Programme	B. Sc. Geology				
Course Code	GEL2CJ101				
Course Title	**PROCESSES AT THE EARTH'S SURFACE**				
Type of Course	**Major**				
Semester	II				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	0	2	75
Pre-requisites	NIL				
Course Summary	This course summarises the actions of various geological agents responsible for the formation of landforms. The processes and features produced thereof is explained in this geomorphology course.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Assess the various exogenous process in molding the earth's surface	Ev	C	Exams/ Quiz
CO2	Examine the origin, types, and effects of mass wasting	An	C	Assignment/ Exams
CO3	Distinguish various morphological features resulting from geological actions of running water.	Un	C	Practical Assignment/Exams
CO4	Describe the basic concepts on the distribution and occurrence of groundwater	An	C	Assignments/ Exams
CO5	Distinguish various morphological features resulting from geological actions of wind and glacier.	An	C	Practical Assignment /Exams
CO6	Distinguish various morphological features of ocean floor and coastal region resulting from geological processes	Un	P	Practical Assignment/ Internal exams

* - 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: PROCESSES AT THE EARTH'S SURFACE

Module	Unit	Content	Hrs	Marks
I		**Mass Wasting & Running Water**	**10**	**25**
	1	The Importance of Mass Wasting. Landslides as Geologic Hazards	1	
	2	Mass Wasting in Landform Development	1	
	3	Controls and Triggers of Mass Wasting	2	
	4	Hydrologic Cycle. Drainage basin and drainage patterns	2	
	5	Graded, Braided, and Meandering streams	1	
	6	Geological work of streams: Erosional and depositional fluvial landforms	2	
	7	Base level, Rejuvenation, Knick Points, River Piracy	1	
II		**Groundwater**	**10**	**10**
	8	Underground water: Occurrence.Water table, porosity, permeability	3	
	9	Aquifers: Confined and unconfined, aquicludes, aquitard, and aquifuge.	3	
	10	Natural Springs and types	2	
	11	Geological work of groundwater, Karst Topography	2	
III		**Glacier & Wind**	**15**	**20**
	10	Ice Sheets. Types of glaciers	2	
	11	Formation and movement of glacial ice	2	
	12	Glacial erosion and features produced by glacial erosion	3	
	13	Glacial deposits. Concept of ice ages.	2	
	14	Global distribution of deserts. Formation of deserts.	2	
	15	Geological actions of wind: erosion, transportation & deposition	2	
	16	Processes and features associated with wind action	2	
IV		**Oceans**	**10**	**15**
	17	Oceans and Seas –distribution over earth	1	
	18	Waves, tides, currents, CCD, Marine sediments.	2	
	19	Types of continental margins	1	
	20	Ocean bottom topography.	2	
	21	Shoreline processes	2	
	22	Shoreline features	2	
V		**Practical**	**30**	**20**
	1	Stream ordering using toposheets	5	
	2	Google Earth application in understanding the global distribution of glaciers, deserts and oceans	20	
	3	Calculations involving sediment and water movement in streams	5	

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. Tarbuck, E.J. and Lutgens, F.K., 2008. Earth: An Introduction to PhysicalGeology. 9th Edition, Pearson Education, Inc., New Jersey, USA.

2. Wicander, R. and Monroe, J., 2006. Essentials of Geology. 4th Edition, Thomson Learning Inc., USA

Programme	B. Sc. Geology				
Course Code	GEL2MN101				
Course Title	**GEOINFORMATICS - II**				
Type of Course	Minor				
Semester	II				
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	An intermediate level course for learners of geoinformatics				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will comprehend the classification of sensors and their parameters.	U	F	Exam
CO2	Students will learn about different types of multispectral sensors and hyperspectral imaging techniques.	Ap	C	Quiz
CO3	Students will understand the types of platforms used in geoinformatics	An	P	Assignment
CO4	Students will identify various sources of GIS data, different data models in GIS,	E	M	Viva
CO5	Students will develop skills in data management and editing within a GIS framework..	Ap	F	Assignment
CO6	Students will gain a comprehensive understanding of GNSS technologies, including GPS and GAGAN.	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 - II

Module	Unit	Content	Hrs	Marks
I	**Sensors**		10	15
	1	Classification of sensors		
	2	Sensor parameters – spatial, spectral, radiometric, temporal		
	3	Components of sensors		
	5	Multispectral sensors – pushbroom & whiskbroom scanners		
	6	Hyperspectral imaging		
	7	Atmospheric sensors, SONAR, LiDAR		
II	**Platforms**		15	20
	8	Types of platforms – Groundborne, Airborne (balloons, aircrafts, UAV), Spaceborne (sunsynchronous, geosynchronous)		
	9	Orbital elements - six elements of Keplerian orbit.		
	10	Types of satellite orbits – Sunsynchronous, Geosynchronous		
	11	GNSS – GPS, GAGAN		
	12	Types of platforms – Ground-borne, Airborne (balloons, aircrafts, UAV), Spaceborne (sunsynchronous, geosynchronous)		
III	**Data sources and data models of GIS**		15	20
	13	Sources of GIS data – introduction		
	14	Conventional analogue map sources – Topographical maps, Thematic maps, Geologic maps & Existing digital map sources		
	15	Aerial photographs & satellite imageries		
	16	Field data sources – Surveying & GPS		
	17	Reports & Publications		
	18	Data models in GIS		
	18	Spatial data model – Raster & Vector		
	19	Attribute data model – hierarchical, network, relational		
IV	**Data Management and Editing in GIS**		5	15
	20	Data base management system		
	21	Data management in GIS		
	22	Data editing: Detecting and correcting errors		
	23	Data reduction, Generalization, Transformation		
	24	Rubber Sheeting and edge matching		
V	**Practicals**		30	10
	25	Georeferencing		
	26	Preparation of different thematic layers		

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 Remote Sensing" by James B. Campbell and Randolph H. Wynne (Guilford Press, 2011)
2. "Remote Sensing and Image Interpretation" by Thomas M. Lillesand, Ralph W. Kiefer, and Jonathan W. Chipman (Wiley, 2015)
3. "Fundamentals of Remote Sensing" by George Joseph., (Universities Press, 2005)
4. "Remote Sensing Digital Image Analysis" by John A. Richards., (Springer, 2013)
5. "Principles of Geographical Information Systems" by Peter A. Burrough and Rachael A. McDonnell., (Oxford University Press,1998)
6. "GNSS Applications and Methods" by Scott Gleason and Demoz Gebre-Egziabher., Artech House, 2009)

Programme	B. Sc. Geology				
Course Code	GEL2MN102				
Course Title	**GEOMORPHOLOGY**				
Type of Course	**Minor**				
Semester	II				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	0	2	75
Pre-requisites	NIL				
Course Summary	This course summarises the actions of various geological agents responsible for the formation of landforms. The processes and features produced thereof is explained in this geomorphology course.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Assess the various exogenous process in molding the earth's surface	Ev	C	Exams/ Quiz
CO2	Examine the origin, types, and effects of mass wasting	An	C	Assignment/ Exams
CO3	Distinguish various morphological features resulting from geological actions of running water.	Un	C	Practical Assignment/Exams
CO4	Describe the basic concepts on the distribution and occurrence of groundwater	An	C	Assignments/ Exams
CO5	Distinguish various morphological features resulting from geological actions of wind and glacier.	An	C	Practical Assignment /Exams
CO6	Distinguish various morphological features of ocean floor and coastal region resulting from geological processes	Un	P	Practical Assignment/ Internal exams

* - 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: GEOMORPHOLOGY

Module	Unit	Content	Hrs	Marks
I		**Mass Wasting & Running Water**	**10**	**25**
	1	The Importance of Mass Wasting. Landslides as Geologic Hazards	1	
	2	Mass Wasting in Landform Development	1	
	3	Controls and Triggers of Mass Wasting	2	
	4	Hydrologic Cycle. Drainage basin and drainage patterns	2	
	5	Graded, Braided, and Meandering streams	1	
	6	Geological work of streams: Erosional and depositional fluvial landforms	2	
	7	Base level, Rejuvenation, Knick Points, River Piracy	1	
II		**Groundwater**	**10**	**10**
	8	Underground water: Occurrence.Water table, porosity, permeability	3	
	9	Aquifers: Confined and unconfined, aquicludes, aquitard, and aquifuge.	3	
	10	Natural Springs and types	2	
	11	Geological work of groundwater, Karst Topography	2	
III		**Glacier & Wind**	**15**	**20**
	10	Ice Sheets. Types of glaciers	2	
	11	Formation and movement of glacial ice	2	
	12	Glacial erosion and features produced by glacial erosion	3	
	13	Glacial deposits. Concept of ice ages.	2	
	14	Global distribution of deserts. Formation of deserts.	2	
	15	Geological actions of wind: erosion, transportation & deposition	2	
	16	Processes and features associated with wind action	2	
IV		**Oceans**	**10**	**15**
	17	Oceans and Seas –distribution over earth	1	
	18	Waves, tides, currents, CCD, Marine sediments.	2	
	19	Types of continental margins	1	
	20	Ocean bottom topography.	2	
	21	Shoreline processes	2	
	22	Shoreline features	2	
V		**Practical**	**30**	**20**
	1	Stream ordering using toposheets	5	
	2	Google Earth application in understanding the global distribution of glaciers, deserts and oceans	20	
	3	Calculations involving sediment and water movement in streams	5	

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. Tarbuck, E.J. and Lutgens, F.K., 2008. Earth: An Introduction to PhysicalGeology. 9th Edition, Pearson Education, Inc., New Jersey, USA.

2. Wicander, R. and Monroe, J., 2006. Essentials of Geology. 4th Edition, Thomson Learning Inc., USA.

Programme	B. Sc. Geology				
Course Code					
Course Title	**MINERALS, ROCKS & FASCINATING PLATE TECTONICS**				
Type of Course	Foundation – Multi Disciplinary Course				
Semester	2				
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	Basic introduction to minerals, rocks and plate tectonics				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Identify various types of minerals anddiscuss about their properties	R	F	Exams/ Quiz
CO2	Able to classify minerals based onvarious properties	U	C	Assignment/ Exams
CO3	Define rock cycle and categorise the rocks into different groups	U	F	Practical Assignment/ Exams
CO4	Illustrate fascinating facts about plate movements	U	C	Assignments/ Exams
CO5	Able to understand the consequences of plate movements	U	C	Assignments/ Exams
CO6	Demonstrate critical thinking and able to identify important minerals and rocks	Ap	P	Practical Assignment/Internal exams

* - 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: MINERALS, ROCKS & FASCINATING PLATE TECTONICS

Module	Unit	Content	Hrs	Marks
I		**Minerals and Their Properties**	9	12
	1	Physical properties of minerals		
	2	Form,colour,streak		
	3	Hardness and types of lustre		
	4	Cleavage and Fracture, Electrical properties		
	5	Magnetic properties		
II		**Classification of Minerals**	9	12
	6	Rock forming Minerals		
	7	Ore forming Minerals		
	8	Silicates and Nonsilicates		
	9	Mafic		
	10	Felsic		
III		**Rocks And Rock Cycle**	9	12
	11	Concept of Rock cycle		
	12	Process of Rock formation and transformation		
	13	Igneous rocks, types with examples		
	14	Sedimentary rocks with examples		
	15	Metamorphic rocks with examples		
IV		**Plate Tectonics**	9	14
	16	Plate Tectonics theory		
	17	Types of Plate boundaries		
	18	Consequences of Tectonics		
	19	Volcano, Island Arcs, Ring of fire		
	20	Earthquake, Rift valley		
	21	Mid oceanic ridges, trenches		
	22	Mineral deposits associated with convergent plate margin		
V		**Open Ended Module**	9	5
	1	Plotting of major volcanoes related to plates		
	2	Plotting of earthquakes on world map based on intensity		
	3	Locating of earthquakes epicentre		

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