

Earth Science Field Methods

GEOL 3500 (3 Credits / 45 hours)

SIT Study Abroad Program:
Nepal: Geoscience in the Himalaya

PLEASE NOTE: This syllabus represents a recent term. Because courses develop and change over time to take advantage of unique learning opportunities, actual course content varies from term to term.

Course Description

The ability to make accurate and insightful field observations underpins many Earth and environmental science disciplines. In this course students will develop geoscience field skills within the setting of Earth's highest mountain range. In a grand traverse of the Himalayas from south to north of the mountains in the Annapurna region, students will learn to reconstruct the geologic past and interpret on-going Earth processes. This course and itinerary incorporates most of the major Himalayan rock formations and climatic zones, giving students broad experience with different types of sedimentary and metamorphic rocks as well as structural and sedimentary features. In constructing and justifying a plausible geologic history through cross-sections, stratigraphic columns, and maps, students will learn how to synthesize a wide range of observations to better understand our planet's dynamic processes. Its main objective is for students to gain the ability to develop and justify a plausible geologic history for a region based on field, map, and remote sensing observations.

Learning Outcomes

By the end of the course, students will be able to:

- a) Identify geologic features such as mineralogy, rock types, rock textures, faults, folds, fossils, and sedimentary structures and explain the associated geologic setting or process/es;
- b) Make measurements of geologic parameters such as rock bedding, foliation, and stratigraphy and sketch and discuss geometric relationships;
- c) Maintain a detailed and comprehensive field notebook and construct cross-sections, geologic maps, and graphic logs;
- d) Synthesize a suite of geological observations and interpretations to produce a geological history that includes sedimentary environment and tectonic evolution;
- e) Propose and evaluate the relative merits of several hypotheses to explain observations.

Language of Instruction

This course is taught in English, but students will be introduced to Nepali vocabulary related to food, logistics, and simple small talk.

Course Requirements

Course Schedule

*Please be aware that topics and excursions may vary to take advantage of any emerging events, to accommodate changes in our lecturers' availability, and to respect any changes that would affect student safety. Students will be notified if this occurs.

Orientation & Introductory Activities (7 hours)

The first four days of the program are the orientation. The next two are travel to the initial field excursion site with educational stops along the way. Out of this about half is devoted to learning that supports the Himalayan earth science component of the program.

Geology of the Himalaya - Overview

Lectures on topics such as Himalayan earth science and basic geology review. Exact topics will vary depending on lecturer availability.

Required Reading:

--Pre-program readings

--Coe, A.L., 2010, *Geological Field Techniques*: Wiley-Blackwell, Washington D.C. 323 p.;
Chapters 3, 4, 8, 9

Field trip stops

En route to the field excursion the program spends a day visiting sites that help students learn basic field skills and rock identification.

Required Reading: None

Himalayan traverse geologic map, cross-section, and paper (26 hours)

The program will travel by foot along in the Annapurna region through three of the major Himalayan rock sequences, from the southern front to north of the highest Himalayan peaks. Students will map the geology and structures, maintain high quality field notebooks, and increase their geological analysis skills.

Field work

Student teams will collect field data related to rock type and geologic geometry and structures.

Required Reading: Coe (2010); Chapter 10.3, 10.4, 10.5.1, 10.6.1-3

Write-up

Students synthesize field observations and some provided information into a paleo-environment and tectonic history paper, map, and cross-section.

Required Reading: None

Detailed analysis project (12 hours)

Students will further develop observation and analysis skills during a detailed project in the Kagbeni or Jomsom area. The focus of this project may change from year to year but will entail a detailed study in stratigraphy or structural geology.

Introduction

Introductory lecture about the primary topic and group overview of field area.

Required Reading: Coe (2010); Chapter 5.1-3, 5.6; Chapter 6

Field work

Student teams will collect field data related to stratigraphy or structural geology.

Required Reading: None

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Write-up

Students synthesize field observations into a stratigraphic log or geologic map and write a short paper.

Required Reading: None

Evaluation and Grading Criteria

Description of Assignments

More detailed instructions and grading criteria will be given out at the start of each assignment. The paragraphs below provide general information.

Participation & collaboration: Students must attend ALL program components. Any unexcused absence will result in a minimum of 5% reduction in final course grade. Physically leaving the program will be grounds for dismissal (see Handbook *Conditions of Participation*). However, the participation and collaboration grade rests on much more than merely being present. A-level participation requires attributes such as: coming with all needed materials; daily input to group discussions that includes analysis and/or creativity; active listening and productive responses to comments by others. When students are working in small groups, each person is expected to contribute equally with both physical and mental tasks.

Field notebook and small assignments: High quality field analysis depends on detailed and comprehensive field notes. Invariably students will develop additional questions when it comes time to do a full project write-up and detailed notes will be essential to answer or dismiss these questions. Students will be coached on what these notes require and then evaluated on consistency, accuracy, and completion. Different types of fieldwork may require different sets of observations. In preparation for the larger projects, students may be given smaller practice assignments that should be recorded in field notebooks.

Himalayan traverse cross-section, map, and paper: The largest assignment of the field methods course will be a cross-section and map of the trek region from south of to north of the highest Himalayan peaks. This region cuts through three of the major rock units of the Himalaya. Students will take detailed observations of bedrock outcrops in order to develop a plausible geologic and tectonic history. This assignment will develop skills in detailed observation and regional synthesis. High quality write-ups will include a cross-section and map supported by accurate field measurements of rock types and structure geometry. The conclusions will be clearly explained and uncertainties highlighted in the associated written report.

Detailed analysis project: Students will further develop observation and analysis skills during a detailed project in the Kagbeni or Jomsom area. The focus of this project may change from year to year but will entail a detailed study in stratigraphy or structural geology. Students will hone detailed observational and synthesis skills and the ability to depict geologic relationships in map or graphic log form. Grading criteria will be similar to those for the Traverse assignment.

Assessment:

Participation & Collaboration	10%
Field notebook & small assignments	10%
Himalayan traverse map, cross-section, paper	55%
Detailed analysis project	25%

Grading Scale

94-100%	A
90-93%	A-

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87-89%	B+
84-86%	B
80-83%	B-
77-79%	C+
74-76%	C
70-73%	C-
67-69%	D+
64-66%	D
below 64	F

Expectations and Policies

In order to best facilitate your learning, my expectations are as follows:

Engage your brain and ask questions

Be ready to contribute actively every day. Success in this program will require active participation.

Show up prepared

Be on time, have your readings completed, and points in mind for discussion or clarification.

Think critically

This course is designed to help you develop your critical thinking abilities; these life skills will help you analyze, infer, evaluate, and make reasoned judgments related to many facets of life.

All assignments must be completed on the due date/time

Written assignments received after the specified time will be considered late and as such, docked 10% per day. Any written assignments not received by 5 days after the due date will receive a zero. Presentations must be completed at the specified time. Exceptions will only be for serious medical reasons and extensions MUST be arranged before the due date/time.

Comply with academic integrity policies (no plagiarism or cheating, nothing unethical)

Respect differences of opinion (classmates', lecturers, local constituents engaged with on the visits)

You are not expected to agree with everything you hear, but you are expected to listen across difference and consider other perspectives with respect.

Please refer to the SIT Study Abroad handbook for policies on academic integrity, ethics, warning and probation, diversity and disability, sexual harassment and the academic appeals process. Also, refer to the specific information available in the Student Handbook.

Disability Services: For information about and support from Disability Services (DS) to facilitate an accessible educational experience, please contact disabilityservices@sit.edu. Additional information regarding SIT Disability Services can be found on the DS website at: <http://studyabroad.sit.edu/disabilityservices>.