FROM THE EDITORS

Spring Break is almost here! The semester is in full swing, and although most of us won’t be able to do much relaxing over the break, at least the days are getting longer. A few warm days have reminded us that winter is almost over, and all we can think about is printing off some articles to read while sitting outside in the sun. Of course, we won’t actually be able to do this for another month or so, but we can dream can’t we?

While most of us are dreaming of the sunny weather to come, there are others who are frantically scrambling to finish writing their dissertations so they can graduate at the end of this semester. We’d just like to remind you to keep an eye out for our fellow stressed out grad students and give them a hand when they need it. Make sure they are getting good meals, getting enough sleep, and whatever else helps them work as efficiently as possible. Also, keep an eye out for friend’s defenses and go to as many as possible. Nothing gives a graduate student confidence like seeing a room full of their friends!

Cheers,

Ryan Alberdi, Andrew Schranck, and Dave Burney, Newsletter editors
ANNOUNCEMENTS

Annie Mattingly published a paper in February titled *Multiple environmental factors influence the importance of the phosphodiesterase DipA upon Pseudomonas aeruginosa swarming* in the journal *Applied and Environmental Microbiology*.

About a dozen students from the Nerenberg, Doudrick, and Bibby labs attended the Association of Environmental Engineering and Science Professors Distinguished Lecture Conference at Purdue University on Friday, February 2. Several students presented during the poster session.

Nunzia Pirro, Tianze Peng, and Karina Soto Rivas attended the Ocean Science Meeting held February 11-16 in Portland. Nunzia delivered a talk titled *Formation mechanism of Anticyclonic Eddies South East of Sri Lanka during Summer Monsoons*. Tianze presented his poster titled *Physical Mechanisms and Influence of Sea-Spray on the Air-Sea Heat Fluxes* at the conference. Last January Karina won a scholarship to assist her in completing her double degree between Notre Dame and the Catholic University of Chile. This funding came from CONICYT, which is a Chilean national commission for science and technology.

Keith O’Connor was awarded the Rapid Exposure to Advanced Computation Training (REACT) Program scholarship through Notre Dame’s Genomics and Bioinformatics Core Facility in February. REACT is a short-term initiative to support graduate students to receive the latest training in computational tools and techniques in their field. This will help fund a nationally recognized two-week summer isotopes in spatial ecology and biogeochemistry course at the University of Utah that he plans to attend this year.

For anyone interested in the new leadership and ethics program being solicited right now by the Graduate School called *Leadership Advancing Socially Engaged Research (LASER)*, Tianze Peng (tpeng2@nd.edu) Andrew Schranck (aschranc@nd.edu) and Monika Arul (aruljayachandran.1@nd.edu) are currently participants in the final cohort of the parent program *Ethical Leaders in STEM*. They would be happy to answer any questions for those interested in applying for the program.
**Pi Day 5K**

Consider volunteering with the annual Pi Day 5K on campus to support science, engineering, fitness, pie, and South Bend youth programs all in one fun-filled day. Check out the website for more information ([https://awis.nd.edu/piday5k/](https://awis.nd.edu/piday5k/)). The event is on March 10 so the event can be on a weekend, but the race does start at 3:14 pm.

**Call for Newsletter Contributors**

Two of the three CEEES Grad Student Newsletter editors are moving on to bigger and better things! Andrew Schranck and Ryan Alberdi have their eyes set on graduation and need to pass off their Newsletter duties to new editors.

The Newsletter editors are strong believers in the value of news, especially the effect CEEES grad student news has on one another. The Newsletter is a space where everyone can catch up on each other’s accomplishments amidst the busy lives grad students lead. The Newsletter is also a great way for grad students to get involved in the department and gain perspective and exposure in the CEEES department.

The Newsletter editors are eagerly searching for students with 1-2 hours a month to contribute to the sustainability of this publication, to continue to provide CEEES grad students with updates and news many months, semesters, and years into the future.

If you are interested in contributing your time and talent to making this publication a success, contact Andrew Schranck, Ryan Alberdi, or David Burney for more information. Their contact info is listed at the end of the Newsletter.
GRADUATE STUDENT UNION (GSU) UPDATE

The most recent council meeting for the GSU took place on Thursday, February 22 in the new Duncan Student Center. Here is your monthly overview of the meeting and all things GSU. The next meeting will be on Thursday, March 22 at 6:30 pm in Room W210, Duncan Center.

- If you have any questions, concerns, or information about anything GSU, reach out to your department rep, Andrew Schranck (aschranc@nd.edu) and let him know!
- You can also submit questions and concerns to the GSU executive board or to gsu@nd.edu for concerns to be brought to the council anonymously.

Council Meeting Notes

- Connie Morrow (cmorrow@nd.edu) from University Health Services - spoke about the Aetna Health Care Plan for students. Connie is very resourceful and helpful for any students who have questions or financial hardships and encouraged those students to contact her. A summary of the FAQs is being developed and will be shared with graduate students via representatives and through the GSU website.
- Mark Bourgeois, Postdoctoral Research Associate, Dean’s Office, Graduate School, spoke about the LASER Program. (Leadership Advancing Socially Engaged Research). For more information & to apply: graduateschool.nd.edu/laser
- If interested in becoming a part of the GSU Executive Board for 2018-2019, please see the nomination petition form. Or email gsu@nd.edu with questions.
- Teaching Awards 2018: Submit applications to gsu@teachingaward2018@gmail.com by Friday, March 30. Win $300 for Outstanding Graduate Instructor & Teaching Assistant; $100 for Honorable Mention. For more information, visit gsu.nd.edu
- Dani Green spoke about a community group interested in reproductive health. Her contact info is danigreen41@gmail.com
- 3MT Website has recently been updated. 3mt.nd.edu
- Looking for an Orientation Chair to assist with 2018-2019 Grad Student Orientation & planning process. Position runs April thru October & applicants need to be on campus during the summer. Applications must be received by March 9. Interviews to follow shortly after. Send application (short word doc, ~250 words) indicating interest in position & applicable skills to gsu@nd.edu.

Upcoming Events

- (tentative) March 24: Brewery Tour, details forthcoming.
- (tentative) April 20: Charity Gala, details forthcoming.
Andrew Schranck is a 4th year Environmental Engineering PhD working in Dr. Kyle Doudrick’s lab. Andrew’s dissertation will focus on inorganic catalysts and electrochemical cells for wastewater treatment. He is currently investigating the interaction of nickel-based catalysts with urine compounds to improve electrooxidation of urea \( (\text{CO(NH}_2\text{)}_2) \), the primary constituent in urine.

The motivation for his work comes from the burden placed on wastewater treatment plants by nitrogen compounds. These compounds impact aquatic ecosystems in the form of eutrophication—which can lead to algal blooms and hypoxic zones—and groundwater contamination—which poses drinking water concerns, especially for babies. Further, wastewater treatment plants face long reactor retention times to treat nitrogen compounds. Urine accounts for 1% of all wastewater volume but up to 80% of the nitrogen content. Typical approaches to improve nitrogen treatment involve preventing urine from entering the wastewater stream and treating it separately. Andrew seeks to produce energy from urine by electrochemically transforming urea into nitrogen \( (\text{N}_2) \) and hydrogen \( (\text{H}_2) \) gases. Nitrogen gas is inert and makes up over 70% of the air you breathe, while hydrogen can be used as a clean burning energy source.

Specifically, Andrew is investigating the interfacial interaction of nickel catalysts, like \( \text{NiCo}_2\text{O}_4 \), on various electrode substrates, such as conductive glass and carbon paper, to better understand how urea behaves with the catalyst surface. He uses analytical chemistry to investigate the behavior of urea in the presence of urine constituents. With techniques like cyclic voltammetry and chronoamperometry, he can understand how applying voltage to his electrodes impacts the transformation of urea into inert gases and hydrogen. Along with catalyst and electrode substrate variability, he is investigating the effects of pH, electrolyte selection, and urine constituent concentration on reactor process performance. Recently he has collaborated with his lab mate Randy Marks to use a technique called in-situ attenuated total reflectance Fourier transform infrared \( (\text{ATR-FTIR}) \) spectroscopy. They use ATR-FTIR to understand the way urine constituents interact with \( \text{NiCo}_2\text{O}_4 \) by identifying the nature of the bonds formed as the two interface. The intended long-term impact of this work will be full scale application of electrochemical urea oxidation cells that reduce the time, space, and energy required for wastewater treatment.

Andrew has presented his research at conferences sponsored by the Association of Environmental Engineering and Science Professors \( (\text{AEESP}) \) and the International Water Association \( (\text{IWA}) \). He is currently preparing a manuscript for publication and for his oral candidacy exam. Andrew has been supported financially by the Air and Waste Management Association \( (\text{AWMA-LMSS}) \) and the NCAA Postgraduate Scholarship. After graduating, he hopes to put his water chemistry and treatment wisdom to use in the private sector while pursuing a professional engineer’s license and eventually working on projects around the world.

Links: Doudrick.info, https://goo.gl/cyQs4C
GROUP SPOTLIGHT

Dr. Clive Neal – The Neal research group consists of PhD students Karl Cronberger, David Burney, and Mike Torcivia, as well as undergraduate researchers Aleks Gawronska, Hannah O’Brien, Donald Welsh, Patrick Berneski, and visiting undergraduate Rodrigo Schmitt. The main goals of the Neal research group are to investigate the evolution of the Moon using modern petrologic and geochemical techniques applied to samples gathered during the Apollo Missions. The Moon was formed through a Giant Impact of a Mars-sized body (named Theia) and the early Earth. The material that was ejected coalesced into a mostly, if not entirely, molten ball which is called the lunar magma ocean (LMO). As the Moon began to cool, minerals began to grow and subsequently sink or float based on their relative density. These minerals preserved the geochemical signature of the LMO during the time of their formation. David’s research focuses on rocks that are derived from partial melts of the mineral phases that sank. These rocks are basalts that erupted onto the surface of the Moon and carry with them geochemical signatures of the lunar mantle. The suite of elements David is measuring are deemed “moderately volatile” and record high temperature differentiation events (i.e. degassing) that occurred in the LMO. Mike’s research focuses on the minerals that floated to the surface of the LMO to form the white lunar crust. These rocks formed very early in the LMO history and have provided some of the benchmarks of geologic age dates of “when the Moon formed”. One caveat to these samples is that they have been exposed on the lunar surface for billions of years, and with no atmosphere to protect them, they have been bombarded by meteorite impacts for that entire time. Mike has found that samples previously labeled pristine are anything but, and the geologic dates derived from them are not quite so simple to interpret. Karl studies the last dregs of the LMO which is unusually enriched in elements that do not like to be incorporated into the crystallizing mineral phases such as potassium (K), Rare Earth Elements (REE), and phosphorus (P). These rocks have been aptly named KREEP, and those with a KREEP-like signature are officially defined as KREEPy. The exact mechanisms that occur for a magma to create these distinct geochemical signatures has long been a mystery, but Karl has been able to use geochemical evidence to model a crystallization sequence that results in a KREEPy rock.

The undergraduate research involves the physical mechanics of crystallization and the ability to quantify the resulting textures. The quantification is called crystal size distributions (CSDs), and they are valuable in the lunar community because they are a non-destructive form of data collection. The relation of the size of the minerals within a rock, to how many of those sized crystals are present, can show if the rock was the result of an eruption of magma that originated from within the Moon, or if it formed from re-melting a pre-existing rock through an impact. The method has shown to work, but it is time consuming to gather the data as >250 crystals need to be hand traced for each sample. The undergraduates are helping to expand the CSD database across the entire lunar sample compendium.

Lab link: https://engineering.nd.edu/profiles/cneal
# THE GRADUATE SCHOOL – SCHEDULE OF DEADLINES

<table>
<thead>
<tr>
<th>Event</th>
<th>Fall 2017</th>
<th>Spring 2018</th>
<th>Summer 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching assistant list submitted to Graduate School</td>
<td>Aug. 20</td>
<td>Jan. 4</td>
<td>—</td>
</tr>
<tr>
<td>First class day</td>
<td>Aug. 22</td>
<td>Jan. 16</td>
<td>Jun. 18</td>
</tr>
<tr>
<td>All course changes</td>
<td>Aug. 29</td>
<td>Jan. 23</td>
<td>—</td>
</tr>
<tr>
<td>Initial graduation list available in GradAdmin (Registrar)</td>
<td>Sept. 5</td>
<td>Jan. 30</td>
<td>Jun. 26</td>
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<tr>
<td>Fall/Spring break begins</td>
<td>Oct. 14</td>
<td>Mar. 10</td>
<td>—</td>
</tr>
<tr>
<td>Course discontinuance</td>
<td>Oct. 27</td>
<td>Mar. 23</td>
<td>—</td>
</tr>
<tr>
<td>Preliminary theses/dissertations submitted for formatting check*</td>
<td>Nov. 6</td>
<td>Mar. 5</td>
<td>Jun. 11</td>
</tr>
<tr>
<td>Thanksgiving break begins (Wed. – Sun.)</td>
<td>Nov. 22</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Easter break begins (Fri. – Mon.)</td>
<td>—</td>
<td>Mar. 30</td>
<td>—</td>
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<tr>
<td>Master’s comprehensive examinations &amp; PhD dissertation defenses**</td>
<td>Nov. 20</td>
<td>Apr. 3</td>
<td>Jul. 2</td>
</tr>
<tr>
<td>Final theses/dissertations submitted to Graduate School</td>
<td>Nov. 27</td>
<td>Apr. 9</td>
<td>Jul. 9</td>
</tr>
<tr>
<td>All admission to candidacy forms submitted to Graduate School</td>
<td>Dec. 4</td>
<td>Apr. 12</td>
<td>Jul. 16</td>
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<td>Last class day</td>
<td>Dec. 7</td>
<td>May 2</td>
<td>Jul. 27</td>
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<tr>
<td>Final exams begin</td>
<td>Dec. 11</td>
<td>May 7</td>
<td>—</td>
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<tr>
<td>Graduation date (official degree conferral)</td>
<td>Jan. 7</td>
<td>May 19</td>
<td>Aug. 5</td>
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</tbody>
</table>

*Formatting checks should be submitted to the Graduate School when the document is given to readers, at least two to four weeks prior to the defense.*

**Reader’s reports must be submitted to the Graduate School at least two days before the defense takes place.**
NEWSLETTER CONTACTS

If you wish to include or contribute news items for the next issue of the newsletter, please contact one of the editorial members below:

Ryan Alberdi, PhD student, Ryan.A.Alberdi.1@nd.edu
David Burney, PhD student, David.C.Burney.2@nd.edu
Andrew Schranck, PhD student, Andrew.F.Schranck.1@nd.edu
Mollie Dash, Department Administrator, dash.1@nd.edu