# USNA Chemistry Internship Descriptions - Summer 2022

These descriptions are for traditional "chemistry" internships. For "medical" internships, see end of this document for information.
Applications must be submitted online, on the chemistry department internship webpage:
https://www.usna.edu/ChemDept/ChemMajor/internships.php

6 December 2021

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1. **ACS Nuclear & Radiochemistry Summer School.**
***San Jose State University, San Jose, California, and Brookhaven National Laboratory, Upton, New York***
This is a competitive fellowship program that consists of lecture and laboratory components. It covers the fundamentals of nuclear theory, radiochemistry, nuclear instrumentation, radiological safety, and applications to related fields. Laboratory work will introduce the mid-shipman to state-of-the-art instrumentation and technology that are used routinely in basic and applied nuclear science. In addition, there are special symposia, guest lectures, and tours of nearby research centers. This internship helps prepare USNA graduates for service in the nuclear communities.
https://www.nucl-acs.org/?p=1375
   - Dates: 13 June – 24 July 2022
   - Eligible for PTE credit: no (because it is a school)
   - Qualifications: Rising 1/C or rising 2/C, 2 years of chemistry, 1 year of physics, 1 year of calculus. A year of physical chemistry is desirable.
   - Funding: Fully funded, but see POC before applying.
   - Application: (1) See website above. Deadline: 1 February 2022. (2) Also, submit online chemistry application. **Note**: See the POC asap before applying.
   - POC: Prof McClean mcclean@usna.edu

2. **Armed Forces Radiobiology Research Institute (AFRRI), Bethesda, Maryland.**
***Radiobiology Research***
The AFRRI mission is focused on radiation countermeasure research. i.e., research involving chemical, biological, radiological, nuclear, and high yield explosives. Midshipmen will work with military and federal civilian scientists on projects related to AFRRI's research portfolio in radiation biology, which includes biochemical and physiologic mechanisms, countermeasure development, radiation injury/dose assessment and prognostication, the effects of combined injury involving radiation, and delayed or late effects such as fibrosis and cancer. Specifics of each project will be determined after interaction between intern and mentor.
https://www.usuhs.edu/afrri
   - Dates: Block 0 + 1 (17 May - 24 June 2022) or Block 2 + ½ of Block 3 (27 June - 5 August 2022)
   - Eligible for PTE credit: yes
   - Qualifications: Rising 1/C or rising 2/C, 1 year of chemistry and an interest in CBRNE. SC, SP, or ME majors.
   - Funding: Reimbursement for daily commutes between USNA and AFRRI.
   - Application: Submit online chemistry application.
   - Other: Midn must reside at USNA and POV commute daily from USNA to AFRRI.
   - POC: Prof McClean mcclean@usna.edu

3. **The Baruch S. Blumberg Institute, Doylestown, Pennsylvania.**
***Hep B Research***
The Baruch S. Blumberg Institute is a leading nonprofit research organization dedicated to hepatitis B and liver cancer. A variety of research projects that center around hepatitis and virus research are available. Selected examples are (1) Early Detection of Disease. (2) Experimental Therapeutics. (3) Molecular Pathogenesis.
http://blumberginstitute.org/
   - Dates: Block 2.
   - Eligible for PTE credit: yes
   - Qualifications: Rising 1/C or rising 2/C. Chemistry major and/or biology background.
   - Funding: Fully funded.
   - Application: Submit online chemistry application.
   - POC: Prof McClean mcclean@usna.edu

4. **The Bureau of Public Health Laboratories-Miami, Miami, Florida.**
***Infectious Organisms Research***
The Bureau of Public Health Laboratories (BPHL) – Miami is one of 3 state reference laboratories in Florida. It provides testing to private sector laboratories for rare and unusual infectious organisms. BPHL-Miami also may confirm the findings of a private laboratory or perform additional high complexity tests for diseases of public health importance. BPHL also belongs to the National Laboratory Response Network for Bioterrorism (LRN-B). A midshipman participating in this internship will learn the role of public health departments in anticipating, detecting, and mitigating dangers to the health and safety of citizens. Because of its location in a major American city with a large international port and population, the participants will learn about the challenges involved in working with diverse and dynamic public health situations, including detection of bioterrorism agents.
http://www.floridahealth.gov/programs-and-services/public-health-laboratories/
   - Dates: Block 1.
   - Eligible for PTE credit: yes
   - Qualifications: Rising 1/C or rising 2/C, with an interest in public health. Completion of General Biology I. Additional biology and/or biochemistry courses would be helpful.
   - Funding: Fully funded.
   - Application: Submit online chemistry application.
   - POC: Prof O'Carroll ocarroll@usna.edu

5. **National Human Genome Research Institute (NHGRI), Bethesda, Maryland.**
***Human Genome Research***
Midshipmen will work with civilian scientists and clinicians on research projects that center around genetics and genomics. Experiments that are aimed at developing better approaches for detecting, diagnosing, and managing genetic disorders. Possible specific research areas are: a study of genetic changes that lead to the initiation and progression of cancer; the identification of genetic abnormalities responsible for human disease; the use of molecular genetics to identify disease-associated gene defects.
http://www.genome.gov/10000218
- Dates: Block 0 + 1 (or by arrangement for a minimum of 6 weeks).
- Eligible for PTE credit: yes
- Qualifications: Rising 1/C or rising 2/C.
- Funding: Typically, not funded.
- Application: (1) See website above; deadline: 1 March 2021, but apply asap. (2) Also, submit online chemistry application.
- Other: Midn must reside at USNA and POV commute daily from USNA to NHGRI.
- POC: Prof McClean mcclean@usna.edu

6. **Naval Research Laboratory, Washington, D.C.**
***Biochemical Aspects of Barnacle Glue***
Hard fouling organisms such as barnacles stick to ship hulls and significantly impede maritime operations, costing the U.S. Navy millions of dollars per year in coating, cleaning and added fuel costs. Such a tenacious underwater bond relies on specialized proteins that form an adhesive for permanent attachment of their hard outer shells to surfaces. NRL's Chemistry and BioMolecular Science Divisions are applying cutting-edge biomolecular and bioinformatic approaches to produce a new, more comprehensive picture of the specialized proteins found in barnacle adhesive and to develop synthetic glue mimics. Midshipmen will investigate the biochemical aspects of barnacle glue, which will involve the development and application of bulk amyloid adhesives for underwater delivery and curing. Projects will involve training/development in scalable adhesive production, biophysical characterization, and standard adhesive testing methods, such as tensile testing and formulation to measure the adhesive properties of amyloid adhesives deployed underwater.
https://www.nrl.navy.mil/Our-Work/Areas-of-Research/
- Dates: Block 1, 2, 3
- Eligible for PTE credit: yes
- Qualifications: Rising 1/C or rising 2/C, chemistry or engineering major. Must have completed 1 year of chemistry and have experience in a wet chemistry lab. Helpful if applicant has completed biology courses, and/or has background in biology, biochemistry, microbiology, or biophysics .
- Funding: reimbursement for daily commutes from USNA to NRL.
- Application: Submit online chemistry application.
- Other: Midn must reside at USNA and POV commute daily from USNA to NRL.
- POC: Prof Yates eyates@usna.edu

7. **Naval Research Laboratory (NRL), Washington, D.C.**
***Quantum Computing***
Quantum computers are expected to be able to perform quantum-mechanical many-particle calculations that cannot be completed on even our largest supercomputers. The intern is expected to work with and test new components in the software package Qiskit on IBM Q quantum computers, and work with NRL staff to integrate these into their research development. Specific roles, expectations, and deliverables will be based on the midshipman's background, experience, and interest and set at the start of the project.
https://www.nrl.navy.mil/Our-Work/Areas-of-Research/
- Dates: Block 1 or 2
- Eligible for PTE credit: yes
- Qualifications: Rising 1/C or rising 2/C. Programming experience in Python would be helpful. Other programming may be useful (C, Fortran, Matlab).
- Funding: Reimbursement for daily commutes between USNA and NRL.
- Application: Submit online chemistry application.
- Other: Midn must reside at USNA and POV commute daily from USNA to NRL.
- POC: Prof Farrell wfarrell@usna.edu

8. **Naval Research Laboratory (NRL), Washington, D.C.**
***Synthetic Biology Research***
Participants in the synthetic biology internship at the Naval Research Lab in Washington, DC, will learn how to manipulate DNA in order to create living sensors to protect Navy divers. Interns will work side-by-side with NRL biologists to gain wet lab experience and basic skills in microbiology and molecular genetics to create bacterial cells that glow when exposed to toxic chemicals. By the end of the internship midshipmen will have experience designing PCR reactions, cloning DNA, and transforming bacterial cells with new DNA.
https://www.nrl.navy.mil/Our-Work/Areas-of-Research/
- Dates: Block 0 + 1
- Eligible for PTE credit: yes
- Qualifications: Rising 1/C or rising 2/C. Well-qualified rising 3/C considered by exception only. Helpful if applicant has completed biology course(s), and/or has background in biology and/or biochemistry.
- Funding: Reimbursement for daily commutes between USNA and NRL.
- Application: Submit online chemistry application.
- Other: Midn must reside at USNA and POV commute daily from USNA to NRL.
- POC: LT Snyder cmsnyder@usna.edu

9. **Naval Research Laboratory (NRL), Washington, D.C.**
***Virus Predictor - Sequence to Symptom***
Participants in the viral protein internship at the Naval Research Lab in Washington, DC, will learn how to clone and purify DNA and to express and purify proteins. Working closely with NRL researchers, interns will develop skills in molecular biology and biochemistry as they produce and purify target proteins containing short stretches of homologous host-pathogen protein sequences (SSHHPS). These sequences have been identified as targets of viral proteases known to interrupt host defense strategies, based on algorithms developed in

the POC's laboratory. Proteins generated in the internship will support studies of biochemical pathways used by viruses to invade hosts. By the end of the internship, midshipmen will gain experience cloning DNA that contains a specific gene sequence, transforming bacterial cells with these new DNA constructs, and purifying target proteins encoded by the gene.
https://www.nrl.navy.mil/cbmse/

- Dates: Block 1, 2, or 3
- Eligible for PTE credit: yes
- Qualifications: Rising 1/C or rising 2/C. Completion of general biology I. Additional experience in biochemistry, biophysics, microbiology, virology, or immunology would be helpful.
- Funding: Reimbursement for daily commutes between USNA and NRL.
- Application: Submit online chemistry application.
- Other: Midn must reside at USNA and POV commute daily from USNA to NRL.
- POC: Prof Schlessman schlessm@usna.edu

**10. Naval Surface Warfare Center - Indian Head Division (NSWC IHD), Indian Head, Maryland.**
***Energetic Materials Research***

NSWC IHD is the Navy's premier facility for ordnance, energetics and explosive ordnance disposal (EOD) solutions. Internship projects center around the following: (1) lab work on propellants. (2) propellant testing (including field testing. (3) explosive manufacturing research. (4) robotics support & explosive detection equipment. (5) work on warhead designs (to include modeling and simulation studies). Midshipmen will be matched to projects based on their majors. Specific projects are listed on a separate document on the chemistry internship website.
https://www.navsea.navy.mil/Home/Warfare-Centers/NSWC-Indian-Head/

- Dates: Block 1, 2, or 3.
- Eligible for PTE credit: yes
- Qualifications: Rising 1/C or rising 2/C, chemistry, physics, and engineering majors.
- Funding: Lodging & meals provided at NSWC-Indian Head.
- Application: Submit online chemistry application. Specific project(s) must be entered on application.
- POC: LT Goldenberg goldenbe@usna.edu

**11. Purdue University, West Lafayette, Indiana.**
***Chemical Composition Analysis of Naval Tactical Fuels, and Engineering of Batteries, Solar Cells, Radar, and Turbine Systems***

This internship will involve hands-on laboratory work conducting experiments and simulations for a variety of renewable energy and electronics projects. The students will gain significant experience in a laboratory environment. It is expected that the student will conduct experiments/perform simulations with the aid of a mentor in the host laboratory's group (likely to be a graduate student or post-doctoral research scientist). At the conclusion of the internship, the student will present his or her work to the wider Purdue student body and faculty. Internship projects center around the chemistry of batteries, thermal management of electronic systems, radar cooling designs, and turbine engineering. Specific projects are listed on a separate document on the chemistry internship website.
https://www.purdue.edu/?_ga=2.14380727.1863141713.1607565799-1166996221.1607565799

- Dates: Block 1
- Eligible for PTE credit: yes
- Qualifications: Rising 1/C or 2/C. Majors: chemistry, mechanical engineering, aerospace engineering, electrical engineering, or other related disciplines.
- Funding: Fully funded.
- Application: Submit online chemistry application. Specific project(s) must be entered on application.
- LT Snyder cmsnyder@usna.edu

**12. Vanderbilt University, Nashville, Tennessee.**
***Multianalyte Microphysiometry Methods***

This internship will involve research with the Cliffel lab, which is developing new multianalyte microphysiometry methods with applications in cancer, diabetes, and toxicology. This is done through electrochemical detectors for many metabolic analytes into the microfluidic chamber to give a complete dynamical picture of the live cell population. Work is always progressing, but recent projects included glucose, choline, lactate, IL6 protein and glutamine detection. The midshipman will work on either fabricating devices or testing detection capabilities. Ultimately, the research focuses on developing electrochemical sensors to detect the effects of biological toxins in cells. This could have applications as wide ranging as determining if a patient is experiencing sepsis or type of care needed after biological warfare attacks.
http://www.vanderbilt.edu/chemistry/faculty/cliffel.php

- Dates: Block 1 or 2.
- Eligible for PTE credit: yes
- Qualifications: Rising 1/C or rising 2/C. Completion of SC261 & SC262. Completion of SC361 & SC364 is desired.
- Funding: Fully funded.
- Application: Submit online chemistry application.
- POC: LT Goldenberg goldenbe@usna.edu

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See next page for additional information.

**To Apply**
Go to the chemistry department internship webpage and apply online.

**Need Additional Information on an internship?**
Contact the POC for that internship.

**Chemistry Department Internship Webpage**
http://www.usna.edu/ChemDept/ChemMajor/internships.php

**Chemistry Department Internship POC**:
Prof McClean (mcclean@usna.edu)

**Medical Internships**
The chemistry department also sponsors medical internships. Information can be found on the chemistry department internship website.

**Other Internships with Chemistry Projects**
A complete list of internships - some with chemistry projects - can be found on the USNA Internship website:
https://intranet.usna.edu/AcResearch/USNA-Approved-Internships.php