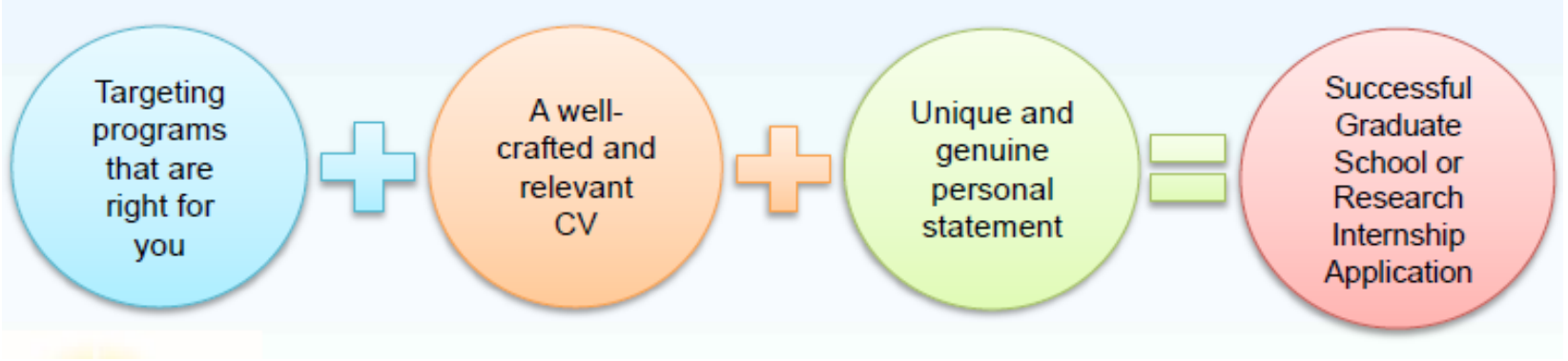
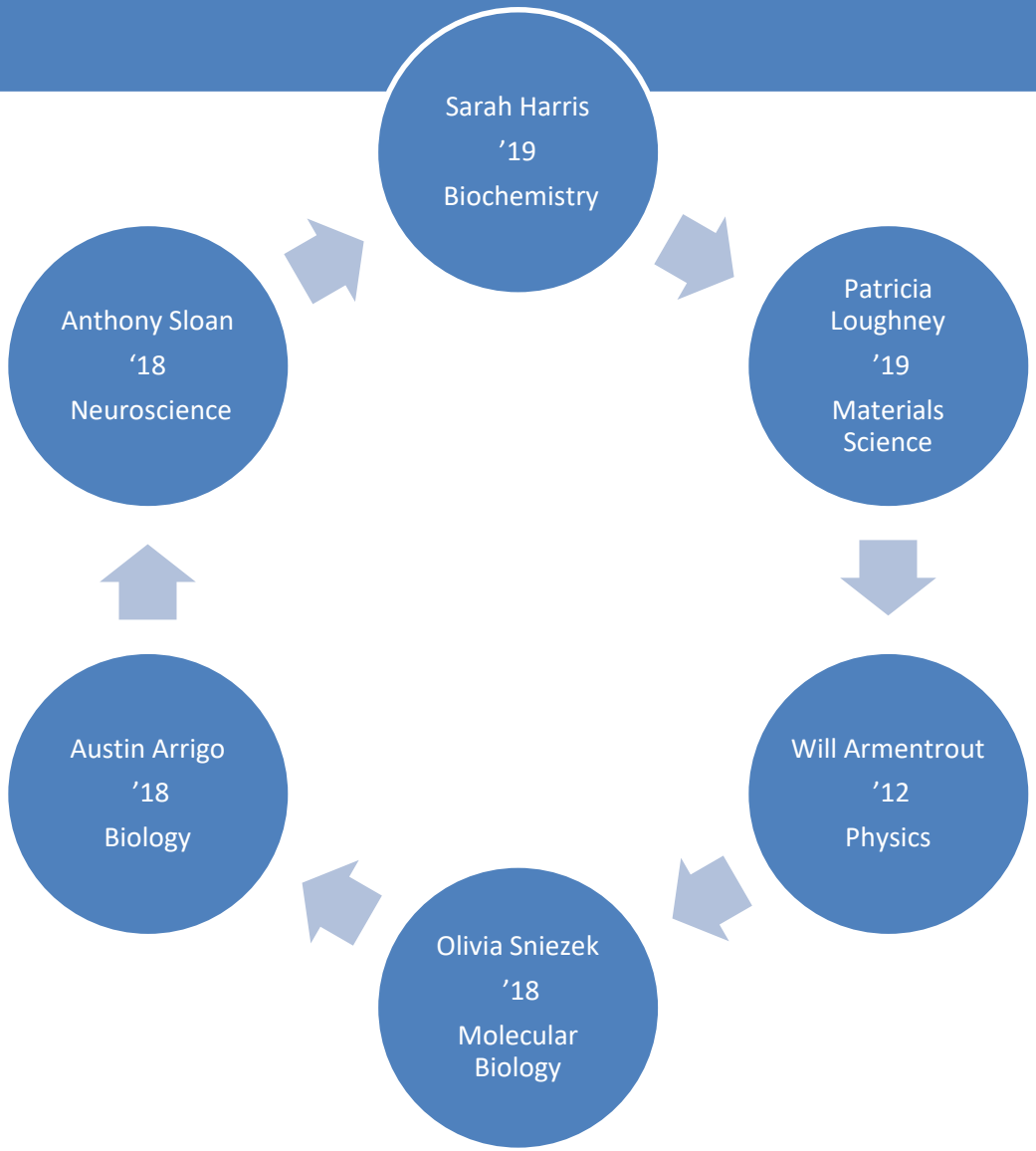
Preparing for the Application Process: **Research Internships and Graduate School in STEM**

Co-sponsored by the Research Professionals Advisory Committee (ResPAC) and the Drinko Center for Undergraduate Research



Westminster Alumni



Finding graduate programs

CUR registry	Google search	GRE search service	PhDs.org	Talk to a faculty member

Finding research internships

Check the ResPAC/Drinko webpages	**Research Experiences for Undergraduates (REU)**	**Large Research Universities**	**Research Institutes and Hospitals**	**Google search** **Talk to a faculty member**

How did you find/decide on a graduate school program/research internship?

Olivia Sniezek
- Johns Hopkins University
- Genetic Medicine

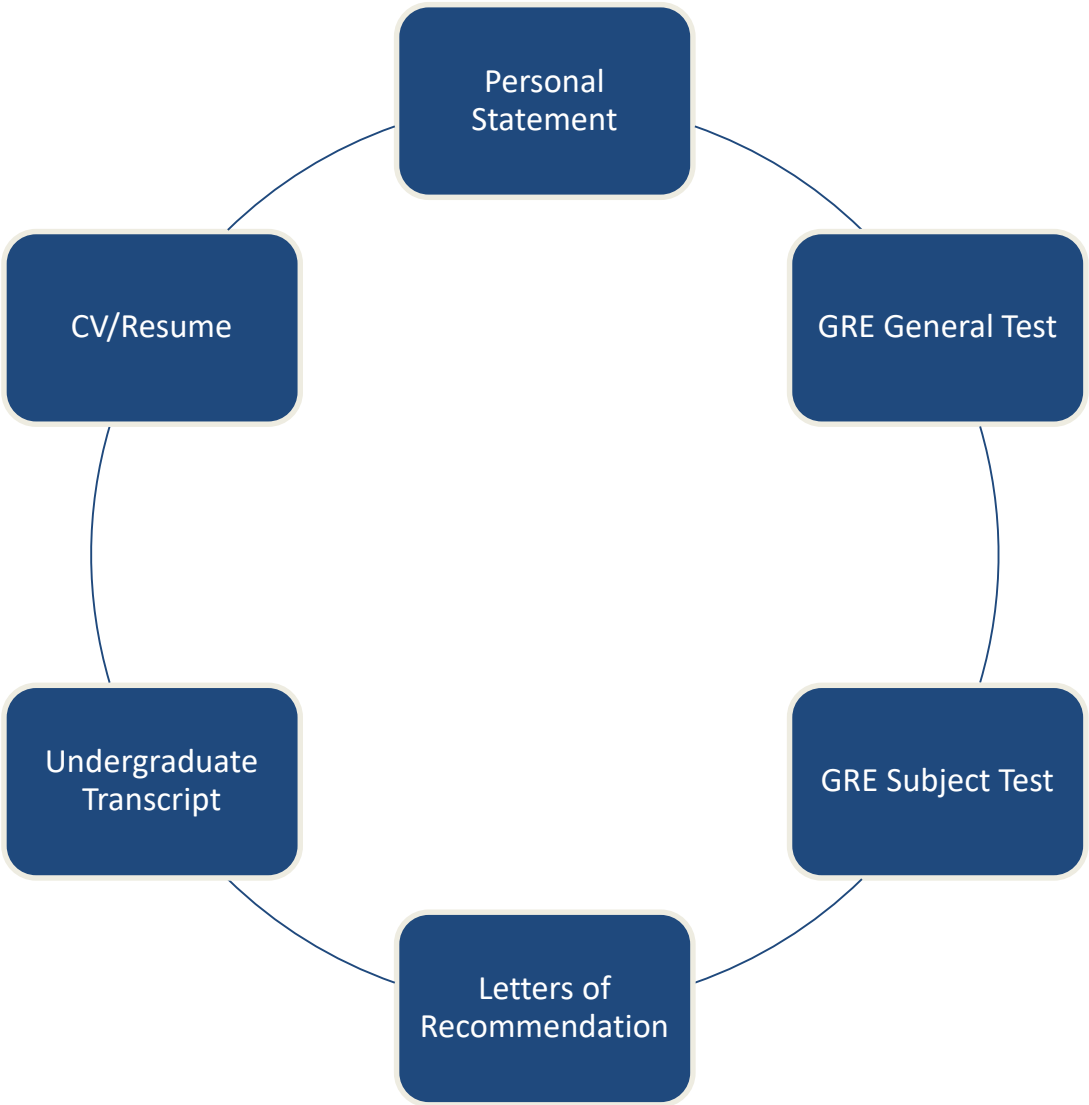
Sarah Harris
- University of North Carolina
- Biochemistry

Anthony Sloan
- Case Western
- Neuroscience

How did you find/decide on a graduate school program/research internship?

Austin Arrigo	• Wake Forest • Molecular and Cellular Biosciences
Will Armentrout	• Green Bank Observatory • Assistant Scientist
Patricia Loughney	• Ohio State University • Materials Science and Engineering

What is involved in the application



Questions to ask yourself before you write your personal statement:

- What's special, unique, distinctive, and/or impressive about you or your life story?
- What details of your life (personal or family problems, history, people or events that have shaped you or influenced your goals) might help the committee better understand you or help set you apart from other applicants?
- When did you become interested in this field and what have you learned about it (and about yourself) that has further stimulated your interest and reinforced your conviction that you are well suited to this field? What insights have you gained?
- How have you learned about this field—through classes, readings, seminars, work or other experiences, or conversations with people already in the field?
- What are your career goals?
- Are there any gaps or discrepancies in your academic record that you should explain (great grades but mediocre LSAT or GRE scores, for example, or a distinct upward pattern to your GPA if it was only average in the beginning)?
- Have you had to overcome any unusual obstacles or hardships (for example, economic, familial, or physical) in your life?
- What skills (for example, leadership, communicative, analytical) do you possess?
- Why might you be a stronger candidate for graduate school—and more successful and effective in the profession or field than other applicants?
- What are the most compelling reasons you can give for the admissions committee to be interested in you?
  - How would you fit in the program? WHAT do you want to do? WHO do you want to work with?

General Outline

- Introductory Paragraph- setup the following:
  - Career goal and why it is your goal
  - Why you are applying to the particular program to achieve this goal

I have often been asked why I am a molecular biology major at a small liberal arts college in a rural Amish town, where one might not expect to find a passionate, hard-working and motivated undergraduate student of science. However, Westminster College is an ideal place for a student with these qualities, as it was recently identified as the #1 college for women in the sciences by Forbes magazine. My coursework and research experience at Westminster, my strong interest in science, my summer internship at the University of Pittsburgh, and my dedication to my work have been valuable assets which have fully prepared me to be a highly qualified graduate school applicant and will help me to obtain a Ph.D. in Cell and Molecular Biology. The Molecular, Cellular, Developmental Biology and Genetics program at the University of Minnesota comes highly recommended by both my professors and peers and will prepare me well for my goals: leading my own research program at an academic institution in order to make significant contributions to the field of cell biology and sharing my knowledge with the next generation of students.

General Outline

- Middle Section- your interest and experience in your particular field, what makes unique
  - Outline research and classroom experience
  - Identify other activities or groups that have influenced you
  - Explain any situations that may have influenced gaps or discrepancies in your academic record, GREs etc BUT still highlight the positives more than the negatives

At Westminster College, every science course has a laboratory component, which has provided me not only with the opportunity to collaborate with my peers but also with the advantage of learning a range of molecular biology techniques as an undergraduate, including DNA and RNA isolation, PCR, tissue and bacterial culture, and bioinformatics. Learning these methods piqued my interest and I chose to pursue an independent research project in my sophomore year under the guidance of Dr. Karen Resendes. This work developed into my honors project, entitled Characterization of PCID2 in Human mRNA Export, which involves studying the cellular localization and interaction partners of the human PCID2 protein, a human homologue of a yeast protein known to be involved in mRNA export. Through this project, I expanded my skill set to include gene cloning, immunofluorescence, immunoprecipitation, and immunoblotting. I also learned how to work independently, plan experiments, manage my time effectively, and troubleshoot problems. Furthermore, I gained grant writing skills when I successfully applied for a research grant from Westminster's Drinko Center for Excellence in Teaching and Learning; these funds enabled me to purchase monoclonal antibodies critical to my studies. Performing independent research has taught me to take pride in my work, which was exemplified by my opportunity to present my data at the 2011 National Conference for Undergraduate Research in Ithaca, New York. I aim to present my completed honors research at local and national conferences in the spring of 2012.

In addition to my research experience at Westminster College, I was also accepted to participate in the University of Pittsburgh's Summer Undergraduate Research Program (SURP). I was excited to have the opportunity to work with Dr. Gerard Apodaca, who studies membrane traffic in the epithelial cells of the urinary tract. My project within the Apodaca lab involved examining assembly of asymmetric unit membrane (AUM) particles, which stud the apical surface of the bladder and are thought to contribute to its barrier function. Previous research in non-polarized cells showed that three of the four proteins in the AUM complex require a heterodimerization partner in order to be trafficked to the plasma membrane. I examined the cellular localization of two of these proteins, UP1b and UP3a, in a polarized cell line, a better model for animal epithelia than the non-polarized cell lines used in earlier studies. My results successfully demonstrated the importance of heterodimerization in AUM particle assembly at the plasma membrane of polarized cells. Through this internship experience, I built upon the foundations of laboratory and writing skills I had acquired at Westminster. Upon completion of the program, I felt more confident in my research skills and in my ability to independently plan and design experiments. SURP provided me with a realistic view of full-time work in a laboratory setting, gave me experience in collaboration with other scientists, helped me solidify my decision to attend graduate school, and has already made me an even more independent and eager researcher as I continue my honors research.

General Outline

- Conclusion – tie everything together and give the big final pitch to sell yourself

It is my desire to attend graduate school in order to further my knowledge and to explore the unknown areas in the field of molecular biology. I have been instilled with a strong work ethic and always go the extra mile, and I believe these traits will help me succeed at the University of Minnesota. Furthermore, I know how to balance my school and lab work with other responsibilities. I participate in several groups on campus, including leadership roles serving as the Tri Beta biology honors society president, captain of the fall colorguard and indoor winterguard performance groups, and public relations chair of the Alpha Phi Omega service fraternity. I am involved in biology education as an on-call tutor for Westminster's Learning Center, and as an employee of the Science in Motion program, which provides laboratory materials to area high schools and middle schools. I believe the skills I have gained through these activities and my extensive research experience make me an ideal candidate for the University of Minnesota's Molecular, Cellular, Developmental Biology and Genetics program. In addition, my interests in cancer biology, nuclear cell biology, and gene expression correspond with the work of university faculty such as Drs. Vivian Bardwell, G.W. Gant Luxton, and Robert Brambl. Because of my background and interests I have much to contribute to the program, while at the same time I am eager to expand my knowledge and skill set in the field of cell biology. I firmly believe that the Molecular, Cellular, Developmental Biology and Genetics program will successfully prepare me for my future career.

Writing the Personal Statement: Top 10 Rules

1. Strive for depth rather than breadth. Narrow focus to one or two key themes, ideas or experiences
2. Try to tell the reader something that no other applicant will be able to say
3. Provide the reader with insight into what drives you
4. Be yourself, not the 'ideal' applicant
5. Get creative and imaginative in the opening remarks, but make sure it's something that no one else could write
6. Address the school's unique features that interest you
7. Focus on the affirmative in the personal statement; consider an addendum to explain deficiencies or blemishes
8. Evaluate experiences, rather than describe them
9. Proofread carefully for grammar, syntax, punctuation, word usage, and style
10. Use readable fonts, typeface, and conventional spacing and margins

General advice

- **Answer the questions that are asked**
  - Don't be tempted to use the same statement for all applications. It is important to answer each question being asked, and if slightly different answers are needed, you should write separate statements.
- **Tell a story**
  - Think in terms of showing or demonstrating through concrete experience. One of the worst things you can do is to bore the admissions committee.
- **Be specific**
  - Don't, for example, state that you would make an excellent doctor unless you can back it up with specific reasons. Your desire to become a lawyer, engineer, or whatever should be logical, the result of specific experience that is described in your statement.
- **Concentrate on your opening paragraph**
  - The lead or opening paragraph is generally the most important. It is here that you grab the reader's attention or lose it.
- **Tell what you know**
  - The middle section of your essay might detail your interest and experience in your particular field, as well as some of your knowledge of the field. Refer to experiences (work, research, etc.), classes, conversations with people in the field, books you've read, seminars you've attended, or any other source of specific information about the career you want and why you're suited to it.
- **Don't include some subjects**
  - For example, references to experiences or accomplishments in high school or earlier are generally not a good idea.
- **Do some research, if needed**
  - If a school wants to know why you're applying to it rather than another school, do some research to find out what sets your choice apart from other universities or programs.
- **Avoid clichés**
  - A medical school applicant who writes that he is good at science and wants to help other people is not exactly expressing an original thought. Stay away from often-repeated or tired statements.

Advice on Personal Statements

Olivia Sniezek	• Johns Hopkins University • Genetic Medicine
Will Armentrout	• Green Bank Observatory • Assistant Scientist

Letters of Recommendation

Think EARLY!

Do you have someone who could write a GOOD letter for you?

Who knows you? Can they say positive things about you? Can they be specific?

ASK early:

Be polite

Provide info to writer

Advice on Letters of Recommendation:

Sarah Harris

- University of North Carolina
- Biochemistry

CV (curriculum vitae)/Resume

What is a CV vs. resume?

- Resume – brief, 1-2 pgs, education & experience – for a particular job
- CV – same content as resume, but can be longer – more detailed, > 2 pgs – best for an academic audience

What should I include?

- Contact info
- Educational background
- Academic achievements
- Teaching experience
- Research experience
- Grants awarded (travel?)
- Publications
- Activities (clubs, volunteer work, etc.)
- Professional affiliations
- References (available on request)

Advice on CV/Resume: Anthony Sloan

- Case Western
- Neuroscience

CV Content

- Contact information
  - Name, address, phone/fax, email
  - Make sure NAME is on each page (header/footer)
- Education
  - List degrees, department, institution, and dates of completion (or expected date)
  - List minors, sub-fields, and any academic honors like Summa Cum Laude
  - Title of thesis and name of advisor if applicable

CV Content

- Experience
  - Research/internships: brief description of work and name of advisor
  - Teaching: TA, tutor, etc.

*Important to list more than just job titles. Explain briefly what you did in each position, quantify your accomplishments as much as possible

CV Content

- Publications
- Conference presentations (URAC counts!)
- Awards, honors, fellowships, scholarships
  - All honors and awards outside of academic honors listed here along with year of the award

SAMMY SLUG

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EDUCATION

Bachelor of Arts in Environmental Science June 2021
University of California, Santa Cruz

- Senior Thesis: Evaluating Energy Conservation for Electricity in the Santa Cruz County

AWARDS

- Dean's Honors Fall 2019- Spring 2020
- Honors in the Major
- UC Santa Cruz College Scholars Program
- Golden Key International Honor Society

RESEARCH EXPERIENCE

Research Assistant, UCSC Department of Environmental Studies Dec. 2018- Present
Santa Cruz, CA

- Conduct weekly interviews with city residents to assess city residents' electricity usage
- Collaborate with research team to construct surveys on electricity usage for a sample of 100+ households monthly
- Analyze and compile data in organized reports to inform policy recommendations

Fieldwork Assistant, UCSC Department of Environmental Studies Sept. -Dec 2018
Santa Cruz, CA

- Evaluated and revised UCSC campus Environmental Impact Report
- Collected surface groundwater samples from the American River and analyzed for pesticide contamination

RELEVANT WORK EXPERIENCE

Conservation Outreach Intern, Center for Biodiversity & Conservation March 2018-Present
Santa Cruz, CA

- Create and implement program of applying remote sensing GIS applications to biodiversity conservation
- Develop targeted strategies incorporating city and county advice aimed at reaching out to government officials, citizens, and community educators

Waste Consultant, Ecology Now Jan. 2016-March 2018
Santa Cruz, CA

- Recruited businesses and non-profits to participate in free water waste audit and performed waste audits
- Educated local citizens of environmental issues in person and via telephone

POSTER PRESENTATIONS

"Legal, Technical, and Economic Challenges in Integrating Renewable Power Generation into the Electricity Grid," 4 San Diego Journal of Climate & Energy Law 1-68, Spring 2013 (with Tim Duane).

PROFESSIONAL AFFILATIONS

Member, National Association of Environmental Professionals (NAEP)
Member, Association of Environmental Studies & Sciences (AESS)

SKILLS

Computer: Proficient in Microsoft, SPSS, JAVA, and GIS
Language: Fluent in French and Conversational in Spanish

REFERENCES

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SPECIAL THANKS TO OUR ALUMNI!!

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Will Armentrout	Patricia Loughney