

# SYLLABUS

## GEOC5089 ME5089, Exploration Geochemistry (3 credits)

Fall 2023

Room Headen 253  
Tuesdays 5:00-7:30 PM

**Instructor:** Dr. Virginia T. McLemore  
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**Office Hours:** by appointment

**Course Description:** Multi-element geochemistry is one of the most powerful tools available to an exploration (and environmental) geologist. In this course, we will learn the principles and methods of lithochemical and surficial geochemical exploration, including planning, sampling, analysis, QAQC, data handling, plotting and data analysis (basic geostatistics in ioGAS), and interpretation. You will also learn how to design effective geochemical sampling programs, managing large multi-element databases, and correctly interpret the data. Furthermore, most of the procedures and data collected in an exploration program can should be used in evaluating areas for potential environmental issues.

**Pre-requisites/Co-requisites:** Introduction to Geology, Mineralogy, basic chemistry

### Course Learning Outcomes:

- How to sample and keep field notes
- Apply sampling techniques in practice
- Validate data, and recognize the limitations of that data
- Use X-Y plots to explore data, validate results of more advanced investigations and link to spatially defined anomalies
- Identify element associations in your data
- Recognize that element associations are scale dependent
- Understand the advantages of using probability plots over histograms
- Use alteration geochemistry to better understand the mineralogy of a hydrothermal alteration system
- Discriminate different rock types using immobile element ratios
- Logistics problem solving
- Evaluating QA/QC data and why they are important

**Grade criteria:**

Exam: Midterm—take home exam that will emphasize short answer and essay questions.

Term project—you will be assigned to a team and each team will be assigned an area in the Zuni Mountains. As a team you will design a stream sediment program, implement it, submit samples, and provide interpretation. This project is part of a contract with the USGS Earth-MRI program as a geochemical reconnaissance project with contract deliverables. A final technical report is required at the end of the contract period. Students will be listed on this report as co-authors.

Safety—each class will start with a safety share, prepared by one of you. Powerpoint or short discussion.

Participation—point system for various tasks completed as part of the term project (see lecture notes)

Field trips—sampling in the Zuni Mountains and other areas

- 1<sup>st</sup> field trip will be Aug 18-20
- 2<sup>nd</sup> field trip will be Aug 25-27 (camp)
- 3<sup>rd</sup> field trip will be Aug 30-31 (how many can do)
- 4<sup>th</sup> field trip will be Sept 22-24?

Link to lectures and assignments:

<https://geoinfo.nmt.edu/staff/mclemore/Fall2023ExplorationGeochemistry.html>

Link to information on Zuni Mountains mining district:

<https://geoinfo.nmt.edu/staff/mclemore/projects/MiningDistricts.html>

**Grading:**

Midterm	10%
Safety share	10%
Paper Presentations	10%
Lab exercises	20%
Term project presentation	20%
Class Participation	30%

**Academic Honesty:** New Mexico Tech’s Academic Honesty Policy for undergraduate and graduate students is found in the catalog, which can be found at:

<https://www.nmt.edu/registrar/catalogs.php/>. Further information about academic honesty can be found on the Associate Vice President for Academic Affairs website:

[https://www.nmt.edu/academicaffairs/avpaa/academic\\_honesty.php](https://www.nmt.edu/academicaffairs/avpaa/academic_honesty.php)

You are responsible for knowing, understanding, and following this policy.

**Reasonable Accommodations:** New Mexico Tech is committed to protecting the rights of individuals with disabilities and providing access and full participation in the educational experience. Students with disabilities who require reasonable accommodations are invited to make their needs known to the Office for Student Access Services (SAS) as soon as

possible. Accommodations are not retroactive and may take some time to implement. The process for requesting accommodations can be found at their website <https://www.nmt.edu/ds/academicaccommodations.php>.

You can contact SAS in person at the Fidel Center Room 245, call 575-835-6209, email [access@nmt.edu](mailto:access@nmt.edu) or book through the link on our [website](#).

**Counseling Services:** New Mexico Tech offers individual and couples counseling, safety assessments, crisis intervention, outreach and consultations through the Counseling Center. These confidential services are provided free of charge by licensed professionals. Please note that changes in the delivery of counseling services may still be on going. For more information on how to access services, please call 835-6619, email [counseling@nmt.edu](mailto:counseling@nmt.edu) or check out our website at <https://www.nmt.edu/cds/>.

**Respect Statement:** New Mexico Tech supports freedom of expression within the parameters of a respectful learning environment. As stated in the *New Mexico Tech Guide to Conduct and Citizenship* (Student Handbook): “New Mexico Tech’s primary purpose is education, which includes teaching, research, discussion, learning, and service. An atmosphere of free and open inquiry is essential to the pursuit of education. Tech seeks to protect academic freedom and build on individual responsibility to create and maintain an academic atmosphere that is a purposeful, just, open, disciplined, and caring community.”

**COVID-19 and other Health-Related Safety Issues for Face-to-Face Instruction:** Please note: provisions on masks, vaccines or other possible COVID-related requirements are subject to change as the situation evolves, based on guidance from the Centers for Disease Control, the State of New Mexico, and university officials (i.e., the President and the Board of Regents). For the most up-to-date guidelines, please consult NMT’s COVID-19 information page: <https://www.nmt.edu/covid19/>.

Students should not come to class if they are feeling ill and should follow any quarantine guidelines that they are given in the event of exposure to COVID-19. If you are sick, you should contact your instructor immediately with a request for making up any missed work and assignments, contact the Student Health Center, and consider getting tested for COVID-19 (as applicable). Please note the Student Health Center does not provide sick notes to students who are not seen by them.

**Title IX Reporting:** Sexual misconduct, sexual violence and other forms of sexual misconduct and gender-based discrimination are contrary to the University’s mission and core values, violate university policies, and may also violate state and federal law (Title IX). Faculty members are considered “Responsible Employees” and are required to report incidents of these prohibited behaviors. Any such reports should be directed to Tech’s Title IX Coordinator (Dr. Peter Phaiyah, 122 West Hall, 575-835-5953 (O), 575-322-0001 (C), [titleixcoordinator@nmt.edu](mailto:titleixcoordinator@nmt.edu)) or reports can be filed online to [Tech’s Title IX & Sexual Misconduct Report](#). Please visit [Tech’s Title IX Website](#) ([www.nmt.edu/titleix](http://www.nmt.edu/titleix)) for additional information and resources.

**Student Success:** New Mexico Tech offers numerous peer tutoring services for students who are struggling in their courses, or who just wish to receive friendly advice, including the Office of Student Learning (Skeen Library, <https://www.nmt.edu/osl/>), the Writing and Communication Lab (Skeen Library, <https://www.nmt.edu/academics/class/center.php>), and numerous department-run centers. These services are free of charge to students! Students may also consult the Associate Dean of Student Success, Elaine Debrine Howell ([elaine.debrinehowell@nmt.edu](mailto:elaine.debrinehowell@nmt.edu)) or may receive emails from her if they are struggling in class.

To read about the services a student will need to be successful **visit MyNMT:**  
<https://www.nmt.edu/mynmt.php>