Montgomery County Community College
GLG 151
Physical Geology
4-3-3

COURSE DESCRIPTION:
Physical Geology is a survey of the physical character of the earth. Topics of surficial geology to be examined include weathering and mechanisms of erosion: mass movement, streams, wind, glaciers, and waves. The internal character of the earth will be explored by studying heat flow, seismology, volcanism and plutonism, metamorphism, crustal deformation and plate tectonics. Though this course and GLG152 are designed to accommodate requirements of the prospective geology major, GLG 151 and GLG 152 should be considered by the student who needs two successive semesters of the same science for transfer purposes. This course is subject to a course fee. Refer to http://mc3.edu/adm-fin-aid/paying/tuition/course-fees for current rates.

REQUISITES:
Previous Course Requirements
- MAT 011 Beginning Algebra or MAT 011B Beginning Algebra with Review of Arithmetic

Concurrent Course Requirements
None

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Apply the scientific method of inquiry.	Lecture Laboratory Procedures Computer-Aided Instruction Text and Outside Readings	Assessment of Laboratories Assessment thru Examination
2. Apply the knowledge of important rock-forming minerals in recognizing and interpreting common crustal rocks.	Lecture Laboratory Procedures Computer-Aided Instruction Text and Outside Readings	Assessment of Laboratories Assessment thru Examination
3. Distinguish weathering regimes in various lithologic and climatologic settings.	Lecture Laboratory Procedures Computer-Aided Instruction Text and Outside Readings Field Trips	Assessment of Laboratories Assessment thru Examination

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
4. Interpret landforms produced by erosional and depositional processes associated with mass wasting, streams, glaciers, deserts, coastlines, and marine settings.	Lecture Laboratory Procedures Computer Simulation Computer-Aided Instruction AV/Multimedia Materials Text and Outside Readings Class Time and Saturday Field Trips Projects	Assess Group/Individual Projects Assessment thru Examination Laboratory Assessments Assessment thru Quizzes
5. Apply a plate tectonic interpretation for the processes of volcanism, plutonism, metamorphism, and crustal deformation.	Lecture Laboratory Procedures Computer Simulation Computer-Aided Instruction AV/Multimedia Materials Text and Outside Readings Class Time and Saturday Field Trips Projects	Assess Group/Individual Projects Assessment thru Examination Laboratory Assessments Assessment thru Quizzes

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria*.

SEQUENCE OF TOPICS:

1. Introductory Material
    a. The Role of the Geologist in Society
    b. Introductory Chemistry
        1) Atomic structure
        2) Bonding
        3) Element distributions in cosmos, whole earth, and crust
    c. Mineralogy
        1) Mineral classification schemes
        2) Silicate polymerization groups
    d. Introduction to Topographic Maps
2. Surficial Processes
    a. Chemical and Mechanical Weathering, and Soils
    b. Mass Wasting
    c. Streams
    d. Groundwater and Karst Geology
    e. Glaciers
        1) Glacial processes
        2) Ice Ages
    f. Deserts

1) Desert climatology
2) Desert geology

g. Coastal Processes
h. Marine Sedimentation
1) Temperate shelf sedimentation
2) Carbonate sedimentation
3) Submarine fans
4) Turbidites
5) Pelagic sedimentation

i. Sedimentary Rocks and Depositional Environment Interpretation
1) Lithification
2) Sedimentary rock classification
3) Primary sedimentary features

3. Internal Processes
a. Introduction to Plate Tectonics
b. Heat Flow
c. Igneous Thermochemistry
d. Volcanic Processes and Volcanic Rocks
e. Plutonism
f. Metamorphism
1) Contact
2) Regional
3) Hi Pressure

g. Magnetism
h. Isostasy
i. Rock Deformation
1) Earthquakes and seismic profiling
2) Brittle strain and faults
3) Ductile strain and folds

j. Plate Tectonics
1) Historical development of model
2) Current justification of model
3) Divergent plate margins
4) Transform margins
5) Convergent plate margins

LIST OF LABORATORIES– to be selected by the instructor. Others may be added at the discretion of the instructor.
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1. Mineral properties, Uses and Identification
2. Silicate Minerals
3. Soils
4. Stream Table
5. Introduction to Topo Maps
6. Running water and groundwater, Steam hydrographs – the statistics of stream flow

7. Hydrology – porosity and permeability determinations
   – ascertaining groundwater flow dynamics
8. Karst topography, subsidence hazards, and slope stability
9. Glacial Geology Maps
10. Coastline Maps
11. Igneous, Sedimentary, Metamorphic Rocks rocks
12. Geologic maps
13. Plate tectonics
14. Volcanoes – hazard determination from geologic maps
15. Earthquakes –determination of an epicenter
16. Radon testing and interpretation
17. Waves, currents and tides

FIELD TRIPS: Optional
Class-time trips:

1. Assessment of landslide potential
2. Towamencin Creek Field Project
3. Stream profiling
4. Local Triassic basin and paleo-environmental reconstruction

Saturday trips may include:

Optional Saturday field trips:

1. Traverse from Cape Henlopen to South Bethany, Delaware
   – determination of natural erosional/depositional dynamics
   – examination of development and associated disruption of coastal dynamics
2. The geology of coal – Southern and Western Middle Anthracite Fields, Pennsylvania
   – strip mined properties: pre- and post-reclamation legislation extraction techniques
   – geological/biological recovery at abused sites
   – culm recovery
   – Centralia mine fire
   – geology, chemistry, and biology of acid mine drainage
3. Ringing Rocks Park, Upper Black Eddy, PA – igneous rock erosional features
4. Pioneer Crossing Landfill, Birdsboro, PA – engineering protection of the environment; waste disposal
5. Crystal Cave, Kutztown, PA – karst terrain; speleothem formation
6. Triassic paleoenvironment
   Border fault Cambrian carbonates
7. Structure and metamorphism contact metamorphism

LEARNING MATERIALS:
Grotzinger, Jordan. (2010). *Understanding Earth* (6th ed.). Freeman. Supplementary handouts: *Earth Science Laboratory Manual* – current edition
Supplementary Handouts
College Computer Network

Learning Resource Center
Media Center
Learning Assistance Laboratory

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

COURSE APPROVAL:

Prepared by:	Robert Kuhlman, Professor of Earth Science	Date: 10/28/2004
Revised by:	George Buchanan, Lecturer of Geology	Date: 2/17/2009
VPAA/Provost Compliance Verification:	Dr. John C. Flynn, Jr.	Date: 9/11/2009
Revised by:	George Buchanan, Professor of Geology	Date: 6/26/2012
VPAA/Provost or designee Compliance Verification:	Victoria L. Bastecki-Perez, Ed.D.	Date: 4/2013
Revised by:	Debbie Dalrymple	Date: 6/27/2016
VPAA/Provost or designee Compliance Verification:	Victoria L. Bastecki-Perez, Ed.D.	Date: 6/27/2016
Revised by:	Debbie Dalrymple and Evon Martins	Date: 1/11/2018
VPAA/Provost or designee Compliance Verification:		Date: 1/30/2018

This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.