USNA Chemistry Department

Navy Surface Warfare Center – Indian Head Division (NSWC IHD) Internship Projects

Summer 2022

6 December 2021

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, computer science, and engineering majors.
- Funding: Lodging & meals provided at NSWC-Indian Head.
- Application: Submit online chemistry application. Specific project(s) can be entered on the application.
- POC: LT Goldenberg goldenbe@usna.edu

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1. **Characterization of Novel Energetic Materials**

   Required majors: Chemistry, Physics, Mechanical Engineering, Aerospace Engineering, General Engineering

   Blocks: 1, 2, 3

   Candidate will work on the characterization of novel energetic materials. This could include field testing and modeling including performance characteristics and analysis of signatures of the materials. These efforts could include organic and inorganic chemistry synthesis, modeling of the energetic materials, engineering efforts to develop testing and diagnostics and analytical process development.

2. **Chemical, Biological and Radiological Protection Schemes**

   Required majors: Chemistry, Biology, Mechanical Engineering, General Engineering

   Blocks: 1, 2, 3

   Candidate will work on collective protection schemes against Chemical, Biological and Radiological Defense for ship and land based applications. The project could include modeling support and design support in these areas.

3. **Commercial Vessel Vulnerability to Air Blast**

   Required majors: Naval Architecture & Marine Engineering, Mechanical Engineering, General Engineering

   Blocks: 1, 2, 3

   Candidate will examine the effects of air blast on commercial maritime vessels using high fidelity modeling and simulation tools. Candidate will familiarize themselves with shock, impulse, air blast and other weapon effects and coupling these effects to the response of a target. Candidate will learn execution of high fidelity M&S, interfacing with local high performance computing assets with the intent of summarizing the vulnerability of a commercial maritime vessel.

4. **Propellant Formulation and Testing**

   Required majors: Chemistry, Physics, Mechanical engineering, Aerospace Engineering, General Engineering

   Blocks: 1, 2, 3

   Candidate will aid in the evaluation of various aspects of propellant formulation. This will include any number of different tests performed to determine safety and performance of candidate propellant formulations.

5. Chem/Bio Defense System Installations

Required majors: Chemistry, Physics, All Engineering

Blocks: 1, 2, 3

NSWC IHD's CBR (chemical, biological, radiological) Fleet Support Branch is responsible for the installation, support, and maintenance of chemical and biological (CB) defense systems onboard U.S. Navy ships. The assignment would entail learning about the Navy's CB detection systems through hands-on troubleshooting/repair work in the organization's lab as well as working with systems installed onboard ships. Ship visits would also include interactions with damage control (DC) personnel who can provide valuable insight into DC operations as well as specific CB defense activities.

6. Support to RIMPAC 2022

Required majors: Chemistry, Physics, All Engineering

Blocks: 1, 2, 3

Candidates will support efforts to showcase the new Common CBRN Picture (CCP) component of the Common Maritime Picture (CMP) during RIMPAC 2022. In short, after being trained on JEM/JWARN operation and CONOPS, the MIDN would interface between the "CBRN Cell" and either the 3rd Fleet MOC, the ARG (LFOC), or the Seabee's TOC (depending on his/her interest, timing, and exercise details).

7. Target Sensing and Lethality Optimization for Hypersonic, Undersea, Expeditionary weapons

Required majors: Electrical Engineering, Computer Engineering, Computer Science

Blocks: 1, 2, 3

Candidate will assist in the analysis of test data for the development of target sensor algorithms and Machine Learning assisted target sensor hardware. This two part effort allows for a candidate to either work on the hardware (embedded system) design or the coding/development of the Machine Learning training data flow / edge level hardware implementation. Depending on the time of year the opportunity to attend test and evaluation events is possible. Depending on the effort supported, they will be working on an expeditionary warfare solution or maritime engagements.