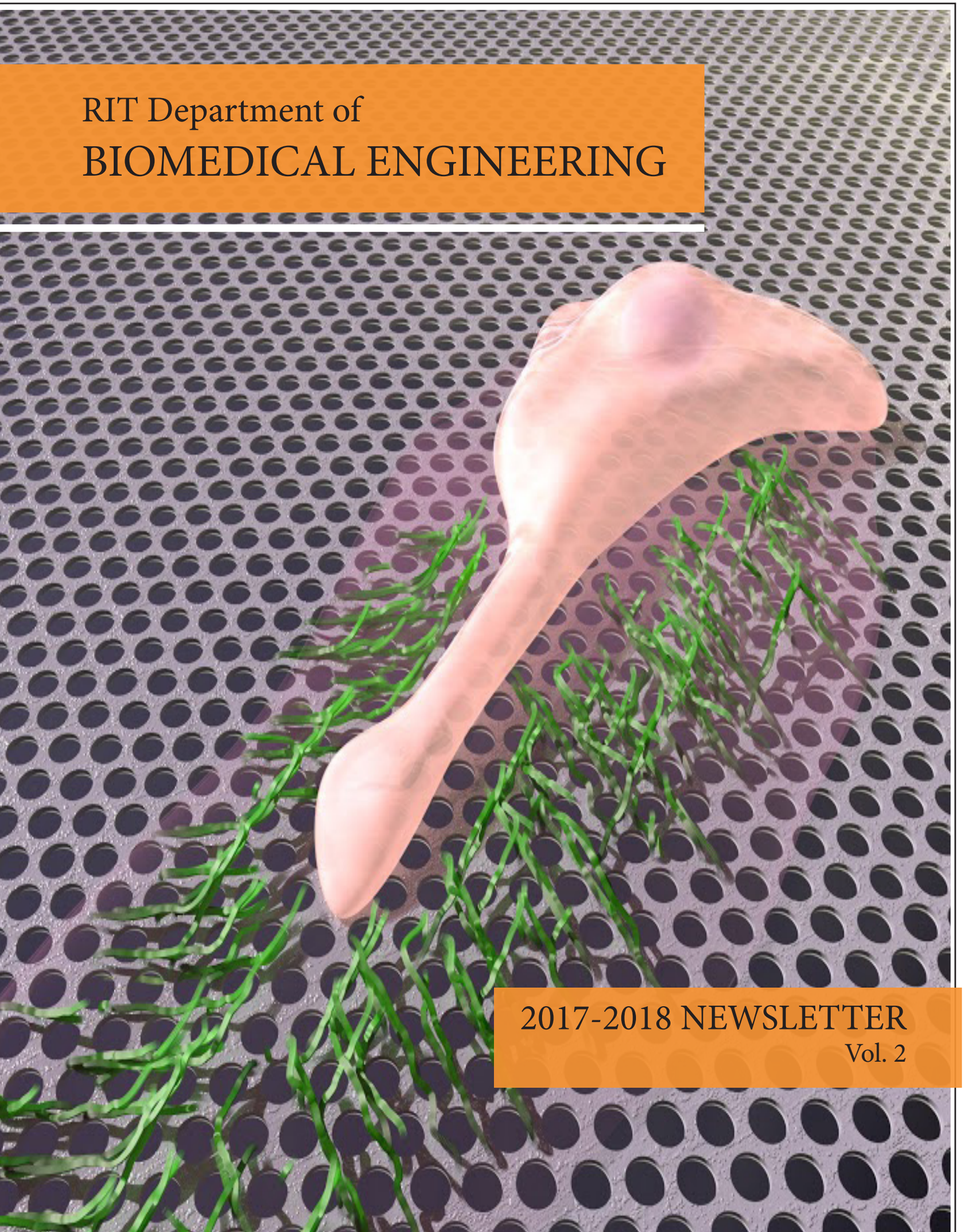
RIT Department of

BIOMEDICAL ENGINEERING



2017-2018 NEWSLETTER

Vol. 2

R·I·T | KATE GLEASON *College of* ENGINEERING

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LETTER FROM DEPARTMENT HEAD

Welcome to the second annual newsletter of the RIT Department of Biomedical Engineering. We had another exciting year in the department. I hope that this annual publication gives you a sense of the range of activities and accomplishments of our students and faculty during the past year.

We will graduate the first full graduating cohort of students this year, having grown quickly from the inaugural class in 2015. I couldn't be more proud of the success of our students within class, labs, jobs, and clubs and have featured a few of these as examples. Our alum have gone on to top graduate and professional programs and more than one hundred companies have hired students for co-op and full-time placement.

The department welcomed the arrival of another experienced faculty to our ranks and are continuing to deliver a robust curriculum rich with experiential learning that prepares students to contribute to teams on (or even before) graduation day. Our faculty team includes full-time educators and a productive group of faculty working with students to publish funded discoveries. A few of these awards and accomplishments are highlighted here.

Thank you for your interest in the department. Best wishes for another successful and productive year!

Steven D Day

FEATURED MSD PROJECTS

What is an MSD project?

The Multidisciplinary Senior Design (MSD) Program prepares students for modern engineering practice through a multidisciplinary, team-based design experience. Students apply the skills and knowledge acquired in earlier coursework to implement solutions to engineering problems while adhering to customer requirements and recognized engineering standards.

Rugby Scrum Cap to Reduce Concussion

Concussions make up a major portion of injuries in rugby and can sideline players for weeks. A scrum cap is a piece of equipment that a player wears to protect against soft-tissue injury. However, current caps provide limited protection against head injuries such as concussions. This team has redesigned a scrum cap to help reduce the incidence of concussion after head impact.

From left to right: Andrew Draveck, Akane Fujimoto, Caroline Kruse, Rachel Baumgarten (BME), Jamie Lucarelli (BME), Eric Iverson

Baby Stroller with HVAC Capability

Infants and young children are particularly sensitive to extreme heat and cold. Maura Keyes developed the project idea as a way to protect her baby niece from the cold weather of Alaska. Maura's sister is a young mother living in northern Alaska that has to walk 10 minutes to and from work each day with her baby. The team has designed the Climate ConStroller to provide a heated baby carriage space for use in cold weather environments.

From top left: Ian Smith, Prince Rex, Danielle Labelle , Emily Heitzhaus, Maura Keyes, Christina Pensabene (BME)

Electrical and Mechanical Bioreactor

The electrical and mechanical bioreactor teams have developed cell culture platforms that will be used in Dr. Jennifer Bailey's Advanced Cell Culture course at RIT. These bioreactors will allow students to study cells in dynamically controlled electrical and mechanical conditions that are representative of the environments found inside the body.

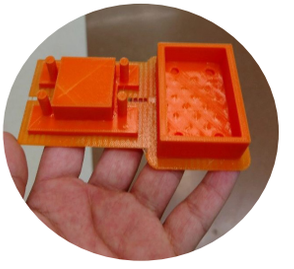
Electrical Bioreactor Team

From left to right: Luk Belekis, Emily Kimber (BME), Shena Marshall (BME), Jonathan Girad, Dillon Flood (BME)

Mechanical Bioreactor Team

From left to right: Emily Wood, Natalie Nold (BME), Simran Singh (BME), Emily Adams, Amanda Castagnino (BME)

Congratulations to team MYSCLE (Myocyte Streching Cellular Lab Experiment) in receiving a grant of $500 from the American Section of the International Association for Testing Materials (ASTM) for their cell straining device!



MSD Projects and affiliated BME students

1. Accessible Motorcycle Sidecar - Katie Green
2. Baby Stroller with HVAC Capability - Christina Pensabene
3. Biosensor Headphones - Tegan Ayers
4. Black Soldier Fly Composting Habitat Improvements - Lauren Cussen
5. Boston Scientific: Implantable Nodules - Stephanie Casillo, Patrick O'Mara, Elise Wilcocks
6. Electrical Bioreactor - Dillon Flood, Emily Kimber, Shena Marshal
7. GAIA Next Step - Jonathan Amerault, Erin Coppola, Eric Anthony Gioe
8. Honduras Hospital Addition: Infact Incubator -Ashley Pitters, Brenna Woodling
9. IdeaLab Project: Rock Climbing Wall - Justin Liao
10. Mechanical Bioreactor - Amanda Castagnino, Natalie Marie Nold, Simran Singh
11. Microfluidics Project - Brandon Hayes
12. Neonatal Emergency Vehicle - Rebecca Bonamico, Austin Zuercher
13. Overcomer Upper Extremeties - Isaac Arabadjis
14. Pocket Rescue Inhaler - Samuel Border, Najwa Taylor
15. Rugby Scrum Cap to Reduce Concussion - Rachel Baumgarten, Jamie Lucarelli
16. Self-Powered Child Jumper - Christine Dobie
17. Soft Robot - Zachary Di Lego, Marie McCartan, Jamie Mortensen, Conor Mckaig
18. SOIL Composting Toilet Design and Urine Management - Christopher James Alpaugh, Tessa Bryn Mellinger
19. Solar Powered UV Water Purification System - Erik James Messier
20. Stand-up Walker for People with Parkinson's - John Bushman, Nathaniel Luther
21. Follow-Up to Glove-Based Wearable Controller - Natasha Amadasun
22. Tremor Mitigation 2 - Nicholas DaCosta, Ashley Lyskawa
23. Tremor Mitigation DAQ - Elizabeth Eichorn
24. Tremor Mitigation Test Arm - Megan Bramlitt, Eric Goodrich
25. Wheelchair Accessible Toilet - Changwu Mungai, Bethany Ann Tisa
26. Wireless Concussion Detection - James Cummings

FACULTY ACHIEVEMENTS

Dr. Steven Day

Dr. Vinay Abhyankar

Dr. Iris Asllani

Dr. Jennifer Bailey

Welcome

Dr. Vinay Abhyankar joined the BME faculty in August 2017. He received his B.S. in Mechanical Engineering from Binghamton University and earned a Ph.D. in Biomedical Engineering from the University of Wisconsin–Madison. Prior to joining RIT, he led the Biological Microsystems Division at the University of Texas at Arlington Research Institute in Fort Worth, TX. Dr. Abhyankar's research laboratory focuses on tissue engineering and microfluidic platforms.

Awards

Steven Day was part of an FDA coordinated author team recognized with the Willem Kolff Award for best abstract and presentation during the 62nd ASAIO Conference

Work from Thomas Gaborski's laboratory was featured on the cover of ACS Biomaterials January 2018 issue

Blanca Lapizco-Encinas joined the Editorial Board of the journal IET Nanobiotechnology

Iris Asllani chaired the Arterial Spin Labeling perfusion fMRI session at the European Society for Magnetic Resonance in Medicine & Biology (ESMRMB)

Cristian Linte was elected as chair of the IEEE Engineering in Medicine and Biology Society (EMBS) Technical Committee on Therapeutic Systems and Technologies

Faculty Scholarship

64 Works of Scholarship, 19 Peer-Reviewed Journal Papers

31 RIT Students involved in publications, presentations, and patents

https://www.researchgate.net/institution/Rochester_Institute_of_Technology/department/Department_of_Biomedical_Engineering

Dr. Thomas Gaborski

Dr. Blanca Lapizco-Encinas

Dr. Cristian Linte

Dr. Cory Stiehl

External Research Grants

Development of dielectrophoresis chromatography employing asymmetric insulating structures and electric fields (NSF)
Blanca Lapizco-Encinas and her team are developing a new hybrid separation microfluidics technique that combines microscale electrokinetics and chromatography.

Development of ultrathin silicon nitride nanomembrane for prototype dialysis modules targeted for home hemodialysis (NSF)
In collaboration with SiMPore Inc. and the University of Rochester, the Gaborski NanoBio Device Lab is researching nano-manufacturing techniques for ultrathin membranes. These nanomembranes are being used in preclinical trials for portable hemodialysis as well as to to purify cellular exosomes.

Plasma clearance of water-soluble and albumin-bound toxins using graphene oxide nanoengineered laminates (NIH)
The Gaborski NanoBio Device Lab is working with the University of Florida to develop new graphene nanomembranes for blood purification. They are researching use of graphene oxide nanolaminates to filter and absorb both water solu ble and protein-bound toxins from blood for use in a portable hemodialysis devices for kidney failure patients.

Cell and Tissue Technologies Laboratory (NYS Empire State Development Fund)
Steven Day will use this award to establish shared laboratory space to further encourage interactions between academic researchers and the private sector

Provost's Learning Innovation Grants (PLIG)

Best Practices in Spatial Visualization
Jennifer Bailey (BME) and David Wick (Office of Diversity and Inclusion)

Reimagining Programmatic Interdisciplinary Coursework: A Pilot Exploration into Biomedical 3D-Printing
Christian Linte (BME) and Jade Myers (RIT Access Technology Prototyping Lab)

Development of Companion Projects for Vertical Integration of Design Experiences Through the BME Curriculum
Cory Stiehl (BME) and Iris Asllani (BME)

WHERE ARE THEY GOING?

Rachel Baumgarten

Rachel has accepted a position with Epic as a Technical Problem Solver and will be working with health-care software starting in July 2018. Her previous co-op experience was with Bausch and Lomb from January 2017- August 2017 working in the process engineering department for the production of new contact lenses.

Stephanie Casillo

Stephanie will be attending the University of Pittsburgh for medical school as part of the Physician Scientist Training Program (PSTP). In that program, Stephanie will have the opportunity to participate in basic science research tailored to her interests in pediatric neuro-oncology. After medical school, she plans to train as a pediatric surgeon and contribute to the development of treatment options for children suffering from brain tumors.

Emily Kimber

Emily will be working in the Vehicle Performance Development department at Toyota as a Crash Safety Engineer starting in late August 2018. Her responsibilities will include recreating airbag deployments and vehicle crash tests to analyze injury mode and crash data results. She credits the numerous opportunities RIT has provided through intramurals, clubs, networking, and co-op for preparing her for a career in engineering.

Tegan Ayers

Tegan will be moving to Boston to work full-time for Bose Corporation as a Product Concept Engineer. This position will be focused on developing new products that promote health and wellness. RIT's co-op program has given Tegan the opportunity to work for four different companies, which helped her build professional working relationships.

Jamie Lucarelli

Jamie will be joining Medtronic Spine and Biologics in Memphis, TN as an Associate R&D Engineer. Her work in the Custom and Specials Department will focus on working with surgeons to improve existing surgical instruments.

Jonathan Amerault

Jonathan will begin his new position as an Associate Manufacturing Engineer at Teleflex Medical OEM in New Hampshire where he also worked as an engineering co-op. His primary responsibility will be to help make the department a center of excellence in PTFE extrusion.

Brandon Hayes

Brandon will be going to Los Alamos National Lab as part of the Science Undergraduate Laboratory Internship (SULI) program. Following this experience, he will pursue a Ph.D. in mechanical engineering.

Featured Employers of BME Graduates

Rheonix, Inc. is committed to improving standards of care by making molecular diagnostics available to more people, in more places, more often. As scientific knowledge evolves, so does the need for new diagnostic technology to simplify processes and enhance innovation.

Stryker is one of the world's leading medical technology companies and together with our customers, is driven to make healthcare better. They offer innovative products and services in Orthopaedics, Medical and Surgical, and Neurotechnology and Spine that help improve patient and hospital outcomes.

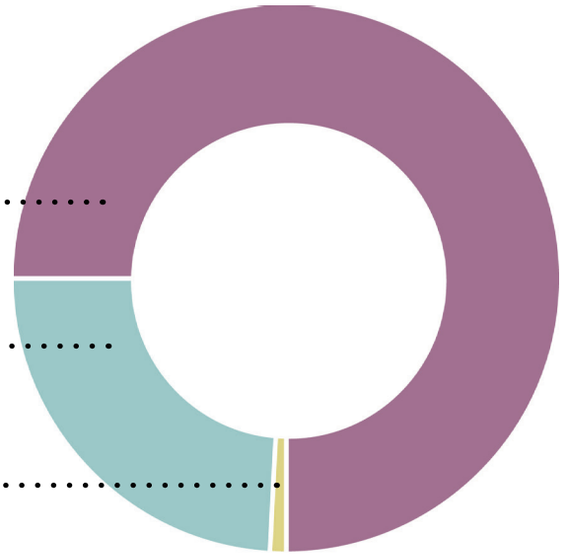
WHERE ARE THEY NOW?

From the first 3 graduating classes of BME:

77% Full-time employment

20% Further full-time study

3% Alternative plans



Laura Alderfer

Laura is attending Notre Dame University pursuing a Ph.D. in Bioengineering. She recently received a $12,500 grant (Research Like a Champion grant) from the Harper Cancer Research Institute for her project titled "Lymphangiogenesis Model to Study the Interplay between Mechanical and Biochemical Cues in the Metastatic Breast Cancer Microenvironment".

Alex Dawson-Elli

Alex is currently a graduate student at the University of Wisconsin-Madison and works as a Research Assistant in the Biomechatronics, Assistive Devices, Gait Engineering and Rehabilitation (BADGER) Lab. As a graduate student, his time is split between formal coursework and conducting research. He develops robotic therapies targeted at improving gait after stroke. On any given day he could be machining a part in the shop, designing a PCB for manufacturing, developing control software in C++ or python, working with a stroke patient, analyzing patient data, or developing a neuromuscular simulation to test new training paradigms.

Alex LaLonde

Alex is currently living in Royal Oak Michigan working as a patent examiner at the United States Patent and Trademark Office. Her responsibilites involve reviewing patent applications for drug delivery devices. She was always very interested in intellectual property during her undergraduate years and enjoys the industry while exploring a new city.

Emily Holz

Emily joined Genentech in South San Francisco, CA in August 2016 as an Associate Engineer. Since then, she has rotated through four departments within the pharmaceutical technical development organization: Protein Analytical Chemistry, Biological Technologies, Drug Delivery, and Purification Development. Among other projects, she developed mass spectrometry processing methods to mine historical data and assist with antibody engineering. She also created a novel stimulus-responsive hydrogel for long-acting drug delivery. She is currently working on a purification process for a new antibody-drug conjugate format.

STUDENT ACHIEVEMENTS

AES Electrophoresis Society

In November 2017, Eric Goodrich received a poster award from the AES Electrophoresis Society in Minneapolis. Only two undergraduates received this award during the AES meeting, and Eric was one of them!

Outstanding Undergraduate Scholar Awards 2017-2018

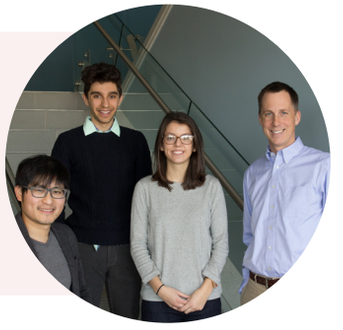
Students Matthew Williams, Nicole Mazzola, and Lucas Quesnel joins an elite group of students who have completed a minimum of 83 credit hours of study and have established a cumulative grade point average of at least 3.85 for all work completed at RIT as of the previous Spring term.

Journal of Chromatography A

The Lapizco Microscale BioSeparations Lab has published a peer-reviewed journal article, "Separating Large Microscale Particles by Exploiting Charge Differences with Dielectrophoresis". Undergraduate BME authors are underlined.

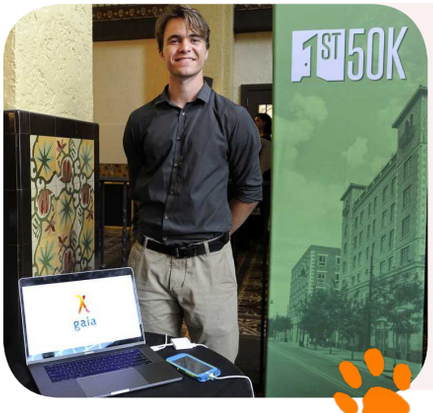
Authors: Danielle V. Polniak, Eric Goodrich, Nicole Hill, Blanca H. Lapizco-Encinas

ACS Biomaterials Science and Engineering



The Gaborski NanoBio Device Lab published a peer-reviewed journal article, "Porous Substrates Promote Endothelial Migration at the Expense of Fibronectin Fibrillogenesis". Undergraduate BME authors are underlined.

Authors: Henry H. Chung, Stephanie M. Casillo, Spencer J. Perry, and Thomas R. Gaborski



Alumni start-up featured as one of the 'Coolest College Startups'

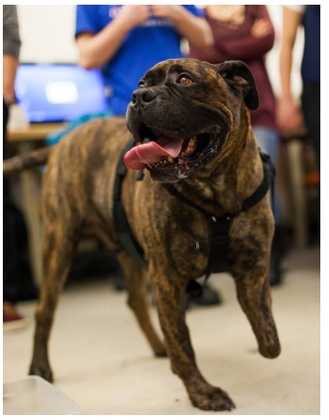
GAIA, a company founded by RIT alumni, was featured in an Inc. article listing the top eight "Coolest College Startups" as named by the Student Startup Madness competition at South by Southwest. This company is almost entirely run by RIT students and alumni.

Co-founded by Brent Chase '17 (BME), Joseph Clifford '17 (ME) and Liam Herlihy '17 (EE), and moving forward with an MSD team including 3 BME seniors (page 4, team 7). GAIA's aim is to "help prevent, mitigate or decrease the frequency of meltdowns for children with autism" by utilizing wearable technology to detect these intense responses to overwhelming situations before they occur.

BME CLUBS

BioPrint

RIT BioPrint provides students with the opportunity to further their knowledge in 3D modeling and design, 3D printing, and materials testing. The club promotes collaboration and teamwork by fostering a venue for small teams focused on specific, yet multi-disciplinary projects.



Engineering World Health

Engineering World Health (EWH) is a non-profit organization founded in 2002 with the goal to inspire, educate, and empower the biomedical engineering community. The RIT student chapter travels annually to Guatemala during winter-break to work with hospital partners.

Biomedical Engineering Society

BMES provides the tools and resources students need to excel in bio-medical engineering. The benefits of membership for those studying to become biomedical engineers are invaluable. The Society has over 145 student chapters and more than 4,500 student members. The RIT student chapter focuses on career development, networking, and leadership skills.

BMES Class Representatives

CONGRATULATIONS CLASS OF 2018

	Christopher James Alpaugh	*	Zachary Anthony Di Lego		Tessa Bryn Mellinger
	Natasha Amadasun	***	Christine A. Dobie	***	Erik J. Messier
*	Jonathan L. Amerault		Elizabeth Margaret Eichorn	***§	Jamie S. Mortensen
	Isaac Mitchell Arabadjis		Dillon Patrick Flood		Ashley M. Nolan
**	Tegan Marie Ayers	** §	Eric Anthony Gioe	***§	Natalie Marie Nold
* §	Rachel Naomi Baumgarten	***	Eric Michael Goodrich		Patrick Robert O'Mara
	Rebecca Ann Bonamico	*	Katie Erin Green		Christina M. Pensabene
**	Samuel Peter Border	***§	Brandon Shafer Hayes	***	Marie Frances Pillidge
	Megan Bramlitt		Emily Kimber	*	Danielle Victoria Polniak
	John J. Bushman Jr.	*	Justin Kwangyao Liao		Simran Singh
** §	Stephanie Casillo	***§	Jamie A. Lucarelli	*	Najwa Haleh Simone Taylor
**	Amanda Castagnino		Nathanial Owen Luther		Bethany Ann Tisa
	Erin Coppola	*	Ashley Lyskawa	***	Elise K. Wilcocks
	James Paul Cummings	§	Shena Marshall		Brenna Kathleen Woodling
	Lauren Nicole Cussen		Marie Elizabeth McCartan		Austin William Zuercher
**	Nicholas DaCosta		Conor Brady McKaig		

* cum laude ** magna cum laude *** summa cum laude § Honors Program

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