Course Outcomes, Program Outcomes, Co-Po Mapping and Bloom's Taxonomy Geomorphology Of Course Code: Geo-C-501 Postgraduate Sikkim University

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Abstract
This abstract provides a concise overview of the integration of Course Outcomes (COs), Program Outcomes (POs), and Bloom's Taxonomy in educational assessment and curriculum design of Geomorphology Of Course Code: Geo-C-501 Postgraduate Sikkim University. Course Outcomes define specific learning achievements expected from students at the end of a course. Program Outcomes are broader goals that graduates are expected to attain through the entire academic program. Bloom's Taxonomy serves as a hierarchical classification of cognitive skills, from basic knowledge recall to complex analysis and creation. The alignment of COs and POs using Bloom's Taxonomy enables institutions to systematically evaluate and enhance student learning, ensuring academic programs meet educational standards and industry expectations. This structured mapping improves teaching strategies, helps in achieving accreditation requirements, and promotes continuous improvement in higher education.

Keywords*: Course outcomes, Program outcomes, Bloom's taxonomy, Geomorphology*.

1. Introduction

Course Outcomes (COs) are precise statements that describe what students are expected to learn and achieve by the end of a course [1,2]. They play a crucial role in curriculum development, assessment, and quality assurance [3]. COs must align with Program Outcomes (POs) and be structured using Bloom's Taxonomy to ensure clarity and measurability [4,5]. Good Course Outcomes should be - Specific: Focused on particular skills or knowledge. Measurable: Can be assessed through tests, assignments, and projects [6, 7,8]. Achievable: Realistic within the scope of the course. Relevant: Aligned with course and program goals and time-bound: Achievable by the end of the course [9,10,11]. The structure of Course Outcomes are like [12,13,14,15,16,17]
CO1: Explain the fundamental concepts of arrays, linked lists, stacks, and queues.
CO2: Apply appropriate data structures to solve computational problems.
CO3: Analyze the performance of different data structures.
CO4: Implement searching and sorting algorithms.
CO5: Design custom data structures for real-world applications.

1.1.COs vs POs vs PSOs [18,19,20]

CO (Course Outcome): What a student should achieve at the end of a course. PO (Program Outcome): Broader skills and attributes a graduate must have. PSO (Program Specific Outcome): Specialized outcomes for a specific discipline or branch.

1.2. Bloom's Taxonomy and Cos [21,22,23,24,25,26,27]

COs are structured using Bloom's Taxonomy to define the cognitive level. Examples include:
- Remember: List, Recall
- Understand: Explain, Describe
- Apply: Use, Implement
- Analyze: Compare, Differentiate

- Evaluate: Justify, Assess
- Create: Design, Construct

1.3. Importance of Course Outcomes [28,29,30,31,32]

- Guide teaching and learning strategies
- Support curriculum development
- Facilitate assessment and feedback
- Aid accreditation processes
- Align education with industry and societal needs

2. Course Outcomes (COs) [33]

CO Code	Course Outcomes (COs)
CO1	Understand fundamental concepts of geomorphology and earth surface processes.
CO2	Analyze the role of weathering, erosion, and tectonics in landscape development.
CO3	Apply geomorphic concepts to real-world problems, including natural hazards.
CO4	Use maps, models, and remote sensing tools to interpret landforms.
CO5	Evaluate the human impact on geomorphological processes and sustainability.

2.1. Program Outcomes (POs) [34]

PO Code	Program Outcomes
PO1	Engineering knowledge: Apply knowledge of mathematics, science, engineering fundamentals.
PO2	Problem analysis: Identify, formulate and analyze problems.
PO3	Design/development of solutions: Design system components to meet needs.
PO4	Conduct investigations: Use research-based knowledge and methods.
PO5	Modern tool usage: Apply appropriate techniques and IT tools.
PO6	The engineer and society: Assess societal, health, legal, and cultural issues.
PO7	Environment and sustainability: Understand environmental impact and sustainable development.
PO8	Ethics: Apply ethical principles in practice.
PO9	Individual and teamwork: Work effectively in teams.
PO10	Communication: Communicate effectively on complex activities.
PO11	Project management and finance: Demonstrate knowledge of management principles.
PO12	Life-long learning: Engage in independent and lifelong learning.

2.2. CO–PO Mapping Matrix [35]

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	1	-	2	1	-	-	-	1
CO2	3	3	2	1	2	-	2	-	-	-	-	2
CO3	2	3	3	3	3	2	3	1	1	-	1	3
CO4	1	2	2	3	3	-	2	-	-	2	1	2
CO5	1	1	2	1	2	3	3	2	2	2	2	3

2.3. COs with Bloom's Taxonomy Levels

CO	Bloom's Level	Category
CO1	Remembering, Understanding	Lower Order Thinking Skills (LOTS)
CO2	Understanding, Analyzing	Middle Order Thinking Skills (MOTS)
CO3	Applying, Evaluating	Higher Order Thinking Skills (HOTS)
CO4	Applying, Creating	HOTS
CO5	Evaluating, Creating	HOTS

2. Conclusion

The integration of Course Outcomes (COs), Program Outcomes (POs), and Bloom's Taxonomy serves as a powerful framework for designing, delivering, and assessing outcome-based education (OBE) of Geomorphology Of Course Code: Geo-C-501 Postgraduate Sikkim University. COs provide specific, measurable learning goals at the course level, while POs reflect broader educational objectives aligned with institutional missions and industry requirements. Bloom's Taxonomy, with its hierarchical classification of cognitive skills, supports this structure by guiding the formulation of clear, outcome-driven learning objectives that range from basic knowledge acquisition to complex problem-solving and critical thinking.

Mapping COs to POs using Bloom's Taxonomy, not only ensures alignment between teaching strategies and desired competencies, but also enhances transparency and accountability in higher education of Geomorphology Of Course Code: Geo-C-501 Postgraduate Sikkim University. This alignment facilitates continuous curriculum improvement, ensures quality assurance, and prepares students with the skills, knowledge, and attitudes required for lifelong learning and professional success. In summary, the systematic application of these frameworks strengthens academic rigor and relevance, ultimately improving student learning outcomes and employability of Geomorphology.

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