Hudson County Community College
Intro to Physical Geology – GEO 111 Credits: 4

Course description:
This course is designed to give students an understanding of general principles of physical geology and appreciation of the natural world from a scientific perspective. The course focuses on the chemical and physical properties of minerals, the composition of igneous, sedimentary, metamorphic rocks and some earth processes responsible for rock and mineral formation. Topics are explored within the general context of planet tectonic theory and include: minerals and rocks, weathering and erosion, geological time, earthquakes, volcanos, mountain building, landforms, and natural resources. Laboratory work involves the practical application of geological principles such as rock and mineral identification and geological data analysis. Laboratory exercises are designed to increase understanding of course material and to expose students to a variety of tools and topics in geological sciences.

Student outcomes/objectives:
Upon successful completion of this course, students will be able to:

1. Demonstrate competence in the technical terminology of geology and of related scientific disciplines.
2. Describe the methods of investigation used in scientific knowledge and present the results of these investigations.
3. Explain the basic divisions of the earth, their compositions, and their role in plate tectonics.
4. Identify the types of plate boundaries and their relationship to crustal movement and major mountain ranges worldwide.
5. Categorize types of volcanoes, lava viscosity, and compositions and their relation to global plate tectonics.
6. Discuss the process and grades of metamorphism and pathways of the rock cycle.
7. Demonstrate an understanding of the earth history.
8. Develop competence in performing laboratory experiments and exercises related to geology.
9. Identify minerals and rocks and recognize their importance in everyday life.
10. Analyze the varied geological history of the local landscape.

Detailed Outline of Suggested Topics:

WEEK 1	**INTRODUCTION TO GEOLOGY** (Chapter 1 and 19) Introduction to the Course and Careers The Solar System, Planets Birth of a Planet	**LAB 1** Observing and Measuring Earth Materials and Processes. Density, Gravity and Isostasy
WEEK 2	**PLATE TECTONICS** (Chapter 15) A Scientific Theory Unfolds	**LAB 2**: Plate Tectonics and the Origin of Magma
WEEK 3	**MINERALS : BUILDING BLOCKS OF ROCKS** (Chapter 2) Mineral Chemistry and Physical Properties Mineral Groups: Common Silicate and Nonsilicate Minerals Mineral Resources	**LAB 3:** Mineral Properties, Uses, and Identification Analyze Minerals for Seven Common Properties
WEEK 4	**IGNEOUS ROCKS** (Chapter 3) Magma: The Parent Material of Igneous Rock Igneous Texture and Compositions Naming Igneous Rocks	**LAB 3 (continue)** Mineral Properties, Uses, and Identification Identify Common Minerals

	Origin of Magma and Bowen's Reaction Series Mineral Resources and Igneous Rocks	on the Basis of Their Properties.
WEEK 5	**VOLCANOES AND OTHER IGNEOUS ACTIVITY** (Chapter 4) The Nature of Volcanic Eruption Volcanic Landforms Tectonics and Volcanic Eruptions Intrusive Igneous Activity and Plate Tectonics	**LAB 4**: Igneous Rocks and Volcanic Hazards Geometry and Origin of Some Intrusive and Extrusive Bodies of Igneous Rocks
WEEK 6	**WEATHERING** (Chapter 5) Earth's External Processes Mechanical Weathering Chemical Weathering Rates of Weathering **Test 1**	**LAB 4 (continue)** Igneous Rocks and Volcanic Hazards Description and Interpretation of Igneous Rock Samples
WEEK 7	**SEDIMENTARY ROCKS** (Chapter 6) Origins of Sedimentary Rocks Classification of Sedimentary Rocks Sedimentary Structures Energy Resources from Sedimentary Rocks	**LAB 5**: Sedimentary Rocks, Processes, and Environments Description and Interpretation of Sedimentary Rocks
WEEK 8	**METAMORPHISM** (Chapter 7) Metamorphism Texture Types of Metamorphism: Metamorphic Environment Metamorphic Zones	**LAB 6:** Metamorphic Rocks, Processes, and Resources Description and Interpretation of Metamorphic Rocks
WEEK 9	*Group Project :* Geologic History of the New Jersey Landscape (Choosing the topics and discussions)	**LAB 7** Sedimentary Rocks and Metamorphic Rocks Hand Sample Analysis and Interpretation
WEEK 10	**EARTHQUAKES** (Chapter 14) What is an Earthquake? The Study of Earthquake Waves Measuring the Size of Earthquakes Can Earthquakes be Predicted?	**Lab 8** Earthquake Hazards and Human Risks
WEEK 11	**CRUSTAL DEFORMATION AND MOUNTAIN BUILDING** (Chapter 17) Rock Deformation Folds, Faults, and Joints Mountain Building Collisional Mountain Ranges	**Group Project:** Geologic History of the New Jersey Landscape (Discussions) **Test 2**
WEEK 12	**GEOLOGIC TIME** (Chapter 18) Key Principles of Relative Dating Dating with Radioactivity The Geologic Time Scale *Group Project (Discussions)*	**LAB 9**: Dating of Rocks, Fossils, and Geologic Events Use Fossils to Date Some Rock Bodies
WEEK 13	**FORMATION OF THE CONTINENTS** (Chapter 19) Earth's First Continent The Making of North America Supercontinents of the Precambrian	**Group Project** (Geologic History of the New Jersey Landscape ***Presentations***

	The Formation of Earth's Modern Continents	
WEEK 14	***Group Project (Presentations)*** Geologic History of the New Jersey Landscape Review for the Final Exam	Labs Review Group Project (Presentations)
WEEK 15	Course Review/Discussions ***Final Exam***	 Labs Review

Proposed student text:

A. LECTURE: Lutgens and Turbuck, Essentials of Geology (10th ed.) Pearson/Prentice Hall, 2009, ISBN-13: 9780136003762
B. LAB: Laboratory Manual in Physical Geology by AGI/NAGT American Geological Institute and Richard M. Busch (8th edition), 2008. ISBN: - 0136007716.

The grade determination is based on lab performance, online quizzes, tests, group project, and comprehensive final exam. The percentage of each component is established as follows:

Weekly online quizzes	10%
Labs & Reports	30%
Tests	30%
Final exam	20%
Group project	10%
Total	100%

There will be an optional field trip. Additional details will be provided. Extra credits can be awarded to participants.