children with autism spectrum disorders and children/adults with cerebral palsy. Understanding the functionality of the brain in children with autism can eventually help in early stage identification, diagnosis and interventions prior to behavioral analysis by psychologists. In the area of cerebral palsy, determining the complex brain connectivity in motor-disabled populations can provide an insight into customizing the physical therapy programs toward accelerated treatment options.

Of course there are many challenges faced when developing and implementing any technology on human subjects. The success of the Optical Imaging Laboratory is largely due to cooperative interaction of the team members and Dr. Godavarty's collaborative efforts with clinicians. Through hard work and passionate research, the team is determined to see breakthroughs in the use of optical imaging as a diagnostic tool which will improve the well-being of society. However the research team at the Optical Imaging Laboratory is very persistent and diligent in their research. Their hard work has been widely recognized at the national level. Dr. Godavarty has received recognition through numerous awards such as the Coulter Early Career Award in Biomedical Engineering by the Wallace H. Coulter Foundation (2009), the Kauffman Professor Award (2009) and the FIU Top Scholars Recognition award to name a few.



*This is an original article contributed by the Optical Imaging Laboratory team at Florida International University. From left, Rigoberto Roche, Pallavi Joshi, Sergio Martinez, Dr. Sarah Erickson, Dr. Anuradha Godavarty lab director, Jean Gonzalez, Manuela Roman, Ujwal Chaudhary, Annie Nunez, and Michael Hall. For more information on the lab and their research activities, please visit the official webpage at <http://web.eng.fiu.edu/oil/>*



Laboratories in the biosciences continuously expend resources in their efforts to expand basic science – both for the sake of new knowledge, and in the hope of remedying medical conditions. Both aims rightfully justify the need for resources, be they in the form of human or animal subjects, personnel, or money to pay for the subjects and personnel, or to buy equipment and supplies. However, in a world where resources are finite and must be responsibly rationed out, it is important to evaluate how to appropriately make use of those resources. Here we introduce a few major resource categories, and offer opening ideas that will be individually discussed in future articles.

### **Animal Resources**

The “**Three Rs**” of animal testing call for the *Reduction, Refinement, and Replacement* of animals in research. Within these realms come various considerations for the use of animals as laboratory resources. One is the choice of animal model. Often researchers choose a model because it is one that is widely used in their field, but it is also important to pick an animal that will be well suited to the experiment. In non-human primate studies, for example, some species of monkey are more suited to particular behavioral tasks than others. These and similar considerations should enter into planning a study. It may also be important to test a hypothesis in a variety of species to see if results can be generalized.

Another issue with animal studies is deciding when to sacrifice the animal. There is a tradeoff between using an animal for multiple experiments to expand its usefulness and minimizing the trauma of its laboratory experience that should be considered on a case by case basis. For example, in traditional neurophysiology with awake primates, at some point the animal is sacrificed in order to verify recording electrode locations. More recently, some neuroscience laboratories have been making use of imaging data (i.e. MRI, CT) to this end, reducing the need for histological evidence. Such an approach may be desired because it allows the animal to be used in multiple studies, which decreases the total number of animals subjected to laboratory life. But at the same time, researchers should also avoid subjecting one individual animal to too much stress and distress.



### **Human Resources**

#### *The human as a subject*

While many researchers focus primarily on basic science, it is also important that advances make their way into the clinic to improve healthcare. One of the steps in the translational process of going from bench to bedside is moving from animal to human subjects. Issues include knowing when to make the jump to human models, as well as the logistics of getting consent both for the research at hand, and for potential experiments down the road, such as in the case of tissue use. Clinical trials may additionally involve people who are unhealthy, and consideration for their effort and willingness to give to research should factor into decisions about research protocols as well.

### *The human as a researcher*

While graduate school is about encouraging students to be assiduous and wholly immerse themselves in a project, it is also important to treat the resource of 'graduate student' in a rightful manner. This involves creating a laboratory environment that is conducive to the progress of the student. The laboratory should have policies for safety and social comfort. Laboratory workloads and traumatic factors should also not be overwhelming or distressing to the extent that the student's health is at risk. Cases have unfortunately arisen where students are so hindered by distress that they require medical attention, constituting both abuse of a resource, and harm toward a human being.



Principal investigators should also strive to create a balance between the number of researchers in the lab and the allocation of resources among them. A laboratory that is rich with students but poor in equipment becomes one where researchers spend more time waiting for the supplies and access to equipment than progressing on their project. Too many researchers plus too little resources is a recipe for unproductivity.

### **Financial Resources**

Many research projects are funded by government organizations, meaning that taxpayer money is the green of growth for laboratories. Money should therefore be used wisely so that purchases will lead to fruitful discoveries. These findings could, for example, benefit the taxpayers in the form of advances in health care, completing the cycle. One consideration here is that products should be carefully researched before they are bought, which might prevent the unnecessary frustrations of handling a deficient product that might eventually need to be replaced. There is furthermore little need to buy a product with fancy bells and whistles if a more austere designed product is available – the money going toward attractive though extraneous features could better be suited to buying other valuable supplies. As the ones given the opportunity to help advance the knowledge and capabilities of society, researchers using such resources should be answerable to the community at large.



### **A Model For Collaboration**

In the face of appropriately addressing resource use issues, it may be necessary to design forums for collaboration. As a start, we propose constructive collaborations between scientists/engineers and ethicists through student traineeships. These would allow graduate students in ethics to do rotations a laboratory where they would work on a project that is both pertinent to the science of the group and that includes an ethical dimension. We furthermore recognize the value of involving biostatisticians in the laboratory. Biostatisticians can inform researchers on the amount and type of data that would be necessary to substantiate findings, and this would in turn guide the design of experiments, from the number of subjects to tips on parsing mass amounts of data. It can be seen that bringing together expertise has clear benefits, and encouraging interdisciplinary efforts may be the ultimate answer to sensible research.

*This article is the first in a series of articles on the topic of resource use and ethics in the field of biomedical engineering. The authors will also post discussion topics in on the AEMB blog. They look forward to feedback from their thoughtful audience. The article was created by Stephanie Naufel, a graduate student at Northwestern University and current National Student Vice President of AEMB, Jerry Collins, professor at Alabama A&M, AEMB advisory board member and director of the BMES Ethics committee and Steve Helms Tillery, a professor in the department of biological and health systems engineering at Arizona State University.*

# 2011 AEMB ANNUAL GRAND MEETING

HARTFORD CT.



The 2011 Annual BMES conference was truly an exciting time for Alpha Eta Mu Beta (AEMB). This year the BMES conference was held at the Connecticut convention center in Hartford Connecticut, the insurance capital of the world. The AEMB sessions were kick-started by the Annual Grand Meeting which was attended by representatives from 15 chapters. Several key areas pertaining to the society were discussed which encompassed management, current finances and the budget and also changes to the constitution. Chapters were given till November to vote on the changes. In addition, at this meeting, the new Executive Director, Dr. Marcia A. Pool was introduced.

The AEMB luncheon this year was held at the City Steam Brewery located on Main Street, a short walk from the convention center. Regarded as one of the finest examples of Romanesque architecture in the US, the building was open in 1877 and housed the largest department store in Connecticut. Later this was transformed into the brewery that it is today. Much of the old décor and charm has been preserved and



brewing continues to be done using the pioneering steam methods of yester year. Over a sumptuous entrée of tender roasted turkey breast and homemade cheese cake for desert, there were attendees that represented over 20 schools nationwide present at the luncheon. The guest of honor at the luncheon was Dr. Robert A. Malkin, founder of Engineering World Health. This year, the keynote speaker was Dr. Jerry Collins, a member of the National AEMB Advisory board and chairman of the BMES Ethics Committee. A very uplifting and inspiring presentation title “AEMB: Gifted to Lead, Privileged to Serve”, Dr. Collins emphasized the importance of using one’s biomedical engineering gifts and talents to help serve others. The keynote speech was very well received by the audience who consisted of undergraduate and graduate students and also faculty and administrators from various BME departments. The luncheon concluded with the presentation of awards by Dr. Eric Gilbeau, an AEMB Advisory Board member and Dr. Anthony McGoron the AEMB National President. The award recipients were announced by the National Student president, Dr. Dominic Nathan and are as follows:

**Patricia I. Horner Outstanding Chapter Advisor Award**

Marcia A. Pool, PhD, Purdue University.

**Outstanding Chapter Officer** – Mr. Rupak Dua,  
Florida International University.

**Outstanding Chapter Member** – Ms. Sridevi Nagaraja,  
Florida International University.

**Outstanding Chapter Activity** - Marquette University

**Most Active Chapter** – Florida International University

**Best Community Service Award** - Marquette University



Sarah Schmiedel Receiving the Outstanding Chapter Activity Award from Drs. Eric Gilbeau and Anthony McGoron. Marquette also received Best Community Service Award

In addition, the Alpha Eta Mu Beta Outstanding Dedication and Service Award, a highly respect and selective award was presented to Charla Triplett and to Ms. Debra Tucker. Charla had served as the interim Executive Director of AEMB during Pat's sudden demise and was instrumental in the administrative duties of the society up until a new executive director had been identified. Debra Tucker is the current meetings director for BMES and has been a significant help over these past few years in assisting AEMB with various conference needs to enable smooth and well planned AEMB Sessions.

AEMB was very pleased to awarded 7 travel awards this year to the following students; Laura Reese (Clemson University), Katharine Hamlington (Tulane University), James Pastranak (Purdue University), Sarah Schmiedel (Marquette University), Rupak Dua (Florida International University), Mary Clare McCorry (Worcester Polytechnic Institute) and Melissa White (University of Miami). These travel awards were made possible through the very generous donation from Pat and Ken Horner in establishing the Pat Horner AEMB Memorial Travel Fund.

The annual ethic session this year was presented by Dr. David Smith, the Director of the Center for Ethics at Yale University. This session provided attendees with a framework that focused on understanding how ethics drives the field of biomedical engineering, and its impact on human dynamics in academics, industry and society as a whole. The goal of the session was to also examine the role of professional humility and its influence on creating engineers who understand contemporary challenges, recognize limitations in the field, and who listen and respect the contributions of others. In addition, Alpha Eta Mu Beta also hosted a special session that examined challenges of food security in sub-Saharan Africa. Chaired by Dr. Jerry Collins and Dr. Lamin Kassama, a professor in food science from Alabama A&M, the session highlighted the key shortages of food in the horn of Africa, its causes and possible solutions. The last session was a joint session with AIMBE on public policy and how it affects funding for research in biomedical engineering. This session was hosted by Jennifer Ayes, the President of AIMBE and Dr. Terri Murray in which several key leaders in the fields of

academia and research present on selected topics and formed a collective panel. All of the sessions were very well attended and overall the 2012 BMES conference was a great experience. AEMB is looking forward to the 2012 BMES conference in Atlanta Georgia.

*Please remember to check our website for the list of events and upcoming information.*



Rupak Dua of Florida International University receiving the Outstanding Chapter Officer Award from Drs Eric Gilbeau and Anthony McGoron.



Dr. Marcia Pool being presented with the Patricia I. Horner Outstanding chapter advisor award by Drs Eric Gilbeau and Anthony McGoron.



Dr. Lamin Kassama answers questions during the AEMB Special Session on food security in the horn of Africa.

## A HUGE THANK YOU TO OUR SPONSORS

AEMB would like to acknowledge Patricia and Ken Horner for their generous efforts in establishing the *Patricia I. Horner Memorial Fund* for student travel awards. Through their generosity, AEMB is able to provide travel awards to students to attend the Annual AEMB meeting and BMES conference.

AEMB would also like to acknowledge the generous donors who made the 2011 Annual AEMB Luncheon possible. These donors have requested to remain anonymous.

Lastly, AEMB would also like to acknowledge the kind donors who make possible the Annual AEMB National Awards. These donors have requested to remain anonymous.

*Thank You*



# Just for Fun

*On the wall of Jimmy Johns® (16<sup>th</sup> and Wells Street), the following was seen and promptly written on a fresh Jimmy Johns® Napkin to be transcribed and placed in this newsletter.*

**Rule 1 :** Life is not fair – get used to it!

**Rule 2 :** The world won't care about your self-esteem. The world will expect you to accomplish something BEFORE you feel good about yourself.

**Rule 3 :** You will NOT make \$60,000 a year right out of high school. You won't be a vice-president with a car phone until you earn both.

**Rule 4 :** If you think your teacher is tough, wait till you get a boss.

**Rule 5 :** Flipping burgers is not beneath your dignity. Your Grandparents had a different word for burger flipping: they called it opportunity.

**Rule 6 :** If you mess up, it's not your parents' fault, so don't whine about your mistakes, learn from them.

**Rule 7 :** Before you were born, your parents weren't as boring as they are now. They got that way from paying your bills, cleaning your clothes and listening to you talk about how cool you thought you were. So before you save the rain forest from the parasites of your parent's generation, try delousing the closet in your own room.

**Rule 8 :** Your school may have done away with winners and losers, but life HAS NOT. In some schools, they have abolished failing grades and they'll give you as MANY TIMES as you want to get the right answer. This doesn't bear the slightest resemblance to ANYTHING in real life.

**Rule 9:** Life is not divided into semesters. You don't get summers off and very few employers are interested in helping you FIND YOURSELF. Do that on your own time.

**Rule 10 :** Television is NOT real life. In real life people actually have to leave the coffee shop and go to jobs.

**Rule 11 :** Be nice to nerds. Chances are you'll end up working for one ☺



*Would you like to contribute an article to any of our sections?*

Please feel free to contact the Editor-in-Chief  
Dr. Dominic E. Nathan via email  
[dominic.nathan@mu.edu](mailto:dominic.nathan@mu.edu)

We are always looking for articles for each of the focus columns and also the main content.



**Do you have a question or concern about AEMB?**

Please feel free to contact the National Student President Dr. Dominic E. Nathan via email

[dominic.nathan@mu.edu](mailto:dominic.nathan@mu.edu)

Our response is a promise.

**REMEMBER  
TO  
CHECK THE  
WEBSITE !**

Please remember to check the national website  
[www.alphaetamubeta.org](http://www.alphaetamubeta.org)

for important information relating to award applications, upcoming AEMB Events and other important topics.