GIS & GeoInformatics

**Degrees Offered**

- Master of Science in GIS & GeoInformatics (Non-Thesis)
- Graduate Certificate of GIS & GeoInformatics: Geospatial Information Technology
- Graduate Certificate of GIS & GeoInformatics: GIS for Geohazards Evaluation
- Graduate Certificate of GIS & GeoInformatics: GIS for Environmental Studies
- Graduate Certificate of GIS & GeoInformatics: GIS for Natural Resources Assessment

**Program Description**

The interdisciplinary online program in Geographic Information System (GIS) and GeoInformatics focus on the applications of GIS technology, hands-on geospatial training, multi-criteria decision making, advanced application and quantitative analysis aspects of GIS and Remote Sensing (RS), and are directly aligned with Colorado School of Mines’ focuses and strengths on Earth, Energy and Environment. Our programs will enhance students’ quantitative geospatial data analysis skills, help the students get ahead of the technology curve, and enable professionals to advance their careers.

**Certificate and Degree Requirements**

We offer four graduate certificates and a non-thesis Master’s degree. The courses taken for certificate degrees can be used towards the Master’s degree. These programs are available as a residential program on the Mines campus and an online one.

The Graduate Certificate Programs in GIS & GeoInformatics outlined below may be completed by individuals already holding an undergraduate or advanced degree or as a combined degree program by individuals already matriculated as undergraduate students at The Colorado School of Mines. The graduate certificate is comprised of:

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<th>Course Work</th>
<th>Total Semester Hrs</th>
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Up to 3.0 credit hours can be at the 300- or 400- level and the remainder will be 500 or 600 level as listed below.

There are four certificates with different specialization areas, namely Geospatial Information Technology, Geohazards Evaluation, Environmental Studies, and Natural Resources Assessment.

**Graduate Certificate of GIS & GeoInformatics: Geospatial Information Technology**

Students working towards a Graduate Certificate of GIS & GeoInformatics with specialization in Geospatial Information Technology are required to take any four of the following courses:

- **GEGN588** ADVANCED GEOGRAPHIC INFORMATION SYSTEMS 3.0
- **MNGN5XX** Big Data Analytics for Earth Resources Sciences and Engineering 3.0
- **CEEN501** LIFE CYCLE ASSESSMENT 3.0
- **CSCI303** INTRODUCTION TO DATA SCIENCE 3.0

**Graduate Certificate of GIS & GeoInformatics: Geohazards Evaluation**

Students working towards a Graduate Certificate of GIS & GeoInformatics with specialization in Geohazards Evaluation are required to take:

Two Required Courses:

- **GEGN542** ADVANCED DIGITAL TERRAIN ANALYSIS 3.0
- **GEGN575** APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS 3.0

And, any two of the following courses:

- **GEGN532** GEOLOGICAL DATA ANALYSIS 3.0
- **GEGN579** PYTHON SCRIPTING FOR GEOGRAPHIC INFORMATION SYSTEMS 3.0
- **GEGN580** APPLIED REMOTE SENSING FOR GEOENGINEERING AND GEOSCIENCES 3.0
- **GEGN588** ADVANCED GEOGRAPHIC INFORMATION SYSTEMS 3.0
- **MNGN5XX** Big Data Analytics for Earth Resources Sciences and Engineering 3.0
- **CEEN501** LIFE CYCLE ASSESSMENT 3.0

**Graduate Certificate of GIS & GeoInformatics: Environmental Studies**

Students working towards a Graduate Certificate of GIS & GeoInformatics with specialization in Environmental Studies are required to take:

Two Required Courses:

- **CEEN581** WATERSHED SYSTEMS MODELING 3.0
- **GEGN542** ADVANCED DIGITAL TERRAIN ANALYSIS 3.0

And, any two of the following courses:

- **GEGN532** GEOLOGICAL DATA ANALYSIS 3.0
- **GEGN579** PYTHON SCRIPTING FOR GEOGRAPHIC INFORMATION SYSTEMS 3.0
- **GEGN580** APPLIED REMOTE SENSING FOR GEOENGINEERING AND GEOSCIENCES 3.0
- **GEGN588** ADVANCED GEOGRAPHIC INFORMATION SYSTEMS 3.0
- **CEEN501** LIFE CYCLE ASSESSMENT 3.0
- **CSCI303** INTRODUCTION TO DATA SCIENCE 3.0

**Graduate Certificate of GIS & GeoInformatics: Natural Resources Assessment**

Students working towards a Graduate Certificate of GIS & GeoInformatics with specialization in Natural Resources Assessment are required to take:

Two Required Courses:

- **MNGN4XX** Mine Closure and Reclamation 3.0
MNGN5XX Big Data Analytics for Earth Resources Sciences and Engineering 3.0

And, any two of the following courses:

GEGN532 GEOLOGICAL DATA ANALYSIS 3.0
GEGN575 APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS 3.0
GEGN579 PYTHON SCRIPTING FOR GEOGRAPHIC INFORMATION SYSTEMS 3.0
GEGN580 APPLIED REMOTE SENSING FOR GEOENGINEERING AND GEOSCIENCES 3.0
GEGN588 ADVANCED GEOGRAPHIC INFORMATION SYSTEMS 3.0
CEEN501 LIFE CYCLE ASSESSMENT 3.0

The Master of Science (Non-Thesis) Program in GIS & GeoInformatics

The Master of Science (Non-Thesis) Program outlined below may be completed by individuals already holding an undergraduate or advanced degree or as a combined degree program by individuals already matriculated as undergraduate students at Colorado School of Mines. Courses taken while working on any of the four GIS & GeoInformatics graduate certificates can be applied to this Master of Science program. The program is comprised of:

GEGN575 APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS 3.0
SYGN588 GIS-BASED REAL WORLD LEARNING PROJECT 6.0

Core Course Work 21.0

Total Semester Hrs 30.0

Up to 9.0 credit hours can be at the 300- or 400- level listed below and the remainder will be 500 or 600 level.

All Master of Science (Non-Thesis) program will include the following core requirements:

GEGN575 APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS 3.0
SYGN588 GIS-BASED REAL WORLD LEARNING PROJECT 6.0

And, any seven of the following courses:

GEGN542 ADVANCED DIGITAL TERRAIN ANALYSIS 3.0
GEGN532 GEOLOGICAL DATA ANALYSIS 3.0
GEGN579 PYTHON SCRIPTING FOR GEOGRAPHIC INFORMATION SYSTEMS 3.0
GEGN580 APPLIED REMOTE SENSING FOR GEOENGINEERING AND GEOSCIENCES 3.0
GEGN588 ADVANCED GEOGRAPHIC INFORMATION SYSTEMS 3.0
CSCI303 INTRODUCTION TO DATA SCIENCE 3.0
CEEN581 WATERSHED SYSTEMS MODELING 3.0
MNGN4XX Mine Closure and Reclamation 3.0
MNGN5XX Big Data Analytics for Earth Resources Sciences and Engineering 3.0
CEEN501 LIFE CYCLE ASSESSMENT 3.0

Mines Combined Undergraduate / Graduate Program

Students enrolled in Mine's Combined Undergraduate/Graduate Program (meaning uninterrupted registration from the time the student earns a Mines undergraduate degree to the time the student begins a Mines graduate degree) may double count up to six hours of credits which were used in fulfilling the requirements of their undergraduate degree at Mines, towards their graduate program. Any courses that count towards the graduate degree requirements as either “Required Coursework” or “Elective Coursework”, as defined below, may be used for the purposes of double counting at the discretion of the advisor (MS Non-Thesis) or thesis committee (MS Thesis or PhD). These courses must have been passed with a "B-" or better and meet all other University, Department, Division, and Program requirements for graduate credit.

Program Director

Wendy Zhou, Associate Professor, Engineering Geology & GIS

Program Associate Director

Sebnem Duzgun, Professor, Fred Banfield Endowed Chair in Mining Engineering

Professors

Terri Hogue, Hydrology and Water Resources, Professor
Amy Landis, Civil and Environmental Engineering, Professor, Mines Presidential Fellow for Diversity
Kamini Singha, Hydrogeology, Professor, Fryrear Chairs for Innovation and Excellence

Teaching Associate Professor

Wendy Fisher, Computer Science, Teaching Associate Professor

Arthur Lakes Library

Carol Smith, University Librarian

Colorado Geological Survey

Kevin McCoy, Engineering Geologist