

WEST POINT CENTER FOR MOLECULAR SCIENCE



West Point
READY 

READY TO SERVE. READY TO LEAD.



Molecular Science is at the root of human understanding of existence, and for the Army, it can mean the difference between saving a life on a successful mission, or not. At West Point's Center for Molecular Science (CMS), faculty, civilians, cadets, and post-doctoral researchers unite with the greater Department of Defense science and technology community to develop solutions that keep soldiers safe, treat the wounded, and address the Warfighter of tomorrow's most difficult technical challenges.

Housed within the Department of Chemistry & Life Science, CMS is a centralizing hub of cutting-edge research in bioengineering, nanomaterials, and clinical studies offering world-class laboratories and state-of-the-art instrumentation. Research experiences are enabled by summer internships, scientific conference travel, peer-review publications, guest lectures, research awards, post-doctoral fellows, and more. Distinguished from other centers at West Point and at sister universities—in which cadets conduct research only as capstone projects in their final year—CMS provides cooperative research opportunities for cadets throughout all four of their years at the Academy. With research programs conducted in Bartlett Hall and in partner laboratories around the globe, cadets can start research as early as their plebe year and have multi-year experiences that result in scientific conference presentations, peer-reviewed publications, and patents to support the soldier.

Yet in order to execute Margin of Excellence programs and innovations which keep West Point on the cutting-edge of scientific inquiry and leadership, CMS needs private endowment funding to enable sustainable support for its long-range plans. As outlined at levels on the back of this brochure, funding opportunities exist for The Core Imaging Laboratory—where research in all programs is facilitated by the ability to “see” at an infinitesimally small scale—as well as for research programming, workshops, and conferences in each of the center's three main domains of study.

RESEARCH & INNOVATION

The Center for Molecular Science houses an incredibly wide scope of exceptionally relevant scientific inquiry. Bioengineering technology is growing at an increasingly rapid pace, and in the broadest sense, is a tool that addresses life itself. Bioengineering includes synthetic biology—the reprogramming biology that allows science to create sensors that can detect roadside bombs, for example, or olfactory detection systems that assess, treat, and remediate environmental impacts of chemicals found in pesticides or in biological warfare agents in the field. It is enabling researchers to develop materials for hemorrhage control to aid in wound healing; helping to diagnose and treat disease; develop new materials derived from petrochemical sources; and create new processes and products for improving foods, fibers, and agricultural practices.

Similarly, the Nanomaterials Research Program at CMS works on developing multi-functional materials for lightweight power, energy, and sensor applications that increase soldier lethality. One recent research project created thin coat solar panels which could provide a portable source of renewable energy without adding to the soldier's load. Another leveraged nanocomposite materials to create lightweight fuel cells and batteries for use in battle.

Through the Clinical Studies program, researchers are working to discover novel biomarkers of disease and injury facing soldiers, from traumatic brain injury to parasites and pathogens. This program is improving the Army's ability to respond to concussions, extremity injuries, Lyme Disease, and more—meaningfully advancing soldier readiness, resiliency, and survival rates across the entire Department of Defense.

With approximately 200 research cadets every year, CMS is developing a substantial body of future warrior-scholars who are uniquely positioned to leverage the best science to implement critical solutions. CMS faculty and cadets continue training to provide STEM leadership at every echelon of tactical and strategic defense in collaborative teams with Army Futures Command (AFC), Defense Threat Reduction Agency (DTRA), Defense Advanced Research Projects Agency (DARPA), Defense Innovation Unit (DIU), and others, as well as throughout the military medical community.

Moreover, cadets working on research under the Center for Molecular Science have greater chances of being accepted into top-tier medical schools, as well as earning selective scholarships such as the Hertz Fellowship, the National Science Foundation Fellowship, the Cambridge Scholarship, and the MIT-Lincoln Labs Scholarship. Indeed, as Colonel John Burpo, Head of the Department of Chemistry & Life Science has said, “one of the most consequential outputs of the Center is [the creation of] complex problem solvers for the Army... which ultimately correlates with the best... care for our soldiers.”

The cadets we teach ultimately go on to serve our Army and nation—and The Center for Molecular Science serves to inspire future leaders of character committed to a lifetime of personal growth and service to the nation.



During his time at West Point, Second Lieutenant Ryan Kreiser '22 compiled an outstanding research record as he pursued his fascination with developing therapeutics for protein-misfolding diseases like Alzheimer's and Parkinson's, which affect combat veterans at an increased rate. Under the supervision of Dr. Ryan Limbocker, Kreiser led the research team his yearling year, producing six peer-reviewed publications and collaborating with research partners at Cambridge University. Their group, "Team Neuroprotectors," won third place in the Combat Capabilities Development Command's Warfighter Innovation in Science & Engineering Challenge for their work on the application of neurodegeneration research to potential biological and chemical threat agents on the battlefield, as well as for their research on promising molecular countermeasures. Kreiser also won the National Science Foundation Graduate Research Fellowship and the Purdue Military Research Institute Fellowship. He is studying biological sciences this fall at Purdue before continuing his service in the operational Army. Kreiser's success is due to the strength of academic enrichment opportunities made possible by the CMS. As he explains, "There's no better academic experience than taking in what we learn in classes and turning it outwards towards a problem in society."



Photo: Lee Ross '73

FUNDING OPPORTUNITIES

Center for Molecular Science endowment \$7.6 million

Bioengineering Research Program	\$1 million endowment/\$40,000 annual
Nanomaterials Research Program	\$1 million endowment/\$40,000 annual
Clinical Studies Research Program	\$1 million endowment/\$40,000 annual
Core Imaging Laboratory Naming	\$2.8 million
Cadet & Faculty Workshops & Conferences	
Bioengineering Workshops & Conferences	\$600,000 endowment/\$25,000 annual
Nanomaterials Workshops & Conferences	\$600,000 endowment/\$25,000 annual
Clinical Studies Workshops & Conferences	\$600,000 endowment/\$25,000 annual

MARGIN OF EXCELLENCE



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