



CHEMISTRY DEPARTMENT

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NCC
NASSAU
COMMUNITY
COLLEGE
STATE UNIVERSITY OF NEW YORK

About

SUNY Nassau Community College's Department of Chemistry is the smart choice for individuals looking to establish a career path in chemical industries. Located in the College's State of the Art Life Science Building, the Chemistry Department provides a high-quality education taught by distinguished full-time faculty who all have PhDs and are experts in their field of study. Each full-time faculty member has developed and carefully tailored each course to meet scientific and academic standards of various fields of study while ensuring that students who register will get a fulfilling experience with the latest scientific pedagogy and instrumentation.

The Associate of Applied Science in Chemical Technology provides student with a direct study to work career path in various chemical industries or the ability to easily transfer courses to a four-year institution to continue studies for a Chemistry Major or related field.

Meet our Students



Jay Guillaume
*Current Chemistry
Department T.A.
and SUNY
Nassau Graduate*

"I graduated from high school without choosing a career path. I knew that coming to SUNY Nassau would allow me to explore my options while getting to know myself and my interests more. Taking General Chemistry did two things for me: It challenged me and it was fun to learn about. The thought analyses that went in to asking and answering questions made the course so interesting. While studying did take up a lot of my time at the College, I became involved at different times in the Biology club, the student government (SGA), and the SGA Programming Board. I was also a New Student Orientation Leader. One of my fondest memories as a student was getting to meet and speak with Ndaba Mandela, the grandson of Nobel Peace Prize recipient and former President of South Africa Nelson Mandela. The semester before he came, I did a report on his late grandfather in a Public Speaking class. For me to meet Ndaba and listen to him speak was surreal. I graduated from Stony Brook with a B.S. in Biochemistry. My career goal is to work in the pharmaceutical manufacturing industry. As a T.A. at SUNY Nassau, my main work is in the lab, but I also tutor students in the learning center. I definitely recommend the College -- not just as an alum, but also because I've seen firsthand how it has changed the lives of those who come through here."



Breanna James
*SUNY Nassau
Graduate*

"I enrolled at SUNY Nassau because I knew I wanted to major in life sciences and I wanted to work on some foundational skills while taking advantage of the College's affordable tuition and proximity to my home. I was also given the opportunity to enroll in the honors program, which allowed me to challenge myself even further. I loved Chemistry in high school and after taking chemistry classes at SUNY Nassau learned more about the opportunities available for a chemist. During my last semester at the College, I was president of the chemistry club, event coordinator for the honors club, an orientation leader for incoming freshmen and a student mentor! I strongly encourage other students to attend SUNY Nassau and take advantage of its many opportunities for students. I built many relationships, from professors to other students, that are more difficult to form at larger universities. I also was able to work on the skills I needed to succeed in college as a STEM major. My transfer to Stony Brook was essentially seamless because I transferred within the SUNY system. In the future I would like to obtain my medical doctorate and master's in public health and one day build clinics to serve underrepresented populations who face barriers to accessing quality, affordable healthcare."

Chemistry Learning Center

The Chemistry Learning Center is a department resource that provides chemistry students with reinforcement and tutorial services. The Center staff provides one-on-one tutoring with an environment designed to help students who are either working on assigned homework or asking questions about unfamiliar chemistry concepts.

Student Life - Chemistry Club

The Department also sponsors the Chemistry Club to interest students in Chemistry and the various avenues that a Chemistry degree can open for them. The Club also provides students with the opportunity to join the most prestigious scientific organization the American Chemical Society.

Exploration of Scientific Curiosity

- **Visit to Neighboring Research Facilities**
- **Seminars by Scientists or Professionals**
- **Panel Discussion**
- **Sponsored Research at BNL**
- **Participation in ACS Conferences**
- **ACS Memberships (Discounted)**

Meet our Full-Time Teaching Faculty

Rakhi Agarwal, PhD

Degree: PhD in Chemistry (Biochemistry) Pune University, India

Research: PhD Thesis: Mutational studies on Rhodopsin gene of Retinitis Pigmentosa patients
Postdoctoral Research Associate followed by Assistant - & Associate-Biophysicist Brookhaven National Laboratory, NY.

Research: Structural and functional analysis of Clostridium botulinum neurotoxins and Drug Discovery (2002-2013).

Expertise: Biochemistry, Protein X-ray Crystallography, and Drug Discovery Research.

Courses: General Chemistry I & II (CHE151/152), College Chemistry I & II (CHE131/132), Introduction of Chemistry (CHE107), and Biochemistry (CHE 260).

Other Responsibilities: Coordinator of Biochemistry, General Chemistry II & Introduction to Chemical Technology, Chemistry Club Advisor.

Interests: Structure and function of proteins, Protein-protein interactions, Infectious diseases, Drug discovery, COVID-19, Botulinum neurotoxins

Terrence Black, PhD

Degree: PhD in Chemistry (Analytical Chemistry) Northeastern University

Research: Characterization of Post Translational Modifications by Liquid Chromatography - Mass Spectrometry.
Detection of DNA Modifications with Differential Ion Mobility. Characterization of Biomarkers for Radiation Exposure.
Completed a Postdoctoral Fellowship at the Lombardi Comprehensive Cancer Center at Georgetown University Medical Center 2008-2010

Expertise: Liquid Chromatography, Mass Spectrometry, Differential Ion Mobility

Courses: Introduction to Chemistry (CHE 107), Contemporary Topics (CHE 109), Chemistry for Applied Sciences (CHE 135)

Other Responsibilities: Coordinator of CHE 106, 107, 109 and 135

Interests: High throughput systems, Ion Mobility, Proteomics

Charles Hicks, PhD

Degree: PhD in Chemistry (Physical Chemistry) Graduate Center CUNY

Research: Excited State Coordination Chemistry. Post-Doctoral appointments at University of Minnesota St. Paul: Time-Resolved FTIR Studies of Photosystems and Brookhaven National Lab: Fluorescent Labeling Methods for Detection of DNA Damage due to Ionizing Radiation Experienced in Space.

Expertise: Modelling complex kinetic schemes, laser kinetics, spectroscopy

Courses: Introduction to Chemistry (CHE 107), College Chemistry I & II (CHE 131/132), General Chemistry I&II (CHE 151/152), Clinical Chemistry (AHS 231 formerly CHE 221)

Other Responsibilities: Coordinator College Chemistry I & II

Interests: Chemical Origins of Life, Next Generation Sequencing, Whole Genome Sequencing, Bioinformatics, Microbial Communities, Chemistry of Exercise, Scientific Theories of Consciousness, Astrobiology, and the Science of Nutrition

Alfredo Mellace, PhD

Degree: PhD in Chemistry (Organic Chemistry) Seton Hall University

Research: Synthetic and Physical Organic Chemistry, Dendritic and Hyperbranched Polymers. Post Doctoral appointment Poly Tech **Brooklyn NY:** Synthesis of Fluorinated Monomer and Materials.

Expertise: Synthetic and Physical Organic Chemistry, Hyperbranched and Dendritic Polymer Synthesis.

Courses: Organic Chemistry I/II (CHE 201/CHE202), Intro to Organic Chemistry (CHE 200), General Chemistry I (CHE 151), College Chemistry (CHE 131), Introduction to Chemistry (CHE 107)

Other Responsibilities: Coordinator of CHE 201, CHE 202

Interests: Diels-Alder Reactions of Bicyclic Compounds, Cyclization Reactions, Stereochemistry of Reactions and Experimental Archaeology of First Century AD Roman Armor (chemistry, metallurgy, science and technology in the manufacture of Roman Military equipment)

Daniel Resch, PhD

Degree: PhD in Chemistry (Organic Chemistry) Stony Brook University

Research: Organic Materials: reactivity and properties of conductive organic polymers with potential applications in OLED devices, dye-sensitized solar cells (DSSCs), and model systems for studying carbon-rich materials.

Expertise: Organic Materials Chemistry and Cheminformatics

Courses: Organic Chemistry I/II (CHE 201/CHE202), Intro to Organic Chemistry (CHE 200), General Chemistry I (CHE 151), College Chemistry (CHE 131), Introduction to Chemistry (CHE 107)

Other Responsibilities: Coordinator of CHE 151, CHE 200

Interests: Studying the properties of new materials for application in engineering and using computers to solve information problems in chemistry.

Qi Wang, PhD

Degree: PhD in Chemistry (Analytical Chemistry) University of North Texas

Research: Electrochemical synthesis of CeO₂ and CeO₂/montmorillonite nanocomposites. Understanding metal accumulation and protein misfolding in neurodegenerative diseases using synchrotron-based infrared and x-ray imaging. Understanding physical-chemical properties of nanomaterials.

Expertise: Analytical techniques and Material Characterizations, FTIR/Raman Spectroscopy, X-ray Spectroscopy, X-ray Fluorescence Imaging, X-ray Diffraction, LC-MS, Electrochemical Techniques, etc.

Courses: General Chemistry I & II (CHE151/152), College Chemistry I (CHE131), Introduction of Chemistry (CHE107), Analytical Chemistry I & II (CHE251 & 252)

Other Responsibilities: Chem Tech Program Coordinator, Analytical Chemistry Course Coordinator.

Interests: Nanoscience: studying physical-chemical properties and the applications of nanostructured materials; Bioanalytical and Biophysical Chemistry: studying chemical makeup and mechanistic properties of structures or molecules in biological systems.



State of the Art Instruments



Agilent: High Performance Liquid Chromatograph with in-line Mass Spectrometer-Time of Flight (HPLC-TOF) (1260 infinity II LC system combined with 6230B Time-of-Flight LC/MS). HPLC-TOF methodology is a powerful instrument that can separate sample mixtures using a liquid based mobile phase. Each separated component then enters the mass spec that can provide extremely precise masses of molecules. It can be used in the analysis of designer drugs, isotopes, pharmaceuticals, drug screening in both biological and non-biological specimens, polymer chemistry, material science, and identification of unknown compounds. The students who use this instrument will be introduced to the world of advanced chromatography which is used in all industries as the staple analytic tool for a variety of samples. Having knowledge of this instrument is indispensable as employers are looking for graduates who can use this technology. **This instrument is primarily used in AAS Chemical Technology (specifically in the Analytical and Instrumental courses).**



Magritek: Benchtop 60-Megahertz Multi-Nuclear Magnetic Resonance Spectrometer (NMR): NMR spectroscopy is used to determine the physical, chemical, and biological properties/structure of carbon/hydrogen containing matter. It is by far the most important instrument in the chemist's arsenal as it enables Chemists to determine the exact way that molecules are constructed from atom to atom. Moreover, it is benefits students by developing their critical thinking skills as NMR data is often a puzzle that must be solved. The importance of NMR has been extended to not only chemical industry where the structure of complex and important pharmaceuticals has been elucidated but also in the medical field by way of magnetic resonance imaging (MRI). **This instrument is primarily used in Organic Chemistry and AAS Chemical Technology (specifically in the Organic Chemistry sequence of the program).**



Bruker: Alpha Fourier Transform Infrared Spectrometer with diamond ATR (Attenuated Total Reflection) (FT-IR ATR) This type of infra-red has become the industry standard measuring spectra. The infrared light passes through a diamond crystal albeit other materials can be used. The light interacts with the sample on the diamond crystal providing a clean spectrum. The IR shows all substances with specific characteristics and is used in addition to NMR to support the chemical structure of different compounds, especially in pharmaceuticals. Furthermore, because of the ease associate with IR, it can also be used to scan paintings, wines, materials in the polymer industry, coatings, oils, forensic drug analysis and food/beverages...to name a few. Students will be given the opportunity to use this instrument to collect data on the compounds they work with in the laboratory along with other instruments to determine the structure of their compounds. **This instrument is primarily used in Organic Chemistry and AAS Chemical Technology (specifically in the Organic Chemistry sequence of the program).**



Rudolf: Polarimeter Polarimetry is an instrument that measures the angle of rotation of the plane of polarized light which is a beam of light in which light travels in one plane instead of scattering in all directions. This light travels through transparent materials giving chemists the ability to see if the substance in questions influences the path of the light. The effect is closely correlated to the structure of the chemical being analyzed. The importance of this instrument is that if an effect is observed in the way light is rotated, then it can provide insight as to whether a substance prefers certain molecular orientations. Students who will use this instrument will be introduced to thinking about molecules in 3D instead

of molecules being flat and what the consequences of their 3D shapes have in biological systems and Organic Chemistry synthesis. This instrument is especially used in pharmaceutical industries as well as flavors and fragrances. **This instrument is primarily used in Organic Chemistry and AAS Chemical Technology (specifically in the Organic Chemistry sequence of the program).**



Agilent: Gas Chromatograph with Autosampler (GC)

A Gas chromatograph is an instrument in which compounds are separated using an injected mixture of gaseous or liquid sample into a helium or hydrogen carrier gas (argon and nitrogen can also be used). The compounds pass through a metal tubing called a column where they are separated. This column is found in an enclosure with an oven that facilitates the passage of samples into a detector. As the samples pass through the detector, the number of components in a sample along with their quantity is obtained on a chromatograph. This instrument is used in pharmaceuticals but also petroleum industry, green chemistry, flavors/fragrances, forensics, beverages and for consumer goods. The students who use this instrument will analyze components of mixtures obtained through the process of distillation or synthesis of small molecule organics. Moreover, the instrument in the Department at NCC has an autosampler which automatically injects samples as a series.... something not found in undergraduate institutions. **This instrument is primarily used in Organic Chemistry and AAS Chemical Technology (specifically in the Analytical and Instrumental courses).**



Thermo-scientific UV Spectrophotometer

UV/VIS spectroscopy is commonly used to quantitatively determine different analytes present in a sample. Primarily to detect transition metal ions, conjugated organic compounds and can also be used for macromolecules. Since solutions of transition metal ions are mostly colored, they absorb or transmit light which is what the instrument measures. Then through a series of calculations, sample concentrations can be determined. Moreover, UV/Vis can be used to determine if a ligand is interacting with certain metal cations which is important in drug design and other biological analyses. Students who use this instrument will analyze various samples to determine the absorbance, transmission, and concentrations of various solutions. **This instrument is primarily used in General Chemistry, College Chemistry and AAS Chemical Technology (specifically in the Analytical and Instrumental courses).**



Vernier Fluorimeter

Fluorescence spectroscopy is a type of spectroscopy that analyzes fluorescence or light emission from a sample exposed to ultraviolet light. This type of spectroscopy is widely used in the dairy industry to verify if the process of pasteurization carried out successfully and to determine protein aggregation and TSE detection. It can also be used in oceanography to measure chlorophyll concentrations based on chlorophyll fluorescence by phytoplankton, and to measure the number of microscopic algae in a water sample. This instrument can also be found in molecular biology to determine the concentration of nucleic acids and in clinical chemistry settings. **This instrument is primarily used in Biochemistry and AAS Chemical Technology (specifically the Analytical and Instrumental courses).**



Advanced Instruments Osmometer

The osmometer is an advanced instrument that allows the determination of the concentration of osmotic solutions. Osmometers can be used for various applications but mainly in clinical studies. They can be used to measure the concentration of solutes in various biological samples to help assist in the diagnoses of certain ailments. Moreover, this instrument can be used to conduct quality control of substances such as beverages and other consumer products as well as to determine the molecular weight of unknown compounds and polymers. **This instrument is primarily used in Biochemistry, Organic Chemistry and AAS Chemical Technology (specifically the Analytical and Instrumental courses).**



Polymerase Chain Reaction (PCR)

The polymerase chain reaction (PCR) technique is used in applications such as DNA sequencing, cloning, library generations, mutagenesis, expression profiling, etc. These instruments are so advanced that they can analyze gene expression along with gene detection and mutation. It can also analyze methylation that has occurred and analysis of mRNA. Recently this instrument has been the primary analysis tool in medical/clinical setting to test for COVID-19 testing but it is also used in pharmaceutical and other biochemical/medical settings for genetic based testing. The students in the Department will have the opportunity to use this instrument to study DNA and mRNA and will also learn how viruses, especially COVID-19, function. **This instrument is primarily used in Biochemistry.**

Other State of the Art Laboratory Equipment



Buchii: Rotary Evaporator

The rotary evaporator is an essential piece of equipment that is used in the Organic Chemistry laboratory to isolate reaction products or to remove unwanted liquids from a sample. The rotovap is a sophisticated simple vacuum distillation. While these are common in Organic Chemistry laboratories in both teaching and research, not all the rotovaps are the same. The one that is used in the Department at NCC is one of the more advanced models that is completely computerized for precise control of the vacuum and distillation conditions. Students who use this piece of equipment get the opportunity to operate something at the level that professional chemists use in industry and research. **The rotovap is primarily used in Organic Chemistry, Biochemistry and AAS Chemical Technology (specifically the Organic Chemistry sequence).**



UV Box Reactor

The UV reactor is a reaction chamber that makes use of ultraviolet light to promote chemical reactions in organic compounds. These types of reactors are not commonly found in undergraduate Chemistry departments rather, they are found in research-oriented universities and chemical industry. This reactor allows students to synthesize compounds that are more difficult to make using conventional heating through boiling. Therefore, reagents are mixed and placed in a test tube holder in the reactor and once the door is closed, the ultraviolet lamps induce higher energy chemical reactions that can lead to interesting molecules that students can study the structure of using the NMR, IR and MS instruments. **The UV reactors are primarily used in Organic Chemistry and AAS Chemical Technology (specifically in Organic Chemistry sequence of the program)**

Bio-Rad Gel Electrophoresis

Gel electrophoresis is a staple laboratory method used in all biochemical research both academic and industrial but also in forensics to solve crimes based on DNA. It is primarily used in separating mixtures of Proteins, DNA, RNA, or other proteins based on molecular size using an electrical field. Finally, after the Proteins, DNA, RNA, or protein molecules have been separated, the resulting bands that are molecules of varied sizes, can be visualized. **This instrument is primarily used in Biochemistry.**





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