

## Washtenaw Community College Comprehensive Report

### GLG 100 Introduction to Earth Science Effective Term: Fall 2020

#### Course Cover

**Division:** Math, Science and Engineering Tech

**Department:** Physical Sciences

**Discipline:** Geology

**Course Number:** 100

**Org Number:** 12330

**Full Course Title:** Introduction to Earth Science

**Transcript Title:** Introduction to Earth Science

**Is Consultation with other department(s) required:** No

**Publish in the Following:** College Catalog , Time Schedule , Web Page

**Reason for Submission:** Three Year Review / Assessment Report

**Change Information:**

**Consultation with all departments affected by this course is required.**

**Course description**

**Outcomes/Assessment**

**Objectives/Evaluation**

**Other:**

**Rationale:** This is a master syllabus review to make revisions following the course assessment and to make other necessary changes.

**Proposed Start Semester:** Winter 2020

**Course Description:** In this course, students will gain a basic understanding of the major branches of Earth science, including geology, hydrology, and meteorology. It is designed to develop an awareness and appreciation for these geosystems and their important interrelationships, as well as an understanding of the scientific approach to problem-solving. This course will include an overview of both local and global environmental problems as well as a discussion of possible solutions.

#### Course Credit Hours

**Variable hours:** No

**Credits:** 4

**Lecture Hours: Instructor:** 45 **Student:** 45

**Lab: Instructor:** 45 **Student:** 45

**Clinical: Instructor:** 0 **Student:** 0

**Total Contact Hours: Instructor:** 90 **Student:** 90

**Repeatable for Credit:** NO

**Grading Methods:** Letter Grades

Audit

**Are lectures, labs, or clinicals offered as separate sections?:** NO (same sections)

#### College-Level Reading and Writing

College-level Reading & Writing

#### College-Level Math

No Level Required

## **Requisites**

### **General Education**

#### **MACRAO**

MACRAO Science & Math

MACRAO Lab Science Course

#### **General Education Area 4 - Natural Science**

Assoc in Applied Sci - Area 4

Assoc in Science - Area 4

Assoc in Arts - Area 4

#### **Michigan Transfer Agreement - MTA**

MTA Lab Science

### **Request Course Transfer**

#### **Proposed For:**

Central Michigan University

Eastern Michigan University

Ferris State University

Grand Valley State University

Jackson Community College

Michigan State University

Oakland University

University of Michigan

Wayne State University

Western Michigan University

### **Student Learning Outcomes**

1. Recognize and identify introductory principles, concepts and environmental concerns associated with Earth's geosphere.

#### **Assessment 1**

Assessment Tool: Outcome-related questions on the departmental exams

Assessment Date: Winter 2022

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Multiple-choice questions will be scored using the key.

Essay and short answer questions will be scored using a departmentally-developed rubric.

Standard of success to be used for this assessment: 70% of students will score 72.5% or better on the outcome-related questions on the departmental exams.

Who will score and analyze the data: Appropriate geology faculty will analyze the data.

2. Recognize and identify introductory principles, concepts and environmental concerns associated with Earth's geosphere processes.

#### **Assessment 1**

Assessment Tool: Outcome-related questions on the departmental exams

Assessment Date: Winter 2022

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Multiple-choice questions will be scored using the key.

Essay and short answer questions will be scored using a departmentally-developed rubric.

Standard of success to be used for this assessment: 70% of students will score 72.5% or better on the outcome-related questions on the departmental exams.

Who will score and analyze the data: Appropriate geology faculty will analyze the data.

3. Recognize and identify introductory principles, concepts and environmental concerns associated with Earth's hydrosphere.

**Assessment 1**

Assessment Tool: Outcome-related questions on the departmental exams

Assessment Date: Winter 2022

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Multiple-choice questions will be scored using the key.

Essay and short answer questions will be scored using a departmentally-developed rubric.

Standard of success to be used for this assessment: 70% of students will score 72.5% or better on the outcome-related questions on the departmental exams.

Who will score and analyze the data: Appropriate geology faculty will analyze the data.

4. Recognize and identify introductory principles, concepts and environmental concerns associated with Earth's atmosphere.

**Assessment 1**

Assessment Tool: Outcome-related questions on the departmental exams

Assessment Date: Winter 2022

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Multiple-choice questions will be scored using the key.

Essay and short answer questions will be scored using a departmentally-developed rubric.

Standard of success to be used for this assessment: 70% of students will score 72.5% or better on the outcome-related questions on the departmental exams.

Who will score and analyze the data: Appropriate geology faculty will analyze the data.

5. Apply appropriate principles and concepts to solve problems.

**Assessment 1**

Assessment Tool: Outcome-related questions on the departmental exams

Assessment Date: Winter 2022

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Multiple-choice questions will be scored using the key.

Standard of success to be used for this assessment: 70% of students will score 72.5% or better on all outcome-related questions on the departmental exams.

Who will score and analyze the data: Appropriate geology faculty will analyze the data.

6. Construct and interpret maps, charts, diagrams and graphs.

**Assessment 1**

Assessment Tool: Outcome-related questions on the departmental exams

Assessment Date: Winter 2022

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Essay and short answer questions will be scored using a departmentally-developed rubric.

Standard of success to be used for this assessment: 70% of students will score 72.5% or better on all outcome-related questions on the departmental exams.

Who will score and analyze the data: Appropriate geology faculty will analyze the data.

## **Course Objectives**

1. Describe the formation of the universe, our solar system, and Earth's moon.
2. Identify and classify rocks and minerals based on their physical and chemical properties.
3. Identify the conditions necessary for coal and oil formation, the usage and depletion of these resources, and possible fuel alternatives.
4. Compare and contrast chemical and mechanical weathering.
5. Identify the texture of soil based on the calculated proportions of the components of a soil sample.
6. Distinguish and apply absolute dating from relative dating techniques to determine the ages of various rock layers.
7. Use the geologic time scale to identify fossils from different geologic periods.
8. Analyze trace fossils to determine clues on the lives of extinct organisms.
9. Compare and contrast the hypothesis of continental drift to the theory of plate tectonics.
10. Explain the key pieces of "evidence" used to support the theory of plate tectonics.
11. Identify the major tectonic boundaries of the world.
12. Match plate boundaries with associated features and processes, including mountains, volcanoes, and earthquakes.
13. Locate examples of each plate boundary throughout the world.
14. Identify various waves on seismographs, and use them to determine the distance from the epicenter of an earthquake.
15. Compare and contrast the layers of the Earth by identifying the composition, pressure, and temperature conditions associated with each.
16. Locate and classify major volcanoes around the world.
17. Identify the methods used to predict and describe natural disasters, such as earthquakes and volcanism.
18. Interpret geologic maps and structures, including the various forms of deformation, joints, faults, and folds.
19. Use topographic maps to locate and identify geological features.
20. Draw topographic map profiles.
21. Identify the erosional, transportational, and depositional qualities and features of running water.
22. Compare and contrast the features and properties of young and mature river systems.
23. Distinguish amongst ground hydrology terms, such as porosity, permeability, aquifer, aquitard, perched water table, water table, caverns, and karst topography.
24. Compare and contrast porosity and permeability in soils and relate these terms to groundwater flow.
25. Describe the features associated with geothermal energy, including geysers and hot springs, as well as their possible uses as an alternative energy source.
26. Explain the mechanics involving the formation, advancement, and retreat of a glacier.
27. Describe the possible causes of glacial periods or ice ages, their effect on climate, living things, and the topography of the land.
28. Interpret and identify erosional and depositional glacial features on maps and diagrams.
29. Construct a mapped cross section of the seafloor, labeling the various features of the seafloor.
30. Identify and draw the major surface currents of the oceans.
31. Analyze the effects of salinity and temperature differences on the density of seawater.
32. Understand the physics of tidal movement and the generation of waves on water.
33. Identify the causes, consequences and possible prevention or detection of natural disasters involving the hydrosphere, including: flooding, sinkholes, and tsunamis.
34. Analyze negative human-related effects on the hydrosphere, including contamination and depletion of surface, ground, and ocean waters.
35. Identify various forms of beach destruction and protection.
36. Define the makeup and percentage of gases in the atmosphere.
37. Given a structural diagram of the atmosphere, identify layers of the atmosphere based on characteristics unique to each layer and temperature changes found within each layer.
38. Describe the concerns and causes for ozone depletion.
39. Using a graph, identify how pressure changes with altitude.

40. Compare and contrast the various motions and their effects on the Earth, including rotation, revolution, and precession.
41. List the two reasons for the variation in solar energy reaching locations on Earth, and causing Earth's seasons.
42. Identify the seasons (in both hemispheres) by date, hours of sunlight received, and the axial tilt of the Earth.
43. Define the greenhouse effect, listing the positive and potential negative outcomes of the effect on Earth.
44. Explain the science behind climate change, describing both the causes of it, and the predicted effects from it.
45. Explain the Milankovitch theory and how it relates to the creation of ice ages on Earth.
46. Identify the possible outcomes of ice ages and their effects on humans and the environment.
47. State and explain the five controls of temperature and how they affect the temperature of various locations around Earth.
48. Construct and explain isothermal maps.
49. Using a sling psychrometer and related charts, calculate relative humidity and dew points.
50. Explain the various processes and heat exchanges involved in the hydrologic cycle.
51. Define and explain the mechanisms of cloud formation.
52. Using pictures and descriptions, identify the three most common cloud types and their associated weather.
53. Identify various fog and precipitation types based on descriptions and temperature conditions.
54. List five differences between high and low pressure.
55. State and explain what causes wind using pressure gradient, Coriolis Effect, and friction.
56. Identify and label global winds and pressure zones on Earth.
57. Identify symbols, define terms and describe the origin and movement of air masses and fronts.
58. Explain the process of cyclogenesis, or the formation of a midlatitude cyclone.
59. Using weather maps, locate positions of fronts, air pressure zones, cyclones and anticyclones; also, state past, current and future weather for given locations on the weather map.
60. Apply geologic principles, such as superposition and crosscutting, to relative dating to determine the sequence of events in a given column of rock.

## New Resources for Course

### Course Textbooks/Resources

#### Textbooks

Thompson and Turk. *Earth*, 2 ed. Brooks/Cole Cengage Learning, 2015, ISBN: 9781285442266.

#### Manuals

#### Periodicals

#### Software

### Equipment/Facilities

Level III classroom

Computer workstations/lab

TV/VCR

Data projector/computer

### Reviewer

#### **Faculty Preparer:**

*Suzanne Albach*

### Action

*Faculty Preparer*

### Date

*Dec 02, 2019*

#### **Department Chair/Area Director:**

*Suzanne Albach*

*Recommend Approval*

*Dec 02, 2019*

#### **Dean:**

<i>Victor Vega</i>	<i>Recommend Approval</i>	<i>Dec 04, 2019</i>
<b>Curriculum Committee Chair:</b>		
<i>Lisa Veasey</i>	<i>Recommend Approval</i>	<i>Feb 10, 2020</i>
<b>Assessment Committee Chair:</b>		
<i>Shawn Deron</i>	<i>Recommend Approval</i>	<i>Feb 11, 2020</i>
<b>Vice President for Instruction:</b>		
<i>Kimberly Hurns</i>	<i>Approve</i>	<i>Feb 14, 2020</i>

# Washtenaw Community College Comprehensive Report

## GLG 100 Introduction to Earth Science

Effective Term: Fall 2012

### Course Cover

**Division:** Math, Science and Health

**Department:** Physical Sciences

**Discipline:** Geology

**Course Number:** 100

**Org Number:** 12330

**Full Course Title:** Introduction to Earth Science

**Transcript Title:** Introduction to Earth Science

**Is Consultation with other department(s) required:** No

**Publish in the Following:** College Catalog , Time Schedule , Web Page

**Reason for Submission:** Course Change

**Change Information:**

**Total Contact Hours**

**Outcomes/Assessment**

**Rationale:** This change is necessary to align this course with the federal mandate that defines minimum contact hours for science laboratory courses.

**Proposed Start Semester:** Fall 2012

**Course Description:** This course provides a basic understanding of the major branches of earth science, including geology, hydrology and meteorology. It is designed to develop an awareness and appreciation for these geosystems and their important interrelationships, as well as an understanding of the scientific approach to problem-solving. This course will include an overview of both local and global environmental problems as well as a discussion of possible solutions.

### Course Credit Hours

**Variable hours:** No

**Credits:** 4

**Lecture Hours: Instructor:** 45 **Student:** 45

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**Clinical: Instructor:** 0 **Student:** 0

**Total Contact Hours: Instructor:** 90 **Student:** 90

**Repeatable for Credit:** NO

**Grading Methods:** Letter Grades

Audit

**Are lectures, labs, or clinicals offered as separate sections?:** NO (same sections)

### College-Level Reading and Writing

College-level Reading & Writing

### College-Level Math

No Level Required

### Requisites

#### General Education

**MACRAO**

MACRAO Science & Math

MACRAO Lab Science Course  
**General Education Area 4 - Natural Science**  
Assoc in Applied Sci - Area 4  
Assoc in Science - Area 4  
Assoc in Arts - Area 4

### **Request Course Transfer**

#### **Proposed For:**

Central Michigan University  
Eastern Michigan University  
Ferris State University  
Grand Valley State University  
Jackson Community College  
Michigan State University  
Oakland University  
University of Michigan  
Wayne State University  
Western Michigan University

### **Student Learning Outcomes**

1. Recognize and identify introductory principles and concepts of the earth sciences, including geology, hydrology and meteorology, as well as the environmental concerns associated with each.

#### **Assessment 1**

**Assessment Tool:** Departmental Exams

**Assessment Date:** Winter 2013

**Assessment Cycle:** Every Three Years

**Course section(s)/other population:** All sections.

**Number students to be assessed:** Random sample of 50% of students from each section offered with a minimum of one full section.

**How the assessment will be scored:** Multiple choice questions will be scored using the key. Essay and short answer questions will be scored using a departmentally-developed rubric.

**Standard of success to be used for this assessment:** Students will score an overall average score of 72.5% or better on each assessment question.

**Who will score and analyze the data:** Appropriate geology faculty will analyze the data.

2. Apply appropriate principles and concepts to solve problems, as well as construct and interpret maps, charts, diagrams and graphs.

#### **Assessment 1**

**Assessment Tool:** Departmental Exams

**Assessment Date:** Winter 2013

**Assessment Cycle:** Every Three Years

**Course section(s)/other population:** All sections.

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**Standard of success to be used for this assessment:** Students will score an overall average score of 72.5% or better on each assessment question.

**Who will score and analyze the data:** Appropriate geology faculty will analyze the data.

### **Course Objectives**

1. Describe the formation of the universe, solar system and Earth's moon.  
**Matched Outcomes**
2. Identify and classify rocks and minerals based on their physical and chemical properties.  
**Matched Outcomes**
3. Compare and contrast renewable and non-renewable resources.  
**Matched Outcomes**
4. Identify the conditions necessary for coal and oil formation, the usage and depletion of these resources and possible fuel alternatives.  
**Matched Outcomes**
5. Compare and contrast chemical and mechanical weathering.  
**Matched Outcomes**
6. Identify the triggers and hazards of various mass wasting types.  
**Matched Outcomes**
7. Determine the soil profiles of soil variations found in Washtenaw County using a soil profile map.  
**Matched Outcomes**
8. Identify the texture of soil based on the calculated proportions of the components of a soil sample.  
**Matched Outcomes**
9. Distinguish and apply absolute dating from relative dating techniques to determine the ages of various rock layers.  
**Matched Outcomes**
10. Use the geologic time scale to identify fossils from different geologic periods.  
**Matched Outcomes**
11. Analyze trace fossils to determine clues on the lives of extinct organisms.  
**Matched Outcomes**
12. Compare and contrast the hypothesis of continental drift to the theory of plate tectonics.  
**Matched Outcomes**
13. Explain the key pieces of "evidence" used to support the theory of plate tectonics.  
**Matched Outcomes**
14. Draw and label the major tectonic boundaries of the world.  
**Matched Outcomes**
15. Match plate boundaries with associated features and processes, including mountains, volcanoes and earthquakes.  
**Matched Outcomes**
16. Locate examples of each plate boundary throughout the world.  
**Matched Outcomes**
17. Identify various waves on seismographs and use them to determine the distance from the epicenter of an earthquake.  
**Matched Outcomes**
18. Label the layers of the Earth and identify the composition, pressure and temperature conditions associated with each.  
**Matched Outcomes**
19. Locate and classify major volcanoes around the world.  
**Matched Outcomes**
20. Identify the methods used to predict and describe natural disasters involving the geosphere, including: earthquakes and volcanism.  
**Matched Outcomes**
21. Interpret geologic maps and structures, including the various forms of deformation, joints, faults and folds.  
**Matched Outcomes**
22. Use topographic maps to locate and identify geological features.  
**Matched Outcomes**
23. Draw topographic map profiles.  
**Matched Outcomes**
24. Identify the erosional, transportational and depositional qualities and features of running water.

**Matched Outcomes**

25. Compare and contrast the features and properties of young and mature river systems.

**Matched Outcomes**

26. Distinguish amongst ground hydrology terms, such as porosity, permeability, aquifer, aquitard, perched water table, water table, caverns and karst topography.

**Matched Outcomes**

27. Compare and contrast porosity and permeability in soils and relate these terms to groundwater flow.

**Matched Outcomes**

28. Describe the features associated with geothermal energy, including geysers, hot springs and possible uses as an alternative energy source.

**Matched Outcomes**

29. Explain the mechanics involving the formation, advancement and retreat of a glacier.

**Matched Outcomes**

30. Describe the possible causes of glacial periods or ice ages, their effect on climate, living things and the topography of the land.

**Matched Outcomes**

31. Interpret and identify erosional and depositional glacial features on maps and diagrams.

**Matched Outcomes**

32. Construct a mapped cross section of the seafloor, labeling the various features of the seafloor.

**Matched Outcomes**

33. Identify and draw the major surface currents of the oceans.

**Matched Outcomes**

34. Analyze the effects of salinity and temperature differences on the density of seawater.

**Matched Outcomes**

35. Understand the physics of tidal movement and the generation of waves on water.

**Matched Outcomes**

36. Identify the causes, consequences and possible prevention or detection of natural disasters involving the hydrosphere, including: flooding, sinkholes, tsunamis.

**Matched Outcomes**

37. Analyze negative human-related effects on the hydrosphere, including contamination and depletion of surface, ground and ocean water.

**Matched Outcomes**

38. Identify various forms of beach destruction and protection.

**Matched Outcomes**

39. Define the makeup and percentage of gases in the atmosphere.

**Matched Outcomes**

40. Given a structural diagram of the atmosphere, identify layers of the atmosphere based on characteristics unique to each layer and temperature changes found within each layer.

**Matched Outcomes**

41. Describe the concerns and causes for ozone depletion.

**Matched Outcomes**

42. Using a graph, identify how pressure changes with altitude.

**Matched Outcomes**

43. Compare and contrast the various motions and their effects on the Earth, including rotation, revolution and precession.

**Matched Outcomes**

44. List the two reasons for the variation in solar energy reaching locations on Earth, and causing Earth's seasons.

**Matched Outcomes**

45. Identify the seasons (in both hemispheres) by date, hours of sunlight received and the axial tilt of the Earth.

**Matched Outcomes**

46. Define the greenhouse effect, listing the positive and potential negative outcomes of the effect on Earth.

**Matched Outcomes**

47. Explain the global warming theory, including arguments both for and against the theory.  
**Matched Outcomes**
48. View and critique the video, "An Inconvenient Truth."  
**Matched Outcomes**
49. Complete a global warming WebQuest (online activity) using a computer and the Internet.  
**Matched Outcomes**
50. Explain the Milankovitch theory and how it relates to the creation of ice ages on Earth.  
**Matched Outcomes**
51. Identify the possible outcomes of ice ages and their effects on humans and the environment.  
**Matched Outcomes**
52. State and explain the five controls of temperature and how they affect the temperature of various locations around Earth.  
**Matched Outcomes**
53. Construct and explain isothermal maps.  
**Matched Outcomes**
54. Using a sling psychrometer and related charts, calculate relative humidity and dew points.  
**Matched Outcomes**
55. Explain the various processes and heat exchanges involved in the hydrologic cycle.  
**Matched Outcomes**
56. Define and explain the mechanisms creating cloud formation, including the processes of collision-coalescence and the Bergeron Process.  
**Matched Outcomes**
57. Using pictures and descriptions, identify the ten most common clouds and their associated weather.  
**Matched Outcomes**
58. Identify various fog and precipitation types based on descriptions and temperature conditions.  
**Matched Outcomes**
59. Record daily weather observations for a period of one month.  
**Matched Outcomes**
60. List five differences between high and low pressure.  
**Matched Outcomes**
61. State and explain what causes wind using pressure gradient, Coriolis Effect and friction.  
**Matched Outcomes**
62. Compare and contrast El Nino and La Nina.  
**Matched Outcomes**
63. Identify and label global winds and pressure zones on Earth.  
**Matched Outcomes**
64. Identify symbols, define terms and describe the origin and movement of air masses and fronts.  
**Matched Outcomes**
65. Describe and interpret synoptic weather symbols at any given point on a weather map.  
**Matched Outcomes**
66. Explain the process of cyclogenesis, or the formation of a midlatitude cyclone.  
**Matched Outcomes**
67. Using weather maps, locate positions of fronts, air pressure zones, cyclones and anticyclones; also, state past, current and future weather for given locations on the weather map.  
**Matched Outcomes**
68. Using data collected in the weather observations project, determine cyclone, anticyclone, air mass and frontal passages.  
**Matched Outcomes**
69. Identify the causal effects, warning systems and precautions for severe weather, including thunderstorms, tornadoes and hurricanes.  
**Matched Outcomes**

**New Resources for Course**  
**Course Textbooks/Resources**

Textbooks

Thompson and Turk. *Earth*, 1 ed. Brooks/Cole Cengage Learning, 2011, ISBN: 0-538-74099-x.

Manuals

Periodicals

Software

**Equipment/Facilities**

Level III classroom

Computer workstations/lab

TV/VCR

**Reviewer**

**Action**

**Date**

**Faculty Preparer:**

*Suzanne Albach*

*Faculty Preparer*

*Mar 14, 2012*

**Department Chair/Area Director:**

*Kathleen Butcher*

*Recommend Approval*

*Mar 27, 2012*

**Dean:**

*Martha Showalter*

*Recommend Approval*

*Mar 28, 2012*

**Vice President for Instruction:**

*Stuart Blacklaw*

*Approve*

*Apr 11, 2012*