

# Undergraduate Curriculum in Geological Engineering

## (Effective for Students Entering GLE Fall 2008)

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## A. General College Requirements

### 1) Communications A General Education Requirement

### 2) Physics

EMA 201 or Phys 201

### 3) Chemistry

Chem 109 or Chem 103 and 104

### 4) Introduction to Engineering

InterEgr 101, InterEgr 160, or a course on the CoE approved list.  
Students in Geological Engineering should take GLE 171

### 5) Math

Math 221 (or 217 or 275) and Math 222 (or 276)

## B. Mathematics Requirement (3 cr)

### 1) Calculus

Math 234	Calculus & Analytical Geometry	3 cr
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Transfer students must have 3 equivalent math courses to meet the calculus requirement. If these courses total fewer than 9 cr, one additional math course is required. If they total fewer than 12 cr, additional Technical Elective credits (see Section E) may be taken to bring the total to 12 cr. All transfer students must have (or complete at UW-Madison) an introduction to differential equations.

## C. Basic and Engineering Sciences Requirement (14 cr)

### 1) Physics

Physics 202	General Physics	5 cr
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Transfer students may satisfy the physics requirement with a 4 cr physics course having similar content as Physics 202. The additional credit can be satisfied with an additional 1 cr in Technical Electives (see Section E).

### 2) Mechanics (9 cr)

EMA 202	Dynamics	3 cr
EMA 303	Mechanics of Materials	3 cr
CEE 310	Fluid Mechanics	3 cr

## **D. Engineering Tools (9 cr)**

### **1) Statistics**

Stat 311	Introduction to Mathematical Statistics	3 cr
	OR	
Stat 324	Introductory Applied Statistics for Engineers	3 cr

### **2) Computer-Based Problem Solving**

GLE 291	Problem Solving Using Computer Tools	3 cr
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### **3) Engineering Economics**

IE 313	Engineering Economic Analysis	3 cr
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## **E. Geology (19 cr)**

Geology 202	Introduction to Geologic Structures	4 cr
Geology 203	Earth Materials	5 cr
Geology 204	Evolution of the Earth	4 cr
Geology 303	Fluids and Sedimentary Processes	3 cr
Geology 455	Structural Geology	3 cr

## **F. Professional, Ethical, and Sustainability Issues (3 cr)**

Students must take at least 3 credits from the following list of approved courses:

InterEngr 102, InterEngr 250, InterEngr 251, Rural Sociology 248, Environ Studies 339, Environ Studies 441.

Courses from this list can be combined to meet the 3 cr requirement.

## **G. Required Geological Engineering (22 cr)**

### **1) Geophysics (4 cr)**

GLE 594	Intro to Applied Geophysics	3 cr
GLE 595	Intro to Applied Geophysics Lab	1 cr

### **2) Soil, Rock, Groundwater (14 cr)**

GLE 330	Soil Mechanics	4 cr
GLE 474	Rock Mechanics	3 cr
GLE 475	Rock Mech. Appl to Environ. Probs.	3 cr
GLE 627	Hydrogeology	4 cr

### **3) Analysis and Design (4 cr)**

GLE 478	Intro to Geological Engineering Design	1 cr
GLE 479	Geological Engineering Design	3 cr

## H. Technical Electives (15 cr)

Students must take at least 15 credits in the Technical Electives category, with a minimum of two courses from the Geotechnics Electives category and a minimum of two courses from the Geoenvironment Electives category. Courses in the "cross-cutting" category can be used as Geotechnics Electives or Geoenvironment Electives. All students must complete at least two designated design courses (noted as D). Students may take up to 6 credits of GLE 489, Honors in Research, as technical electives.

### 1) Geotechnics Electives

GLE	530	Seepage and Slopes	3 cr (D)
GLE	531	Retaining Structures	3 cr (D)
GLE	532	Foundations	3 cr (D)
GLE	735	Soil Dynamics	3 cr

### 2) Geoenvironment Electives

CEE	315	Hydrology	3 cr
CEE	320	Environmental Engineering	3 cr
CEE	427	Solid Waste Engineering	3 cr (D)
CEE	357	An Intro to Geographic Info Systems	4 cr
CEE	556	Remote Sensing Image Interpretation	3 cr
CEE	655	Computerized Land Info Systems	3 cr
Envir St	575	Analysis of Environmental Impact	3 cr
Geog	336	Our Hazardous Environment	3 cr
Geology	302	Physics & Chem. Of the Earth's Interior	3 cr
Geology	320	Geomorphology	3 cr
Geology	410	Minerals as a Public Problem	3 cr
Geology	411	Energy Resources	3 cr
Geology	420	Glacial and Pleistocene Geology	3 cr
Geology	421	Applied Surficial Geology	3 cr
Geology	430	Stratigraphy	3 cr
Geology	456	Geologic Field Methods	2 cr
Geology	457	Conducted Field Trip	2 cr
Geology	459	Field Geology	6 cr
Geology	515	Principles of Economic Geology	4 cr
Geology	629	Contaminant Hydrogeology	3 cr (D)
GLE	633	Waste Geotechnics	3 cr (D)
GLE	635	Remediation Geotechnics	3 cr (D)
Soil Sci	321	Soil & Environmental Chemistry	2 cr
Soil Sci	324	Soils & Environmental Quality	3 cr

### 3) Cross-Cutting Electives

EMA	405	Practicum in Finite Elements	3 cr
GLE	301	Intro to Aerial Photographic Systems	1 cr
GLE	302	Electro-optical & Microwave Rem Sens	1 cr
GLE	303	Intro to Rem Sens Digital Image Proc.	1 cr
GLE	304	Rem. sens. visual image interp. & GIS	1 cr

GLE	412	Groundwater Hydraulics	3 cr
GLE	444	Practical Aspects of GPS Surveying	2 cr
GLE	476	Field Methods in GLE	3 cr (D)
GLE	489	Honors in Research	varies
GLE	514	Coastal Engineering	3 cr (D)
GLE	596	Electrical & Electromagnetic Methods	3 cr
GLE	597	Borehole Geophysics	3 cr
GLE	730	Engineering Properties of Soils	3 cr
GLE	731	Properties of Geosynthetics	3 cr

### I. Communication Skills (5 cr)

EPD 275	Technical Presentations	2 cr
EPD 397	Technical Writing	3 cr

### J. Liberal Studies (16 cr)

GLE students must take 16 credits from the College of Engineering, the Institute for Environmental Studies, or the College of Letters and Science that carry H, S, L or Z timetable breadth designators. These credits must fulfill the following sub-requirements.

- (a) A minimum of two courses must be taken from the same department. At least one of these courses must be above the elementary level (i.e., must have I, A or D level designator), as indicated in the timetable.
- (b) A minimum of 6 cr must be taken in courses designated as humanities (H, L or Z credit), and an additional minimum of three other credits must be taken in courses designated as social studies (S or Z). Foreign language courses count as H credits.

Note: "Retro-credits," which are credits awarded by foreign language departments for successful completion of a higher-level course, do **not** count toward this sub-requirement and do not count toward the 16 cr required in liberal studies. However, if a foreign language course is taken at the intermediate level, and retro-credits have been awarded, then sub-requirement (a) is satisfied.

- (c) At least 3 cr in courses designated as ethnic studies (small case "e" in the timetable). These credits may help satisfy regulations (a) or (b) as well, but they only count once toward the total required.

### K. Double Major in GLE and Geology and Geophysics

Students pursuing a double major with Geology and Geophysics (G&G) need to earn at least 4 additional G&G credits in an intermediate/advanced course (not including the required cross-listed courses GLE 475, 594, 595, and 627 listed under Required Geological Engineering). The course used for these credits must be among those approved for the G&G major (either 100, 106 or 101 taken before the 200 level core courses for the major, or most courses numbered 300 or above). A student may satisfy this requirement by selecting a G&G course as one of the technical electives listed under Section H.

## L. Fundamentals of Engineering Exam

All students must take the Fundamentals of Engineering exam. The General Engineering or Civil Engineering sections are recommended for the afternoon portion of the exam, as there is no section specifically for Geological Engineering.

## M. Honors in Research

Students in Geological Engineering that have completed at least two semesters on the Madison campus with a cumulative GPA of **at least 3.5** may apply to participate in the Honors in Research program. Students may register for 1 to 3 credits per semester. A grade of "P" (Progress) will be assigned each semester until the student completes the honors in research program or drops out of the program, at which time a final grade is assigned (based on research progress and the written thesis, if completed). This becomes the grade for all credits taken in GLE 489.

A senior thesis worth 3 credits of GLE 489 is required. The senior thesis is a written document reporting on a substantial piece of work that is prepared in the style of a graduate thesis. The thesis advisor determines the grade which the student receives for the thesis. A bound copy of the thesis must be submitted to the Geological Engineering office to complete the program.

The designation "Honors in Research" will be recorded on the student's transcript if the following criteria are met:

1. Satisfaction of requirements for an undergraduate degree in Geological Engineering.
2. A cumulative grade-point average of at least 3.3.
3. Completion of a total of **at least 8 credits** in GLE 489.
4. Completion of a senior honors thesis with a **final grade of B or better**.

Students interested in the Honors in Research program should contact their advisor or the GLE chairman for more information. Applications to the program are to be submitted to the GLE chairman with a supporting letter from the student's academic and thesis advisors. Decisions regarding acceptance are made by the GLE chairman.

## N. Geological Engineering Bachelor of Science Degree Typical Four-Year Plan

### Freshmen Year

Fall Semester		Spring Semester	
Course	Credits	Course	Credits
Math 221	GCR	Math 222	GCR
Chem 109	GCR	Geology 204	4
Geology 202	4	EMA 201	GCR
Communications Elective "A"	GCR	GLE 171	GCR
<b>Total</b>	<b>4 + GCR</b>	<b>Total</b>	<b>4 + GCR</b>

### Sophomore Year

Fall Semester		Spring Semester	
Course	Credits	Course	Credits
Math 234	3	Physics 202	5
GLE 291	3	CEE 310	3
EMA 202	3	Geology 203	5
EPD 275	2	EMA 303	3
Stat 224	3		
Liberal Electives	3		
<b>Total</b>	<b>17</b>	<b>Total</b>	<b>16</b>

### Junior Year

Fall Semester		Spring Semester	
Course	Credits	Course	Credits
EPD 397	3	Geology 455	3
GLE 474	3	GLE 475	3
Geology 303	3	Technical Electives	6
GLE 330	4	Liberal Electives	3
Liberal Electives	3	IE 313	3
<b>Total</b>	<b>16</b>	<b>Total</b>	<b>18</b>

### Senior Year

Fall Semester		Spring Semester	
Course	Credits	Course	Credits
Geology 594	3	GLE 479	3
Geology 595	1	Technical Electives	6
GLE 627	4	Professional, Ethical, Sustainability	3
GLE 478	1	Liberal Electives	4
Technical Elective	3	Fund. of Engr. Exam (fall or spring)	
Liberal Electives	3		
Fund. of Engr. Exam (fall or spring)			
<b>Total</b>	<b>15</b>	<b>Total</b>	<b>16</b>

### Geological Engineering Bachelor of Science Degree Curriculum Flow Chart

