Endeavors
ISSUE 2
SUMMER 2010

LOYOLA UNIVERSITY CHICAGO
OFFICE OF RESEARCH SERVICES

UNDERGRADUATE RESEARCH HIGHLIGHTS 2010
Dear Colleagues,

Welcome to this special issue of Endeavors focusing on undergraduate research. Our goal is to share with the Loyola community how undergraduate research contributes to the transformative education at Loyola University Chicago.

Many Loyola students engage in undergraduate research by applying for and receiving competitive funded fellowships through the Loyola Undergraduate Research Opportunities Program (LUROP). This issue of Endeavors explores how student researchers in LUROP delved into the research process, developing questions, collecting and analyzing data, and formulating implications and conclusions.

Led by faculty and graduate student mentors, these Loyola undergraduates have participated in the co-creation of knowledge that contributes to a better understanding of local and global communities. Through many hours spent in the lab, in the library, or in the community, these students have developed a richer understanding of research and fully engaged in the transformative education of Loyola University Chicago. These featured undergraduate scholars enrich us with new knowledge that potentially serves the larger community through new perspectives.

Loyola student researchers often present their research at regional, national, and international conferences, as well as co-author scholarly publications with faculty. In addition, in the spring, we hosted the 2010 Loyola Undergraduate Research Symposium, “Transformative Research: Knowledge in Service of Humanity,” which featured the work of more than 150 undergraduate students, who collaborated with faculty mentors, research assistants, community members, and graduate students on thought-provoking research projects.

The collaboration between the Office of Research Services and the Center for Experiential Learning demonstrates Loyola’s commitment to transformative learning through undergraduate research. Through LUROP and other forms of undergraduate research, our students bring to life Loyola’s mission of working to expand knowledge in the service of humanity through learning, justice, and faith.

Sincerely,

Samuel A. Attoh, PhD
Associate Provost for Research and Dean of the Graduate School

Patrick M. Green, EdD
Director, Experiential Learning
<table>
<thead>
<tr>
<th>PAGE</th>
<th>PROJECT</th>
<th>UNDERGRADUATE STUDENT RESEARCHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Creating Social Change in Chicago</td>
<td>Grace Sutherland</td>
</tr>
<tr>
<td>5</td>
<td>Analyzing Social Justice in the Maghreb</td>
<td>Chet Jechura</td>
</tr>
<tr>
<td>6</td>
<td>Collaborating to Improve Education</td>
<td>Kathryn Nolan and Lauren Parente</td>
</tr>
<tr>
<td>7</td>
<td>Gaining Hands-On Research Experience in the Laboratory</td>
<td>Conrad Ziembinski</td>
</tr>
<tr>
<td>8</td>
<td>Working Together</td>
<td>Angie San Juan and Julie Longua</td>
</tr>
<tr>
<td>9</td>
<td>Mapping Human Chromosome 21</td>
<td>Akadia Kachaochana</td>
</tr>
<tr>
<td>10</td>
<td>Becoming an Independent Thinker</td>
<td>April Williams</td>
</tr>
<tr>
<td>11</td>
<td>Exploring Native Culture in the Amazon</td>
<td>Matthew Ruggirello</td>
</tr>
<tr>
<td>12</td>
<td>Studying Culture Through Acting</td>
<td>Meghan LaRocca</td>
</tr>
<tr>
<td>13</td>
<td>Conducting Community-Based Research</td>
<td>Shelena Johnson</td>
</tr>
<tr>
<td>14</td>
<td>Standing on the Shoulders of Giants</td>
<td>Sonia Singh</td>
</tr>
<tr>
<td>15</td>
<td>Learning Life Lessons from Microbial Communities</td>
<td>Tanya Grancharova</td>
</tr>
<tr>
<td>16</td>
<td>LUROP Fellowships and Scholarships</td>
<td></td>
</tr>
</tbody>
</table>
Creating Social Change in Chicago

Research with a Chicago-based youth mentoring organization has helped Grace Sutherland reaffirm her dedication to social work.

Changing society is a challenging yet rewarding pursuit, a lesson Grace Sutherland learned while conducting research with the Chicago Economic Mentoring Program, an initiative that provides mentoring to male youth in the juvenile justice system and empowers them to make positive choices regarding their academic and financial futures. Working with the youth and their mentors and witnessing their life-changing relationships inspired Sutherland and reinvigorated her passion for social work.

“Changing our society to promote and foster equality is a difficult, time-consuming task,” says Sutherland. “In spite of this, however, I have reaffirmed within myself that this task is essential.” The research experience also helped strengthen Sutherland’s desire to continue her social-work education in a masters-level program.

As a Provost Fellow, Sutherland not only gathered and recorded data for the Economic Mentoring Program but also worked with the project director on the program’s broader goals. Through the practical field experiences, she learned about the inner workings of nonprofit organizations.

“The best part about my research experience was that I really got to see all levels of the process and execution of the research,” she says. She also was able to take ownership of the learning experience by applying her findings to other projects she is working on. Sutherland is leaving the experience with “a new-found understanding of what it means to recognize a problem and to try to address it in an evidence-based, ethical way,” she says.

Sutherland also found inspiration in the dedication of her faculty mentor, Dr. Julia Pryce, to the project. Pryce, an assistant professor in the School of Social Work, is “a great example and inspiration to a new social worker in the field like me,” says Sutherland, noting that Pryce supports the project “even when the going gets tough.” Pryce affirms that Sutherland, too, is “very committed to her work and to contributing to social change at a broader scale.”

Immersing oneself in the research is important, notes Sutherland, but so is stepping back to understand how the “project fits into the broader scope of your department, your field, or your world.” In taking a critical view of the Economic Mentoring Program’s larger impact, Sutherland observes that it “builds on Loyola’s mission to address the injustices in our communities. Providing helpful resources to underserved populations is one of the most obvious ways that we can address injustice in our communities and in Chicago.”

Analyzing Social Justice in the Maghreb

A passion for social justice led Chet Jechura to research the constitutional guarantees of women in the Maghreb region of Africa.

For Chet Jechura, exploring social justice issues isn’t a choice; “it is intrinsically in who I am as a person.” That passion motivated him to embark on a three-week field-research trip to Tunisia. There, Jechura grew mentally, intellectually, and spiritually as he studied the constitutional guarantees of women living in the Maghreb region of Africa.

“Women need to be respected around the world,” says Jechura, who hopes his research will help Loyola and the Gannon Center for Women and Leadership draw attention to the significant injustices occurring in North Africa. Despite the prevalence of such injustice, there is reason for hope. “Tunisia is working hard to liberate itself through democratization,” he says. The most far-reaching gender-related reforms in the Maghreb have taken place in Tunisia.

A political science and philosophy double major, Jechura integrated his academic and research interests with Loyola’s focus on social justice and service to humanity. “Academic rigor and service for and with others are two important components of St. Ignatius of Loyola’s vision for what education ought to be,” says Jechura. “This experience has enabled me to engage in an academic pursuit that simultaneously allows me to remain true to the quest for social justice at home and abroad.”

Jechura found the research and travel experience transformative as he gained a greater awareness of himself and of other cultures. “I grew as an entire person,” he says. Jechura was able to appreciate the “beauty of religion” in Tunisia and witness the Islamic call to prayer five times each day. “It was very important for me in growing in my awareness of universal humanity,” he says, adding that he would like to return to the region.

Through conducting his research project, Jechura also developed a close relationship with his faculty mentor, Dr. Peter J. Schraeder, a professor in the Department of Political Science, who helped guide the project while encouraging Jechura to take ownership of it. Schraeder adds that he gets real enjoyment from seeing the “fresh and unique perspective” that students like Jechura bring to his own research interests.

Every Loyola student should consider pursuing their personal interests through a research project, advises Jechura, who was the recipient of a Rudis Fellowship. Research enabled him to apply the skills he learned in the classroom to tackling larger social questions.

“Research can be an incredible, exhilarating experience, especially if you are researching topics that really interest you,” says Jechura. “The frontier of intellectual inquiry is vast and without end, and there is always more to seek and discover.”
Collaborating to Improve Education

An effective partnership helped students Kathryn Nolan and Lauren Parente learn not only from the research at hand but also from each other.

The ability to work together and share learning experiences helped Kathryn Nolan, Lauren Parente, and their faculty mentor, Dr. Leah Bricker, enrich their individual research investigations. The three formed a close, collaborative relationship while furthering Bricker’s study of students’ science and technology learning experiences.

“I think the collaboration aspect of this project made it really special,” comments Nolan. “The opportunity to collaborate with a classmate and fellow student teacher was quite unique, and I can’t imagine having completed this project without her support,” Nolan says of Parente, with whom she spent hours working on the project.

Likewise, Parente enjoyed sharing ideas with Nolan. Despite focusing on distinct aspects of the project, teamwork helped each student prepare her analysis and successfully present the findings at the Illinois Science Teachers Association’s annual conference.

Working closely with Bricker, an assistant professor in the School of Education, was a tremendous opportunity for the two, says Nolan. Bricker not only helped the students foster connections with other professionals in the field but also introduced them to advanced research methods and analysis techniques.

Indeed, Parente feels that she developed a unique relationship with Bricker by working with her on the research project “that I would not have had if I had just taken her class.” Partnering closely with her professor allowed Parente to learn about what interested Dr. Bricker and how she conducted a large-scale study.

As special education majors, Parente and Nolan exist in different fields of education from Bricker, who focuses on science education. Coming from different backgrounds helped everyone learn more from each other, says Nolan. “Dr. Bricker was not only open to but also interested in learning more about special education practice from us,” she says, noting that Bricker often joked that she had moved Nolan to the science-teacher side of education. “The three of us have become quite interested in the intersections between special education and science education,” agrees Bricker.

The experience for Bricker meant conducting her research in a team setting. “Partnering with Kathryin and Lauren enabled me to form a functioning research group and make more progress on my research last summer than I would have without them,” says Bricker, adding that she hopes the two will be able to apply what they have learned during their Provost Fellowship to their future teaching careers.

Gaining Hands-On Research Experience in the Laboratory

Expanding classroom learning through hands-on laboratory research helped Conrad Ziembinski gain a greater understanding of microbiology concepts.

Conducting laboratory research has helped Conrad Ziembinski, a Mulcahy Scholar, expand his knowledge of microbiology and gain practical experience with many of the concepts and processes he learned about in the classroom. In class, students are often asked to remember the steps involved in a particular process for an exam, but in the lab, Ziembinski actually performed each of these steps and expanded on them to reach findings for his project. “It is one thing to sit in a lecture hall and learn about the results of past researchers and the techniques they used and another to actually dip your hands into the broad world of biology,” says Ziembinski.

Fascinated by molecular techniques and the endless possibilities they provide, Ziembinski investigated the ammonification and denitrification aspects of microbial cave isolates and how they have the capacity to employ the processes needed for survival in their environments. Conducting his research exposed Ziembinski to newer concepts and processes he learned about in his biology classes and outside the classroom, notes Ziembinski. “It has helped me become familiar with and hold a greater understanding of the concepts studied in my biology classes,” he says. Ziembinski had to develop modifications to the experiments throughout the course of his research, a process that increased his independence and ownership of the project.

Conducting lab research can also help students engage in Loyola’s community outside the classroom, notes Ziembinski. He developed a close relationship with his faculty mentor, Dr. Domenic Castignetti, a professor in Department of Biology. “I worked in Dr. Castignetti’s lab for over three years now, and I can definitely say that I have made a contact for life,” says Ziembinski. “He has mentored me through not only my research but many of my classes and questions regarding my undergraduate career,” he says, noting that he looks forward to staying in contact with Castignetti well past his years at Loyola.

Ziembinski acknowledges that researchers must make additional discoveries about the novel cave bacteria with which he worked in his project, and he hopes that the research he conducted at Loyola will help “pave the way for more and greater results in the hands of new students that will use my work to ask and answer future potential questions about these microorganisms.”
**Working Together**

In a pilot Graduate School program, graduate student Julie Longua mentored undergraduate Angie San Juan in research and in personal decisions.

While many colleges and universities keep graduate and undergraduate students separate, Loyola fosters mentoring relationships between them to the benefit of both groups, according to Julie Longua and Angie San Juan. The two developed a close partnership while working together on Longua’s social psychology research on self-esteem and romantic relationships.

Mentor relationships between undergraduate and graduate students “will make the community at Loyola stronger,” predicts San Juan. In working with Longua, “it wasn’t just the undergrad being a slave to the grad student,” she says. Instead, San Juan not only contributed to Longua’s project meaningfully but also received valuable personal and professional advice.

Working with faculty members can be difficult at times for undergraduate students because they may view them as authority figures, says San Juan. With a graduate student, “it is easier to be a team,” San Juan notes. “Angie changed many of my expectations about the type of work that undergraduates are able to do,” she says. “We worked well together and built a very special mentoring relationship that was both personal and professional.” Mentoring is a rewarding skill that develops over time, and it’s important to find a balance between challenging students to be their best while also boosting their confidence, says Longua.

Program participants meet frequently to discuss their projects and share their research experience. The group discussed the different paths to graduate school and the requirements needed to move forward on these goals. “I saw what my résumé would have looked like if I pursued my psychology interest or my biology interest. I saw what my CV needed to look like if I wanted to get to a higher level of education,” says San Juan, who is entering medical school in the fall and was able to apply what she learned to her interviews and classes.

San Juan credits the mentoring program with making her a happier person, because of the life lessons Longua taught in addition to the research. “If I didn’t have the graduate student who was really close to me and guiding me...I wouldn’t have been as confident in my decision-making,” she says. “I attribute my maturity level now in addressing my professional career to this program.”

**Mapping Human Chromosome 21**

Akadia Kachaochana’s lab research may one day contribute to solving the health problems associated with the human chromosome 21.

Akadia Kachaochana is working toward completing a map of a portion of the human chromosome 21, or HC21p. Although she is conducting research specific to one area of HC21p, Kachaochana understands that her contribution may enable others in the future to solve larger health problems associated with the chromosome, such as Down syndrome, leukemia, and Alzheimer’s disease.

“Working in the lab has helped me understand how important even the smallest research contribution will be some day,” says Kachaochana. “I feel that no matter how small someone’s part is within a research group, the compilation of the group’s work will, given enough time, help pave the way for future discoveries within the science community.”

Kachaochana first began working in the biology lab of Professor Jeffrey Doering, PhD, by observing others’ experiments and analyzing articles relevant to the work. She gradually began performing her own experiments and received a Biology Research Fellowship for her work.

“Performing experiments on my own has helped me take ownership of my learning experience,” Kachaochana says, explaining that she has to plan each experiment in advance, gather the necessary materials, and ensure proper timing of each stage of the experiment. Understanding how her individual experiments relate to the overall goals of the lab has been a key part of her education in the lab.

Juggling research, classroom work, and home life requires dedication and efficiency, abilities Kachaochana has improved throughout her time in the lab. “Gradually, I am beginning to develop better time-management skills, and this has helped me feel less overwhelmed by all the things an undergraduate student has to do,” she says.

Performing undergraduate research also has increased Kachaochana’s knowledge of professional opportunities. “I have become aware of the various careers and choices available to those who are passionate about dedicating their lives to research that will have significant impact on society,” says Kachaochana, who previously had thought the most relevant path for a person with a bachelor’s degree in biology was medical school. Other opportunities, such as Doctors Without Borders or MD/PhD programs, appeal to Kachaochana’s interest in combining research with her passion for helping others.

No matter which profession she chooses, Kachaochana knows her lab work has helped her greatly. “Being able to use the scientific method as a way to better understand observations about the world in general is an important skill to possess regardless of the profession I decide to pursue,” she says.
Becoming an Independent Thinker

April Williams discovered finding new answers to complex questions requires dedication and independent thinking.

Conducting research as a Carbon Scholar has helped April Williams learn how to work out complex scientific questions through trial and error instead of theoretically on paper. Researching for two years the number of mutations separating genetic sequences in both humans and Plasmodium falciparum, a parasite that causes malaria, has “made me more independent as a thinker, a better problem solver,” says Williams. “When you get projects in class, they are designed so you implement the right tools, so you come up with a pretty answer. That’s not the case when you perform primary research and try to find your own answers.”

Williams’ research merges concepts in computer science, biology, chemistry, and statistics, and much of her work has been experimental, explains Dr. Catherine Putonti, an assistant professor in the departments of biology and computer science and a faculty mentor to Williams. “She is able to identify connections and really evolve her research direction as she goes,” Putonti adds. Experimental research can be frustrating at times, but she says that Williams was able to learn and make discoveries. Despite challenges that may arise, Williams enjoys solving problems herself and taking ownership of her project. “In my lab, the projects are really about us,” she says. “If I hit a road block, I have to search the literature and find other ways of thinking about it or ways other people have used to get around a similar problem.”

The Carbon Scholars program has also provided Williams with unique opportunities to present her research to the scientific community and to network with other students and educators. Talking with scholars at conferences “helped me come up with good ideas for my project,” because others can provide details on specific aspects of the work. For example, “I don’t know much about the malaria parasite itself, but there are other people who do know about it and can offer more insight.” In addition to attending conferences and participating in poster sessions, Williams was the primary author on a paper published in an academic textbook.

“The experience definitely made me a stronger student and a better thinker… It’s given me a good basis in science, especially for moving on to graduate school.” She believes that having the opportunity to conduct her own research made her a stronger candidate in competitive graduate programs.

Exploring Native Culture in the Amazon

Matthew Ruggirello has built lifelong relationships with the Huaorani people.

In researching the cultural effects of globalization on natives in the Ecuadorean Amazon, Matthew Ruggirello found himself changed not only by what he learned but also by the relationships he developed with the indigenous people. What began in 2007 as research into eco-tourism has turned into a lifelong project, and “is something I am going to be doing beyond Loyola and for the rest of my life,” says Ruggirello, who has traveled to the Huaorani communities of Bameno and Bowanamo in Ecuador five times.

As a Mulcahy Scholar and Provost Fellow, Ruggirello has continued to document the Huaorani’s way of life and has witnessed how forces outside the communities, including tourism, expanding infrastructure, and nearby cities, have affected the native people’s culture. His first trip to the area required a six-hour trek across unpaved roads to access the river that brings outsiders to the communities. The same route took less than three hours during Ruggirello’s most recent trip because oil interests in the area paved the road to get oil out more easily. It was the “most noticeable and most disturbing” change, he says, describing the pace of expansion as “unbelievable.”

The personal relationships Ruggirello created with the Huaorani people have made him more aware of the “common threads that connect us as human beings” and forced him “to grow as a human and an intellectual,” he says, noting he speaks on the phone with members of the community frequently.

Ruggirello wants to continue helping the communities develop eco-tourism initiatives so they can earn revenue in a way that does not endanger the survival of their unique culture, and he intends to continue teaching others about the Huaorani after graduation from Loyola.

Ruggirello’s research provided Dr. Peter Sanchez, a professor in the Department of Political Science, with an opportunity to explore an area of Latin American studies he had not previously researched, and Sanchez has integrated Ruggirello’s research into his Latin American and international relations curriculum. “I have talked about his project in my classes since it shows how indigenous peoples have been affected by globalization and also points at some ways that they can preserve their cultures in the modern world,” he says.

Sanchez worked with Ruggirello to focus and shape his experiences into two research papers that investigated the potential benefits and consequences on tourism in the area and compared the budding Huaorani initiatives to others globally.

If eco-tourism is handled in the right way it could make the Huaorani independent of potentially negative Western forces, asserts Ruggirello. “I can’t just abandon them, because now they are my friends,” he says.
Studying Culture Through Acting

In researching acting methods in Rome and Beijing, Meghan LaRocca discovered a passion for international studies.

While pursuing her research goals, Meghan LaRocca learned a lot about how different cultures approach theater, which led to a broader desire to know more about other societies and to take a new academic path. Studying theater companies, acting schools, and actors near Loyola’s campuses in Rome and Beijing showed LaRocca that she loves “learning about other cultures, how the countries of the world interact and affect each other,” she says. The experience “has changed me in that I have a newfound hunger for travel and a passion for international studies,” which is now her minor.

LaRocca, a Ricci Scholar, based her research on the idea that acting is the study of culture, a concept frequently discussed by her mentor Jonathan Wilson, MFA, a professor of theatre. “As an actor, it is important to understand the cultural context of a character in order to more fully understand that character and why he or she acts a certain way,” she says.

When interviewing local actors and acting teachers, LaRocca examined each city’s culture from the perspective of a resident. She also examined “the actors themselves to see if their cultures and influences had given rise to different ways of approaching a role and trying to perform.” She compared their experiences with her own training in Loyola’s theatre department.

As the trip progressed, LaRocca was surprised to find that her own personal growth had become one of the most memorable aspects of her journey. Traveling abroad is a “powerful and wonderful experience,” says LaRocca. Balancing classes and research was challenging at times, but “I was forced to grow up, buckle down, and prioritize in order to get everything done,” she says. “What I learned was that I could, which was really empowering.”

LaRocca is proud of what she accomplished in Rome and Beijing, though she believes she only began to scratch the surface of exploring how culture affects the study of actor-training methods. “I wanted more time, to see more shows, do more interviews, add more countries,” she says, noting she now recognizes herself as a scholar because of the success of her research experience. LaRocca is sharing her inspiring experience with others and encouraging them to travel abroad as well.

Conducting Community-Based Research

Working closely with Chicagoland high school students helped Shelena Johnson better understand and appreciate their unique skills and stories.

In working on a community-based research project as a Center for Urban Research and Learning (CURL) fellow, Shelena Johnson uncovered the potential for success that exists in many high school students. As she taught seniors from Evanston Township High School how to identify and analyze social problems, the students taught Johnson about themselves and their abilities.

“The best part of it all is working with high school seniors who are just on the brink of college and seeing where their minds will take us each day,” says Johnson. The students “have begun to develop the analytical, research, and writing skills necessary either for college or their next steps in life, while inadvertently helping us to sharpen our own as we teach them,” she says.

Johnson had decided, before starting the project, that she wanted to pursue elementary education as a career because she felt high school would not be the right fit. However, after working closely with area high school students, her perspective changed. The experience “assisted me in realizing how awesome this age group is, in essence how far they can go with their learning and the different ways that they analyze and understand concepts,” she says.

Guidance from faculty such as CURL director, Philip Nyden, PhD, helped Johnson understand how the project addresses these issues. Working with her mentor, Joel Ritsema, a sociology PhD student, also helped her gain a larger understanding of the project and the social justice issues that drive it. Johnson feels that the project has been a life-changing opportunity to assist the students in spearheading policy change for their school and community.
Standing on the Shoulders of Giants

Sonia Singh is building on existing research to solve real problems in stream ecosystems and landfills.

Tackling a real-world problem requires understanding the existing research and asking new questions that can build upon it, says Sonia Singh, the recipient of a Center for Urban Environmental Research and Policy (CUERP) Fellowship. Exploring the effects of a popular prescription antibiotic on stream ecosystems helped Singh better understand how scientists create knowledge and reveal it to others.

“Standing on the shoulders of giants’ means you have to first learn all that has already been discovered before you can stand on top and ask new questions,” she says, adding she had previously not fully understood “how people came to research the really abstract and detailed questions.”

While this concept may seem basic to more experienced researchers, “it was a big revelation for me,” says Singh.

“The project is raising awareness of contaminants in natural resources and the problems they pose for humans and animal ecosystems. “Often, questions are valued based on direct human impact, usually human health, but investigating the net effects of our endeavors on the environment and other animals helps keep success in perspective,” she says. It also introduces research methods that others can use to monitor and regulate yet-uninvestigated contaminants.

“I learned patience with this process,” says Singh. “I came in wanting answers immediately, but I was forced to realize the energy that needs to be invested to really ‘learn to see’ something that is not directly obvious.” Singh’s research enabled her to learn how to ask questions and search for answers, a skill that is applicable to other areas of her life.

Singh’s work on the stream ecosystem project inspired her to help launch another CUERP initiative—a biogas project that is aimed at bringing an anaerobic digester to Loyola to reduce the amount of food waste going to landfills. To successfully inform administration about why the technology is a good investment, Singh first had to build a persuasive argument about why sending less food waste to landfills is important.

“We were teaching the administration how to see the impact of Loyola’s waste stream on landfills and the methane emissions,” she says. “I brought a lot to that project about the ways to make a strong case for stakeholders involved in your issue.”

Singh credits the CUERP Fellowship with developing her ability to make a real difference in environmental issues.

“I am very passionate about sustainability projects, and I found that the foundation of researching something I learned from this internship helped me to come up with ideas I am passionate about and try to implement them.”

Learning Life Lessons From Microbial Communities

One of the most important lessons Tanya Grancharova learned while conducting lab research is that failure is an integral part of good science. Grancharova researched microbial community composition in two projects, one investigating biosolids and the other looking at invasive cattails in the Indiana dunes. “I had this idea that you go into the lab, have a plan for what you are going to do, and you go and do it,” she says. “That’s not how science works.”

Grancharova discovered that lab work is not a linear process, and a scientist may end up working on a small aspect of a project for a month or even years. “The most important thing I learned is that failure is a part of doing science and being a scientist,” says Grancharova. “Rarely do scientists conduct an experiment once and complete it,” noting it is “unrealistic” to expect such outcomes.

Fortunately, scientists often have a community in which they can discuss projects and potential results. Grancharova’s mentor, Dr. John Kelly, an associate professor in biology, provided an independent learning environment but also ensured he was available to offer assistance when needed.

“I benefit tremendously from the energy and enthusiasm that undergraduate students like Tanya bring to our research projects,” says Kelly, adding he relies on talented undergraduates to conduct independent research projects much like graduate students do. Kelly also encouraged Grancharova to become involved in scientific symposiums.

Grancharova was able to present her research posters at symposiums alongside graduate students, faculty, and industry scientists. “The purpose of science is not just to do your research in the lab but actually let people know what you found,” she says. Presenting at the larger symposiums was a learning experience, because it was different than presenting at Loyola. “Usually, I need to explain the nitrogen cycle, but [the symposium attendees] know that,” she says, admitting to being a little nervous before speaking to an audience in her discipline.

In addition to teaching her about what it means to be a scientist, the research Grancharova is completing may have important ramifications on the environment in the future. For instance, the biosolids project looks at the application of biosludge, a byproduct of wastewater treatment, on soils and the impact on bacteria. “If biosludge can be recycled and used as a fertilizer, that would be a good thing,” she says.
LUROP’S FELLOWSHIPS & SCHOLARSHIPS

**Biology Research Fellows Program**

The Biology Research Fellows Program funds long-term independent research projects under the direction of a faculty mentor in the Department of Biology. Students work for two-three years on their projects during the academic year and in each of the intervening summers.

**Biology Summer Research Fellowship**

The Biology Summer Research Fellowship funds research projects with Department of Biology faculty. A ten-week commitment is required, and specific dates are negotiated with the faculty mentor.

**Carbon Scholars Program**

The Carbon Scholars Program offers a full two-year, interdisciplinary research opportunity for science and math majors to work closely with faculty mentors. This program is designed for students who plan to pursue research in graduate or professional schools.

**Center for Urban Environmental Research and Policy (CUERP) Fellowship Program**

The CUERP fellowship Program allows students to conduct interdisciplinary research projects focused on elements of ecosystem structure and function, impacts on human health, public policy, behaviors, and other environmental factors.

**Center for Urban Research and Learning (CURL) Fellowship**

The CURL Fellowship facilitates involvement of students in collaborative research projects with community-based organizations, social service agencies, health care providers, businesses, and government in order to improve the quality of life of all members of the Chicago community. Involvement in CURL can help students develop a foundation for future graduate programs, community development, or volunteer service.

**Mulcahy Scholars Program**

The Mulcahy Scholars Program is designed for College of Arts and Sciences majors in the sciences, who are interested in working on an individual project with a faculty mentor, serving as a research assistant, or engaging as a member of a collaborative research team to support ongoing faculty projects throughout the academic year.

**Provost Fellowship**

The Provost Fellowship is designed for undergraduate students in any academic discipline who are interested in either establishing an individual project with faculty mentorship or working as a research assistant with a faculty member on his or her ongoing research.

**Research Mentoring Program (RMP)**

RMP is designed to partner graduate students who are working on their dissertation research with undergraduates who are interested in participating in research. This summer program supports doctoral students, while providing an opportunity for undergraduates to learn more about graduate studies and graduate-level research.

**Ricci Scholars Program**

The Ricci Scholars Program is an innovative research and cultural immersion program organized around the theme of the meeting of East and West. The program awards scholarships for travel, research and exploration during a junior year of study divided between two of the world’s most important cities: Rome, Italy, and Beijing, China.

**Rudis Fellowship**

The Anthony and Mary Rudis Research Scholarship provides scholarships to students whose research focuses on the comparative study of constitutions, concentrating on the ways in which societies secure, or fail to secure, the rights of their citizens. Recipients of the scholarship will write a research paper during the academic year under the guidance of a faculty member.

**Women in Science Enabling Research (WISER)**

WISER is designed for undergraduate women seeking to explore research science, work closely with faculty, learn how laboratory work is conducted, and build a sense of community.

Questions regarding externally funded research at Loyola can be directed to:

**Office of Research Services**

1032 W. Sheridan Road • Chicago, IL 60660
Granada Center, Suite 400
773.508.2471 • ors@luc.edu
LUC.edu/ors

General information regarding undergraduate research at Loyola can be answered by:

**Loyola’s Undergraduate Research Opportunities Program (LUROP)**

Center for Experiential Learning • Sullivan Center
1032 W. Sheridan Road • Chicago, IL 60660
773.508.3366 • experiential@luc.edu
LUC.edu/lurop

We are Chicago’s Jesuit, Catholic University—a diverse community seeking God in all things and working to expand knowledge in the service of humanity through learning, justice, and faith.