

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Overway, K.S. (2017). *Environmental Chemistry*. An Analytical approach. John Wiley and Sons.
2. Sonwani, S. and Shukla, A. (2021). *Air borne Particulate Matter, Source, Chemistry and Health*. Springer Singapore
3. Colin B. and Michael C. (2012). *Environmentdal Chemistry*, Fifth edition. W. H. Freeman & Company.
4. Stanley M. (2017). *Environmental Chemistry*. CRC Press
5. Bhatti, N.H. and Noreen, S. (2017). *Principles of Environmental Chemistry*. The Carwan Book House, Lahore

Further Reading: As suggested by the Instructor.

PRE-REQUISITE: F.Sc. or equivalent

LEARNING OUTCOMES

- This course will provide an introduction to the Geology to the students.
- The students will learn about the Rocks and Minerals.
- They will have the knowledge about the occurrences and importance of Geology.
- The students will get used to the different Geological Features.

CONTENTS

Unit-1: Introduction

- 1.1. Evolution of the Geologic Time Scale
- 1.2. Internal Structure of the Earth
- 1.3. Earths Four Spheres

Unit-II: Igneous Rocks

- 2.1. Magma, Plutonic and Volcanic Rocks,
- 2.2. Formation and Structure of Igneous Rocks
- 2.3. Textures and Classification of Igneous Rocks

Unit-III: Weathering, Soil and Erosion

- 3.1. Weathering, Erosion, Transportation
- 3.2. Types of Weathering
- 3.3. Mechanical Weathering
- 3.4. Chemical Weathering

Unit-IV: Sediments and Sedimentary Rocks

- 4.1. Sediments and Formation of Sedimentary Rocks
- 4.2. Types and Structures of Sedimentary Rocks
- 4.3. Textures of Sedimentary Rocks and Sedimentary Environments.

Unit-V: Metamorphism and Metamorphic Rocks

- 5.1. Causes and Consequences of Metamorphic Rocks
- 5.2. Formation and Types of Metamorphic Rocks
- 5.3. Structures and Textures of Metamorphic Rocks
- 5.4. Grades of Metamorphism and Metamorphic Facies

Unit-VI: Mass Wasting

- 1.1. Definition of Mass Wasting and Role of Water
- 1.2. Factors that Control Mass Wasting and Types of Mass Wasting
- 1.3. Mass Wasting Triggered by Earthquakes and Volcanoes and its Prediction

Unit-VII: Streams

- 7.1. Hydrological Cycle, Types and Sources of Streams
- 7.2. Characteristics of Streams, Perennial and Non-Perennial Streams
- 7.3. Drainage Basins, Crossings, Ability of Streams to Erode, Transport and Deposit Sediments

Unit-VIII: Plate Tectonics

- 8.1. Alfred Wegener and Origin of Idea, Rock Magnetism, Apparent Polar Wandering
- 8.2. Continental Drift, Sea Floor Spreading, Plates and Plate Tectonics
- 8.3. Divergent Plate Boundary, Convergent Plate Boundary, Transform Plate Boundary
- 8.4. Anatomy of a Plate, Causes of Plate Motion

Unit-IX: Deserts and Wind Action

- 9.1. Etymology and Types of Deserts
- 9.2. Weathering and Erosional Processes in Deserts, Depositional Environments in Deserts
- 9.3. Desert Landscape and Desertification
- 9.4. Physical, Ecology and Biogeography of Deserts

Unit-X: Glaciers and Glaciations

- 1.1. Introduction, Types, Formation of Glaciers
- 1.2. Glaciers of the World, Structure and Movement of the Glaciers
- 1.3. Glacial Erosion, Landform created by Glacial Deposition
- 1.4. The Ice Ages, Glacial Geology, Climate Change

Unit-XI: Mountains

- 11.1. Definition, Geology and Climate of Mountains
- 11.2. Mountains and Mountains Ranges, Plate Tectonics and Mountain Building
- 11.3. Deformation and Ruptures of Rocks, Geologic Structures
- 11.4. Island ARCS, The Building of Two Mountains Chains: Andes and Himalayas

Unit-XII Oceans and Coastlines

- 12.1. The Origin of Ocean, The Earths Ocean, Oceans Currents
- 12.2. Physical Properties, Chemical Composition of Seawater
- 12.3. Studying the Features, Sediments and Rock of Sea Floor, Continental Margins, Sea Water
- 12.4. The Sea Coast, Size, Formation, Types of Coastlines
- 12.5. Emergent and Submergent Coastlines, Beaches, Life in Sea, Mid Oceanic Ridges

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Plummer, C.C., Carlson, D., and Hammersley, L. (2021) *Physical Geology*, Mc Graw-Hill, USA.
2. Fletcher, C. (2019) *Physical Geology: The Science of Earth*, Wiley, 3rd Edition, pp.1-600.
3. Martin, R., (2018) *Earth's Evolving Systems: The History of Planet Earth*, Jones & Bartlett Learning, 2nd Edition, pp.1-593.
4. Murphy, B., and Nance, D. (2015) *Physical Geology Today*, Oxford University Press, 1st Edition, pp.1-769

Further Reading: As suggested by the Instructor.

ENSC-203: INTRODUCTION TO EARTH SCIENCES (PRACTICAL) (01 Credit hrs)

PRE-REQUISITE: F.Sc. or equivalent

LEARNING OUTCOMES

- This course will provide an introduction to the Geology to the students.
- The students will learn about the Rocks and Minerals.
- They will have the knowledge about the occurrences and importance of Geology.
- The students will get used to the different Geological Features.

CONTENTS

Unit-I: Practical-1

- 1.1. Identification of Minerals in Hand Specimen
- 1.2. Identification of rocks in Hand Specimen

Unit- II: Practical-2

- 2.1. Identification of Igneous rocks
- 2.2. Identification of Sedimentary rocks
- 2.3. Metamorphic Rocks in Hand Specimen.

Unit- III: Practical-3

- 3.1. Polarizing Microscope
- 3.2. Parts and Functions of microscope.

Unit- IV: Practical-4

- 4.1. Preparations of Thin Sections of Igneous, Sedimentary and Metamorphic Rocks in Laboratory.

Unit- V: Practical-5

- 5.1. Microscopic Study of Different Minerals

Unit- VI: Practical-6

- 1.1. Microscopic study of Igneous, Sedimentary and Metamorphic Rocks.

Unit- VII: Practical-7

- 7.1. Graphic Plotting of Igneous, Sedimentary, Metamorphic Rocks.

Unit- VIII: Practical-8

- 8.1. Salt Range, Stratigraphic Sequence of Salt Range.

Unit- IX: Practical-9

- 9.1. Detailed study of different Formations presents in Salt Range

Unit- X Practical-10

- 10.1. Maps, Geological and Topographic Maps, Contour Lines, Different Landforms

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

2. Adams, A.E., Mackenzie, W.S., Guilford, C., (2014) *Atlas of Sedimentary Rocks under the Microscope*, Routledge, USA, pp.
3. Mackenzie, W.S. and Adams, A.E. (2011) *A Color Atlas of Rocks and Minerals in Thin Sections*, Manson Publishing, U.K., pp.1-189.
4. Heta, R.N. (2011) *Practical Approach to Petrology*, CBC Publishers & Distributors P0vt Ltd., pp.1-126.

Further Reading: As suggested by the Instructor.