TEACHING INTERESTS

ABUL HUSSAM
Professor and Director
Center for Clean Water and Sustainable Technologies
Department of Chemistry and Biochemistry
George Mason University
Fairfax, VA 22030, USA
ahussam@gmu.edu, abulhussam@gmail.com

My primary teaching interest is analytical chemistry at undergraduate and graduate levels. I believe understanding chemical equilibria and theories of analytical processes in a quantitative way are fundamental to the teaching and research in analytical chemistry. I learned many of the basic concepts from some of the best professors in the field (Professors Amir H. Khan, Johannes F. Coetzee, Peter W. Carr, Steven G. Weber, Louis Meites, Daniel Martire, and Syed Qutubuddin). I believe hands-on experience through rigorous laboratory experiments can only provide the realities of science e.g., the Electroanalytical Chemistry (CHEM 625) graduate class has 9 hours of lab experiments, although it is a theory course. Undergraduate Research (CHEM 355/451/452) is a way to involve students in research and motivate students in chemistry. Students with undergraduate research experience were placed much better in the graduate and professional schools than those without the experience.

TEACHING AREAS
CHEM 624: Principles of Separation Chemistry
CHEM 625: Electroanalytical Chemistry
CHEM 620: Modern Instrumentation
CHEM 821: Theory of Analytical Processes
CHEM 529: Instrumental Techniques in Analytical Chemistry
CHEM 421: Instrumental Analysis
CHEM 423: Instrumental Analysis Lab
CHEM 451: Special Projects in Chemistry (Research Projects)
CHEM 350: Computer Applications in Chemistry
CHEM 315: Organic Lab I
CHEM 318: Organic Lab II
CHEM 321: Quantitative Chemical Analysis (Lab and lecture)
CHEM 211: General Chemistry 1
CHEM 212: General Chemistry 2

RESEARCH STUDENTS: THESIS AND PROJECTS

Graduates and Postdoctoral Fellows Mentored
1. Chris Kennedy, 2017-Current. *Electrochemical Probes for Surfactants and Nanoparticle Pseudophase.* PhD candidate
2. Sean Park, 2017- Current. *Development of Microfluidics Integrated Electrochemical Flow Cells for Trace Analysis.* MS candidate.
3. Corina Cooling, 2014-2016. *Noncovalent Sorption, Association and Partition of n-Alkylbenzenes on Amorphous Carbon and Single-Wall Carbon Nanotubes (SWCNT) by Equilibrium Headspace Gas Chromatography.* MS 2016
4. Kirubel Assegid, 2008 - 2012. *Development of a gas phase chemiluminescence system for the measurement of arsenic in water.* PhD. May 2012.
5. Jinsoo Hong, 2008 – 2012. *Gas-phase electrochemical detection of trace arsenic in drinking water.* PhD. December 2012.
6. Doug Mays, 2007- 2013. *Voltammetric Stripping of Trace Arsenic in a Flow Cell with Gold Wire as Working Electrode.* PhD. May 2013.
7. Mahmoud D. Eljack, 2009 – December 2013. *Thermodynamics of solubilization of hydrocarbons in natural and synthetic surfactants by headspace gas chromatography.* PhD 2013.
8. Said Khiti, 2010 – 2012. *Measurement of vapor solute-solid surface interactions by headspace gas chromatography.* MS dissertation work (incomplete).
9. Kirubel Assegid, 2007. *Development of a chemiluminescence based technique for the measurement of arsenic in environmental and biological samples.* MS thesis, 2007.
10. Dr. Sad Ahamed, Oct 2007- 2010, *Thermodynamics and Kinetics of Arsenic Removal by Composite Iron Matrix.* (Publications)
11. Kristen Perlot Bloschock, *Development of a MEMS-fabricated SU-8 device for 2D separations and Molecular Diffusion Measurements in Saturated Solutions,* PhD dissertation Committee, Department of Physics, Georgetown University, August 23, 2007.
12. Vaughan Woodzell, Summer 2003, *Windows Software Development for the Portable Potentiostat as a Detector for 2D MEMS Lab on Chip.* Science Application International Corporation (SAIC) Research Projects.
13. William. Z. Nakhleh, 1997, MS Graduate Project: *Cycling Studies of Nickel-Hydrogen Battery*
14. Wei Zhang, 1996, Graduate, MS Thesis: *Buckministerfullerene (C_{60}) in Microemulsions* (ACS Publication)
15. Dr. Subshash Basu, 1996, Postdoctoral Fellow, *A Precise Study of Solute-Micelle Interactions by Headspace Gas Chromatography. (*ACS Publication)
16. Shamim Ahmed, 1996, MS Graduate Project: *Electroless Deposition of Copper on Carbon Fibers*
17. Niema Osman, 1996, MS Graduate Project: *Development of Electrochemistry Experiments for Undergraduates*
18. Lulu Gebermehdin, 1994, Graduate, MS Thesis: *Potentiometric Stripping Analysis in a Quiet Solution*
19. S. H. Siddique, 1990, Graduate, MS Thesis: *Electrochemical Behavior of Synthetic Lipid Modified Carbon Fiber Electrodes*

Undergraduate Research Projects Mentored
1. Laor Boonsamer, 1987, Undergraduate research CHEM 451, *Reaction Headspace Gas Chromatography: Measurement of Artificial Sweeteners, Sodium Cyclamate.*
2. Sharma Shobna, 1988, Undergraduate, *Study of Equilibria in Micellar Solution by Headspace Gas Chromatography.*
3. Richard Kendall, 1989, Undergraduate, *Comparison of Differential Pulse and High Performance Differential Pulse Voltammetry in Trace Metal Analysis.*
4. Mark Hixon,1989, Undergraduate, *Development of a General Method for the Study of Solute-Micelle Equilibria by a High Precision Headspace Gas Chromatography (PRF Fund.* Anal. Chem. Publication.).
5. John Thomas, 1990, Undergraduate, *Pressure-Volume Study of a Commercial Headspace Analyzer*
6. Zohra Olumee, 1991, Undergraduate*, Measurement of Hydrophobic Interactions of Benzene by Headspace Gas Chromatography (*PRF Fund, Anal. Chem. publication).
7. Kattrice Lippa, 1991, Undergraduate, *Measurement of n-Butanol in Microemulsions by Headspace Gas Chromatography* (PRF Fund).

8. Malcolm Pon, 1991, Undergraduate, *Development of a Basic Program for Electrochemistry Experiment with PAR-273 Analyzer*
9. Saam Tabar, 2000, Undergraduate, *Testing of Groundwater for Trace As(III) by Anodic Stripping Voltammetry.* Biology Major.
10. Shehraze Shah, 2000, Undergraduate, *Measurement of Volatile Organic Compounds in the Environment by Solid Phase Microextraction.* Biology Major.
11. Bamshad Tabar, 2000, Undergraduate, *Testing of a High Resolution Protein Electrophoresis System for Clinical Applications.* Biology major.
12. Zeshaan Ahmed, 2000, Undergraduate, *(I) Development of a Membrane Separation System for Arsine and its Application in Groundwater Arsenic Measurement, (II) Hydrogen Bonding of Acid-Base Systems in Hydrocarbon Fuels. (*J. Petroleum Sci. and Tech.).
13. Syed U Ali, 2002, Undergraduate, *Reflectance Measurement and Microwave Extraction of Filters Containing Air Particulates from Indoor Pollutants. (Fall 2002).* Biology Major.
14. Naseeruddin Qureshi, 2003, *Micro-scale Organic Synthesis and Characterization by Solid Phase Microextraction,* CHEM 451 Undergraduate Research Project, Presented December 5, Fall 2003
15. Naseeruddin Qureshi, 2004, *Thick Film Hybrid Chip Electrochemical Cell for the Measurement of Arsenic in Groundwater,* CHEM 452 Undergraduate Research Project, Presented December, Fall 2004.
16. Kyle Purdy, 2004, *Development of a Virtual Electrochemical System for the Measurement of Arsenic in Ground Water by Using Ultramicroelectrodes in Flow Cells,* $1000 Scholarship to Kyle from University Research Office. Presented in Tech Showcase.
17. Kirubel Assegid, 2005. *Solute Partitoning in FC-70 (Perfluorotripentylamine),* Project supported by National Science Foundation Grant and University of Pittsburgh. CHEM 452 Undergraduate Research Project. Presented
18. Hung Au, Spring 2005. *Stripping Voltammetry with a Quartz Crystal Microbalance Electrode: Measurement of Arsenic in Water.* CHEM 451 Undergraduate Research Project Report.
19. Auteen Brahimi, Fall 2006, *Development of Gas Phase Chemiluminescence Device to Measure Arsenic in Groundwater at Part-Per-Billion.* CHEM 452 Undergraduate Research Project.
20. Jessica Bajkowski, Summer 2007. *Evaluation of arsenic measurement kits and development of reflectance spectrophotometric quantitation technique.* Summer undergraduate researcher from Wagner College, NY, July-August 2007.
21. Salman Elfekey. *Acid-Base Reactions on the Surface of Composite Iron Matrix.* Undergraduate Honors Student Research Project. June-August 2008.
22. Munif Saza, *Composite Iron Matrix Embedded Fabrics for Water Filtration,* High School Student Project, July – September 2009.
23. Farhan Ahmed, *Gas Phase Chemiluminescence of Arsine-Ozone and Headspace Gas Chromatographic Measurement of Methylated Arsenic Species.* Senior Undergraduate Research Projects, 2010. (CHEM 451, CHEM 452)
24. Joan Rozario, *Composite Iron Matrix Embedded Fabrics for Arsenic Removal (Parts I and II). Study of* Ag^{+} *-* AsH_3 *Reaction by Reflectance Photometry- Application in Trace Arsenic Measurement.* Undergraduate Research Projects, 2010-2011. (CHEM 451 CHEM 452)
25. Yousuf Azim, *Toxicity Characteristic Leaching Procedure.* Biology Honors Undergraduate Research Project, 2010
26. Lam Dang, *Surface Complexation Reactions with Composite Iron Matrix Surface.* Undergraduate Research Project, 2011. (CHEM 451)
27. Rachael Ann Wilson, *Equilibria of trace alkylbenzenes at infinite dilution with Humic acid and polyvinyl pyrrilidone coated gold nanoparticles.* Undergraduate Research Projects (CHEM 451-452). Fall and Spring, 2014. OSCAR Scholar.
28. Shayer Chowdhury, *Combating arsenic poisoning in Bangladesh: Development and test of inline water filters,* Fulbright undergraduate scholar, Fall 2014.
29. Brittany Rapp, *A Noninvasive Inductance Sensor for the Measurement of Nanoparticles,* Undergraduate Research Projects (CHEM 451, 452). Spring, 2017, 2018. OSCAR Scholar.
30. Gautom Subramania, *Development of Arduino Based Titration System for the Identification of Commonly Available Pharmaceutical Preparations*. Undergraduate Research Project (CHEM 355). Spring 2018. Bioengineering major.