Programme	B. Sc. Geology				
Course Code	GEL1CJ101				
Course Title	**INTRODUCTION TO GEOLOGY**				
Type of Course	**Major**				
Semester	I				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	NIL				
Course Summary	This course serves as an introduction to the field of geology, covering fundamental concepts related to Earth's formation, dimensions, dynamic evolution, geochronology, and major geological hazards.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will have an understanding of the basic principles and concepts of geology, including the formation of Earth and its dimensions.	U	F	Exam
CO2	Students will be able to explain the theories of Earth's formation and its physical dimensions, including the structure and composition of Earth's interior layers.	Ap	C	Home assignments
CO3	Students will analyze the dynamic processes that have shaped Earth's surface and interior over geological time scales, including plate tectonics, mountain building, erosion, and sedimentation.	An	P	Seminar presentations
CO4	Students will be able to interpret geochronological data and understand the methods used to determine the ages of rocks	E	M	Home assignments
CO5	Students will identify and describe major geological hazards, including earthquakes, volcanic eruptions, and understand the geological processes that cause them.	Ap	F	Assignment
CO6	Students will evaluate strategies for mitigating the impacts of geological hazards on society and the environment.	E	M	Practical Assignment

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus: INTRODUCTION TO GEOLOGY

Module	Unit	Content	Hrs	Marks
I	**Introduction to Geology**		**10**	
	1	Geology: The Science of Earth	2	
	2	The Development of Geology	3	**15**
	3	The Nature of Scientific Inquiry	2	
	4	Plate Tectonics and Scientific Inquiry	3	
II	**Earth's Formation and Dimensions**		**15**	
	5	Earth's Spheres	3	
	6	Earth System	3	
	7	Evolution of Earth	2	**20**
	8	Formation of Earth's layered structure	2	
	9	Earth's Internal Structure	2	
	10	Layers defined by Physical Properties	3	
III	**Changing Earth & Geochronology**		**10**	
	11	The Rock Cycle	2	
	12	The face of Earth. Mountain building. Origin & evolution of ocean floor	2	
	13	Age of the earth	2	**15**
	14	Dating methods: Absolute (radiometric) and relative (stratigraphy)	2	
	15	Application of dating methods in constructing the Geological Time Scale	1	
	16	Overview of eras, periods, epochs – major geological events.	1	
IV	**Introduction to Major Geological Hazards**		**10**	
	17	Volcanoes & Volcanic Hazards	1	
	18	Nature of Volcanic Eruptions and Products	1	
	19	Types of Volcanoes & Volcanic Landforms	2	**20**
	20	Earthquakes & Earthquake Hazards	2	
	21	Seismology, Seismic Waves, Earthquakes & Plate Boundaries	2	
	22	Earthquake Destruction. Prediction, Forecast and Mitigation	2	
V	**Practical**		**30**	
	1	Lab exercises to apply the concepts of interior of earth, earth's magnetism and plate tectonics. Exploring geologic features using Google Earth.	20	**20**
	2	Introduction to Topographic Maps. Exercises involving contour lines.	4	
	3	Application of Gt.Aide (Academy) Freeware	6	

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	-	-							
CO 2	2	3	-	-	-	-							
CO 3	-	-	1	-	-	-							
CO 4	-	-	2	3	-	-							
CO 5	-	1	-	-	-	-							
CO 6	-	-	-	3	-	-							

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:
External evaluation: 70 marks. Internal Evaluation: 30 marks

INTERNAL MARK SPLIT-UP (TOTAL 30 MARKS)			
	Components of Internal Evaluation	4 Theory Modules (10)	**Practical (20)**
1	Test paper/ **Continuous Evaluation of Practical Exercises**	5	**10**
2	Seminar/ **End Sem Exam &Viva-Voce**	3	7
3	Assignment / **Lab Record**	2	**3**

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Seminar	End Semester Examinations
CO 1	✓			✓
CO 2	✓			✓
CO 3	✓			✓
CO 4		✓		✓
CO 5		✓		✓
CO 6			✓	

References:

1. Condie, K.C., 2015. *Earth as an Evolving Planetary System,* 3rd Edition, Academic Press,USA.
2. Hudson, T., 2012. *Living with Earth – An Introduction to Environmental Geology*. PearsonEducation Inc., New Jersey, USA
3. Marshak, S., 2001. *Earth: Portrait of a Planet.* W.W. Norton & Co., Inc., USA
4. Wicander, R. and Monroe, J., 2006. *Essentials of Geology.* 4th Edition, Thomson LearningInc., USA.
5. Tarbuck, E.J. and Lutgens, F.K., 2008. Earth: An Introduction to Physical Geology. 9th Edition, Pearson Education, Inc., New Jersey, USA

Programme	B. Sc. Geology				
Course Code	GEL1MN101				
Course Title	**GEOINFORMATICS - I**				
Type of Course	Minor				
Semester	I				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	NIL				
Course Summary					

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will acquire knowledge of the key sciences and technologies involved in geoinformatics	U	F	Exam
CO2	Students will learn about the origin and development of GIS, its components and its core functions	Ap	C	Quiz
CO3	Students will understand the advantages and limitations of different GIS platforms	An	P	Assignment
CO4	Students will understand the principles and techniques of map-making, and map projection types	E	M	Viva
CO5	Students will grasp the fundamental concepts of remote sensing	Ap	F	Assignment
CO6	Students will be able to define and explain the meaning and scope of geoinformatics, and understand its importance in various fields	E	M	Assignment

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus: GEOINFORMATICS - I

Module	Unit	Content	Hrs	Marks
I	**Introduction to GIS**		**15**	**20**
	1	Meaning and scope of Geoinformatics		
	2	Sciences and technologies involved – Remote Sensing, GIS, Cartography, Photogrammetry		
	3	Origin of GIS		
	4	GIS – definition		
	5	Components – hardware, software, people, methods, data		
	6	Functions – data input and output, visualization, editing, analysis, map design		
	7	Desktop GIS, mobile GIS, web GIS		
	8	Limitations of GIS		
II	**Maps**		**10**	**15**
	9	Maps – to convey location and extent, characteristics, and spatial relationships		
	10	Classification of maps – topographic maps, thematic maps, cadastral maps		
	11	Elements of a map		
	12	Classification of projection – Cylindrical, Conical, Azimuthal		
	13	Map design		
III	**Introduction to Remote Sensing**		**10**	**15**
	14	History of Remote Sensing		
	15	Introduction to aerial photography: overlaps, flight lines, drift, crab, tilt, dead ground		
	16	Geometry of aerial photographs - scale, principal point, perspective centre, fiducial marks, nadir, focal length, airbase, photo base, isocentre, relief displacement.		
	17	Vertical & oblique aerial photographs		
	18	Visual image interpretation & elements of interpretation - tone, texture, shape, association, pattern, shadow, size		
	19	Stereoscopy - Pocket Stereoscope, Mirror Stereoscope, Parallax Bar		
IV	**Concept of Remote Sensing**		**10**	**20**
	20	Stages in Remote Sensing		
	21	Energy Source – EMR, characteristic of EMR –wave nature and particle nature. EMR spectrum		
	22	Blackbody radiation, Stefan Boltzmann's law, Wein's displacement law		
	23	Interaction of EMR with atmosphere – reflection, scattering, absorption		
	24	Interaction of EMR with earth's surface features – reflection, transmission		
	25	Spectral Reflectance of land cover – Vegetation, Soil, Water		
V	**Practicals**		**30**	**10**
	1	Interpretation of aerial photographs		
	2	Interpretation of toposheets		
	3	Downloading of toposheets		

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	-	-							
CO 2	2	3	-	-	-	-							
CO 3	-	-	1	-	-	-							
CO 4	-	-	2	3	-	-							
CO 5	-	1	-	-	-	-							
CO 6	-	-	-	3	-	-							

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

External evaluation: 70 marks. Internal Evaluation: 30 marks

INTERNAL MARK SPLIT-UP (TOTAL 30 MARKS)			
	Components of Internal Evaluation	**4 Theory Modules (10)**	**Practical (20)**
1	Test paper/ **Continuous Evaluation of Practical Exercises**	5	**10**
2	Seminar/ **End Sem Exam &Viva-Voce**	3	7
3	Assignment / **Lab Record**	2	**3**

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Seminar	End Semester Examinations
CO 1	✓			✓
CO 2	✓			✓
CO 3	✓			✓
CO 4		✓		✓
CO 5		✓		✓
CO 6			✓	

References:

1. "Introduction to Geographic Information Systems" by Kang-Tsung Chang (McGraw-Hill Education, 2018)
2. "Remote Sensing and Image Interpretation" by Thomas M. Lillesand, Ralph W. Kiefer, and Jonathan W. Chipman., (Wiley, 2015)
3. "Geographic Information Systems and Science" by Paul A. Longley, Michael F. Goodchild, David J. Maguire, and David W. Rhind., (Wiley, 2015)

4. "Elements of Photogrammetry with Applications in GIS" by Paul R. Wolf, Bon A. Dewitt, and Benjamin E. Wilkinson., (McGraw-Hill Education, 2014)
5. "Principles of Geographic Information Systems" by Rolf A. de By and Henk J. Scholten (ITC,2010)
6. "The GIS 20: Essential Skills" by Gina Clemmer., (ESRI Press, 2013)

Programme	B. Sc. Geology				
Course Code	GEL1MN102				
Course Title	**PHYSICAL GEOLOGY**				
Type of Course	**Minor**				
Semester	I				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	NIL				
Course Summary	This course serves as an introduction to the field of geology, covering fundamental concepts related to Earth's formation, dimensions, dynamic evolution, geochronology, and major geological hazards.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will have an understanding of the basic principles and concepts of geology, including the formation of Earth and its dimensions.	U	F	Exam
CO2	Students will be able to explain the theories of Earth's formation and its physical dimensions, including the structure and composition of Earth's interior layers.	Ap	C	Home assignments
CO3	Students will analyze the dynamic processes that have shaped Earth's surface and interior over geological time scales, including plate tectonics, mountain building, erosion, and sedimentation.	An	P	Seminar presentations
CO4	Students will be able to interpret geochronological data and understand the methods used to determine the ages of rocks	E	M	Home assignments
CO5	Students will identify and describe major geological hazards, including earthquakes, volcanic eruptions, and understand the geological processes that cause them.	Ap	F	Assignment
CO6	Students will evaluate strategies for mitigating the impacts of geological hazards on society and the environment.	E	M	Practical Assignment

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus: PHYSICAL GEOLOGY

Module	Unit	Content	Hrs	Marks
I	**Introduction to Geology**		**10**	
	1	Geology: The Science of Earth	2	
	2	The Development of Geology	3	**15**
	3	The Nature of Scientific Inquiry	2	
	4	Plate Tectonics and Scientific Inquiry	3	
II	**Earth's Formation and Dimensions**		**15**	
	5	Earth's Spheres	3	
	6	Earth System	3	
	7	Evolution of Earth	2	**20**
	8	Formation of Earth's layered structure	2	
	9	Earth's Internal Structure	2	
	10	Layers defined by Physical Properties	3	
III	**Changing Earth & Geochronology**		**10**	
	11	The Rock Cycle	2	
	12	The face of Earth. Mountain building. Origin & evolution of ocean floor	2	
	13	Age of the earth	2	**15**
	14	Dating methods: Absolute (radiometric) and relative (stratigraphy)	2	
	15	Application of dating methods in constructing the Geological Time Scale	1	
	16	Overview of eras, periods, epochs – major geological events.	1	
IV	**Introduction to Major Geological Hazards**		**10**	
	17	Volcanoes & Volcanic Hazards	1	
	18	Nature of Volcanic Eruptions and Products	1	
	19	Types of Volcanoes & Volcanic Landforms	2	**20**
	20	Earthquakes & Earthquake Hazards	2	
	21	Seismology, Seismic Waves, Earthquakes & Plate Boundaries	2	
	22	Earthquake Destruction. Prediction, Forecast and Mitigation	2	
V	**Practical**		**30**	
	1	Lab exercises to apply the concepts of interior of earth, earth's magnetism and plate tectonics. Exploring geologic features using Google Earth.	20	**20**
	2	Introduction to Topographic Maps. Exercises involving contour lines.	4	
	3	Application of Gt. Aide (Academy) Freeware	6	

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	-	-							
CO 2	2	3	-	-	-	-							
CO 3	-	-	1	-	-	-							
CO 4	-	-	2	3	-	-							
CO 5	-	1	-	-	-	-							
CO 6	-	-	-	3	-	-							

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:
External evaluation: 70 marks. Internal Evaluation: 30 marks

INTERNAL MARK SPLIT-UP (TOTAL 30 MARKS)			
	Components of Internal Evaluation	4 Theory Modules (10)	**Practical (20)**
1	Test paper/ **Continuous Evaluation of Practical Exercises**	5	**10**
2	Seminar/ **End Sem Exam &Viva-Voce**	3	7
3	Assignment / **Lab Record**	2	**3**

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Seminar	End Semester Examinations
CO 1	✓			✓
CO 2	✓			✓
CO 3	✓			✓
CO 4		✓		✓
CO 5		✓		✓
CO 6			✓	

References:

1. Condie, K.C., 2015. *Earth as an Evolving Planetary System,* 3rd Edition, Academic Press, USA.
2. Hudson, T., 2012. *Living with Earth – An Introduction to Environmental Geology*. Pearson Education Inc., New Jersey, USA
3. Marshak, S., 2001. *Earth: Portrait of a Planet.* W.W. Norton & Co., Inc., USA
4. Wicander, R. and Monroe, J., 2006. *Essentials of Geology.* 4th Edition, Thomson Learning Inc., USA.
5. Tarbuck, E.J. and Lutgens, F.K., 2008. Earth: An Introduction to Physical Geology. 9th Edition, Pearson Education, Inc., New Jersey, USA

Programme	B. Sc. Geology				
Course Code					
Course Title	**EXPLORING THE MOTHER EARTH**				
Type of Course	Foundation – Multi Disciplinary Course				
Semester	1				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	0	45
Pre-requisites	NIL				
Course Summary	A brief introduction to Earth and the geological processes				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Understand the fundamental concepts and principles of geology as a scientific discipline.	U	F	Exam
CO2	Describe the processes involved in Earth's formation, including differentiation and early geological history.	Ap	C	Quiz
CO3	Explain the principles and techniques of geochronology used to determine the ages of rocks and geological events.	An	P	Assignment
CO4	Interpret the geological time scale and recognize major landforms and geological features.	E	M	Viva
CO5	Identify the driving forces behind tectonic activity and plate movements.	Ap	F	Assignment
CO6	Identify geological hazards associated with plate tectonics	E	M	Assignment

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus: EXPLORING THE MOTHER EARTH

Module	Unit	Content	Hrs	Marks
I		**Introduction to Geology**	10	15
	1	Overview of Geology as a Science		
	2	Branches of Geology: Physical Geology vs. Historical Geology		
	3	Earth's Structure: Core, Mantle, Crust		
	4	Rock Cycle and Types of Rocks		
	5	Origin of the Solar System and Earth		
	6	Nebular Hypothesis and Planetesimal Accretion		
	7	Differentiation of Earth's Interior: Core, Mantle, and Crust		
	8	Earth's Spheres: Lithosphere, Hydrosphere, Atmosphere, Biosphere		
	9	Measurement of Earth's Dimensions: Circumference, Diameter, Mass		
II		**Early Earth Differentiation and Geochronology**	8	10
	9	Early Earth Conditions: Hadean, Archean, and Proterozoic Eons		
	10	Differentiation Processes: Formation of Earth's Layers		
	11	Principles of Radiometric Dating and Isotopic Decay		
	12	Geological Time Scale: Eons, Eras, Periods, and Epochs		
III		**Geological Time Scale and Landforms**	8	10
	13	Geological Time Scale: Overview and Major Events		
	14	Relative Dating Methods: Stratigraphy, Superposition, Cross-Cutting Relationships		
	15	Absolute Dating Methods: Radiometric Dating Techniques		
	16	Major Landforms and Geological Processes: Mountains, Plateaus, Valleys, Plains		
	17	Geomorphic Agents: Weathering, Erosion, Deposition, Tectonic Activity		
IV		**Tectonics and Plate Movements**	10	15
	18	Plate Tectonics Theory: Historical Development and Evidence		
	19	Types of Plate Boundaries: Divergent, Convergent, Transform		
	20	Geological Features Associated with Plate Boundaries: Mid-Ocean Ridges, Subduction Zones, Faults		
	21	Tectonic Forces and Earthquakes		
	22	Volcanic Activity and Geological Hazards		
V		**Open Ended Module**	9	5
	Discussing the new trends in exploring the Universe. Eg. James Web Space Telescope. Different Missions to various planetary bodies.			

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	-	-							
CO 2	2	3	-	-	-	-							
CO 3	-	-	1	-	-	-							
CO 4	-	-	2	3	-	-							
CO 5	-	1	-	-	-	-							
CO 6	-	-	-	3	-	-							

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:
External evaluation: 50 marks. Internal Evaluation: 25 marks

INTERNAL MARK SPLIT-UP (TOTAL 25 MARKS)			
	Components of Internal Evaluation	**4 Theory Modules (20)**	**Open ended Module (5)**
1	Test paper/ Mid semester Exam	10	2.5
2	Seminar/ Viva/ Quiz	6	1.5
3	Assignment/ Group Discussion	4	1

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	End Semester Examinations
CO 1	✓	✓	✓
CO 2	✓	✓	✓
CO 3		✓	✓
CO 4		✓	✓
CO 5		✓	✓
CO6		✓	✓

References:

1. Condie, K.C., 2015. *Earth as an Evolving Planetary System,* 3rd Edition, Academic Press, USA.
2. Hudson, T., 2012. *Living with Earth – An Introduction to Environmental Geology*. Pearson Education Inc., New Jersey, USA
3. Marshak, S., 2001. *Earth: Portrait of a Planet.* W.W. Norton & Co., Inc., USA
4. Wicander, R. and Monroe, J., 2006. *Essentials of Geology.* 4th Edition, Thomson Learning Inc., USA.
5. Tarbuck, E.J. and Lutgens, F.K., 2008. Earth: An Introduction to Physical Geology. 9th Edition, Pearson Education, Inc., New Jersey, USA