

Daniel Paul Regan

Graduate Research Assistant
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Education

University of Maine, Graduate School of Biomedical Science & Engineering, Orono, ME *May '22*

Predoctoral Student in Biomedical Engineering

Research Area: Biodefense, Biointerfaces, Biological Sample Preparation, Biological Threat Detection

Miami University, Oxford, OH

May '17

Bachelor of Science in Bioengineering | Concentration in Bioprocessing | Minor in Molecular Biology

University Honors Program | IES Engineering-In-Freiburg Study Abroad Program, 2015

Research Experience

Howell Biointerface & Biomimetics Lab | Dissertation Lab *Jul '18-Present*

- Reviewed liquid-infused surface research on droplet manipulation for an invited mini-review
- Expanded bacterial concentration protocols via evaporation with paper-based geometric vessels
- Explored modifications to paper systems for research on liquid droplet stability and physics

Rieger Lab – MDI Biological Laboratory | Graduate Research Rotation *May '18-Jul '18*

- Identified flaws with existing device designed to induce mechanical stress on zebrafish
- Used SolidWorks to create 3D models of the device and its new parts
- Reconstructed the device using 3D PLA prints, OpenBeamUSA support, and a custom Dynamixel motor
- Programmed LabVIEW software to operate the device in a succinct and reproducible manner

Howell Biointerface & Biomimetics Lab | Graduate Research Rotation *Aug '17-May '18*

- Created ImageJ scripts to analyze material surface properties and bacterial concentration effects
- Simulated biological agent detection with COMSOL to analyze pathogen concentration models
- Designed prototypes of rapid and portable point-of-care diagnostics via paper-based platforms
- Modified surface properties via immobilized liquid layers to study effects on low-volume droplet control

Saul Research Group | Research and Development *Sept '16-May '17*

- Created experimental protocols for propagation, emulsion, and rate of release analysis for the bacteriophages
- Reviewed literature on trigger mechanisms of lipid vesicles and bacteriophage immune responses
- Strategized and designed theoretical models to combat bacterial infections developed in burn-wound patients

Kennedy Research Group | Undergraduate Team Leader *Aug '14-May '17*

- Supervised a research team of 17 undergraduates as a sophomore
- Conducted metabonomic research in search of a novel biomarker for pancreatic ductal adenocarcinoma
- Authored and awarded IACUC protocols and university funded grants to perform mouse model research
- Utilized Aperio ImageScope software to score IHC sections of mouse pancreata for levels of HMGA expression
- Designed and created an online atlas for collaborators to develop a uniform scale for PanIN grading
- Maintained and gathered bio-fluids and tissue samples from a transgenic mouse model of 3,000
- Prepared, embedded, stained and imaged the pancreatic tissue and vital organs for pathological analysis
- Adjusted and configured over 300 sample of urine, fecal, and serum samples for NMR spectroscopy
- Collaborated with pathologists to development PanIN grading and immunohistochemistry protocols

- Performed literature reviews and presented on relevant journal articles to ensure efficient practices
- Analyzed the genomic profile of the mouse model using RT-PCR and southern blotting
- Trained and directed the undergraduate students on the protocols and operations of the research lab

Publications

In Press

[4] Regan, D. P., & Howell, C. (2019). Droplet manipulation with bioinspired liquid-infused surfaces: a review of recent progress and potential for integrated detection. *Current Opinion in Colloid & Interface Science*.

Selected Publications

[3] Schmahl MJ, **Regan DP**, Rivers AC, Joesten WC, Kennedy MA (2018) NMR-based metabolic profiling of urine, serum, fecal, and pancreatic tissue samples from the Ptf1a-Cre; LSL-KrasG12D transgenic mouse model of pancreatic cancer. PLoS ONE 13(7): e0200658. <https://doi.org/10.1371/journal.pone.0200658>

[2] Veite-Schmahl MJ, Rivers AC, **Regan DP**, Kennedy MA (2017) The Mouse Model of Pancreatic Cancer Atlas (MMPCA) for classification of pancreatic cancer lesions: A large histological investigation of the Ptf1a^{Cre/+};LSL-Kras^{G12D/+} transgenic mouse model of pancreatic cancer. PLoS ONE12(11): e0187552. <https://doi.org/10.1371/journal.pone.0187552>

[1] Veite-Schmahl, M. J., **Regan, D. P.**, Rivers, A. C., Nowatzke, J. F., Kennedy, M. A. Dissection of the Mouse Pancreas for Histological Analysis and Metabolic Profiling. *J. Vis. Exp.* (126), e55647, doi:10.3791/55647 (2017).

Online Atlas

<https://mousepancreaticcancer.wordpress.com>

Manuscripts in Preparation

Enhanced Properties of Coated Paper Liquid-Infused Surfaces for Bacteria Handling and Detection

Presentations

Military Health System Research Symposium

Aug '18

- Presented during the *State of the Science for Trainee and Deployment Related Events to Include Wounds, Skin & Soft Tissue Infections* poster session with “Enhanced Properties of Coated Paper Liquid-Infused Surfaces for Bacteria Handling and Detection”

University of Maine Student Symposium

Apr '18

- Discussed the findings and significance of the work conducted on coated paper liquid-infused surfaces and their interactions with bacteria during the oral section of the student symposium

VEMI Laboratory's Rapid Research Week

Jan '18

- Collaborated with students from the Virtual Environment and Multimodal Interaction Laboratory to design, execute and present the findings of our study on the effects of effort on distance perception

Senior Design Showcase

May '17

- Discussed the analysis of our senior design project before the College of Engineering & Computing
- Presented during the poster session with “Development of an Encapsulated Bacteriophage for Integration into Wound Dressings for Severe Burns.”

Alternative Spring Break

Mar '15 & '17

- Advocated on importance of funding and undergraduate research with legislatures in DC and Columbus
- Presented at *Posters on the Hill* over the search for an early detection biomarker for pancreatic cancer

Undergraduate Research Forum

Apr '14

- Presented at Miami University's Undergraduate Research Forum after one year of undergraduate research
- The poster discussed the importance and use of a mouse model to study pancreatic ductal adenocarcinoma

Awards & Honors

CPB Senior Exposition-Best Engineering Design

May '17

- Awarded to our senior design group for our work and presentation of research regarding "Development of an Encapsulated Bacteriophage for Integration into Wound Dressings for Severe Burns."

Doctoral Undergraduate Research Scholarship

Dec '15

- Awarded a \$1,000 grant based on my proposal to conduct research into the metabonomic profile of the serum component of a mouse model in order to study the development of pancreatic ductal adenocarcinoma
- The grant is geared to increase the mentorship of a graduate-undergraduate relationship to provide guidance into the work style of a graduate student and to develop skills for advanced research

Engineering in Germany: Study Abroad Scholarship

Jul '15

- Granted an Honor's Program tuition waiver to study thermodynamics and economics in Freiburg, Germany
- Visited Basel Power, BMW Munich, Fraunhofer ISE, Micronas, and other engineering companies to applying concepts of engineering economics and thermodynamics to real industrial issues
- Participated in two guest lectures from professors at the University of Freiburg on thermodynamics application
- Discussed the cultural differences and approaches to engineering design between the Europe and the USA

Undergraduate Research Award

2015, 2016, 2017

- Awarded \$485 to design and research an encapsulated-bacteriophage phospholipid vesicle complex
- Awarded an additional \$536 for the research and publication proposal originally awarded for the Doctoral Undergraduate Research Scholarship to study the metabonomic profile of a mouse model in regard to developing a novel biomarker for the early detection of pancreatic ductal adenocarcinoma
- Awarded a \$1,000 grant, the maximum value, based on my proposal to develop a databank based off of the histology sections of the pancreas in order to fully analyze the PanIN development in the mouse model

Government Relations Network-Alternative Spring Break

Mar '15 & '17

- Selected to represent Miami University Undergraduate Research in Washington D.C. and Columbus, Ohio
- Engaged elected officials and staffers in the importance of research opportunities at the undergraduate level

United States Senate Youth Program

2013

- Hosted by the United States Senate as one of two delegates from the State of Ohio
- Sponsored by the William Randolph Hearst Foundation to travel to Washington D.C. to meet with public servants in the federal government and military in addition to a \$5,000 scholarship

Boy Scouts of America | Eagle Scout & Order of the Arrow

Sept '01-Jun '13

- Earned the Rank of Eagle Scout on December 12, 2011

- Fundraised and Organized 50 volunteers to complete 450 hours of service to build the Outdoor All Saints Chapel that was built by fundraising nearly \$2,500 with support from the local community and churches

Certifications

Emergency Management Institute

Oct '18

- ICS 100: Introduction to the Incident Command System
- ICS 700: An Introduction to the National Incident Management System

American Red Cross

Sept '18

- Mass Casualty Incident Response Training

MDI Biological Laboratory

Jul '18

- Applied Bioinformatics

Collaborative Institutional Training Initiative Program

Aug '17

- Introduction to Biosafety Training
- Basic Biosafety Training
- OSHA Personal Protective Equipment Training
- OSHA Bloodborne Pathogens
- Emergency and Incident Response to Biohazards and Spills
- NIH Recombinant DNA (rDNA) Guideline
- Select Agents, Biosecurity and Bioterrorism

Committees

Graduate School of Biomedical Science & Engineering Executive Committee

Sept '18-Present

- Served as the Biomedical Engineering Representative for GSBSE Student Body
- Communicated the needs of the biomedical engineering doctoral students to the graduate school administration and faculty committees on admissions, curriculum development, and steering

University of Maine Student Symposium Abstract Submission Committee

Dec '17-Apr '18

- Developed the submission criteria and provided input for the design of the submission portal for the submission of abstracts for performance, poster, and oral presentations at the 2018 UMMS

Chemical, Paper, and Biomedical Engineering Faculty Search Committee

Apr '17

- Audited guest lectures, conducted interviews, and provided feedback to the hiring committee on the candidates for the tenure-track assistant professorship

Leadership & Service

Medical Reserve Corps: Northeastern Maine Unit 115

Sept '18-Present

- Aided in the transition of the unit to become deployment ready and engaged with the community

Sons of the American Legion

Jun '15-Present

- Supported the efforts of the American Legion to better the Buckeye Boys State Program

Theta Tau | Professional Engineering Fraternity

Sept '13-May '17

- Served as Editor-In-Chief of the Miami Engineering Review Journal for its third publication period
- Marketed and edited submissions of undergraduate research and senior design projects for the journal

- Instilled the principles of brotherhood, professional development, and service as New Member Educator
- Promoted Miami Engineering by serving 2 years on the departmental panel for potential new students
- Participated biannually in Habitat for Humanity builds and STEM Outreach

Buckeye Boys State | Counseling Staff

Jun '13-Present

- Boys State is hosted by the American Legion and is held for 8 days every summer with over 1,250 participants
- Assisted the Legion and Miami University in transitioning the program to Miami's campus for the 2017 program
- Immediately oversaw 45 participants and aided in the facilitation of the daily program and itinerary
- Developed a nightly curriculum that tied in the message of the program to leadership and service

Honors Student Advisory Board | Spring Philanthropy Team Lead

Sept '13-May '14

- Executed plans to host an on-campus 5K in compliance with University policies and donor support
- Delegated tasks to 20 volunteers that resulted in 50 runners and over \$3,000 for the Wounded Warrior Project

Work History

Miami University | Career Assistant

Aug '16-May '17

- Provided feedback and peer review to students who sought help with their professional portfolios
- Assisted undergraduate students develop skills for writing a personal statement and curriculum vitae
- Guided students to the appropriate resources to learn about internship, career, and graduate opportunities

Miami University | Summer Research Coordinator

May '16-Aug '16

- Maintained contact with collaborators and organized meetings to discuss project progress and troubleshooting
- Fine-tuned protocols for nuclear algorithm analysis for HMGA protein expressions with Apeiro ImageScope
- Supervised the summer REU student and developed project details for their summer work
- Operated the Olympus AX-70 microscope to collect images of the various study groups

Miami University | Teacher's Assistant

Aug '15-May '16

- Aided in the facilitation of course material and exam proctoring for CPB 341: *Engineering Economics*
- Completed grading duties and evaluated student progress for the course

Miami University | Resident Assistant

Aug '14-May '15

- Maintained a safe living environment for the 330 residents of the honors living learning community
- Programmed a community that fostered cultural competency and self-awareness among the residents