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 (GIS & GeoInformatics) focuses 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 is directly aligned with Colorado School of Mines' emphasis on, and strength in, 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:

Course Work: 12.0
Total Semester Hrs: 12.0

Up to 3.0 credits 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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEGN542</td>
<td>Advanced Digital Terrain Analysis</td>
<td>3.0</td>
</tr>
<tr>
<td>GEGN575</td>
<td>Applications of Geographic Information Systems</td>
<td>3.0</td>
</tr>
<tr>
<td>GEGN580</td>
<td>Applied Remote Sensing for GeoEngineering and Geosciences</td>
<td>3.0</td>
</tr>
</tbody>
</table>

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:

One Required Course:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEGN575</td>
<td>Applications of Geographic Information Systems</td>
<td>3.0</td>
</tr>
</tbody>
</table>

And, any three of the following courses:

<table>
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<tbody>
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<td>GEGN542</td>
<td>Advanced Digital Terrain Analysis</td>
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</tr>
<tr>
<td>GEGN532</td>
<td>Geological Data Analysis</td>
<td>3.0</td>
</tr>
<tr>
<td>GEGN579</td>
<td>Python Scripting for Geographic Information Systems</td>
<td>3.0</td>
</tr>
<tr>
<td>GEGN580</td>
<td>Applied Remote Sensing for GeoEngineering and Geosciences</td>
<td>3.0</td>
</tr>
<tr>
<td>GEGN588</td>
<td>Advanced Geographic Information Systems</td>
<td>3.0</td>
</tr>
<tr>
<td>MNGN5XX</td>
<td>Big Data Analytics for Earth Resources Sciences and Engineering</td>
<td>3.0</td>
</tr>
<tr>
<td>CEEN501</td>
<td>Life Cycle Assessment</td>
<td>3.0</td>
</tr>
</tbody>
</table>

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:

One Required Course:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEEN581</td>
<td>Watershed Systems Modeling</td>
<td>3.0</td>
</tr>
</tbody>
</table>

And, any three of the following courses:

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<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEGN542</td>
<td>Advanced Digital Terrain Analysis</td>
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<td>Advanced Geographic Information Systems</td>
<td>3.0</td>
</tr>
<tr>
<td>CEEN501</td>
<td>Life Cycle Assessment</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI403</td>
<td>Introduction to Data Science</td>
<td>3.0</td>
</tr>
</tbody>
</table>

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:

One Required Course:

<table>
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<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNGN5XX</td>
<td>Big Data Analytics for Earth Resources Sciences and Engineering</td>
<td>3.0</td>
</tr>
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</table>

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 |
DSCI403 | Introduction to Data Science | 3.0 |
And, any three of the following courses:

- **MNGN4XX** MINE CLOSURE AND RECLAMATION 3.0
- **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 I - FUNDAMENTALS 6.0

Core Course Work 21.0

Total Semester Hrs 30.0

Up to 9.0 credits 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 I - FUNDAMENTALS 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
- **CEEN581** WATERSHED SYSTEMS MODELING 3.0
- **DSCI403** INTRODUCTION TO DATA SCIENCE 3.0
- **MNGN4XX** MINE CLOSURE AND RECLAMATION 3.0
- **MNGN5XX** BIG DATA ANALYTICS FOR EARTH RESOURCES SCIENCE AND ENGINEERING 3.0
- **CEEN501** LIFE CYCLE ASSESSMENT 3.0

**Mines Combined Undergraduate / Graduate Program**

Students enrolled in Mine's Combined Undergraduate/Graduate Program may double count up to six 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, Professor, Geology & Geological Engineering

**Program Associate Director**

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

**Professors**

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

Terri Hogue, Hydrology and Water Resources, Professor and Dean, Earth and Society Programs

Amy Landis, Civil and Environmental Engineering, Professor, Mines Presidential Faculty Fellow for Access, Attainment & Diversity

Kamini Singha, Hydrogeology, Professor, Fryrear Chair for Innovation and Excellence

Wendy Zhou, Professor, Geology & Geological Engineering

**Teaching Associate Professor**

Wendy Fisher, Computer Science, Teaching Associate Professor and Associate Department Head

**Research Associate Professor**

Zane Jobe, Research Professor, Geology & Geological Engineering