Student Profile: Abigail Reynolds, Biology

Kayaking For Research
by Rosangela Dominguez

Dr. Duffy’s lab concentrates on the evolutionary and community ecology of infectious diseases found in natural populations of Daphnia, small crustacean zooplankton. They collect samples from different sites, like the Congaree National Park, Atlanta area lakes and ponds, and the W. K. Kellogg Biological Station in Michigan. The samples are then brought to campus and are analyzed. Reynolds’ summer research focused on different zooplankton found in the many ponds of the Congaree National Park. She aimed to find correlations between size and depth of ponds versus the types of zooplankton found in them. During this process, Reynolds worked closely with Rachel Penczykowski, a graduate student also working in Dr. Duffy’s lab. Penczykowski taught her the correct way to collect water samples, to cast the Wisconsin net and other useful data collection strategies. Reynolds continues to work as a data quantifier where she collects water samples to bring back to the lab. Once she’s back in lab she counts, graphs and analyzes the data. The graphed data shows the different cyclical seasonal dynamics and infection rates of the natural population.

Reynolds believes that the most important experience from her research so far has been the amount of field work.
Student Interview: Natasha Barbely AE

The Office of Undergraduate Research interviewed Natasha Barbely, a fourth year Aerospace Engineering major, about her experience as a member of the Undergraduate Student Research Program at NASA Ames Research Center.

U/G Research: How did you become involved in research as an undergraduate student at Georgia Tech?

NB: After I got back from my first term at NASA Ames I was so excited and interested in the field of work I was assigned, I spoke with Dr. Sankar and he helped direct me on my exploration with Rotorcraft Aeroacoustics.

U/G Research: How did you become interested in your current field of research?

NB: Acoustics in general is so amazing and interesting. But, I don’t feel I would have had this great of aspiration if it weren’t for my mentors at NASA Ames. Dr. William Warmbrodt got me excited in rotorcraft and from there my other mentors Dr. Ben Sim and Cahit Kitaplioglu really opened the door to rotorcraft aeroacoustics. I was always told that it was very difficult but I never gave up and my desire to explore rotorcraft aeroacoustics hasn’t died.

U/G Research: Describe your role within your professor’s research and research group?

NB: While at Georgia Tech, I have had the opportunity to work on my research with my mentors at NASA, as well as, Dr. Sankar and his students. Each of my projects have been designed as a solo project but I was guided along the way by Jeremy Bain, Dr. Kyle Collins and Nischint Rajmohan at Georgia Tech and then again Dr. William Warmbrodt, Dr. Ben Sim and Cahit Kitaplioglu at NASA Ames.

U/G Research: How key was your professional relationship with your mentor?

NB: It was highly important that the relationship with my mentor was always close and that whatever we needed to explain was fully understood in both parties because I did distance research. And if I really didn’t understand I never pushed it to the side, I had them explain it as many times as it took to understand it.

U/G Research: What have you learned during your experience that goes beyond the classroom?

NB: I have learned that I can do it! I may not always be the smartest person in the class but I have the drive to make it, follow what interests me, and make my contribution to the world that will last.

U/G Research: What impact has this project made on your academic experience while at Georgia Tech and your future career choices?

NB: My experience with this project and all the undergraduate research has molded my choice in what I want to study for graduate school, which will flow over to my career choice.

U/G Research: What are some interesting experiences that you have had while at NASA?

NB: I had the opportunity to take helicopter lessons and actually fly a helicopter! I also was fortunate enough to get to fly the Vertical Motion Simulator with a V-22 Osprey installed. And, also getting to meet Astronaut Buzz Aldrin.

U/G Research: What’s the number one piece of advice you would give to fellow undergraduates who might be interested in research?

NB: Pay attention in class and if something makes you think “wow, that is cool!” or “Man, I want to know more about that!” go research the professors in the department that specialize in your interests and go talk to them.
experience that she has been able to accumulate thanks to Dr. Duffy. She agrees that there is a lot of knowledge available in books and publications but that “no book could have taught me how to take water samples properly, read/record the hydrolab data or how to semi-gracefully plop into a kayak full of lab equipment. No lab manual could have told me just how much fun I would have out in the field collecting data, nor how much work I would do once in the lab.” Reynolds also mentions how crucial a good relationship with your mentor. She added, “Dr. Duffy is absolutely wonderful about checking in with me to make sure all is going well.” She felt that Dr. Duffy and the rest of the lab members helped her become more comfortable in lab which encouraged her to ask questions. Reynolds has definitely had a very positive experience researching here at Georgia Tech and she feels like researching has added variety and real world experience that lectures fail to bring into the curriculum. She advises undergraduates interested in research to “Simply ask! The faculty are more than happy to see students who are interested in going above and beyond the classroom.” Reynolds recommends that you visit your major’s website, read some of the faculty’s published papers and look for different research topics that interest you. Many would agree with Reynolds that “half of the battle is getting up the courage to talk to a professor and showing that you’re interested.”

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Undergraduate Research News

Faculty Interview: TyAnna Herrington, LCC

U/G Research: How did you become involved as a mentor to undergraduate researchers?

TH: I’ve always been interested in helping students pursue their own research interests, especially as they have related to mine. It has been many years since undertaking the first undergraduate research project, but I believe it came about after a conversation with one of my students when we realized that we had common goals and ideas to test and support.

U/G Research: What types of projects have you mentored? Have there been publications/presentations or contributions to proposals that have resulted from this work?

TH: Most of the projects that I’ve mentored have been related to my Global Classroom Project (GCP), which links Russian and American students through the Internet, providing an experiential learning forum for studying cross-cultural, digital communication. A number of students have developed unique digital projects to support the GCP. For instance, one effort led to creation of a 3D visual model of instances of agreement and disagreement in cross-cultural communication within a class semester; the research project charted these over time, highlighting cultural characteristics and other focused markers affecting the fluidity and efficiency of communication. Another student created an interface for the Global Classroom Project, taking what would otherwise be static structures of information (within set visual frames) and instead, layering them, making them visually and functionally accessible with a click or rollover of the mouse or trackpad. This kind of functionality is common today, but when my student developed his project, technology like this had not appeared in the market. Another of my undergraduate students developed an article for publication comparing his learning experiences in the Global Classroom Project in 2 different semesters (see Kennon, Justin. “International Collaboration and Cross-Cultural Communication: The Global Classroom Project,” in Designing Globally Networked Learning Environments: Visionary Partnerships, Policies, and Pedagogies. Starke-Meyerring and Melanie Wilson, Eds. Sense Publishers, 2008. pp. 114-128.)

U/G Research: How do you utilize undergraduate students in your research?

TH: As the above examples illustrate, students’ research extends the reach of the Global Classroom Project itself. Since the goal of the project has been to enable international learning in new ways, students’ research expands participants’ learning experiences and adds breadth to the Project as a result. And the new products they create in relation to the Project have the potential to support it further by allowing development of new means of information access or unique insights that can be used in developing work for future semesters.

U/G Research: What should a student do to become involved?

TH: A student can become involved by coming to see me to propose a new project idea. If it seems feasible, advantageous to the student, and supports the work I do, either in the Global Classroom Project or in intellectual property law, the focus of the bulk of my written research, I’m always happy to support a new project.

U/G Research: What are the benefits to faculty of mentoring undergraduates in research?

TH: As with any collaboration between parties of different backgrounds or research interests, undergraduate research benefits faculty by allowing them to gain new insights resulting from access to students’ unique points of view, experiences, interests,

Continued on page 5
Whether constructing water measurements in Clayton County, evaluating sensor equipment on a construction site, or analyzing supply chain logistics in Italy, undergraduate researchers at Georgia Tech have strategically utilized MS&T grants sponsored by Georgia Tech’s Quality Enhancement Plan (QEP) in several projects. Since 2006, grants totaling in $123,310 have been awarded by UROP to faculty in support over 206 exceptional undergraduate students in conducting ongoing research.

During the Fall 2009 semester, the MS&T grants were used in a variety of ways. At Georgia Tech Savannah, faculty member Francesco Fedele initiated a new undergraduate research project for investigating new principles for extracting energy from tidal streams. The main goal was to develop and test a small-scale prototype of an energy device that harvests energy from vortex shedding in stream currents. The students in this group have built a website devoted to their research to inform others of their current work: http://www.gtsav.gatech.edu/people/ffedele/Research/researchsite/OMHtmlExport/index.htm. Georgia Tech Savannah faculty member Kevin Haas used the funds to purchase a simulation equipment was used to characterize the flow patterns for rip currents observed in a wave basin. His students Ashley Brown (mechanical engineering) and Stephanie Smallegan (civil engineering) developed an automated method for locating the center of circulation and estimating longshore currents from video.

Michael Filler, faculty member at Georgia Tech Atlanta, used MS&T funds to purchase various chemicals and polymers needed to complete the work of undergraduates Bomy Lee Chung and Gahau Liang, which focuses on forming complex nanostructures through the controlled self-assembly of block co-polymers on individual nanowire surfaces. Such nanostructures could find application in the generation of solar energy.

Professor Kenneth Brown’s research group in Chemistry has focused on the stabilization of...
tion of a tunable 729 nm diode laser used in cooling and detecting molecular atoms. His student Kenneth Wright had the opportunity to design and implement a Pound-Drever-Hall lock circuit in the control system of the laser.

In December 2009, Deborah Peak (industrial engineering) used the MS&T funds to complete the final evaluation stages of her ongoing research at the Emergency Deployment Unit (EDU) of the World Food Program (WFP) headquartered in Rome, Italy. This involved a detailed review of the function and organization of logistics groups in EDU to better focus on improving its logistics capabilities through training and analysis of the supply chain logistics. During the visit, many vital parameters were established for the creation and scope of the supply chain model. This program and tool will be used to improve the decision making process of shipping and transporting goods from their origin to final destination point.

One MS&T funded research project completed by Brandon Harris, Emma Reuter, Brandon Strellis, and Ingrid Duque under the advisement of Professor Thorsten Stoesser in MSE involved studying wetlands used for wastewater treatment by the Clayton County Water Authority. The students humorously reported that “field measurements and quantification were conducted in May, June, and November of 2009 at great risk to life and limb. The cat-tails present in the wetlands are razor-sharp, but with an iron will our team plunged through them, heedless of the pain we incurred in service to Our Lady of Science. Dr. Stoesser documented our endeavors and made helpful comments, such as, ‘I didn’t think the water would be so deep.’”

Third-year chemistry major Jairo Zapata’s research project under the direction of Dr. Christine Payne in Chemistry focused on the image analysis necessary to understand the intracellular degradation of low-density lipoprotein (LDL). The Payne lab is “interested in how enzymes contained in vesicles degrade the LDL particle, thereby allowing the lipids to be used by the cell.” Jairo worked to automate a step of the image analysis using a Java-based program, ImageJ. Funding from UROP provided additional computer hardware used in the processing of the large data sets required in the research. Jairo’s software is now used by the lab and has drastically increased the speed of their analysis.

Brian Duke and John McCaskey worked with Dr. Linda Green in Biology during the Fall semester. Both students spent most of their research hours ‘in the field’ on outdoor excursions to 10 viable field sites in the metro Atlanta area, and they regularly visited a key site (Lullwater Forest at Emory University) to perform quadrat sampling for salamanders. According to Green, the trips “helped provide experience in sampling techniques and with our equipment [electronic balance and relative humidity/temperature meter].”

So, needless to say, the MS&T grants have been a beacon of support for undergraduate researchers and their faculty at Georgia Tech. Without the means of MS&T grants, many of these opportunities would have added financial burdens for the research groups while some opportunities may not have been possible at all. The UROP program is hopeful that grants can continue in future years.
Upcoming Workshops & Events

President’s Undergraduate Research Award (PURA) Information Session
Tuesday, Feb. 16, 2010 11-12 Noon
Student Success Center
President’s Suites C & D
Interested in being paid for part-time research work? Then, attend an information session on the President’s Undergraduate Research Award (PURA). Eligibility, timing, and application tips and hints will be discussed. This event is suggested for all students thinking of applying for Summer or Fall 2010 awards. For additional information, contact pura@gatech.edu. Applications for Summer 2010 awards are due March 1st.

Presenting with Power – Oral Presentation Workshop
Tuesday, March 9, 2010 11:00am - 12:00 Noon
Student Success Center
President’s Suites C & D
This interactive workshop is designed to be hands on. Participants will leave the workshop with a working draft of their PowerPoint slides and with concrete tips on how to present their research effectively and dynamically. Register by e-mailing urop@gatech.edu

Eye-Catching Posters
Thursday, March 11, 2010 11:00am - 12:00 Noon
Success Center, President’s Suites C&D
We’ll examine several research posters used in the past and comment on their design. Students will also learn tips on how to effectively convey their research in a poster setting. Register by e-mailing urop@gatech.edu.

5th Annual ACC Meeting of the Minds Undergraduate Research Conference April 15-17, 2010
GA Tech Global Learning Center
Students interested in participating in the 5th Annual ACC Undergraduate Research Meeting of the Minds Conference can view submission information at http://www.undergradresearch.gatech.edu/documents/ACC-conf-2010-application.pdf. Submission of attendee information (student and faculty), presentation details, and presentation abstracts (250 words) are due February 8th.

5th Annual (March 16) Undergraduate Research Spring Symposium & Awards Ceremony

For more information, visit http://www.undergradresearch.gatech.edu/SpringSymposium.php
News from the Director

I’m glad that you picked up this copy of the UROP newsletter! We hope that the short articles inside provide a good sample of undergraduate research projects going on at Georgia Tech. You’ll also learn more about the in-depth projects enabled by this year’s faculty materials, supplies, and travel grant funded by the Quality Enhancement Plan (QEP). Thank you to contributors Fadrika Prather, Nashlie Sephus, and Rosangela Dominguez for their articles.

Spring is one of the most active times in our program. Join us Tuesday, March 16th as we celebrate undergraduate research at Georgia Tech by stopping at our 5th annual UROP Spring Symposium and Awards. Students from all over campus will gather in the student center ballroom and surrounding rooms to present their research in poster and oral presentations. We’ll also honor top researchers on campus during our awards ceremony immediately following the event. For additional information visit: http://undergradresearch.gatech.edu/SpringSymposium.php.

Join Georgia Tech in welcoming over 75 undergraduate researchers from Atlantic Coast Conference (ACC) universities to campus in April as we host the 5th annual ACC Meeting of the Minds Undergraduate Research Conference. Students and faculty interested in helping out at the conference should contact us soon.

Lastly, I encourage students to submit their work for publication in Georgia Tech’s Undergraduate Research Journal, The Tower. Pick up a free copy at the library, student center, or the Flag building. Students can submit three different types of articles for publication—traditional journal articles and shorter perspectives and dispatches. For more information visit: http://gttower.org/

Best,
Karen Harwell