



American Nuclear Society
University of Illinois

Samuel Glasstone Award Submission

Assembled by the 2018-2019 Executive Board:

Special Thanks To:

Jacob Tellez		<i>President</i>
Kelsey Luo		<i>External Vice-President</i>
Katie Butler		<i>Internal Vice-President</i>
Maxx Villotti		<i>Treasurer</i>
Jimmy Shehee		<i>Secretary</i>
Alex Fanning		<i>Public Relations</i>
Isabella Iaccino		<i>Outreach</i>
Adam Pichman		<i>Social Chair</i>

Special Thanks To:

Rizwan Uddin		<i>Department Head</i>
Kathryn Huff		<i>ANS Student Section Advisor</i>
Becky Meline		<i>Coordinator of Academic Programs</i>
Barbara J. Russell		<i>Administrative Aide</i>
Susan Mumm		<i>Media Specialist and Coord. of Alumni Relations</i>
Hannah Stites		<i>Office Support Associate</i>
Grace Witmer		<i>Office Support Specialist</i>



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1 Introduction

The University of Illinois student section of the American Nuclear Society (ANS-Illinois) has continued to build on the successes of previous chapters. Despite stagnant enrollment within the Department of Nuclear, Plasma, and Radiological Engineering (NPRE), our student section has maintained or slightly increased chapter participation and involvement. ANS-Illinois has done this by (1) continually building a foundation of active freshmen and sophomores who are passionate and will remain engaged throughout their academic careers; (2) expanding our involvement to other departments and student groups; (3) ensuring that chapter events are meaningful to the community with which we interact and our members; and (4) creating a friendly, welcoming environment that is enjoyable for new and seasoned members of our organization.

Despite restrictions placed on the NPRE Department by the University of Illinois on how it can support student events and travel, ANS-Illinois has been able to improve on its yearly event schedule. Our chapter has not only maintained but expanded our outreach events to high schools across the country as well as local schools. Our chapter also managed to meet with professionals from nearly every field of nuclear science, a first for our chapter. In addition, ANS-Illinois brought 29 students to the 2019 ANS Student Conference, consistent with last year but low for the past several years, and managed to return with five presentation awards. Last year, ANS-Illinois supported the very first WiN-Illinois chapter which has proven to be a fruitful relationship for both parties as members from each got to seek professional opportunities and attend trips between the two organizations.

Chapter involvement has steadily continued from last year, with 52 active members, 6 of which being graduate students. The involvement of underclassmen and new members this year has been at an all-time high. The majority of our organizational turnout can be contributed to the number of involved underclassmen that have supported our events this year. Likewise, we have seen an increase in the number of non-nuclear students in ANS-Illinois, including students from physics, engineering physics, pre-engineering, and a few with undeclared majors. Though this turnout has been wonderful to see, ANS-Illinois continues to expand our involvement to many more majors, not limited to those in STEM, and will continue to pursue this goal.

Additionally, we have seen what may be a record number of visits from industry professionals. ANS-Illinois has also been working hard to modernize the organization. Full-time adoption of Slack, a serious website-makeover, and electronic attendance mark the beginning of the new, revamped ANS-Illinois that will thrive in years to come.

ANS-Illinois has demonstrated incredible growth and tenacity for improving the community, despite funding challenges. Our chapter has achieved remarkable successes in the past year, earning prestigious recognitions for both our members and faculty advisor despite being one of the smallest engineering organizations (and majors) at the University of Illinois. We hope you value the fruits of our labor as much as we do, and that you consider our chapter for the honor of winning the Samuel Glasstone Award.

2 Section Management

At the core of any strong ANS student section is its leadership. The ANS-Illinois executive board included students from nearly every stage of their academic career (sophomores, juniors, and seniors) and students from every concentration in the Nuclear Engineering program at the University of Illinois (Power, Plasma, and Radiology). The diversity of school year and concentration allowed this year's board to provide meaningful events for general members and give a voice to most everyone represent in the ANS-Illinois chapter. This year's board was extremely dedicated to maintaining a strong presence in public outreach, being good nuclear advocates, and providing many diverse opportunities to our members.

This section details the leadership of our student section and the interaction we have with the Department of Nuclear, Plasma, and Radiological Engineering and the College of Engineering at the University of Illinois. Without these crucial elements, the student section would not see the success that it has over the course of the last year.

2.1 Executive Board

The ANS-Illinois executive board consists of eight positions, each with their own unique duties as seen in the chapter constitution. Each board member and their role may be found below. Note that ANS-Illinois found leadership in two Internal-Vice Presidents this year, each acting for one semester.

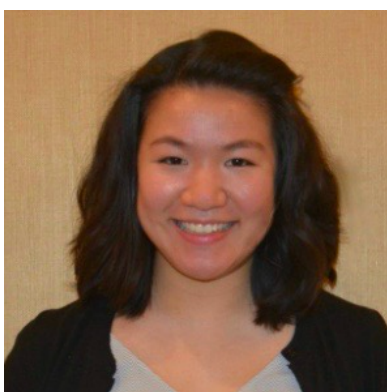


Figure 1: *2018-2019 ANS Executive Board. Courtesy of University of Illinois Engineering Council*



Jacob Tellez
President

Jacob is a senior, studying Nuclear Engineering with a concentration in Power, Safety, and the Environment, and is pursuing a minor in mathematics as well. His interests lie primarily in research surrounding the use of Lie groups to construct differential-difference invariant schemes and applying findings to power generation technology. Jacob enjoys a number of hobbies outside of school such as rollerblading, hiking, mountain biking, and playing Pokemon GO. Most of all, he is excited to see the ANS chapter thrive in the upcoming months.



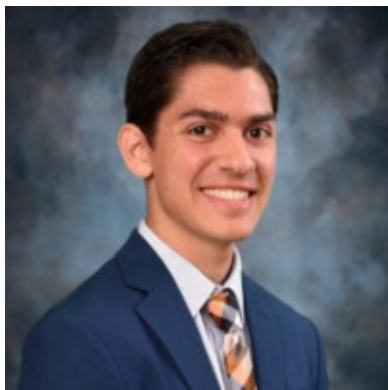
Kelsey Luo
External Vice-President

Kelsey Luo is a current Junior in the NPRE department's radiological concentration track. She is also pursuing a mathematics minor and certificates in data science, computational science and engineering, and arms control and domestic and international security. She previously served as the chapter's Treasurer for the past 3 semesters, but she is now excited to be a bigger part of the organization this year serving as the External Vice President. When not preoccupied with classwork or ANS events, she enjoys playing volleyball, volunteering, and eating all kinds of food.



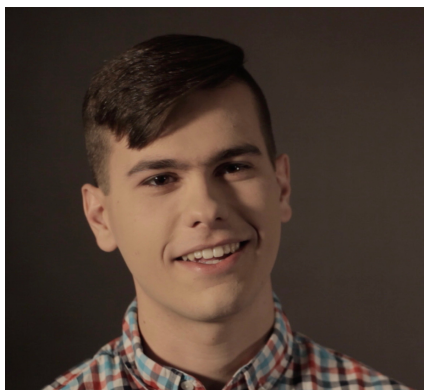
Katie Butler
Internal Vice-President
(Fall 2018)

Katie is a junior in NPRE with a concentration in Plasma Physics and Fusion Sciences. She is also a research assistant at the Center for Plasma Material Interactions where she works with liquid metals. She is also a member of the trombone section in the Marching Illini! Outside of school she likes to watch Netflix, cruise YouTube, and take naps.



Dario Panici
Internal Vice-President
(Spring 2019)

Dario Panici is a junior in the Plasma and Fusion Science concentration, and is also pursuing a minor in Physics. He is interested in computational research in plasmas, especially anything relating to fusion research such as modelling plasmas in fusion systems. Dario was in London studying abroad in the fall semester, but is excited to be back at UIUC this spring and take over the Internal Vice Presidency from Katie. Outside of ANS, Dario is a teaching assistant for the plasma and fusion science course NPRE 421. When not studying or doing homework, Dario enjoys playing soccer, getting beat by his friends in Super Smash Bros., watching Friends on Netflix, and cooking beautiful Italian meals.



Maxx Villotti
Treasurer

Maxx is a senior in NPRE focusing on power, safety, and the environment. He is also receiving a certificate in global security through the university's Arms Control and Domestic and International Security program (ACDIS). Maxx also serves as the vice president of the ACDIS Security Studies Group and is a teaching assistant for the University's nuclear arms and arms control course. Outside of the nuclear world, Maxx is the president of the Illinois Congressional Debate Society and enjoys reading, lifting, and playing video games.



Jimmy Shehee
Secretary

Jimmy is a Sophomore in the Pre-Engineering Program. He plans to transfer into the NPRE program before the Spring semester, with a concentration in power, safety, and the environment. Jimmy is also the President of Illini Venturing, and is pursuing a minor in leadership studies. In his free time, Jimmy enjoys cycling, camping, and playing video games. His apartment features a variety of plants, and a pet snake.



Alex Fanning
Public Relations

Alex Fanning is currently a junior in the power concentration of Nuclear, Plasma, and Radiological Engineering. Inspired by a trip to Argonne National Lab when she was younger, she joined NPRE because of her interest in nuclear science and the future of the nuclear industry in the United States. Outside of class, Alex likes to spend her free time reading books, biking, taking naps, volunteering, and exploring. She really enjoys being involved with campus activities and loves being a member of ANS!



Isabella Iaccino
Outreach

Isabella Iaccino is a junior in the Plasma and Fusion Science concentration. She has an interest in surface modification applications of plasmas, and is a member of the Radiation Surface Science and Engineering Lab. Isabella loves teaching children about STEM and leading them through fun activities to engage and educate them. In addition to being the outreach chair of ANS, she is also an Engineering Ambassador for the College of Engineering. In her free time, Isabella likes to watch she had more free time and she watches vine compilations on YouTube. She loves dogs and cheese and anything Star Trek related.



Adam Pichman
Social Chair

Adam is a senior, studying Nuclear Engineering with a concentration in Power, Safety, and the Environment. He is pursuing a minor in business as well. This exceptional young man is not only a vital member of this executive board, but also an active member in his fraternity, Alpha Kappa Lambda. He takes pride in the fact that he works his hardest during the day so that he can retain his social life at night. Adam enjoys working out, dominating his Fantasy Football League, and spending time with his friends and family. Most of all, he is excited to create a more welcoming environment within ANS, instilling life long friendships among all members.

2.2 Committees

2.2.1 Outreach Committee

The Outreach Committee, initially begun during the 2017-2018 academic year, has since become an integral part of ANS-Illinois operations. This committee is overseen by the Outreach chair and maintains responsibility for planning, preparing for, and executing the majority of our public outreach and education events. The committee has successfully planned and executed many of our events including Nuclear Science Week (locally), Boy Scouts Nuclear Merit Badge, Engineering Open House, and other public school education days. The committee mostly consists of underclassmen being that this committee has (to some extent) taken the place of our Underclassman Round Table; though, the committee continues to see significant involvement from upperclassmen and the occasional graduate student.

2.3 Faculty Advisor & The University

ANS-Illinois is lucky to have a fantastic relationship with our department and faculty advisor. Professor Katy Huff, our faculty advisor, stays up to date with our chapter and attends many of our events, despite her busy schedule. Our students have the opportunity to interact with her often at our weekly happy hour, general meetings, and more. In addition, she always keeps her door open so that the chapter has the opportunity to seek advice, whether it be for professional or section management topics. She has been an integral component in increasing the student voice within the department and pushing our chapter to construct a proposal for the 2021 ANS Student Conference. Her dedication to the ANS-Illinois, the Women in Nuclear at Illinois (WiN-Illinois), and the students of this university is best shown by her receipt of the Stanley H. Pierce Award from the University of Illinois College of Engineering. This award is given to a nominee who has worked hard to develop empathetic student-faculty cooperation, and requires the recommendations of several students and peers. She is truly an outstanding advisor. Professor Huff continually pushes our chapter to better ourselves and achieve higher than ever before. The ANS-Illinois would not succeed as it has without her.

Our chapter also maintains a strong relationship with the NPPE department at Illinois. Many events are co-hosted with the department, such as seminars, luncheons with industry representatives, and the annual awards banquet. Historically many of our off-campus events were funded by the NPPE department; however, due to budgetary restrictions this has been reduced in the past year. Despite this, the department has continued to support us in every way possible.

Finally, our student section is recognized as an official registered student organization (RSO), both at the University level, and the College of Engineering level. Our chapter is eligible to obtain funds from a pool of money set aside by the Student Organization Resource Fee (SORF) at the University level, while we can also obtain funds from Engineering Council at the College level. Being registered at these levels also enables the chapter to participate in events that allow us to advertise our society throughout the year. Additionally, being a good-standing RSO of Engineering Council allows the chapter to make use of special events and awards given out by the College of Engineering that help with educational outreach and recognizing our members.




Figure 2: *ANS-Illinois Faculty Advisor Kathryn Huff*

3 Operations & Management

3.1 Weekly Executive Meetings

Every Sunday our chapter holds an executive board meeting. This meeting was used to brainstorm new events, delegate tasks, keep up to date on what each board member is doing, and recap events that happened in the previous week. An agenda (meeting notes) is made and edited for each meeting and often keeps a list of To-Do's for each member. This agenda is kept in a Google Drive owned by the ANS-Illinois and shared such that every member of the executive board can view and edit the meeting notes before, during, and after meetings. An example of the meeting notes can be seen at the right. Agendas are typically modified by the secretary. These meetings are open to the general body and are attended mostly during the weeks leading up to elections by prospective executive board applicants. Professor Huff, our faculty advisor, occasionally attends as well to update herself with our progress or to update us with special news.



American Nuclear Society
University of Illinois

Weekly Exec Board Meeting

01/13/2019

Convened: 18:01
Adjourned: 19:01

Upcoming Events:

1. **Dr. Ge Yang (Assistant Professor - Dept. of NE @ NCSU)**
 - a. Will be re-visiting during the spring (January 29th)
 - i. Do people need to RSVP?
 1. Don't know - talk to Hannah
2. **(All) How is attendance going?**
 - a. General meeting attendance
 - b. Professional Events
 - c. Outreach Events
 - d. Ways to improve
3. **(All) Goals for the year.**
 - a. Jacob wants more outreach. That's the name of the game.
 - i. School visits
 1. See previous meeting notes for details.
 - ii. Visit to government to advocate for nuclear
 1. National goes to D.C., we may go to Springfield
 - iii. STEM trivia night - collab with other RSO
 1. See previous meeting notes for details.
 - iv. Outreach committee
 1. Expand membership
 2. Committee has say in Exec board's decisions?

Figure 3: *Example agenda from an executive board meeting.*

3.2 Weekly General Meetings

General meetings were held on a bi-weekly basis, aside from irregularities caused by mandatory school closure for Fall, Winter, and Spring break. The regularity of meetings helped to improve turnout over past years. Outside of email and social media communication, meetings were used as the most direct method to communicate information to the general body. Additionally, meetings were found to be the primary method of acquiring new members, as this was typically the first even they would attend whether it be the beginning, middle, or end of term.

Each meeting had a presentation which was made available online (via the weekly newsletter and our website) for members who were unable to attend. Meetings were generally streamlined to provide the most important information relevant to members. This helped reduce wasted time at meetings and increased the value of attending general meetings. Meeting slides consist of a brief summary of upcoming events and their dates for members who cannot stay the entirety of the meeting, followed by a more thorough description of each event. This acted as a method for students to ask questions about

events. These brief discussions at meetings were especially helpful when preparing for large events such as our annual Engineering Open House, professional trips, or the student conference. If discussions became too long they were deferred to the end of meeting for the sake of time. In addition, a few meetings throughout the year included workshops that would benefit the chapter. An example of these would be the “How to Advocate for Nuclear”, “How to Give a Presentation”, or “How to Build a Resume” workshop series that our chapter held during meetings this past year. Occasionally, meetings included a *meme-tank* where members took five minutes to create comics for the nuclear community. This really helped with bonding of the chapter.

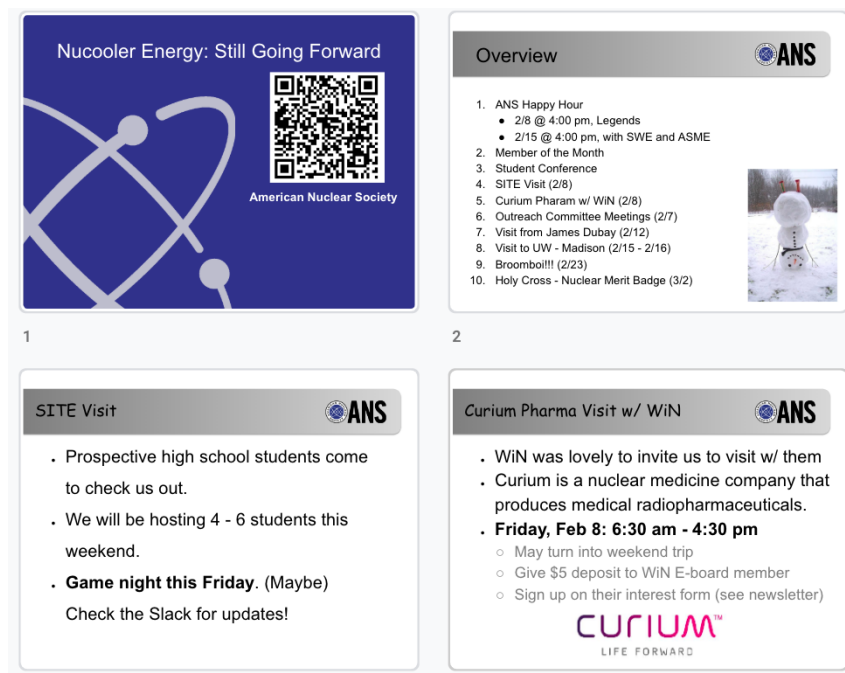


Figure 3: *Example slides from a general meeting.*

3.3 Communication

One of the goals of the University of Illinois Student chapter was to increase communication and make getting involved a more relaxed and friendly process. This year, we sought to accomplish this goal by increasing accessibility of the executive board to general members, making it easier for members to ask questions and communicate concerns. Historically ANS-Illinois has used a weekly email newsletter as the primary form of communication with the general body. Sent out at the beginning of each week, the newsletter notifies members of new opportunities and events hosted by the American Nuclear Society, links to relevant sign-up forms, meeting slides, and our social media accounts. In the past we have found that 34% of our members read the newsletter, with this number falling each year. To facilitate better communication within our chapter and make communication a two way street, a chapter wide Slack channel is used in addition to newsletters.

The ANS-UIUC Slack offers many great opportunities to improve communication and productivity within the chapter. The use of channels allows the Slack to remain organized so that members can communicate to only those who might find the information relevant. Within each channel, members (general and executive alike) may contact the entire

channel with one message. Slack also offers the ability to make custom polls, allowing for members to schedule unofficial events or executive members to obtain the opinion of the general body. Custom *Slack-bot* responses can also be added to Slack, so that if a member asks a question with certain keywords, the Slack-bot can respond with the relevant information quicker than any member. Slack also offers the ability to link Google Drive and Calendar applications, which allows the Slack-bot to give custom set reminders and weekly updates to certain channels about upcoming events. The use of Slack has greatly improved the productivity, planning, and coordination between executive and general members.

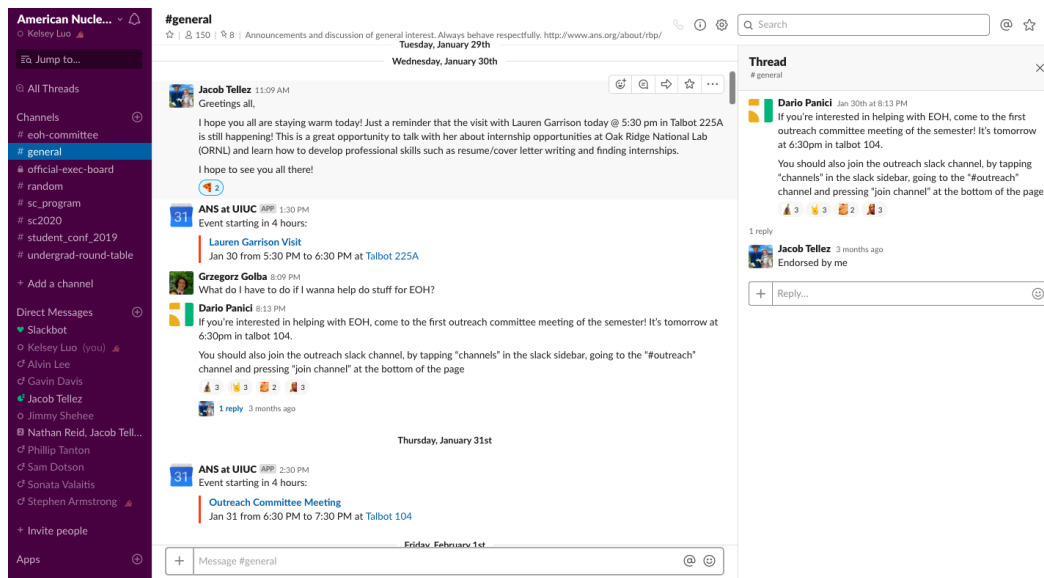


Figure 4: *Example of the ANS-Illinois Slack Channel*

Aside from Slack and newsletters, the chapter also uses a website (<https://ans.npre.illinois.edu>) to communicate to members and those outside of the organization. The website includes a number of items such as a live calendar, Member of the Month awards, recent professional and outreach events, our event attendance form, executive board contact information, newsletters, general meetings slides, links to our social media and Slack, the ANS-National website, and our market place. The market place is where members can pay dues or purchase ANS-Illinois merchandise such as T-shirts, sweatshirts, and more. The Member of the Month award is given to a general member who demonstrates outstanding work and dedication to the chapter for that month. The award is voted on by the executive board. Our attendance form is kept on the website because it allows the chapter to track attendance and hours at any event, without the need of coordinating sign in sheets, and grants the ability to readily track members' hours and attendance trends.



Figure 5: *Example of the ANS-Illinois Website*

3.4 Funding & Financial Planning

In order to be able to fund the professional and social events that we held this year, our ANS chapter received a lot of support beyond the \$20 per active undergraduate member dues which generates around \$1,000 a year. We also raised over \$60 from selling nuclear themed shirts and additional ANS merchandise to our members. Other events considered on a case-by-case basis, like our Nuclear Science Week Fundraiser and joint broomball event with SWE that brought in about \$10 and \$40 respectively. In addition to these generated funds, our ANS chapter is grateful for and would like to thank the support and funding received from the following sources:

1. The Nuclear, Plasma, and Radiological Engineering (NPRE) department at the University of Illinois graciously contributed over \$10,000 for transportation, lodging, professional events and trips our chapter attended such as the 2019 ANS Student Conference at Virginia Commonwealth University and FermiLab.
2. The Student Organization Resource Fee (SORF) at the University of Illinois also permits a maximum allotted allocation of \$10,000 for things such as contractual services, travel, publications, and permanent equipment. This source was primarily used to purchase items for permanent equipment such as cloud chambers, materials used in demonstrations at Holy Cross and EOH exhibit supplies, and reimbursements for ANS member volunteer expenditures spent to help transport members to and from events. This year, we received just under \$100 from SORF.

Table 1: *Summary of Yearly Budget for 2018-2019*

Total Income	\$11,636.11
Total Expenditures	\$11,015.50
Balance for Next Year's Board	\$620.61

4 Professional Events

4.1 ECS-NPRE Resume Review Session

This year ANS-Illinois and the NPRE Department hosted a resume review session in conjunction with Engineering Career Services (ECS) at Illinois. Prior to the review session, members were able to prepare resumes and compare with upperclassmen who have professional experience and developed resumes or curriculum vitae. The review session allowed for students to have their resumes revised by professionals from ECS in order to prepare them for SPEED Interchange, the Illinois Engineering Career fair, and the plethora of other professional events and opportunities hosted by ANS-Illinois, the NPRE Department, and the University of Illinois. This event proved to be very successful as upperclassmen and underclassmen alike sought the reviews given by ECS.

4.2 ECS-NPRE Career Studio

Similar to the ECS-NPRE Resume Review Session, members received the opportunity to practice their elevator pitch and interview skills with industry professionals. Though less popular than the resume review session, the career studio attracted many underclassmen and found great success.

4.3 Speed Interchange

Speed Interchange is a fall event that has been hosted by the ANS-Illinois chapter and the NPRE Department annually since 2009. This event has been an effective way for current students and alumni to network and discuss recruitment opportunities available specifically for nuclear engineers. Students and company recruiters enjoyed a lunch provided by the UIUC ANS Chapter who then had the opportunity to speak in break rooms with one another. This year, a record of nine companies were in attendance: Exelon Corp., GE Healthcare, Intel, Jensen Hughes, Los Alamos National Laboratory, Oak Ridge National Laboratory, US Nuclear Regulatory Commission, Starfire Industries, and UIUC NPRE alumnus Stephen Coggeshall. This year's interchange was fortunate to offer networking opportunities to students in each concentration of the NPRE program here at the university. This event has proven to be vital to ANS-Illinois because it creates a significant portion of internships earned by our members.



Figure 6: *Promotional Image for Fall 2018 Speed Interchange.*

4.4 Industry Professional Visits

Each year ANS-Illinois aims to bring in nuclear professionals from a variety of fields for our members. Visits from professionals typically include a 1-hour *pizza session* where the professional will discuss their work and company, then open up the room to questions for discussion. Occasionally, these visits include one-on-one interviews for internship opportunities as well. This year ANS-Illinois was fortunate to have meetings with:

- James DuBay - *Exelon Corp. (multiple visits)*: ANS hosted a pizza session with James DuBay, Director of Reactor Services at Exelon Generation. He gave a presentation on both Exelon as a company and on what his own personal job entails. He talked about the different things that reactor services is responsible for, and showed some videos of RXS taking apart a reactor during an outage. He also stayed after his presentation to talk with interested students and give career/internship advice. These events were hosted in conjunction with the NPRE Department.
- Dr. Thomas Fanning - *Argonne National Laboratory*: Dr. Thomas Fanning, a Department Manager in the Engineering Analysis Division at Argonne National Lab, did a presentation that focused on sodium fast reactors (his area of expertise). He began his presentation with a brief overview of the history of SFRs, and then discussed the benefits of using sodium as a coolant. To aid his presentation, he showed the graphical results of simulations run using different nuclear modeling codes that predicted the behavior of an SFR under various conditions. Dr. Thomas Fanning ended his presentation by talking about plans to build a sodium-cooled test reactor at Idaho National Lab that will be called the Versatile Test Reactor (VTR).
- Tracy Radel - *SHINE Medical*: Tracy Radel, Director of Process Engineering at SHINE, discussed SHINE's mission to be the world leader in the safe, clean, affordable production of Mo-99 without the use of highly enriched uranium. She also discussed the basic design of irradiation units, the isotope extraction process, design challenges faced by the industry, and the uniqueness of SHINE's Mo-99 production process.
- Dr. Jason Petti - *Sandia National Laboratory, NM (multiple visits)*: Dr. Petti, the manager of the Nuclear Safety Technologies Department at SNL, discussed the mission of and research/internship opportunities at the Albuquerque, NM branch of SNL. During his fall visit he also discussed opportunities available at the Livermore, CA branch. Some of these events were hosted in conjunction with the NPRE Department.
- Dr. Ge Yang - *North Carolina State University*: Dr. Yang, an Assistant Professor at NCSU, discussed graduate opportunities and his research at the university. Dr. Yang met with several students who got to enjoy lunch and discuss the various opportunities with each professor at NCSU. This event was hosted in conjunction with the NPRE Department.
- Dr. Lauren Garrison - *Oak Ridge National Laboratory (multiple visits)*: Dr. Garrison connected with the WiN-Illinois chapter to discuss her work at ORNL; while her discussion with ANS-Illinois focused on internships and careers at ORNL; how to create a good SULI application; and crafting your resume, essays, and cover

letter for jobs and internships. Some of these events were hosted in conjunction with WiN Illinois.

- Lt. Daniel Klinge - *Navy Nuclear Propulsion Program*: Lt. Klinge, a Navy recruiter, came to the university to tell our chapter members the options that they have when pursuing a nuclear career with the Navy. He talked about the Nuclear Propulsion Officer Candidate (NuPOC) Program and much more. This event was hosted in conjunction with the NPRE Department.
- Dr. Eva Davidson - *Oak Ridge National Laboratory*: Dr. Davidson, a Reactor Physics Analysis Engineer in the Reactor Physics Group within the Reactor and Nuclear Systems Division (RNSD), came to talk about her work with reactor physics, reactor modelling, and fuel cycle design as well as internship opportunities available at ORNL. This event was hosted in conjunction with the NPRE Department.

4.5 SITE Student Weekend

Each year Engineering Council, one of the overseeing bodies of ANS-Illinois on campus, hosts prospective engineering students who are still in high school through their “Student Introduction to Engineering” weekend. This year ANS-Illinois hosted three of these students. SITE students got to see a day-in-the-life of an engineering student, hang out with students from ANS, and tour several of the NPRE department laboratories.

5 Trips & Conferences

A core pillar of our ANS student section are the opportunities available to the students to take off-campus trips, enriching their understanding of industry, expanding their exposure to National Labs, and becoming more involved with the national organization. These trips specifically help students grasp the opportunities available to them post graduation, and often help students refine their future career interests.

5.1 Argonne National Laboratory

Argonne National Laboratory is one of the closest national laboratories to the University of Illinois. That being said, making use of this unique circumstance allowed our student to tour a variety of facilities at ANL such as the Argonne Tandem Linear Accelerator and their Advanced Proton Source. Attendees also spoke with industry professionals from various research groups at the laboratory.

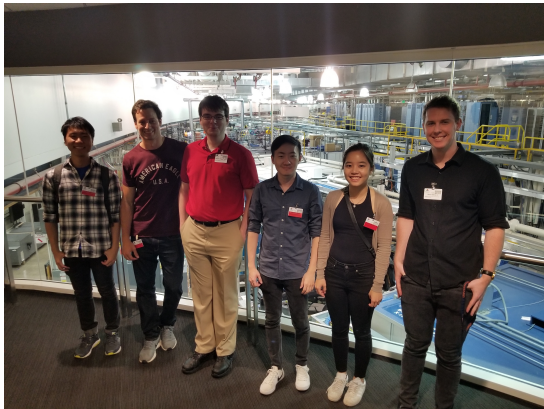


Figure 7: Attendees of the Argonne National Laboratory visit.



Figure 8: Some ANS attendees at the ANL visit and a tour guide.

5.2 FermiLab

During our spring term, ANS members got to attend a tour at FermiLab. They received a guided walk through of the lab and got to see the facility's linear accelerator. Attendees also had the chance to have a Q&A session with a scientist, physicist, and doctor who have worked with the neutron therapy and other neutron beam applications.



Figure 9: *FermiLab Facility*



Figure 10: *Some ANS attendees at the FermiLab visit*

5.3 University of Wisconsin - Madison

A big part of promoting professionalism in the nuclear field is maintaining good relations with other industry professionals, especially those involved with other parts of the ANS. This year, the ANS student chapters at Illinois and UW-Madison part took in the second of what may be many professional chapter visits to come. ANS-Illinois went to UW-Madison and got to tour facilities such as their thermal hydraulics lab and fusion institute, went to a Madison Capitals hockey game, and had a social with students and faculty of the department.

5.4 LaSalle Nuclear Generating Station with WiN-Illinois

This year the WiN-Illinois chapter coordinated a trip to visit the LaSalle Nuclear Generating Station near Chicago, Illinois which powers nearly 2.3 million homes with two GE BWR's. ANS-Illinois was fortunate enough to join WiN-Illinois on this trip and tour the reactor facilities. Attendees toured turbine rooms, backup diesel generators, reactor containment buildings (during refueling preparation), and the control room for the reactors. Attendees received the opportunity to meet with reactor engineers, reactor operators, and managers at the facility. Attendees also got to discuss outreach and volunteering opportunities with the WiN chapter from the LaSalle power plant.



Figure 11: *Some attendees of the LaSalle Station visit in the reactor building entrance.*

5.5 Curium Pharmaceuticals with WiN-Illinois

The WiN-Illinois chapter coordinated a trip to visit Curium Pharmaceutical near St. Louis, MO. ANS-Illinois was fortunate enough to join WiN-Illinois on this trip and tour the various production facilities there. Attendees also received the opportunity to meet with professionals and discuss their careers with them.

5.6 2019 ANS Student Conference

The ANS student conference is always a huge part of our chapter's focus and center of anticipation in the spring semester. Benefits of attending the Student Conference are myriad for undergraduate and graduate alike, from the specialized career fair to recognition for research. This year, we had a contingent of 29 students attend, driving all the way to Virginia Commonwealth University in Richmond, and every single one presenting research at either the poster session or in podium talks. The ANS-Illinois chapter and the NPRE Department are especially proud of the five awards brought home by our members. Not only was bringing 29 presenting students a huge accomplishment for our own chapter and the students which make it up, but also in hoping for the opportunity of hosting in the coming years.

Last year, for the first time in many years, the ANS-Illinois chapter submitted a proposal to host the student conference. This effort began completely from scratch and brought together numerous members from the society. The proposal is a reflection of the building momentum of the ANS-Illinois chapter, and demonstrates the continued excitement and involvement of our general body. While the proposal for the 2019 conference was unsuccessful and a 2020 proposal was not submitted, our chapter plans to submit a proposal for the 2021 conference and continue refining our proposal until we are successful in our conference bid. This effort is made easier due to the high level of support for the proposal coming from younger members and graduate students, which form a basis of support that will be at the University of Illinois for several more years. Our chapter is excited to submit our 2021 proposal and host the conference in coming years.



Figure 12: *Some attendees of the 2019 ANS Student Conference.*

6 Outreach Events

Outreach events work to combat the stigma and misinformation about the nuclear industry by spreading facts and awareness. Through targeting both young and old audiences, these events bring the whole ANS student section together to promote nuclear energy.

6.1 Nuclear Science Week Advocacy Booth

For Nuclear Science Week this year, the ANS UIUC Chapter wanted to do something different in order to gain more participation and attention from students and the general public and clear common misconceptions about nuclear energy. During Nuclear Science Week in the fall, the ANS-Illinois student section set up a nuclear advocacy booth on the main quad. The promise of hot chocolate on a chilly day drew many people to the booth, where they had the opportunity to win prizes by playing a nuclear trivia game. Lots of students were able to walk away with a Nuclear Science Week sticker or 3D printed cooling tower, or sometimes both if they were able to answer a difficult question. There was also an interactive Geiger counter activity. By grabbing the attention of people walking past, a large number of students who knew little about nuclear science left the booth more educated on the topic than before. Many passing students stayed, asked questions to, and had long conversations with members of our ANS student chapter, and walked away far more informed about the benefits of nuclear energy.



Figure 13: *The ANS Nuclear Science Week booth on the main quad featuring hot chocolate, trivia, and more.*



Figure 14: *Some volunteers helping out at the ANS Nuclear Science Week booth.*

6.2 Boy Scouts - Nuclear Merit Badge

In the spring, the ANS-Illinois Student chapter brought nine of our members to the Holy Cross Boy Scout merit badge session. We taught two classes of scouts of ages ranging from 10 to 15 years old. Each class was four hours long for a total of eight hours of teaching by members of our student chapter. Throughout the course of the class, the scouts learned what makes up an atom, what radiation is and how to detect it, how nuclear fission works, how a nuclear power plant functions, and the benefits of nuclear energy. Throughout the classes the scouts asked many questions about things they had

heard about nuclear energy, which allowed members of our student chapter to disprove misinformation the scouts had heard and go more into detail about things the scouts were interested in. The scouts were also broken up into groups after the course was finished so they could ask members of our student chapter specifics about nuclear engineering as a major and as a career option. Not only did this event help educate the scouts, but also parents that had come with their scouts. Parents approached us after the class had ended to thank us for not only informing their child but also them, and they appreciated our enthusiasm and the effort we put in to involve the scouts in the learning process.



Figure 15: *ANS volunteers leading a Holy Cross Boy Scouts session.*



Figure 16: *ANS volunteers leading a Holy Cross Boy Scouts session.*

6.3 Engineering Open House (EOH)

The ANS-Illinois student chapter presents an exhibit every year at the university's Engineering Open House. It is our most important, longest outreach event of the year taking place over the course of three days and giving us the opportunity to reach hundreds of people, if not more. A huge range of people come see our exhibit, from babies in strollers to teachers and their classes to grandparents coming with their grandchildren, EOH is our biggest opportunity to educate the general public on what we do as nuclear engineers and the benefits of nuclear science.



Figure 17: *ANS volunteers teaching students about radiation, cloud chambers, the importance of detection, and historical uses of uranium glazes.*

Our exhibit this year had three main focuses based on the three concentrations of the nuclear engineering department here on campus. The first of these, our most interactive part, was radiological instrumentation. We had a table set up with a television showing a cloud chamber, a Geiger counter with a uranium glaze-coated plate, and boxes of dosimeters and dosimeter chargers. The dosimeters were handed out as souvenirs after they were explained to anyone who wanted one, and the dosimeter chargers were given to teachers or parents who wanted one. Visitors were also able to test out the Geiger counter we had on display and use it to detect radiation from the uranium-coated plate.

The second part of our exhibit focused on nuclear energy and is the favorite of our younger visitors. It is called our “mousetrap reactor” and involves setting many mousetraps and placing one or two ping-pong balls on the side of the trap that does not set it off. A large see-through plastic cover is placed over the mousetraps and the explanation of what a chain reaction is and how it is used in nuclear reactors begins. A blackboard behind the setup is utilized to explain the fission process of uranium, and its splitting into fission fragments and neutrons. Once the explanation is over, one lucky visitor gets to take a ping-pong ball, or “the first neutron” and throw it into a small hole at the top of the plastic lid, setting off a chain reaction of all the mousetraps. Nearby this station was also a poster board discussing common nuclear myths and disproving them. This portion of the exhibit is also used to elaborate on the importance of using computational models to predict the behavior of nuclear systems. A laptop and an adjacent monitor were set up to present diffusion models that our members learn about in their nuclear courses and a transport model that a student was using in their research. Both of these models were interactive, allowing visitors to change parameters such as the cross sections, neutrons released per fission, and densities of the materials to see the affect on the system behavior.



Figure 18: *ANS volunteers teaching students about fission with our popular mousetrap reactor exhibit.*



Figure 19: *ANS volunteers teaching students about plasmas and their application to the world. Machine imaged is the diffuse glow chamber, courtesy of the Center for Plasma-Materials Interaction at the University of Illinois.*

The final station of the exhibit is the plasma and fusion science section. There was a small plasma ball set up for the younger visitors to give them a simplified explanation that they could understand. After that was our can crusher. This device provides an explanation of magnetic fields, which are used to confine a plasma. The can crusher runs a current through a wire wrapped around an empty pop can, which then due to the induced magnetic field inside of the can, crushes it. After this explanation is given, visitors move to either our DC glow machine (left) or our newest addition, the fusor which makes use of electrostatic confinement. These devices exemplify to visitors just what a plasma is, and different ways we can confine and manipulate it.

This year, our ANS student chapter was also able to work with the Center for Plasma-Materials Interactions on campus and offer tours of the lab to people who were interested and wanted to learn more. A professor was able to collect groups of people at predetermined times and give them tours of the plasma lab, where they were able to see many plasma research devices. These devices include semi-conductor experiments and Illinois' largest fusion research machine, HIDRA which is a stellarator-tokamak hybrid device. As word spread of the lab tours, the number of visitors attending each tour grew drastically as Engineering Open House went on, ending with a group of at least 20 people on the very last tour.

Throughout all of the different stations of the exhibit, our ANS members were able to tailor their explanations and demonstrations to allow each visitor to best understand what was happening. This ability was vital with the huge range of ages we saw visiting our exhibit. Combined with our members' ability to answer visitors' questions about all things nuclear, this was the event which allowed us to educate the largest number of people.

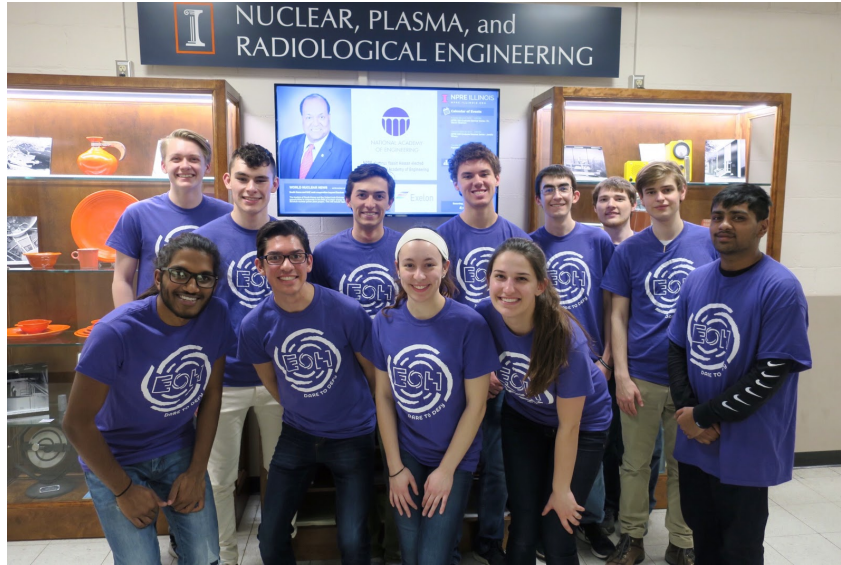


Figure 20: *Some ANS volunteers at the end of EOH weekend.*

7 Social Events

7.1 Friday Happy Hour

Perhaps the most cherished social past time of the ANS-Illinois chapter is Friday Happy Hour at Legends, a local restaurant and bar (not 21+ exclusive). This event is so true to our hearts that it makes the first bullet point of every general meeting overview slide. Happy hour is where students and professors alike meet at 4:00 pm to relax, enjoy good company, and indulge in appetizers and drinks. Happy hour has proven to be a low pressure environment bringing excellent opportunities for students to mingle and become acquainted with faculty in the department, or even their student peers. Many times these events led to students learning more about professors, their research and the many research opportunities that they offer. At least one professor attended the happy hour almost every week, with frequent appearances from ANS faculty advisor Katy Huff. Happy hour has been and hopefully always will be a place for underclassmen, upperclassmen, graduate students, faculty, and staff to enjoy themselves at the end of each week.



Figure 21: *Several dozen ANS/NPRE students, faculty, and staff enjoying a casual Friday Happy Hour.*

7.2 ANS Extended Happy Hours

One goal of our ANS chapter was to expand our connections and membership beyond the immediate nuclear community at the University of Illinois. As a product of this goal, ANS-Illinois opened up happy hour to several other professional engineering groups on campus. These happy hours were used to broaden our members' network and expand our professional opportunities with the involved organizations. Our first extended happy hour took place with the Society of Women Engineers at Illinois (SWE-Illinois) and Engineers Without Borders at Illinois (EWB-Illinois). Our second happy hour saw continued involvement with SWE-Illinois and added the American Society of Mechanical

Engineers at Illinois (ASME-Illinois). These happy hours were very successful in that they have produced non-nuclear student interest and a potentially fruitful relationship with SWE-Illinois for the upcoming years.

7.3 Beginning of the year BBQ



Figure 22: *Students enjoying food, conversation, and more at the kick-off barbecue.*

With the new school year starting, ANS-Illinois always enjoys kicking with a yearly BBQ where faculty, staff, and new and returning students within the Nuclear, Plasma, and Radiological Engineering department come together to catch up and get to know each other more while enjoying some great food. As the first event of the school year, many incoming students are eager to get involved in a casual setting, meet their peers and professors, and start their collection of ANS UIUC Chapter apparel.

7.4 Curtis Apple Orchard

It is a well-known fact among the students of The University of Illinois that taking a visit to the Curtis Apple Orchard is a must during the Fall season. Members of the ANS UIUC Chapter went to enjoy picking seasonally ripe apples, getting to pet and feed local goats, and also got to take home apple cider and doughnuts to enjoy. This was a great event for new members to get to know and socialize with some of the upperclassmen members very early on in the semester.



Figure 23: *Students deciphering between the good and the bad apples at Curtis Apple Orchard.*

7.5 Friendsgiving Potluck



Figure 24: *ANS members enjoying our annual Friendsgiving potluck in the NPRE student lounge.*

With midterms among students gathered around Thanksgiving break, the ANS UIUC Chapter hosted the annual Friendsgiving for members to participate in a potluck, de-stress, and discuss what they are thankful for this year. Members were very generous with bringing in ample desserts like pie and cookies, turkey stuffing, mac & cheese, and even 100 chicken nuggets.

7.6 ANS Goes Bowling

ANS-Illinois decided to followup the Kick-Off barbecue with a bowling event. Members got enjoy bowling at the Illini Union's bowling alley, right across the street from the nuclear building! On top of that, new students got the opportunity to socialize with returning students and check out some of the neat facilities that the Illini Union offers to students at Illinois.



Figure 25: *ANS-Illinois members hanging out at the Illini Union bowling alley.*



Figure 26: *ANS-Illinois members at the Illini Union bowling alley.*

7.7 ANS Plays Broomball

One of our favorite pastimes at ANS-Illinois involves a friendly game of broomball, despite the bruises from slipping! ANS members got the opportunity to invite their friends to some friendly competition at the UIUC Ice Arena.



Figure 27: *ANS-Illinois members enjoying a game of broomball.*



Figure 28: *ANS-Illinois members at the Illinois Ice Arena after long games of broomball.*

7.8 ANS-SWE Broomball

As an extension of our continued relationship with SWE-Illinois, ANS-Illinois invited the organization and its friends to join us in some friendly competition at the UIUC Ice Arena. This event was a great time for bonding and socializing between the two organizations and their friends in a casual environment.



Figure 29: *ANS-Illinois, SWE-Illinois, and friends after intense games of broomball at the Illinois Ice Arena.*

7.9 1st Annual Grant M. Schumock Memorial Barnana Crawl

ANS-Illinois hosted a banana-themed bar crawl to promote a sense of community among the club's members. The theme also accomplished other goals such as normalizing radiation by explaining to bystanders that bananas are radioactive, celebrating a soon-to-be extinct fruit, and promoting safety among members by wearing bright yellow banana suits. The event was a major success; several bars played *Hollaback Girl* especially for our members. Our members even got to boast after leaving our first bar's trivia night with first *and* third place finishes.



Figure 30: *A number of ANS-Illinois members and friends dressed as bananas.*

7.10 End of the Year Hootenanny

ANS continued its annual tradition of hosting an end of the year party. It served as a way for the current and future executive board members to chat with current members and reflect on the past year. This event was very well attended. The event even managed to bring out a number of graduate students for one last goodbye to the seniors.

8 Elections & Honors Banquet

8.1 Elections

Elections for the 2019-2020 board were held in early-mid April. This year boasted a field of candidates with 16 applications for 8 positions. Such strong interest in becoming involved on the executive board is indicative of the increasing interest and excitement amongst general members in the chapter. The strongest representation amongst applicants was among current freshmen and sophomores, proof that initiatives to drive participation amongst younger students have been successful. It should also be noted that gender diversity on the board will be at a record high, with a perfect 50% male/female split during the fall semester! It should also be noted that while no graduate students applied for executive positions, ANS-Illinois has two graduate students leading the 2021 Student Conference proposal. Graduate participation in previous years has been consistently low, so the interest of graduate students in becoming involved within our chapter is very exciting. The new ANS-Illinois board is listed below:

Katie Butler - *President*
Jimmy Shehee - *External Vice-President*
Dario Panici - *Internal Vice-President*
Anna Balla - *Secretary*
Alex Fanning - *Public Relations*
Stephen Armstrong - *Treasurer*
Dilan Kurukulasuriya - *Outreach*
Isabella Iaccino - *Social Chair*

8.2 NPPE Honors Banquet

Each year, ANS-Illinois and the Nuclear, Plasma, and Radiological Engineering (NPPE) department work together to put on an awards banquet to honor the hard work and dedication of ANS members and other students within the department. This year, ANS took on an even bigger role than past years, contributing advice to the planning, helping distribute awards, and putting together a video presentation highlighting the impact of the ANS-Illinois chapter over the past year. The banquet was an excellent opportunity to recognize the outstanding members within the section, and this year awards were given to more students than ever before. This event is also open to alumni and serves to recognize alumni and professors who have made significant contributions to the fields of nuclear science and technology. This event also serves as an opportunity for current students to connect with outstanding alumni from the department, setting the stage for mentorship opportunities and for ANS and exemplary students to form connections with industry professionals.



Figure 31: *NPRE/ANS students, faculty, staff, family, and friends after the honors banquet.*

9 Attendance

In previous years, the ANS UIUC Chapter required attendees to sign-in at events and general meetings via manual sign-in sheets available at the front of the room. This year, the chapter implemented two new methods to expedite sign in for attendees and attendance tracking. These include a QR code and online sign-in sheet accessible on the chapter website. The electronic sign in was tested this year as an evaluation and data gathering mechanism for better utilizing a point system to track active members. The data from the sign in sheet is processed in a Python code and output in various ways for interpretation. Items that are tracked with the attendance include: name, email, event type, event name, event date, leading executive officer, hours attended, leadership taken by the member, and other concerns. Our executive board went for data acquisition prior to implementation because the point-based system will qualify members for “active” or “inactive” status and we did not want to set boundaries that would unnecessarily deem members inactive.



Figure 32: QR code slide made available at the beginning of general meetings for members to sign in with.

Email address *

Your email

What is your name? (First Last) *

Your answer

What type of event did you attend? *

General Meetings do not give points. Happy hour is not a social event.

☐ General Meeting

☐ Committee Meeting

☐ Social Event

☐ Outreach Event

☐ Professional/Networking (on campus)

☐ Professional/Networking (off campus)

Figure 33: A portion of the attendance form that members use.

As a consequence of the attendance in previous years, the executive board began taking attendance at all events hosted by the chapter to begin building a data set for the implementation of the points system come Fall 2019. This system remains under construction, but will likely follow the scheme below. Active membership will require

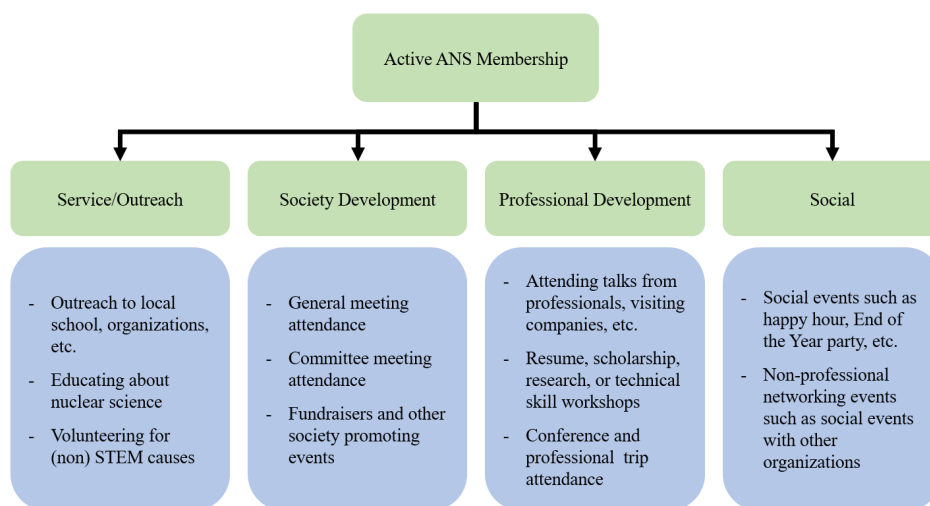


Figure 34: Active membership pillars for new point-based membership system

fulfillment of a minimum number of hours for each pillar and an overall total number of hours. Hour requirements will vary on the data collected, though social events will contribute the least to the hour requirements. From the information obtained Outreach and Service events have been the most popular and thus will contribute to a large number of hours; though general meeting attendance and preparation for outreach events occur within society development which will increase the minimum number of hours required in

this category. Unfortunately, turnout to professional events was unacceptably low so the minimum number of hours will be higher than the attendance rates from the 2018-2019 academic year.

10 Looking Forward: ANS-Illinois in 2019-2020 and Beyond

Many great things lie ahead for the ANS-Illinois chapter. With a strong team leading the 2021 Student Conference proposal and reviews from our failed 2019 conference proposal, ANS-Illinois has the power, support, facilities, and potential to host an outstanding conference. From world-class facilities here at the university to local industry leaders like Exelon Corp. Argonne National Laboratory, Curium Pharmaceuticals, SHINE Medical, Fermilab, and more to historical landmarks like Chicago Pile One, and others; Illinois has a plethora of things to show at the conference. Though the conference is not all that ANS-Illinois has in store.

Last year we began a high school outreach program where our members return to their local high schools over winter break to educate their previous school about nuclear science. The lack of success in this outreach event was disappointing this year, but with PowerPoints and activities prepared, ANS-Illinois will see success in this outreach event and much more with our Outreach Chair and executive board. Aside, ANS-Illinois began working with Engineering Outreach Society, a local group that visits multiple local elementary and middle schools each week, to prepare a series of nuclear science experiments (for the oncoming year due to a lack of time this past spring). In addition, a new prospering relationship with SWE-Illinois should lead to excellent networking, outreach, and professional opportunities. One could not forget our work with WiN-Illinois. With ANS-Illinois and WiN-Illinois both recognized as organizations by the university and their national governing bodies, our nuclear organizations, in conjunction with the NPPE Department at Illinois, have no bounds on what they can do for their local and national communities. Finally, ANS-Illinois has had the unique opportunity to discuss a plant tour with Bruce Power, a CANDU reactor operator in Canada, which is scheduled to take place next fall.

11 Appendices



Figure 35: *BBQ - Students and faculty at the Kick-off barbecue.*



Figure 36: *BBQ - Students cooking burgers, brats, and veggie burgers at the barbecue.*



Figure 37: *BBQ - Students and faculty enjoying the Kick-off barbecue.*



Figure 38: *Curtis Orchard - Entrance to Curtis Apple Orchard.*



Figure 39: *Curtis Orchard - Some of the members in attendance at the Curtis Apple Orchard visit.*



Figure 40: *Curtis Orchard* - Students on the giant rocking chair at Curtis Apple Orchard. The chair is an orchard landmark for the local community.



Figure 41: ***Curtis Orchard** - Members walking away from the camera dramatically as they head to go find some delicious apples.*



Figure 42: *Curtis Orchard* - Members head to find pumpkins in the *Curtis Orchard Pumpkin Patch*.



Figure 43: *Curtis Orchard* - Future president Katie Butler has found her pumpkin to carve this year.



Figure 44: *Curtis Orchard* - ANS members on the nu'cool'er bus.



Figure 45: *NSW* - Several ANS members volunteering at the Nuclear Science Week booth on the Main Quad.



Figure 46: *SPEED Interchange* - Students and industry professionals networking at the Speed Interchange lunch.



Figure 47: **EOH** - Students celebrating the success of Engineering Open House with a goofy picture.



Figure 48: **EOH** - Several members presenting the DC Glow (left), can crusher (middle), and fusor (right) machines.



Figure 49: **EOH** - Current President Jacob Tellez discusses the importance of computer models in nuclear science and common myths about nuclear science.



Figure 50: *EOH* - Several members show off the mousetrap reactor at EOH. Some picture featuring the semiconductor and stellarator machines at the Center for Plasma-Materials Interactions are pictured on the board.



Figure 51: *EOH* - Future and current Internal-Vice President Dario Panici and future Outreach Chair Dilan K. present the DC Glow and can crusher machines at EOH.



Figure 52: *EOH* - Future and current Internal-Vice President Dario Panici and future Outreach Chair Dilan K. present the DC Glow and can crusher machines at EOH.

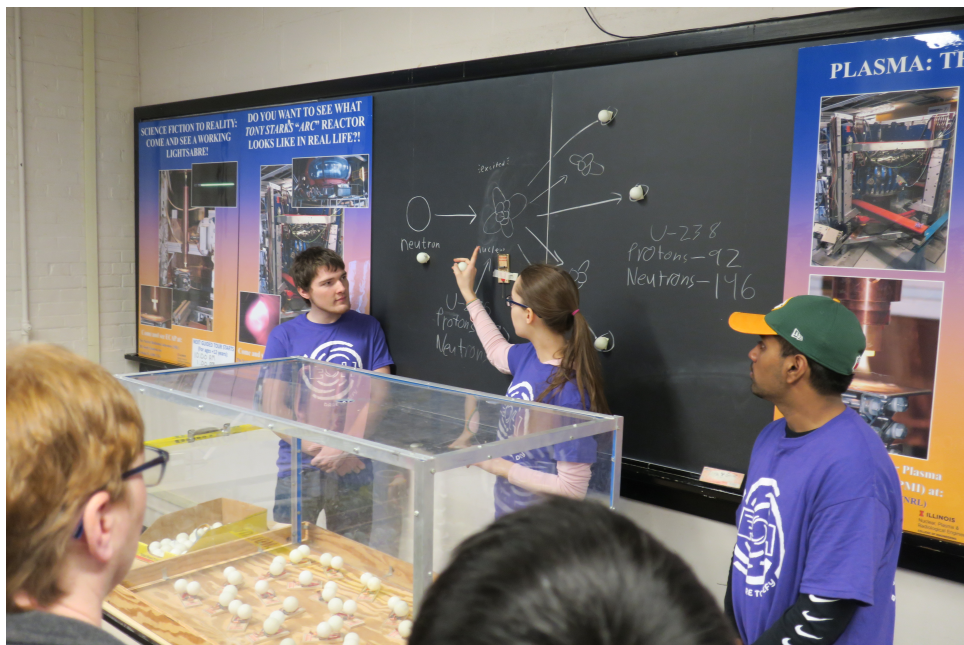


Figure 53: *EOH - Several members present the mousetrap reactor and teach visitors about fission in heavy isotopes.*



Figure 54: *EOH - A member presents the history of nuclear science to visitors.*