Blood tests are a common experience in the medical field. These tests provide doctors with a wide variety of information, ranging from things like blood cholesterol and glucose, to whether or not we have are positive for diseases like Hepatitis. However, blood tests face quite a few of restrictions. All of those tests require quite a bit of blood and take quite some time to complete. That waiting time could be crucial. For example, if you were testing someone to see if they needed antibiotics, you wouldn’t want to wait a few days. That could mean the difference between the patient living and dying.

A company named Theranos has developed a way to take lab testing to the next level with significantly less blood. How much less? Theranos needs only 1/1000 the size of your typical blood draw. In real life, that means whereas you used to need maybe 3 test tubes to hold all the blood, Theranos needs a 1.29cm tall container. That’s it. Patients who cannot withstand large blood draws, such as those who suffer from anemia or other conditions, patients with elusive veins, no longer need to deal with large and unwieldy blood draws. In addition, they can do the tests much faster, getting results in hours instead of days, while still having incredible accuracy. The types of
blood tests that Theranos offers are as numerous and varied as they come. The range from simple things, like glucose, to the complex, like a Respiratory Virus panel for 12-25 targets, to the specific enzymes like Alanine Aminotransferase and Cholinesterase. All of this means more and better tests, and most importantly of all, more information for your doctors and health care specialists to make the informed decisions they need to help you. In addition, Theranos’s technology improves patient compliance, by making the lab tests easier and more accessible and allows more customized health care that the doctor can prescribe.

Theranos is also determined to change the way lab testing is done by opening its new wellness centers. Theranos hopes to bring the lab testing experience closer to the patients, and so they are opening these centers in stores like Walgreens. Theranos hopes to use these to help streamline the patient testing experience. The doctor would simply send in an order, and you would just go in whenever you are free, get a tiny amount of blood drawn, and be on your way. Their process is designed to integrate seamlessly into the usual practices of medical practitioners.

The work Theranos is doing is highly promising and is an exciting step in improving our daily lives. Their work is an excellent example of our goals as Biomedical Engineers: to bridge the gap between engineering and medicine, bringing new technology to improve the lives of people everywhere.

**INTERVIEW: ELENA FOSTER**  
**BY: DAICY**

Have you ever wanted to learn more about the TA’s from your courses? Ever wonder about the person behind that red check mark on your homework assignment or -10 points on your midterm or occasional 100/100 on the front cover of quizzes? What about the person you’ve been bombarding with questions and regrades at office hours weekly? In this edition of the BMESsenger, we interviewed Elena Foster who has TA-ed for several upper division Biomedical Engineering courses since her start of graduate school here at Davis!

Q: Name, Hometown, where you got your undergraduate degree, major?

A: Elena Foster. Chisinau, Moldova. Undergraduate degree from UC Davis in Biomedical Engineering.
Q: Why did you choose Davis for graduate school? Emphasis? Year you are in graduate school?

A: I am a second year Master's student with an emphasis in cellular and molecular systems. I chose UC Davis because I really liked the department and I wanted to continue my research here as a graduate student.

Q: What courses have you TA-ed for?

A: I have TA-ed for BIM109, BIM 102, BIM 106 and BIM 162.

Q: So far, which course have you enjoyed most as a TA and why?

A: So far I've really enjoyed TA-ing for BIM 109, Introduction to Biomaterials. I like the interdisciplinary nature of the material that we cover and the breadth of topics. I also had a chance to give a few exam reviews and discussions in this class, and I enjoyed the hands-on work with my students.

Q: How do you balance studies, "TA-ing", work, research, and extracurricular activities?

A: I'm still working on my balancing skills. I think you just have to accept that some quarters will be classwork heavy, and during some others you'll have to dedicate a lot of time to TA-ing, and finally some will be more free for intensive research. I try to set realistic priorities in every type of work and accomplish those first.

Q: Most important thing you learned from your undergraduate experience that helped you for graduate school?

A: The most important thing for me was learning how to learn, because, I think, as engineers and scientists in general this is what we have to do from now on, continuously. This is the most valuable skill my instructors and my peers taught me, each one in their own way. In graduate school it is immensely useful to know how to find reliable information fast, how much of it, how detailed you need it to be, and how to retain the essentials - these are skills you learn and practice during your time as an undergraduate.

Q: How are you enjoying your experience and any general advice you would like to give?

A: I really enjoy being a graduate student in our department. We have a network of extraordinary faculty and an awesome graduate student organization. Combining this with the ability and resources needed to do exciting research make it a great experience. My only advice would be to really take your time learning everything you can during your undergraduate education. After graduation there is never again the luxury of so much time dedicated to studying so many diverse topics at a reasonable depth. I strongly believe that everything you learn makes you better at anything else you chose to do.
On April 10th, the faculty seminar series featured Dr. Aijun Wang, an assistant professor of surgery and Co-Director of the Surgical Bioengineering Laboratory at the UC Davis School of Medicine. The goal of Dr. Wang’s lab is to combine the intensive fields of bioengineering and surgery in order to design innovative treatments, especially in the field of tissue regeneration. The topic of the seminar was his current research in designing a treatment for spina bifida. Spina bifida is a congenital disorder (a condition that occurs before birth) in which the neural tube of the fetus doesn’t completely close, leaving the unfused portion of the spinal column exposed. This birth defect is usually nonlethal, but results in permanent, lifelong disabilities such as paralysis, incontinence, and cognitive defects. While postnatal surgery has been the traditional way to address birth defects, in recent decades fetal surgery has been shown to have potentially better outcomes.

Dr. Wang’s research focused on combining bioengineering techniques with surgical procedures in order to find a novel treatment for spina bifida, using sheep fetuses as a model. His initial approach was a biomaterials-oriented method, which involved surgically placing a drug-delivering scaffold in the lesion site of the fetus’s spine. This technique was unsuccessful, however, and the lambs remained paralyzed after birth, so Dr. Wang turned to stem cells as a possible solution. His research eventually led him to use multipotent placental stem cells, for their many potential cell lineages and for their ability to secrete high levels of factors needed for tissue regeneration. He set up an experiment that involved two twin lambs, in which one received only a matrix and its twin received a matrix plus stem cells. To the astonishment of the researchers, when the lambs were born, the second was able to walk! The lamb that had received the stem cells had a dramatic recovery and had almost total motor control. Given these exciting results, it seems that Dr. Wang and his team have made a crucial step forward in the field of fetal surgery.

The material presented in the seminar was not only fascinating, but also indicative of how cross-disciplinary approaches to problems can lead to innovative treatments.
INDUSTRY SPOTLIGHT: NUVASIVE
BY: JASMINE

In alternative to the significant research positions a Biomedical Engineering field can offer, there are numerous industry opportunities in the BME field as well. Here is a preview of a company named, NuVasive, whose primarily focus is developing medical devices for the spine. From their website, their numbers show excellent progression, since their start-up in 1999, for being the “third-largest spine company in the U.S., and the fourth-largest globally... with corporate headquarters in San Diego, California and additional offices are in Memphis, Tennessee and Paramus, New Jersey; as well as Puerto Rico, the United Kingdom, Germany, Italy, Australia, Singapore, Malaysia, and Japan.”

As many know, surgical repairs dealing with the spine can become a risky procedure due to the possible effects of infection or nerve damage which may then lead to paralysis.

Hence, NuVasive saw this demand for non-invasive medical equipments and aimed to develop surgical equipment and procedures that gave fewer abrasive effects after spinal surgery has been performed. They call this approach, Minimally Invasive Surgery (MIS), which can reduce traditional and traumatic incisions of 4-6 inches to a mere couple of inches with the technology and procedures they have developed. By achieving this mission, patients have less recovery time and may even walk the same day after surgery.

Visit their website at www.nuvasive.com if you are interested in working with the spine, in medical devices in general, or would just like to add NuVasive to your BME Industry Companies list!

THE 2014 – 2015 BMES OFFICERS
BY: NATALYA

The daring duo coming at you again with a fantastic, informative, and quirky article! On May 9th, the club elected our new officers for the 2014-2015 school year; we’ve reached out to them and asked them a few questions so you can get to know them!

Rose Hong Truong (President) - Such President, Much Power, So Influence, Wow. Doge Approved!

1) Third year, specializing in Cell and Tissue. Microsoft Power Point has a default office color pallet; my favorite pastel color is the green from that pallet. Although I would not complain if I saw toppings, I’m a Plain Jane and I love my ice cream best when there isn’t anything on it.
Random fact: I learned a lot about doing the right thing and caring for others from my favorite super hero, Captain America. More random facts: I tend to claim that I have the two best, most beautiful cats, Bernoulli and Feynman.

2) As president I am in charge of directing the Society’s day-to-day and long-term activities. My goals and vision for the club is to provide our members with resources that will help them succeed in their academic and professional career.

3) I am proud to be a BME, especially a BME at UC Davis, because (1) our biomedical engineering community here in Davis is exceptional, and (2) we are engineers for health and medicine. Every year I meet more and more BME's (students, staff, faculty) that inspire me with their hard work, leadership, and devotion to this field. I'm also proud to be a BME because our inherent goal is to contribute to society by working to advance human health and well being. With that one goal in mind, we can do this in a broad way that utilizes many different sets of skills with focuses on biology, or chemistry, or computer analysis, etc.

David Gomez (Vice President - Industry) - El Guapo Commandante de Industria, y El Destructor de Cacahuetes

1. Hello, my name is David Gomez, and I am a third year with a dual focus in bio-mechanics and medical devices. My favorite pastel color is Sea Mint. I don't like peanuts on my ice cream because I'm allergic to them. It's not very random to the people that know me but I'm interested in music and I write music when I have the time. I guess a more random interest is that I used to play Dungeons and Dragons; I was an illiterate, Half-Orc Barbarian woman named Bouldina.

2. As Vice President of Industry all I want to do is make sure our members are prepared to find a job. I will work tirelessly to make sure this happens.

3. I'm proud to be a biomedical engineer because there is an inherently selfless component to everything we do. When we learn, when we toil, and when we build, we do it because we know there is a patient on the other side. Talk to anyone within our major (faculty included) and you'll immediately notice the passion that extends beyond just the field of engineering.

Natalya Shelby (Vice President - Outreach) - Spelunker Extraordinaire, Bajelle Connoisseur

1) My favorite pastel color is pastel gold, my least favorite ice cream toppings are anchovies and onions, and when I’m not tirelessly studying or working for the greater BMES good I enjoy spear fishing and inventing sandwiches.

2) This coming year I will be your Vice President of Outreach, connecting with the community outside of campus and coordinating events wherein we can tell them a little bit about what we do as BMEs and to try and enrich their lives in some way. I already have plenty of schemes for what we can do next year, so be sure to stay tuned and sign up for events!
3) My reasons for being proud to be a BME are more numerous than the sands in the sea, so I will keep it short: what everyone else said, but ESPECIALLY what Philip said.

Kenneth Chang (Treasurer) - Master Chef Kenny (Because He Knows How to ‘Cook the Books’)

1) Currently a second year specializing in Medical Devices. My favorite pastel color is Pastel Red, although I like neon colors more. Least favorite ice cream topping would be anything syrupy, as I generally find that those things make it too sweet. I am a fan of chess, although I haven’t played in awhile, so I’m pretty sure my skill has degraded horribly.

2) I am the new Treasurer, which means that I am in charge of managing all the money in our club, and making sure it gets used on things that are beneficial to our members. I am super excited for this job, and I also plan on helping develop more interactive and competition-like events.

3) I am proud to be a BME, as it allows me to combine my own interests with the ability to change the lives of people everywhere. I am always looking for ways to help improve the world we live in, and I believe that as a BME I can do exactly that.

Gabriel Jagoe-Seidl (Student Affairs) - Mr. Suit and Tie, The Aggie Gentleman

1. Hello all, My name is Gabriel Jagoe-Seidl and I am a second year Biomedical Engineer specializing on the cellular and tissue track. My favorite pastel color is capri. I dislike gummi bears on my ice cream because they solidify and disrupt the chocolate ice cream flavors that I typically enjoy. I really love camping and hiking and when I have a free weekend I like to do things with outdoor adventures. At some point after college I want to get my pilots license and soar a bit. I also plan on getting a REAL bike, a bike with a bit of speed.

2. I have been elected to be the Student Affairs Officer for the 2014-15 school year. As officer of student affairs, I will be an integral part of the BMES mentor-mentee program here at UC Davis. I will try my best to ensure that everybody who wants a mentor will find one who can guide them in the right direction. There will be several events that I will run that will serve to bring mentors and mentees closer together both socially and professionally.

3. I am proud to be a BME at UC Davis because we work on the forefront of science and medicine. Because of where we work, we have a huge impact on peoples lives. We are the medicine of the future, and we take problems that ail todays patients and solve them so that people can live without worry or fear of their own health and wellbeing.

Philip Domondon (Fearless Editor-in-Chief) - Advocate for Truth and Justice, Voice of the People

1. Hi guys, I am currently a 3rd year BME student specializing in Systems & Synthetic Biology. I am a fan of Pastel Orange, my least favorite ice cream topping is probably Caramel syrup (too much for me, lol), and I'm a big Photography nerd!
2. As Editor-in-Chief, I am in charge of collaborating with student writers to produce one of our club's important cornerstones: the one and only BMESsenger newsletter. I have a vision of reaching out and sharing the legacy our club leaves behind and thus showing the reader why our club provides the best undergraduate experience for its members. Lastly, I want to show our club members that anyone can be an exceptional writer; anyone can make a difference through their contribution to our newsletter.

3. I am very proud to be a biomedical engineering student, especially now that it is through our generation we will be pioneering the direction of this industry. I have always had the mind of an engineer and to be able to apply it towards the greater good of human health makes me confident there is a difference to be made. Whatever I sow will be reaped tenfold by the BME community, hopefully leaving the world a better place long after i'm gone. The real question is how can I not be proud to be a BME?

Jackie Lim (Secretary) - The Azure Lily of the Bleak Garden that is Life, The Voice of Reason in the Darkness

1. Hello! My name is Jackie Lim, and I am a third year pre-med specialization. My favorite color is pastel yellow because it's happy yet calming. I don't like gummies as an ice cream topping because they become too hard to chew. I really like dogs and capturing memories through photos.

2. I am super excited about serving as your secretary next year! I'll be taking detailed minutes at officer meetings and sending out timely to-do lists. I am also looking forward to leading more hands-on events in the upcoming year.

3. BME has so much potential in improving the lives of so many people. It's really awesome that we can bridge the gap between engineering and medicine. We can truly change lives, one step at a time!

Nazia Podana (EJC Representative) - The Unwavering Bridge of Communication Between Our Awesome Club and All the Other Lowly Engineering Clubs Who Can’t Even Hold a Candle to Our Greatness

1. 2nd year, specializing in Cell and Tissue. To be honest I don't know much about all the different pastel colors. But my favorite color is orange. So any shade of orange (in pastel color form) is nice. Editor’s note: I guess she doesn’t like ice cream altogether.

2. I'm the new EJC officer, the engineering joint committee officer. I'll be helping out with the club's events, while simultaneously attending biweekly EJC general meetings and planning our annual event in E-Week.

3. Definitely working alongside other compatible BME students. All the students here are amazing, and I am really happy that I get to meet many other diverse students here.
Anthony Leung (EJC Representative) - Bridge Number Two.

1. Anthony Leung, Second Year, Medical Imaging, Dark Pastel Blue is my favorite pastel color because it's the only one that I could find that interested me when I Googled "pastel colors", I don’t really have a least favorite ice cream topping. Toppings add variety to simple flavors., I'm a big gamer, not in the sense that I'm necessarily good, but that I play a lot of video games. Trading card games are also another interest of mine. They bring very diverse people together and that's what makes it fun.

2. As one of the EJC Representatives, I will be representing BMES at meetings where I can relay information between our club and the university. My goal is to make sure that not only I'm on top of everything happening with EJC, but that everyone will be on the same page and the representatives in order to do out best at their events.

3. I'm proud to be a BME because it combines all the realms that I enjoy to learn about and apply. It's nice being part of a relatively new field, able to watch it grow and thrive. The people in the major are amazing and they push me to be the best I can be.

Kevin Hong (Events Officer) - Glue that Holds the Lego Universe Together

1. Sophomore (Class of 2017), pastel blue, sprinkles. I enjoy writing poetry and performing spoken word, and one of my life goals is to serve in the Peace Corps!

2. As one of the events officers, I’ll be coordinating events with faculty, organizing events throughout the year, including Lunches with Faculty, Relay for Life, Quarterly Symposiums, Picnic Day Committee, etc. My goal is to create a vibrant social atmosphere that will link members to resources they need!

3. BME has so much potential in the years to come. I like knowing that it’s a space that I can pour my creativity into! I look forward to working with all the innovative minds that will challenge me to think critically about changing the world.

Aaron Kho (Events Officer) - Also Glue

1. Hi! I am currently a 2nd year specializing in Imaging. My favorite pastel color is Deep Sky Blue. My least favorite ice cream topping would be gummy worms because they get too hard to eat when they get cold. One of my hobbies that I have back home would be keeping planted aquarium tanks. I really enjoy aquascaping and trying to recreate nature in my tanks.

2. As one of the events officers, I will be organizing a lot of events including Lunch with Faculty, Quarterly Symposia, and conferences. One of my main goals for the next school year would be getting our members to talk to people in their grade that they haven't met before and make new friends that they will probably see in future classes.

3. I am proud to be a BME at UC Davis because we are known as one of the best imaging schools in the nation. The research going on at UC Davis by our professors is very innovative and truly fascinating. Some of the research going on are so clever that I would have never
thought it was possible to do some of those things.

**Anthony Sorbera (Historian) - Camera-wielding Chronicler of Club Events**

1. Musculoskeletal Biomechanics and Pre-Med (honestly not sure what I’m doing yet), Antique Ruby, fruity pebbles after 2 minutes (they get soggy), I love cooking and I am applying to be certified as a personal trainer this summer.

2. As historian I will taking pictures of all of the events and making everyone look good. Pictures will be on Facebook and available to the newsletter editors for use in their articles. I also hope to host my own event, similar to the suture lab but I really want to incorporate robotic surgery or laparoscopy.

3. Why wouldn’t I be proud to be a BME? We are among the academically hardest working and most driven students on campus and the opportunities being a BME presents are amazing. From REGROWING BONES (that’s Harry Potter stuff!) to developing prosthetics, everything we do is awesome.

**Htet Ma (Social Media Chair) - The Better-Looking Zuckerberg of UCD**

1. I am Htet Ma, currently a sophomore hoping to specialize in Pre-Med. Lavender and pastel green are really pretty to me. My least favorite ice cream topping are gummy worms and gummy bears. They are too sweet! Recently, I tried eating ramen in different ways instead of just with broth.

2. As social media chair next year, I am in charge of updating BMES website, Smartsite, Facebook, Twitter – basically all social networking sites. I will also be informing members, students, faculty, and staff about our events. Overall, I want to show our campus about the events we’ll hold and the memories we’ll make, and the things we’ll learn.

3. We learned a variety of topics and disciplines that other majors do not cover. I feel like we have the best of both worlds: engineering and biological science

**Janak Jobanputra (Graphic Designer) - Great Wizard of Colors and Shapes**

1. 2nd year right now, 3rd year next year. Favorite color is BLUE. My least favorite ice cream topping is NONE. Random interests - I love photography, playing and watching sports, watching movies, and hanging out with friends.

2. I will be in charge of designing and working with all of the graphics in BMES. This includes designing the T-shirt, logos, any and all fliers, etc.

3. I am proud to be a BME because it is one of the only fields where you have to be good at everything to do well!
LAST WORDS 
BY: CHRISTIAN

Hi guys,

It’s been a fruitful year for the BMESSENGER. There have been plenty of new articles that have been born from this year’s committee, and there continues to be growth. This is my last newsletter as this year’s Editor-In-Chief, as evidenced by the previous article. I’ve been with this committee since its inception in 2011, and it’s been an ineffable experience: to start with nothing and to see, 3 years down the line, your newsletter being used to recruit new, starry-eyed BMEs. I cannot seem to let this committee go, so I will be a writer and advisor to the new Editor-In-Chief, Philip Domondon.

My plan for this year was to expand the types of articles that our committee did to further reach the entirety of both the BME world and of our modest UC Davis community. There are now regular articles for seminars and BME industry, in addition to the tried and true interviews. The actual writing and research was done by my very committee, whose dedication to the BMESSENGER I cannot express in such a small paragraph like this. My writers are the ones who deserve the most credit in this committee, for their writing is the lifeblood of the newsletter; I am a mere organizer. I hope that they will return to the committee to continue writing not only for the Editor-In-Chief, but for the BME department and the future of hopeful BMEs who will grace UC Davis with their intelligence and presence in due time.

Good luck on finals everyone.

THE BMESSENGER STAFF

<table>
<thead>
<tr>
<th>EDITOR IN CHIEF</th>
<th>DESIGNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHRISTIAN PASCUAL</td>
<td>EDITH KARUNA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMMITTEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KENNETH CHANG</td>
</tr>
<tr>
<td>DAICY LUO</td>
</tr>
<tr>
<td>LIZA NGUYEN</td>
</tr>
<tr>
<td>NATALYA SHELBY</td>
</tr>
</tbody>
</table>

| HYUN LEE |
| JONATHEN CHEN |

Thank you for reading! We’ll see you in the Spring 2014 Edition!