

**Obtain your**

***Master of  
Science Degree***

**in either**

***Geology & Geophysics***

**or**

***Geological Engineering***

**from the**

**University of Missouri-Rolla**

**through the auspices of the**

***USAES-UMR  
Cooperative  
Degree Program***

## **Highlights: USAES-UMR Cooperative Academic Program (G&G Option)**

- The program allows qualified students of the Engineer Captains Career Course (ECCC) and other officers who have completed ECCC within the past six years to complete a Master of Science Degree in either **Geology & Geophysics** or **Geological Engineering** at the University of Missouri-Rolla through the auspices of the Geology & Geophysics Option. (**See Admission Requirements.**)
- The program is a non-thesis Master's Degree that requires 30 credits of graduate-level work. This requirement can be met as follows:
  - (1) Twelve credit hours earned for completion of associated courses based on course work taken during ECCC, and subject to the student completing the listed contact hours of additional instruction including examinations under UMR supervision.
  - (2) Eighteen credit hours earned for satisfactory completion of 6 approved UMR courses during two eight-week sessions according to dates established by USAES following student completion of the Engineer Captains Career Course and Combined Arms and Service Staff School.
- Students completing the program may participate in graduation exercises at UMR during the next regular commencement ceremony.
- Fees for classes conducted at Fort Leonard Wood will be based on the prevailing UMR rate at the engineering center in St. Louis, Missouri.

## **MS Program Description: G&G Option ( G&G or GE MS Degree)**

The Geology and Geophysics Option, ECCC Program, is focused on applied earth science, geotechnical engineering, non-destructive subsurface imaging, geographical information systems (GIS), hazardous waste management, geomorphology, hydrogeology and geotechnology. The candidate will complete a comprehensive suite of geology, geophysics, and geological engineering courses. Graduates will have a fundamental understanding of rock and soil depositional processes and principles, rock and soil engineering properties, and the methodologies (invasive and non-invasive) through which engineering properties are determined (in-situ and in-lab). Graduates will also be familiar with GIS principles and applications.

## **Admission Requirements: Geology and Geophysics Option**

Admissions criteria for ECCC students will be the same as for on-campus graduate students. Students will be admitted as "special" students if their grade point average (for the last 60 credit hours) is evaluated to be below 3.00 on a 4.00 scale. The following prerequisites are required of all students: 1<sup>st</sup> year college algebra, 1<sup>st</sup> year chemistry, and either first year physics or biology. (**Note:** All ECCC students will be eligible for the **Geology and Geophysics MS Degree**, however only those ECCC students with an undergraduate degree in engineering will be eligible for the **Geological Engineering MS Degree.**)

## **Contact Information: Geology and Geophysics Option**

FLW-based UMR personnel: Ms. Ashley Dirks {dirksa@umr.edu; (573) 329-2707}  
UMR-based personnel: Dr. Neil Anderson {nanders@umr.edu; (573) 341-4852}

## Academic Requirements: Geology and Geophysics Option

This is a non-thesis Master's Degree that requires 30 credits of graduate-level work. This requirement can be met as follows:

(1) Twelve credit hours earned for the following courses based on course work taken during ECCC:

COURSE	UMR CONTACT HR	ECCC EQUIV* CONTACT HR	COST PER STUDENT	CREDIT HOURS
GEOL 325 Advanced Physical Geology	15	30	%	3
GE 373 Geologic Field Methods	15	30	%	3
GE 275 Geomorphology	15	30	%	3
GE 301 Introduction to Military Geology	45	0	%	3
<b>TOTAL</b>	270	0	%	12

(2) Eighteen credit hours for satisfactory completion of approved UMR courses during dates established by USAES following student completion of the Engineer Officers Advanced Course and Combined Arms and Service Staff School.

COURSE	UMR CONTACT HR	ECCC EQUIV* CONTACT HR	COST PER STUDENT	CREDIT HOURS
GEOL 414 Advanced Mineralogy and Petrology	45	0	%	3
GEOL 440 Geochemistry <i>or</i> GEOL 305 Hydrogeology	45	0	%	3
GEOPH 484 Advanced Engineering and Environmental Geophysics	45	0	%	3
GE 346 Applications of GIS	45	0	%	3
GE 335 Environmental Geological Engineering <i>or</i> GE 372 Soil Science in Engineering Practice	45	0	%	3
GE 437 Advanced Geological and Geotechnical Design for Hazardous Waste Management	45	0	%	3
<b>TOTAL</b>	270	0	%	18

## Course Descriptions: MS Geology and Geophysics Option

**GE 275 Geomorphology:** Study of geomorphic processes, landform development and surficial materials. Stresses the evaluation of engineering properties for terrain site selection and design of engineered structures.

**GE 301 Introduction to Military Geology.** Focuses on fundamental principles of physical geology, geohydrology and geomorphology as applied to military problems, such as development of fortifications, core infrastructure, interim transportation infrastructure, water resources and combat engineering requirements.

**GE 335 Environmental Geological Engineering:** Study of statistical methods applicable to geologic investigations in environmental protection studies. Topics include design of test programs to meet regulatory guidelines, statistical procedures for analysis of test data and applicable statistical techniques for comparing test conclusions with regulatory criteria.

**GE 346 Applications of GIS:** Applications of geographic information systems and remote sensing to environmental monitoring, mineral resource exploration and geotechnical site evaluation.

**GE 372 Soil Science in Engineering Practice:** A study of the ways in which soils and geologic conditions influence engineered projects. Soil formation, soil chemistry, and properties to include composition, organic component, ion exchange and water relationships as well as erosion control and re-vegetation will be covered.

**GE 373 Geologic Field Methods:** Field practice in geologic mapping and interpretation using topographic maps and aerial photos. Emphasizes the description and interpretation of stratigraphic sections and sedimentary structures.

**GE 437 Advanced Geological and Geotechnical Design for Hazardous Waste Management:** Nature and classification of hazardous wastes; federal and state regulation for treatment and disposal; geological characterization of facility sites; design of impoundments, storage and containment facilities; ground water monitoring and protection; site permitting and licensing planning.

**GEOL 325 Advanced Physical Geology:** History and materials of the earth's crust, structures and geologic features of the surface. Study of common minerals and rocks, topographic and geologic maps, depositional systems, sedimentary classification systems.

**GEOL 305 Hydrogeology:** This course discusses geologic aspects of major surface and subsurface hydrologic systems of North America. Chemical and physical relationships between groundwater and fractures, faults, karst, subsurface pressures, mineral deposits plus both contaminant and hydrocarbon migration are discussed.

**GEOL 414 Advanced Mineralogy and Petrology:** Study of physical mineralogy and petrology, overview of systematic determination of minerals and rocks by means of their physical properties. Includes the recognition of crystal forms and field relationships of rocks.

**GEOL 440 Geochemistry:** Basic principles of geochemistry and trace element analysis. Distribution and mobility of elements in igneous, sedimentary and metamorphic rocks.

**GEOPH 484 Advanced Engineering and Environmental Geophysics:** An introduction to the theory and application of the gravity, magnetic, resistivity, self-potential, induced polarization, seismic, electromagnetic and GPR methods as applied to the solution of engineering and environmental problems.