

## Science Undergraduate Laboratory Internships (SULI)

Summer 2022 - Application for: Carly Elizabeth Haas

### APPLICANT PROFILE

#### General Applicant Information

**First Name:** Carly

**Middle Name:** Elizabeth

**Last Name:** Haas

**Previous Last Name(s):**

**Primary Email Address:** haasc2@allegheny.edu

**Alternate Email Address 1:** carlyhaas@yahoo.com

**Alternate Email Address 2:**

**ORCID:** [0000-0003-2294-454X](https://orcid.org/0000-0003-2294-454X)

#### Current Address

**Primary Phone Number:** 412-337-4839

**Alternate Phone Number:** 412-824-7181

#### Citizenship/Languages/Eligibility Information

**I will be 18 years of age or older by the time the internship begins:** Yes

**Are you a U.S. Citizen?** Yes

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### EDUCATIONAL BACKGROUND

#### Academic Information

Are you currently attending a community college or 2-year college? No

Current academic status: Junior

If you are selected as a participant in this DOE program, will you receive academic credit from your university/college for participating? No

#### Undergraduate Institution Information

College/University Country: United States and U.S. Territories

College/University State/Province/Territory: Pennsylvania

College/University Name: Allegheny College

College/University Address: 520 N. Main St

College/University City: Meadville

College/University Zip Code: 16335-3902

Expected/Declared Major: Physical Sciences - Chemistry

Minor and/or Concentration Expected/Declared: Communication and Journalism - Communication and Media Studies

Expected Degree From This College/University: Bachelor's

Expected/Completed Graduation Date: May / 2023

Transcript: Haas Transcript Fall 2021.pdf

Does this institution provide grades? Yes

GPA Scale: 4.0

Total Attempted Credits: 95.00

Total Earned Credits: 78.00

Total Quality Points: 301.80

GPA: 3.87

## Science Undergraduate Laboratory Internships (SULI)

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### Science, Technology, Engineering and Mathematics (STEM) Courses

**Course Title:** Analytical Chemistry

**Course Number:** 362

**Enrollment Status:** Currently Enrolled

**Course Title:** Calculus 1

**Course Number:** 151

**Enrollment Status:** Recently Completed

**Course Title:** Calculus 2

**Course Number:** 152

**Enrollment Status:** Recently Completed

**Course Title:** Chemical Concepts 1

**Course Number:** 120

**Enrollment Status:** Recently Completed

**Course Title:** Chemical Concepts 2

**Course Number:** 122

**Enrollment Status:** Recently Completed

**Course Title:** Computational Expression

**Course Number:** 100

**Enrollment Status:** Currently Enrolled

**Course Title:** Core Concepts in Physics 1

**Course Number:** 110

**Enrollment Status:** Recently Completed

**Course Title:** Current Topics in Inorganic Chemistry

**Course Number:** 422

**Enrollment Status:** Recently Completed

**Course Title:** Current Topics in Physical Chemistry

**Course Number:** 442

**Enrollment Status:** Recently Completed

**Course Title:** Inorganic Chemistry

**Course Number:** 222

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<b>Enrollment Status:</b>	Recently Completed
<b>Course Title:</b>	Introductory Biochemistry
<b>Course Number:</b>	253
<b>Enrollment Status:</b>	Recently Completed
<b>Course Title:</b>	Junior Seminar
<b>Course Number:</b>	584
<b>Enrollment Status:</b>	Recently Completed
<b>Course Title:</b>	Multistep Synthesis
<b>Course Number:</b>	386
<b>Enrollment Status:</b>	Recently Completed
<b>Course Title:</b>	Organic Chemistry 2: Synthetic Strategies
<b>Course Number:</b>	332
<b>Enrollment Status:</b>	Recently Completed
<b>Course Title:</b>	Organic Chemistry: Form & Function
<b>Course Number:</b>	231
<b>Enrollment Status:</b>	Recently Completed
<b>Course Title:</b>	Physical Chemistry
<b>Course Number:</b>	242
<b>Enrollment Status:</b>	Recently Completed
<b>Course Title:</b>	Quantum Chemistry
<b>Course Number:</b>	345
<b>Enrollment Status:</b>	Currently Enrolled

## Science Undergraduate Laboratory Internships (SULI)

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### Awards or Honors

**Award Title:** Outstanding Scholastic Achievement in Freshman Chemistry

**Month & Year Received:** May / 2020

**Awarding Institution:** American Chemical Society, Erie Chapter

**Award Title:** 2019-2020 Distinguished Alden Scholar

**Month & Year Received:** October / 2020

**Awarding Institution:** Allegheny College

**Award Title:** 2020-2021 Distinguished Alden Scholar

**Month & Year Received:** October / 2021

**Awarding Institution:** Allegheny College

### High School Graduation or GED

**Date of High School Graduation or GED:** May / 2019

**Country:** United States

**City:** Monroeville

**State/Province/Territory:** PA

## Science Undergraduate Laboratory Internships (SULI)

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### WORK EXPERIENCE & SKILLS

## Science Undergraduate Laboratory Internships (SULI)

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Work Experience	
<b>Name of Place of Employment or Activity:</b>	Allegheny College Organic Chemistry 1 Teaching Assistant
<b>Dates of Employment or Activity:</b>	From 9/2/2021 To 12/9/2021
<b>Hours Per Week:</b>	3.0
<b>Primary Duties:</b>	Laboratory technique instruction, laboratory experiment supervision, lab material preparation, synthetic product characterization, waste maintenance
<b>Tasks Performed:</b>	Instructed laboratory techniques to organic chemistry students prior to lab, supervised students during lab experiments, answered questions about the process of an experiment or results, calibrated and prepared instruments like HPLC and rotovaps prior to lab, analyzed characterization data of synthetic products made by students during the lab, prepared stock solutions or collected chemicals needed for the lab, maintained proper waste disposal of hazardous organic materials
<b>Name of Place of Employment or Activity:</b>	Allegheny College Lord Fellowship Intern
<b>Dates of Employment or Activity:</b>	From 6/13/2021 To 7/23/2021
<b>Hours Per Week:</b>	35.0
<b>Primary Duties:</b>	Conduct experiments for independent project, data collection from instruments, data analyzation, write protocols and final report of results
<b>Tasks Performed:</b>	Synthesized compounds needed for project, completed experiments with concentration, solvent, and metal ion on aggregation ability, took UV-Vis spectra for experiments, processed and analyzed raw spectra, used Excel to fit UV-Vis spectra with Gaussian curves, wrote protocols for future experiments, wrote final report and presented results of project to PI
<b>Name of Place of Employment or Activity:</b>	Dissertation Literature Research Assistant
<b>Dates of Employment or Activity:</b>	From 1/4/2021 To 4/26/2021
<b>Hours Per Week:</b>	2.5
<b>Primary Duties:</b>	Literature searching, literature organization, literature reading, and topic proposal
<b>Tasks Performed:</b>	Searched for literature pertinent to the candidate's thesis, read through literature to ensure of its relevance to the thesis, organized catalog of literature being used by candidate, and proposed subtopics necessary to discuss through the literature review section of the thesis based on literature findings
<b>Name of Place of Employment or Activity:</b>	Allegheny College General Chemistry 1 Teaching Assistant
<b>Dates of Employment or Activity:</b>	From 9/1/2020 To 10/6/2020
<b>Hours Per Week:</b>	3.0
<b>Primary Duties:</b>	laboratory technique instruction, guided experiment supervision, lab material preparation, and waste maintenance
<b>Tasks Performed:</b>	Demonstrated specific lab techniques needed for a guided experiment such as a titration to general chemistry students, supervised students during lab, answered questions that students had about the process of the experiment or results, calibrated and prepared instruments such as UV-Vis spectrometers or pH sensors prior to lab, prepared stock solutions or synthetic solids necessary for an experiment prior to lab, maintained waste disposal after lab completion
<b>Name of Place of Employment or Activity:</b>	Allegheny College Research Assistant
<b>Dates of Employment or Activity:</b>	From 9/5/2019 To 3/12/2020
<b>Hours Per Week:</b>	4.0

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<b>Primary Duties:</b>	Laboratory maintenance, data collection, material preparation, student shadowing and assistance
<b>Tasks Performed:</b>	Cleaned and organized new laboratory, prepared stock solutions or buffers, synthesized non-purchasable products, collected data with spectrometers (fluorescence and UV-Vis), worked with older students to collect data and to further develop independent projects, shadowed older students, reported experimental data back to PI
<b>Professional Associations</b>	
<b>Are you a member of any professional organizations?</b>	Yes
<b>Professional associations you are affiliated with:</b>	American Chemical Society
<b>Computer Skills</b>	
<b>Computer related skills:</b>	<ul style="list-style-type: none"> <li>Excel - processing of spectral data, graphically representing data, statistical analysis of data, fitting data to models or equations <ul style="list-style-type: none"> <li>Excel was used for the entirety of my data processing and representation with my independent project that I completed in the summer of 2021 as a Lord Fellowship Intern at Allegheny College</li> </ul> </li> <li>MNova Software - processing specifically NMR spectra</li> <li>Currently learning the coding language, Python, in the Computational Expression course I am currently enrolled in</li> </ul>
<b>Laboratory/Technical Skills</b>	
<b>Experience with advanced laboratory techniques or equipment:</b>	<ul style="list-style-type: none"> <li>Organic Synthesis Techniques <ul style="list-style-type: none"> <li>Able to carry out the following: TLC, flash column chromatography, aqueous extraction, rotary evaporation, nitrogen manifold system, cannulation, microwave-assisted synthesis, reflux synthesis, recrystallization, vacuum filtration</li> </ul> </li> <li>Spectroscopy &amp; Characterization Instruments <ul style="list-style-type: none"> <li>Able to prepare samples, collect and datalyze data from the following instruments: NMR, FTIR, Fluorescence Spec, UV-Vis Spec, HPLC, GC-MS, Raman Spec</li> </ul> </li> <li>Able to use the following equipment: Stopped-Flow system, sonicator baths, millipore filtration system</li> <li>Able to complete the following: Micropipetting &amp; volumetric pipetting, volumetric stock preparation</li> </ul>



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### PROGRAM INFORMATION

#### Eligibility

Have you previously participated in 2  
SULI appointments? No

#### Previous DOE Internship/Fellowship Experience

Have you ever had an  
internship/fellowship with the  
Department of Energy or any of its  
National Laboratories? No

#### Availability

What is the earliest date you can  
begin your internship? 5/20/2022

When do you need to complete your  
internship? 8/27/2022

#### First Choice Host DOE Laboratory

DOE Laboratory: Brookhaven National Laboratory (BNL)

First Choice Research Area: Physical Chemistry

Second Choice Research Area: Nuclear Chemistry

Third Choice Research Area: Accelerator Physics/Science

#### Second Choice Host DOE Laboratory

DOE Laboratory: Thomas Jefferson National Accelerator Facility (TJNAF)

First Choice Research Area: Physical Chemistry

Second Choice Research Area: Materials Sciences

Third Choice Research Area: Accelerator Physics/Science

#### Relatives Employed at DOE Laboratories

Are you a relative of an employee at  
the proposed host DOE laboratories? No

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### ESSAYS

Research Experience:	<p>I began with research my freshman year of college as soon as I possibly could. Since then I have worked on two research projects with different professors. The first project, completed under Dr. Moira Flanagan, investigated the structure-function relationship in the photoprotective and aggregation ability of melanin pigments. The second project, completed under Dr. Alice Deckert, investigated the kinetics and mechanism of surface substitution reactions. Both of these projects have been essential in developing my ability to work both independently and collaboratively while being a part of a larger research team.</p> <p>The first project over time shifted from a shared project guided by senior students into an independent project of my own. Through the fall of 2020 to the spring of 2021, I completed preliminary studies and small experiments as an assistant to senior faculty and students. I assisted with a series of experiments comparing the changes of photophysical properties of fluorescent dyes to those of a monomer of eumelanin. We took fluorescence emission spectra of fluorescein dye with differing conditions. Then, in the summer of 2021, I completed an independent project. About half of my time on the project involved the organic synthesis of necessary compounds not available for purchase. The rest of my time of this project involved taking spectra of samples under differing conditions. Ultimately, this project taught me how to undertake an independent research project as part of a whole team.</p> <p>For the fall 2021 semester, I was able to complete another independent research project. The project, completed under my advisor, investigated if steric hindrance of an imidazole would affect the substitution mechanism of a protein immobilization reaction would follow on an ester tether attached to a surface such as for usage with a biosensor. So, I completed kinetic trials of the attachment to a silver nanoparticle surface using Raman spectroscopy. The techniques that I learned from my first lab assistance and developed from my first independent project made my work on this project possible.</p> <p>Lastly, throughout the fall of 2021, my junior seminar lab course was run as a course-based undergraduate research experience. In the lab course, in a group of three students, we completed an independent research project using all of the same skills I had gained previously.</p>
Research Interests:	<p>My favorite area of research is physical chemistry, which is a generally broad topic so in particular I really enjoy surface chemistry and quantum chemistry. Physical chemistry explains interactions occurring on an atomic or molecular level rather than actually performing them like you would with organic or inorganic chemistry. Taking data represented as spectra and numbers and being able to convert it with something such as a mathematical model into a describable process or action really fascinates me. Organic chemistry feels a lot like baking to me; it is meticulous and stressful and requires a special kind of hand to get the exact right outcome. Physical chemistry feels like cooking; there is an end goal that can be achieved through several routes and even if the end goal isn't achieved, you can still learn something about the process that occurred. Besides the process of understanding and learning about the chemistry, I enjoy the activities you are able to complete more with a physical chemistry lab over a synthetic organic or inorganic lab. I really love to get to learn new technology and what their data looks like and represents.</p> <p>Both of my selected host laboratories specialize in physical chemistry and physics and I am very interested in the work that they do. At Brookhaven, I would be particularly interested to work in the surface electrochemistry, electron/photon induced processes, neutrino and nuclear chemistry groups within the chemistry department. Importantly, I would get the opportunity to learn about and use a ton of new technology, anything ranging from the UHV-EC system to the electron accelerator. At Jefferson, any project within the physical chemistry, materials science, or accelerator physics/science group would offer me a very similar experience and would be a fascinating project to have the chance to complete.</p> <p>Besides these locations both working on research that I am interested in, I have family that live nearby, so my housing accommodation would already be settled and ready for the summer.</p>
Personal Experience:	<p>Besides my research experience, I think there are many aspects of myself that would make me a great candidate for the SULI program. First, I definitely consider myself a leader amongst many different groups. On campus, I have been fortunate enough to be a part of several clubs, which I have taken up executive roles in. This academic year, for our Chemistry and Women in Stem clubs, I am the secretary for both where I maintain the list of active members and report club or departmental information to members. I am a Junior class social chair for the honors program and have planned events and provided guiding information to first-year honors students. Although I feel headstrong and able enough to be a leader, I work well in teams even if I am not in a leadership role and enjoy the chance to cooperate and explore new ideas with others. Furthermore, when I'm not in class or in the lab, I spend a lot of time doing creative projects, like playing guitar, writing, and crafting. I think that my time spent on hobbies like these allow for a certain creativity and imaginative mindset that I am able to bring over to a scientific table. While working in research does require a good analytical and logical thought process, creativity is needed to work through the process to form new experiments and hypotheses or to troubleshoot when the plan for the experiment does not go as expected. Lastly, I am incredibly passionate about science and research. Proven by how</p>

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	<p>early I started research and the science clubs I am in, there is nothing more that I love than having the opportunity to do and learn about chemistry. I love having the time for undivided attention to research and the chance to invest myself in a project like one that I would be able to complete through this internship. Overall, my leadership skills, creativity, and passion for science would make me a great addition to the SULI program.</p>
Professional Goals:	<p>In the future, I plan on going to graduate school to obtain my Ph.D. in physical chemistry or a sub-discipline of physical chemistry, then after that I would like to continue my research. My dream would be to be able to work at a national lab, such as Brookhaven or Jefferson, in the US or in another country, investigating a very large scale, cooperative project. I have considered going into academia to continue research, but I have always doubted my skills at being a professor, so I would prefer to work in a lab where research and not teaching is my full time responsibility. Through the SULI program, I expect to expand upon my objective laboratory skills and knowledge as well as my ability to think and work as a scientist. As much as I love Allegheny College, there is only so much at my disposal with a smaller department. I would definitely get to learn how to use new technology and equipment, and I would learn about specialized topics that would all be useful in my journey through gaining a Ph.D. to joining the industry. Similarly, though the research experience I have gained already has begun teaching me to be a scientist, getting the chance to work at a large laboratory and have a fully immersive experience for 10 weeks would further those skills. It would demonstrate how to work with an expansive research team and how to write and present experimental findings even further. It would also open new connections specifically in the field that I would like to pursue in my graduate studies and in my future career options. As I have previously discussed, getting to do this would be the opportunity of a lifetime for me and it would be extremely worthwhile and rewarding not only for my career development but also for the growth of my passion towards science.</p>

### RECOMMENDATIONS

Recommendation 1:	<p><b>First Name:</b> Alice  <b>Last Name:</b> Deckert  <b>Email:</b> adeckert@allegheny.edu  <b>Status:</b> Received 1/3/2022</p>
Recommendation 2:	<p><b>First Name:</b> Moira  <b>Last Name:</b> Flanagan  <b>Email:</b> mflanagan@allegheny.edu  <b>Status:</b> Received 1/3/2022</p>

NAME Carly Elizabeth Haas

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Deckert, A.

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ALLEGHENY  
COLLEGE

MAJOR Chemistry

MINOR Communication

PRINTED 01/05/22

DEPT. NO. DESCRIPTION CREDIT HR. GRADE

DEPT. NO. DESCRIPTION

CREDIT HR. GRADE

FALL 2019

LATIN	0AE	ADVANCED PLACEMENT	4.00	TR
PSYCH	110	FOUNDATIONS OF PSYCHOLOGY	4.00	TR
HIST	0AE	ADVANCED PLACEMENT	4.00	TR
AP	BIO	COLLEGE ELECT ADV PLACEMENT	4.00	TR
TOTAL AP CREDITS			16.00	
FS	101	ACADEMIC DISCOURSE I	4.00	A
CHEM	120	CHEMICAL CONCEPTS 1	4.00	A
MATH	151	CALCULUS I	4.00	A
HIST	157	HIST MOD FRANCE, 1789-PRESENT	4.00	A
SEM-4.00	CUM-4.00	COMPLETED HOURS	32.00	

SPRING 2020

CHEM	122	CHEMICAL CONCEPTS 2	4.00	A
FS	102	ACADEMIC DISCOURSE II	4.00	A
MATH	152	CALCULUS II	4.00	B
POLSC	303	CONLAW: RIGHTS AND LIBERTIES	4.00	A
SEM-3.75	CUM-3.88	COMPLETED HOURS	48.00	

COVID-19. See transcript key. 05/05/20

FALL 2020

FSCHE	201	RESEARCH METHODS IN CHEMISTRY	4.00	A-
COMM	120	INTRODUCTION TO MEDIA CULTURE	4.00	A
PHYS	110	CORE CONCEPTS IN PHYSICS I	4.00	A-
CHEM	231	ORGANIC CHEM: FORM & FUNCTION	4.00	A
CHEM	590	INDEPENDENT STUDY	1.00	A
SEM-3.86	CUM-3.87	COMPLETED HOURS	65.00	

SPRING 2021

CHEM	222	INORGANIC CHEMISTRY	4.00	A-
CHEM	332	ORGANIC CHEM II: SYNTHETIC ST	4.00	A
CHEM	386	MULTISTEP SYNTHESIS	2.00	B+
CHEM	590	INDEPENDENT STUDY	1.00	CR
CHEM	442	CURRENT TOPICS/PHYSICAL CHEM	2.00	A
CHEM	422	CURRENT TOPICS/INORGANIC CHEM	2.00	A
SEM-3.81	CUM-3.86	COMPLETED HOURS	80.00	

FALL 2021

CHEM	242	PHYSICAL CHEMISTRY	4.00	A
CHEM	253	INTRODUCTORY BIOCHEMISTRY	4.00	A-
CHEM	590	INDEPENDENT STUDY	1.00	A
COMM	251	GENDER IN PUBLIC COMMUNICATION	4.00	A
CHEM	584	JUNIOR SEMINAR	2.00	A
SEM-3.92	CUM-3.87	COMPLETED HOURS	95.00	

58.80	301.80	QUALITY POINTS
15.00	78.00	QUALITY POINT HOURS

-----END OF TRANSCRIPT-----

# SULI PROGRAM APPLICATION RECOMMENDATION FOR CARLY ELIZABETH HAAS

## Recommender Contact Information

- **First Name:** Alice
- **Last Name:** Deckert
- **Title:** Paul and Mildred Hill Professor of Chemistry
- **Department:** Chemistry
- **Institution/Organization:** Allegheny College
- **Telephone:** 814-332-5329
- **Email:** adeckert@allegheny.edu

## Applicant Information

### Association

Describe your relationship to the applicant, including how long you've known the applicant, where, and in what capacity.

I have worked with Carly for two and a half years as her advisor, research mentor and professor in several classes.

### Applicant Comments

Please provide substantive comments about the applicant's education, training, aptitude, or promise relevant to the SULI program. Include any relevant additional detail or perspective regarding the applicant's research experience or equivalent experience on complex projects, including the level of independence or other factors that would contribute to the applicant's ability to make an excellent contribution to the SULI program.

Carly is intelligent and able to problem solve in complex situations. I have seen her ability to master complex concepts and apply them to solve real-world problems in general chemistry courses, in physical chemistry and in my advanced topics surface science course. In these courses Carly tackled every case study challenge problem that I threw at the class and worked to not only arrive at a reasonable solution, but also to make sure that she really understood the application of the concepts to the problem in a way that allowed her to generalize her approach and apply it to other problem solving activities. This ability to really tackle open-ended problems and analyze them leads me to believe that she will be an scientist and an excellent addition to your research team.

Carly is curious and is typically not satisfied with the easy answer. In my research lab she thinks carefully about the data and the concepts and asks excellent questions that help not only her, but her labmates to understand the material on a deeper level. Our Junior Seminar (superlab) course is taught as a CURE (Course-based Undergraduate Research Experience). In this course students work as a team to develop a mini research proposal related to a topic provided by the instructors and then carry out the research. This culminates in a final written document in ACS journal style as well as a 15-20 minute group presentation. Carly was clearly the leader in her group and my co-instructor and I were particularly impressed with her ability to search, read and synthesize the literature in order to make sense of her group's findings. In addition, her ability to communicate her work in both written and oral form surpassed our expectations of junior level students. This ability to work as a team, ask and answer questions, and communicate clearly makes Carly an asset to any research group.

Carly also displays strong leadership abilities. During class and in lab as her group works to solve problems together she is nearly always the first one to see a way toward a solution. However, she always allows others to express their ideas and does not dominate the group. Rather she works with the group and helpfully brings her classmates along to the best answer. She exudes an enthusiasm for the work that spills over to her group mates and is a joy to watch.

For these reasons I highly recommend that you strongly consider Carly for your position.

Applicant Rating

In comparison to other undergraduate students, please rate the applicant relative to his/her peers on the following qualifications:

	Do Not Know	Below Average	Average	Above Average	Superior
Analytical and Mathematical				X	
Experimental Research				X	
Overall Academic				X	
Initiative and Self Reliance					X
Motivation toward Scientific Career					X
Originality of Thought				X	
Emotional Maturity					X
Ability to Work with Others					X
Potential for Leadership					X
Oral Communication Skills				X	
Written Communication Skills				X	

# SULI PROGRAM APPLICATION RECOMMENDATION FOR CARLY ELIZABETH HAAS

## Recommender Contact Information

- **First Name:** Moira
- **Last Name:** Flanagan
- **Title:** Assistant Professor
- **Department:** Chemistry
- **Institution/Organization:** Allegheny College
- **Telephone:** 814-332-5356
- **Email:** mflanagan@allegheny.edu

## Applicant Information

### Association

Describe your relationship to the applicant, including how long you've known the applicant, where, and in what capacity.

I have been a research advisor to Carly Haas as an Assistant Professor of Chemistry during the F2019, S2020, F2020, S2021 semesters and the Summer 2021 student research internship program at Allegheny College.

### Applicant Comments

Please provide substantive comments about the applicant's education, training, aptitude, or promise relevant to the SULI program. Include any relevant additional detail or perspective regarding the applicant's research experience or equivalent experience on complex projects, including the level of independence or other factors that would contribute to the applicant's ability to make an excellent contribution to the SULI program.

Carly has demonstrated a particularly strong passion for research and sees herself as a career researcher. In fact, she earned our American Chemical Society award for Outstanding Scholastic Achievement in Freshman Chemistry, an award given to a first-year student that shows particular mastery and dedication to the subject both in the classroom and importantly, in the laboratory.

Carly's enthusiasm is infectious and is a joy to have in the lab. In the first weeks of her very first semester here at Allegheny, Carly approached me asking to join my lab. Although fresh out of high school, she explained, she had been exposed to biomedical research environments through her parents, already certain that she wanted to become a researcher herself. Over the semesters and summer that I have worked with Carly, she has quickly caught on to both spectroscopic and molecular biology techniques. As she's learning a new technique, she might hesitate the first time she performs a new measurement, but only because she is internalizing the full experience. The second time, she knows what she is doing and proceeds with efficiency, deliberation, and focus. When I asked her to prepare a few liters of media for bacterial culture during her very first semester as a college student, she quickly copied the protocol but then kept writing in her lab notebook: without being prompted she was making notes at the steps that need precise volume, the steps that do not, and steps where it was important to check the pH—So I don't waste time, she explained. Of course, she had identified the important steps perfectly. While this is behavior that might be expected from a lab technician or graduate student, I do not often see it in early-career undergraduates. Carly is the type of person one can trust with a protocol, procedure, or even open-ended task. She knows how to prioritize and ask the questions that enable her to proceed.

Since her first year in college, Carly has only grown as a researcher. Over this past summer, she worked with me getting to do full-time research finally. Prior to the summer, Carly had been learning how to deconvolve congested UV-Vis spectra to extract site energies and aggregation information but had also been taking our multistep synthesis lab course. When the summer began, Carly

was confident enough in her synthetic skills to prepare a sulfur-substituted analog of the melanin monomer compound to compare to the endogenous structure. She spent the rest of the summer comparing aggregation behavior of the original and analog compounds. By taking on a challenging project, Carly encountered many of the struggles inherent to research. She had to learn to motivate herself through a week of very disappointing results, recover from mistakes, and recognize when it is time to switch gears. I was not at all surprised when she passed all her trials with resilience and a smile, but I was deeply impressed at how independently and effectively she used the literature. Carly quickly caught on to the idea that a researcher's relationship with the literature is cyclical and is always there as a resource. Whenever she came to me with an interpretation of a spectrum or a new experimental idea, she would always be armed (unprompted) with literature comparisons or precedents that were indeed relevant and useful.

Carly is an excellent candidate for your summer program and I strongly recommend that you extend her admission. She will be an asset to your research, and I am confident that your program will help develop Carly into the researcher she plans to be.

## Applicant Rating

In comparison to other undergraduate students, please rate the applicant relative to his/her peers on the following qualifications:

	Do Not Know	Below Average	Average	Above Average	Superior
<b>Analytical and Mathematical</b>				X	
<b>Experimental Research</b>					X
<b>Overall Academic</b>				X	
<b>Initiative and Self Reliance</b>				X	
<b>Motivation toward Scientific Career</b>					X
<b>Originality of Thought</b>				X	
<b>Emotional Maturity</b>				X	
<b>Ability to Work with Others</b>					X
<b>Potential for Leadership</b>					X
<b>Oral Communication Skills</b>				X	
<b>Written Communication Skills</b>				X	