



# Biomedical Engineering Division

Spring 2013

## What is a Biomedical Engineer?

Contributed by Conrad M. Zapanta

*BED 2012-2013 Division Chair*



Over the years, many of us have had the following conversation:

Person: What is a biomedical engineer?

Me: A biomedical engineer is someone who uses engineering tools to solve problems in biology and medicine.

Person: Then what makes you different from biologists and physicians?

I used to respond with a long dissertation on how we use principles like solid mechanics, thermodynamics, circuit analysis, materials testing, etc. to solve various biomedical problems. However, I've recently started to give a shorter answer:

Me: We're **engineers**.

This is the word that we often forget. As BME educators, we clearly recognize the need to educate our students about medicine and the life sciences. The catch is that we need to do this without sacrificing the courses that make us **engineers**.

The amount and type of engineering courses will depend on the constituents of our individual programs. Some departments emphasize the biological applications, while others concentrate on the medical

*Chair continued on page 2*

## When am I ever going to use this....

Contributed by Daniel P. Cavanagh

*2008 Theo C. Pilkington Outstanding Educator*

How many times have we heard our students exclaim this when learning a new challenging concept or attempting to solve a complicated, detailed problem? While many of us might not want to admit it, we sometimes get overly focused on the material we are teaching to our students and not on helping them see why they should learn it. Or we may believe we are doing enough to motivate them. Or we may believe that they should just want to learn it. Additionally, remembering that we each are typically passionate about one or two technical areas yet the students are learning material in two, three or even four areas at one time is challenging as well. All of these thoughts are not surprising as many if not all of us believe that being technically credible must come first in an engineering education. Finding ways to motivate our students to see the bigger 'application' picture can be a daunting task when teaching 20, 60, or even 150 students in class that does not have a laboratory or hands-on component. So, what can we do?

In my fourteen years at Bucknell, I have sought to find as many ways as possible to motivate the students in my classes. I have utilized a range of methods including bringing guest speakers into my classes, introducing hands-on, in-class activities to reinforce concepts, permitting students to select topics for semester-long projects to enhance buy-in, and others. Many of my approaches to motivating my students in my classes are taken from current education literature, ideas from colleagues, topics presented at meetings, and some that are simply thought up on my own. The success of each approach can vary year to year depending upon many factors such as the 'personality' of the class, the quality of a guest speaker, or even the time of day the class is offered. Overall, many documented ways exist to motivate our students within our classrooms. What about outside the classroom?

*Use This continued on page 3*

## ASEE BED Officers 2012-2013

**PAST CHAIR:** Timothy E. Allen, Biomedical Engineering Department, University of Virginia, Box 800759, Health System, Charlottesville, VA 22908, 434-982-6751, teallen@virginia.edu

**CHAIR:** Conrad M. Zapanta, Department of Biomedical Engineering, Carnegie Mellon University, 5000 Forbes Ave, DH 2100, Pittsburgh, PA 15213, 412-268-9061, czapanta@cmu.edu

**CHAIR-ELECT and PROGRAM CHAIR:** J. Aura Gimm, AAAS Science and Technology Policy Fellow, Basic Research Office, Office of Assistant Secretary of Defense for Research & Engineering, Department of Defense. 571.372.6475, aura.gimm@gmail.com

**PROGRAM CHAIR-ELECT:** Joe Tranquillo, Department of Biomedical Engineering, Bucknell University, Dana Engineering 306, Lewisburg, PA 17837, 570-577-1785, jvt002@bucknell.edu

**SECRETARY-TREASURER:** Judy L. Cezeaux, Department of Biomedical Engineering, Western New England University, 1215 Wilbraham Road, Box S-5004, Springfield, MA 01119, 413-782-1618, jcezeaux@wne.edu

**AWARDS CHAIR:** Richard Goldberg, Department of Biomedical Engineering, University of North Carolina at Chapel Hill, CB 7575, Chapel Hill, NC 27599, r.goldberg@unc.edu

**MEMBER-AT-LARGE:** Naomi C. Chesler, Department of Biomedical Engineering, University of Wisconsin, Madison, 1550 Engr. Drive, 2146 ECB, Madison, WI 53706, 608-265-8920, chasler@engr.wisc.edu

**MEMBER-AT-LARGE:** Michael J. Rust, Department of Biomedical Engineering, Western New England University, 216A Sleith, Springfield, MA 01119, 413-782-1491, mrust@wne.edu

**MEMBER-AT-LARGE:** William H. Guilford, Department of Biomedical Engineering, University of Virginia, Box 800759, Charlottesville, VA 22908, 434-243-2740, guilford@virginia.edu

*Chair continued from page 1*

applications. These different applications and approaches have led to lively discussions among colleagues and institutions that try to define what a biomedical engineering curriculum should be. Some schools have pushed strongly for more cell biology classes for all biomedical engineering students, while others push for more bioinstrumentation and quality assurance training.

So who is right? The answer is "everyone." Just as each engineering problem is unique, so is each biomedical engineer. Each institution should be given the flexibility to decide what they want to teach their engineering students (regardless of what their peer institutions say) and therefore define the type of biomedical engineers they produce. The type of engineering skills required to solve specific problems are very dependent on the application, so we then must resist the temptation to teach each biomedical engineering student identically. We must instead educate our students as **engineers** first, and then provide them with enough background in the life sciences so that they will be able to acquire the required knowledge that they need to solve a specific biomedical problem.

For those of you who have read my diatribes over the last year, this will be my last article as the chair of the Biomedical Engineering Division. It has been an honor and privilege to work with you. I look forward to remaining an active member in BED for the years to come.

## ASEE BED Sessions

### M510·"Best" of BED

Mon. June 24, 2013 2:15 PM to 3:45 PM  
Omni CNN Center Hotel, Omni - Chestnut

### M610·Tour of Georgia Technical University's Biomedical Engineering (BME)

Mon. June 24, 2013 4:30 PM to 6:00 PM  
Omni CNN Center Hotel, Omni - Chestnut

### M710·BED Awards Dinner

Mon. June 24, 2013 7:00 PM to 9:00 PM  
Stats Restaurant, 300 Marietta Street NW Atlanta, GA 30313 404.885.1472

### T410·Biomedical Engineering Poster Session

Tue. June 25, 2013 12:30 PM to 2:00 PM  
Georgia World Congress Center, Exhibit Hall A1

### T610·BED Elections and Business Meeting

Tue. June 25, 2013 4:00 PM to 5:30 PM  
Georgia World Congress Center, A308 B

## BED Georgia Tech Tour/Reception

The Coulter Department of Biomedical Engineering at Georgia Tech and Emory cordially invites members of the Biomedical Engineering Division ASEE members to a reception Monday, June 24th, 4:40-6:00pm. We will take a brief walking tour through some of the instructional facilities that support our problem-driven learning curricular innovations. Transportation will be provided. Transportation limits the attendance to 33 participants. To reserve your space, please RSVP by June 20th to [nydia.akins@bme.gatech.edu](mailto:nydia.akins@bme.gatech.edu). Put "ASEE2113- BED reception" in the subject line

Aura Gimm  
ASEE-BED Program Chair 2013

As individual faculty, we generally focus our energies on motivating the students in our classes. As a department chair, I have come to see the significant benefits that can come from dedicating time and resources to finding ways to engage, motivate, and inspire our students outside the classroom. As many of us understand the powerful effect involvement in faculty directed research can have on an undergraduate, I will not focus on that here. My focus, instead, is on the wide range of other activities that can have a profound effect on students. Below are some examples of outside of class motivating experiences:

- **Clinical Visits & Field Trips:** With the ultimate goal of our field being a positive impact on patient health, exposing our students to the ends users of medical technology is the ultimate answer to the “Why do I need to know this?” question. Seeing a patient being kept alive by a pacemaker provides great motivation for an instrumentation class. Seeing this early in their undergraduate careers can have a significant impact on a student.
- **BMES Chapter or Student Managed Seminar Series:** While we all enjoy inviting fellow colleagues to visit as guest speakers, I have seen that students frequently better engage guest speakers with whom they had a role in identifying and inviting. Involving the students offloads much of the work as well as ensures that the students will be interested in the speaker. Offering opportunities for limited numbers of students to have lunch with the speaker is highly effective as well.
- **Attendance at National Meetings:** As few, if any, BME programs are able to expose students to the entire array of sub-disciplines within BME, supporting the attendance of undergraduates at meetings, such as the annual BMES meeting, can leave a significant mark on many students. Working with students to solicit funds from societies sponsoring the meeting, our schools of engineering, administrative offices, student governments, etc., can reduce the financial impact at the departmental level.
- **Departmental Sponsored Social Activities:** When is the last time many of us sat down with an undergraduate student and just chatted about the student’s interests and aspirations? At a department cookout, lunch, or other event, we are better able to engage our students on these issues and provide our perspectives. When outside the classroom and away from graded activities, students are much more inclined to ask questions such as “Why do we need to take so much chemistry?” or “Do I really need to understand circuits for a career in cardiology?”

In thinking about these types of efforts, you might react with questions such as:

- Why should we invest our time and departmental resources in these types of activities?
- How can we realistically do these activities for the large numbers of students in our department?
- What are the benefits to an individual faculty member for being involved?

The generic answer to all of these questions is that through a series of department supported activities that impact most of our students at some point in their undergraduate career, we can have students in our classes who are more engaged, more invested in their work, and have clearer ideas on potential post-graduation pathways. These students are likely to be better research students, more intrinsically motivated, more active in their own education, and have an enhanced positive attitude about their faculty and department.

Many of our students enter into the biomedical engineering field because they are attracted to the opportunity to use engineering and scientific principles to improve patient care and health. As many students sometimes never see the connection of their studies to patient care until senior design, any expectation of ours that they see the bigger, application picture is unrealistic. Working as individual faculty and departments to provide effective motivating experiences outside the graded classroom will only serve to enhance the learning and teaching environments in our classrooms.

## Newsletter

Please submit suggestions or submissions for the ASEE Biomedical Engineering Division newsletter via e-mail to Joe Tranquillo at [jvt002@bucknell.edu](mailto:jvt002@bucknell.edu). Thanks to everyone who contributed to this issue.

## Request for Program Evaluators

Dear fellow members of the ASEE BED,

I believe many of you have seen our requests that you consider applying to become ABET program evaluators (PEVs). We are making this request through the ASEE because you know the importance of engineering education and the importance of ABET accreditation. We are also making this request because the number of ABET accredited bioengineering, biomedical engineering programs and biomedical engineering technology programs continues to grow. This fall, we will need 25 PEVs for accreditation visits and next year we will likely need more. Conflicts of interest (once a PEV visits a program, he/she cannot visit that program again), retirements, and date conflicts are restricting whom we can assign to visit a given program. That is why we are asking for you to consider becoming an ABET PEV.

In the ABET process, BMES is the lead society for “Bioengineering and Biomedical Engineering and Similarly Named Engineering Programs.” Cooperating societies include the American Ceramic Society, American Institute of Chemical Engineers, American Society of Agricultural and Biological Engineers, American Society of Mechanical Engineers, and the Institute of Electrical and Electronics Engineers. The ABET PEV application process requires all PEVs first apply on the ABET web page (<http://www.abet.org/apply-to-become-pev>). PEV qualifications for BMES are comparable to those of other lead societies. They include membership in BMES or one of the cooperating societies, a minimum of ten (10) years of academic, business, or government experience in engineering or engineering technology, appropriate technical competence, both analytical ability and communication skills, and a formal education to the MS or the Ph.D. level. I encourage you to review the materials that describe the responsibilities of a PEV (<http://www.abet.org/program-evaluators>).

All application must be submitted by December 31<sup>st</sup> in a given year. We set that deadline because the BMES Accreditation Activities Committee meets in early January and ABET requires PEV candidate names by mid February. After we have reviewed and approved applications, ABET schedules training. Once you have completed the ABET training, ABET will allow us to assign you for visits.

Please consider the opportunity to become a PEV. If you have questions, please feel free to contact me at [gassert@msoe.edu](mailto:gassert@msoe.edu) or (414)277-7167.

Thank you for your consideration,

John D Gassert, Ph.D., P.E.  
ASEE and BED Member  
ASEE BED Chair, 2001-2002  
BMES Accreditation Activities Committee Chair

### BED Officer Nominations

The BED Nominating Committee is currently seeking nominations for the 2013-2014 division officers, which will be voted on by the members present at the BED Elections and Business Meeting at 4:00pm on Tuesday, June 25, 2013. Specifically, we are interested in nominations for Program Chair-Elect and Member-at-Large.

The Program Chair-Elect is a four-year term of leadership within the division, and the Member-at-Large serves a three-year term on the BED Executive Committee. Please send nominations to Timothy Allen ([teallen@virginia.edu](mailto:teallen@virginia.edu)) by Thursday, June 20, 2013.