GPHY 314.01: Global Mountain Environments

Ulrich Kamp
University of Montana - Missoula, ulrich.kamp@umontana.edu
GLOBAL MOUNTAIN ENVIRONMENTS  
(GPHY 314)

- Fall 2014 -
Class Meets: MWF 10:10 – 11:00 am; Stone Hall 304

Professor Ulrich Kamp, Ph.D.
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ulrich.kamp@umontana.edu
http://www.cas.umt.edu/geography/people/facultydetails.cfm?id=609
Office Hours: W 2 – 3 pm and F 11 am – 12 pm; and by appointment

Course Description and Objectives

The study of mountain environments and their physical processes around the globe: Andes, Appalachians, East African Mountains, European Alps, Hindu Kush-Himalaya-Karakoram, Pamir, Rocky Mountains, Southern Alps of New Zealand, Tien Shan, and others. Topics include mountain building, alpine glaciers, mountain geomorphology and climatology, mountain watersheds, mountain biogeography, and mountain hazards such as earthquakes and mass movements. We will also discuss the exploration of mountains and mountaineering.

By the end of this course, students should be able to:
1. Locate and describe the features of local mountain ranges, including geologic origin, major vegetation communities, and human impacts.
2. Describe the hierarchy of processes controlling the physical and biological patterns we see in mountain landscapes, locally and globally, and how these processes are affected by global change.
3. Access and evaluate primary scientific literature.
4. Identify a research question, collect and analyze data to address the question, and summarize findings in standard scientific formats (text and presentations).
5. Evaluate the work or your peers in a constructive and respectful manner.

Course Policies

Class Attendance and On-time Appearance
Attendance is recorded. Class attendance is essential to your success in class. Excessive lateness disturbs everyone else – please appear on time. You should have your lunch before or after class.

Open Door & Discussion
Please feel free to stop by during office hours or when my door is open to ask any questions you may have regarding the class. Please use this opportunity WHEN NEEDED.

Accommodations
The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Academic Integrity
“All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at:
http://life.umt.edu/vpsa/student_conduct.php.”
Readings, Assignments, and Examinations

Readings
Our (required) textbook is:

For every session, you find the assigned reading in the “Tentative Schedule” below. Make sure to read the assigned text before class; this will aid in understanding the material that will be presented during the class period and for the development of any questions about the material you may have.

An excellent reading for preparing a research paper is:

Additional Course Material
All additional course material will be made available online through Moodle after the lectures in class. Download and use these resources for your studies in preparation for assignments and exams.

Research Paper
You will write a research paper on a specialized topic that matches the main topics of the course (see “Tentative Schedule”). The main body (text) of this research paper is approximately 8-10 pages long (double-spaced, Times Roman 12, including cover page, table of content, and references) plus appendix including figures and tables. This must be submitted by the due date. If you decide to work with one or two peers, the paper length doubles accordingly to the team size.

You (and your peer/s) will develop your paper in steps by submitting six “Paper Preparation” assignments:
1. Research Topics
2. Reference List 1
3. Table of Content
4. Reference List
5. Abstract
6. Paper Draft

All work has to be submitted in the two following ways (each person has to submit via Moodle!):
1. Hard copy of Microsoft Word, Excel, and/or Powerpoint documents including all names.
2. Digital version, uploaded to Moodle. The document file name has to follow this structure:
   “topics_yourlastname.docx”
   “referencelist1_yourlastname_yourtopic.docx”
   “tableofcontent_yourlastname_yourtopic.docx”
   “referencelist2_yourlastname_yourtopic.docx”
   “abstract_yourlastname_yourtopic.docx”
   “finalpaper_yourlastname_yourtopic.docx”
   “presentation_yourlastname_yourtopic.pptx”

Presentation
You (and your peer/s) will give a class presentation at the end of the term about your topic. The presentation is 15 minutes long including a brief discussion.

Examinations
All three “multiple choice” exams will take place in the classroom. They are subjective, not comprehensive; this means that the exam will encompass only the material that is covered in lectures and discussions between exams. The rules for the examinations are as follows:
1. You will take each exam as scheduled. Make-up exams are not allowed—except as listed in the Make-up exam policy below.
2. Material for the exam will be from the required textbook and other readings and all other distributed material. Attendance for each lecture is recommended (and taken) in order that you take notes for each exam.

3. Make-up Exam Policy:
   - All Students must take the final exam as scheduled. Conflicts must be settled with the Dean. This is University Policy and there are no exceptions.
   - All Students must take each exam as scheduled. If an exam is missed, the student will receive a zero (0) on the exam.
   - These are the only exceptions that will warrant a make-up exam: university events—such as sporting or music events; military obligations; religious holidays; serious family emergency; medical emergencies or serious illness; court-imposed legal obligations such as subpoenas or jury duty; serious weather conditions; special curricular requirements such as judging trips or field trips.
   - Any student requiring an exception under this policy must do so prior to the scheduled exam—unless in the case of an actual emergency (sudden hospitalization). A student must provide official documentation of the reason for absence in advance.
   - If a make-up exam is approved. It must be completed within one week of the original exam and scheduled with the Teaching Assistant.

**Work Evaluation and Final Grading**

| Three exams (50 points each) | 150 points |
| Six Research Paper Preparation Assignments (25 points each) | 150 points |
| Research Paper (Final Version) | 100 points |
| Presentation | 100 points |
| Class Attendance | 100 points |
| **Total Points** | **600 points** |

**Missed Classes**

| 0-1 | A | 2 | B | 3 | C | 4 | D | >4 | F |

**Grading Scheme**

| 93-100 | A | 83-86 | B+ | 77-79 | C+ | 67-69 | D+ | <60 | F |
| 90-92 | A- | 80-82 | B- | 70-72 | C- | 60-62 | D- |

Late assignments will be penalized. An assignment that is turned in one day late will have 10% of the available points deducted from the score. An assignment that is turned in two days late will have 20% of the available points deducted from the score. No credit will be awarded for assignments that are more than two days late. "Day" denotes a business day (Monday through Friday) not the time interval between class meetings. For example, an assignment that is due on Thursday but turned in on Monday will be counted two days late.
# Tentative Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEEK 1</td>
<td></td>
<td></td>
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<tr>
<td>25-Aug</td>
<td>Introduction to the Course</td>
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<tr>
<td>27-Aug</td>
<td>What is a Mountain?</td>
<td>TB.1</td>
<td>Submit Paper Topic</td>
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<tr>
<td>29-Sep</td>
<td>Movie: Taller than Everest</td>
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<tr>
<td>WEEK 2</td>
<td></td>
<td></td>
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<tr>
<td>01-Sep</td>
<td>Holiday: Labor Day</td>
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<td>No Class</td>
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<tr>
<td>03-Sep</td>
<td>Explorers and Mountaineers</td>
<td>Paper</td>
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<tr>
<td>05-Sep</td>
<td>Movie: Everest</td>
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<tr>
<td>WEEK 3</td>
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<tr>
<td>08-Sep</td>
<td>Mountain Origins I – Plate Tectonics</td>
<td>TB.2</td>
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<tr>
<td>10-Sep</td>
<td>Mountain Origins II – Plate Boundaries</td>
<td>TB.2</td>
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<td>12-Sep</td>
<td>Mountain Types I – Folding and Faulting</td>
<td>TB.2</td>
<td>Submit References 1</td>
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<td>WEEK 4</td>
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<td>15-Sep</td>
<td>Mountain Types II – Plutonism and Volcanism</td>
<td>TB.2</td>
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<td>17-Sep</td>
<td>Movie: St. Helens: Out of the Ash</td>
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<tr>
<td>19-Sep</td>
<td>Mountain Climate I - Climatic Controls</td>
<td>TB.3</td>
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<td>WEEK 5</td>
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<td>22-Sep</td>
<td>Mountain Climate II – Climatic Elements</td>
<td>TB.4</td>
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<td>24-Sep</td>
<td>Snow and Avalanches</td>
<td>TB.4</td>
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<td>26-Sep</td>
<td>Glaciers</td>
<td>TB.4</td>
<td>Submit Outline</td>
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<td>WEEK 6</td>
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<tr>
<td>29-Oct</td>
<td>Exam 1</td>
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<tr>
<td>01-Oct</td>
<td>Research Project: Glacier Monitoring – Ladakh, Himalaya, India</td>
<td>Paper R1</td>
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<td>03-Oct</td>
<td>Mountain Landscapes</td>
<td>TB.5</td>
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<td>WEEK 7</td>
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<tr>
<td>06-Oct</td>
<td>Research Project: GIScience in Mountain Geomorphology</td>
<td>Paper R2</td>
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<tr>
<td>08-Oct</td>
<td>Mass Wasting</td>
<td>TB.5</td>
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<td>WEEK 8</td>
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<tr>
<td>13-Oct</td>
<td>Global Mountains: Central Asia</td>
<td>Paper</td>
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<td>WEEK 9</td>
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<td>22-Oct</td>
<td>Global Mountains: South Asia</td>
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<tr>
<td>24-Oct</td>
<td>Movie: Everest – the Death Zone</td>
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<td>Submit Abstract</td>
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<td>WEEK 10</td>
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<td>29-Oct</td>
<td>Research Project: K2, Karakoram, Pakistan</td>
<td>Paper R8</td>
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<td>31-Oct</td>
<td>Exam 2</td>
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<td>WEEK 11</td>
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<td>03-Nov</td>
<td>Global Mountains: South America</td>
<td>Paper</td>
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<tr>
<td>05-Nov</td>
<td>Global Mountains: North America</td>
<td>Paper</td>
<td>Submit Paper Draft</td>
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<tr>
<td>07-Nov</td>
<td>Movie: Glacier National Park</td>
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<td>WEEK 12</td>
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<td>09-Nov</td>
<td>Outreach: Crowne of the Continent and Greater Yellowstone Initiative</td>
<td>Paper</td>
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<td>12-Nov</td>
<td>Global Mountains: Africa</td>
<td>Paper</td>
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<tr>
<td>14-Nov</td>
<td>Movie: Volcano Above The Clouds</td>
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<td>WEEK 13</td>
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<td>17-Nov</td>
<td>Global Mountains: Europe</td>
<td>Paper</td>
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<td>19-Nov</td>
<td>Global Mountains: Asia, East Asia, and Pacific</td>
<td>Paper</td>
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<tr>
<td>21-Nov</td>
<td>Final Student Presentations (I-3)</td>
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<td>WEEK 14</td>
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<td>Final Student Presentations (4-6)</td>
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<td>26-Nov</td>
<td>Holiday: Thanksgiving</td>
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<td>28-Dec</td>
<td>Holiday: Thanksgiving</td>
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<td>No Class</td>
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<td>WEEK 15</td>
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<td>01-Dec</td>
<td>Final Student Presentations (7-9)</td>
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<td>Submit Paper &amp; PPT</td>
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<tr>
<td>03-Dec</td>
<td>Final Student Presentations (10-12)</td>
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<td>05-Dec</td>
<td>Final Student Presentations (13-15)</td>
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<td>WEEK 16</td>
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<td>11-Dec</td>
<td>Exam 3, 8:10 – 10:00 am</td>
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<td>WEEK 17</td>
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<td>18-Dec</td>
<td>Final Student Presentations (16-18)</td>
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<td>20-Dec</td>
<td>Final Student Presentations (19-21)</td>
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</table>
Required Readings

Lectures are usually accompanied by required readings and lecture “notes”. All material will be made available as pdf-files for download from Moodle, and additional material for interested students might be posted. Please, take your own notes during class.

What is a Mountain?

Explorers and Mountaineers

Mountain Origins

Climate

Snow, Ice, Avalanches, and Glaciers

Landscapes and Mass Wasting

Research Projects

Central Asia

South Asia

Europe

South America

North America

Africa

Australia, East Asia, and Pacific
Optional Readings

**What is a Mountain?**


**Explorers and Mountaineers**


**Mountain Origins**


**Climate**


**Snow, Ice, Avalanches, and Glaciers**


http://ngm.nationalgeographic.com/2006/02/melting-alps/zwingle-text.html

**Landscapes and Mass Wasting**


**Soils**


**Vegetation**


**Wildlife**


**Natural Hazards**

Hydrology

Environmental Change

Central Asia

South Asia

Europe

South America

North America

Africa

Australia, East Asia, and Pacific
Bibliography

This bibliography includes suggestions of additional interesting and helpful readings.

Books - Science, Encyclopedias, etc.


Books - Biographies, Essays, Mountaineering, Popular Science, etc.


**Scientific Articles and Book Chapters**


**National Geographic**

- **Alps**
  - Meltdown: The Alps Under Pressure, February 2006

- **Andes**
  - The Altiplano, July 2008

- **Appalachian Mountains**
  - When Mountains Move, March 2006

- **Glaciers**
  - The Big Thaw, June 2007

- **Great Smoky Mountains**
  - Seasons of Smoke, August 2006

- **High Atlas**
  - Among the Berbers, January 2005

- **Himalaya**
  - Bhutan’s Enlightened Experiment, March 2008

- **Kamchatka**
  - Fragile Russian Wilderness, January 2009

- **Min Mountains**
  - China’s Mystic Waters, March 2009

- **Mountain climbing**
  - Ice Warriors, January 2008

- **Mountain Gorillas**
  - Who Murdered the Virunga Gorillas?, July 2008

- **Mountains**
  - Daisetsuzan, August 2008

- **Naica Mountain**
  - Crystal Palace, November 2008

- **Rocky Mountains**
  - Crown of the Continent, September 2007

- **Under Fire, July 2008**

  - Muskwa-Kechika, November 2008

- **Of Lynx and Men: Scenes from a Homecoming,* January 2006**
Internet Links

- Association of American Geographers (AAG) – Mountain Geography Specialty Group (MGSG)  
  (http://www.umn.edu/aagmountains/index.html)
- American Alpine Club  
  (http://www.americanalpineclub.org/)
- Alpine Convention  
  (http://www.alpconv.org/home/index_en)
- Center for Snow and Avalanche Studies (CSAS)  
  (http://www.snowstudies.org/)
- Centre for Development and Environment (CDE) – Development in Mountains; Mountain Agenda  
  (http://www.cde.unibe.ch/Themes/DIM_Th.asp); (http://www.cde.unibe.ch/Research/MA_Re.asp)
- Centre for Mountain Studies (CMS)  
  (http://www.cms.ub.ac.uk/)
- Consortium for Integrated Climate Research in Western Mountains (CIRUMOUNT)  
  (http://www.fs.fed.us/psw/cirmount/)
- Consortium for the Sustainable Development of the Andean Ecoregion (CONDESAN)  
  (http://www.condesan.org/)
- International Continental Scientific Drilling Program (ICDP)  
  (http://www.icdp-online.org/content/idcd/front_content.php)
- International Union for Quaternary Research (INQUA) – Commission of Glaciation  
  (http://www.inqua.au.dk/)
- Institut de la Montagne  
  (http://www.institut-montagne.org/)
- Food and Agricultural Organization of the United Nations (FAO) – Sustainable Mountain Development  
  (http://www.fao.org/mnts/)
- Global Change in Mountain Regions (GLOCHAMORE)  
  (http://mri.scnatweb.ch/projects/glochamore/)
- Global Mountain Biodiversity Assessment (GMBA)  
  (http://gmba.unibas.ch/index/index.htm)
- High Mountain Remote Sensing Cartography Society (HMRS)  
  (http://www.kfunigraz.ac.at/geowww/hmrsc/)
- Institute for Alpine Environment at European Academy of Bozen/Bolzano (EURAC)  
  (http://www.eurac.edu/Org/alpineEnvironment/alpineEnvironment/index.htm)
- International Center for Integrated Mountain Development (ICIMOD)  
  (http://www.icimod.org/)
- International Mountain Day  
  (http://www.fao.org/mnts/intl_mountain_day_en.asp)
- International Mountain Society (IMS)  
  (http://www.mrd-journal.org/IMS_imem.asp)
- International Society for Mountain Medicine (ISMM)  
  (http://www.ismmed.org/)
- International Union for Conservation of Nature (IUCN)  
  (http://www.iucn.org/)
- International Year of Mountains 2002 (IYM 2002)  
  (http://www.unu.edu/mountains2002/index.htm)
- Mountain Culture Program at Banff Centre  
  (http://www.banffcentre.ca/mountainculture/)
- Mountain-Lakes.org  
  (http://mountain-lakes.org/)
- Mountain Partnership  
  (http://www.mountainpartnership.org/)
- Mountain Research and Development (MRD)  
  (http://www.mrd-journal.org/)
- Mountain Research Initiative (MRI)  
  (http://mri.scnatweb.ch/)
- Mountain Research Station (MRS) of the Institute of Arctic and Alpine Research (INSTAAR) at UC Boulder  
  (http://www.colorado.edu/mrs/)
- Mountain Studies Institute  
  (http://www.mountainsudies.org/)
- Mountain Voices  
  (http://www.mountainvoices.org/)
- NRCS (National Resources Conservation Service) – National Water and Climate Center (NWCC)  
  (http://www.wcc.nrcs.usda.gov/)
- Rocky Mountain International  
  (http://www.rockymountainintl.com/)
- UNEP (United Nations Environment Programme) – Agenda 21 – Chapter 13: Sustainable Mountain Development  
- USFS (United States Forest Service) – National Avalanche Center  
  (http://avalanche.state.co.us/index.php)
- USGS (United States Geological Service) – Climate Change in Mountain Ecosystems (CCME)  
  (http://www.nrmsect.usga.gov/research/global.htm)
- USGS (United States Geological Service) – Northern Rocky Mountain Science Center (NOROCK)  
  (http://www.nrmnc.usgs.gov/)
- WWF (World Wildlife Fund)  
  (http://www.worldwildlife.org/)
Research Paper and Presentation – Potential Topics

These papers/presentations shall describe topics and/or regional case studies of your choice. Some examples are listed below; additional topics are welcome. (Red: covered by instructor—this does not mean that you could not pick this topic and write an in-depth paper based on the information presented in class).

**Topological Papers**

- Acute Mountain Sickness/ Altitude Sickness
- Alpine Medical Plants
- Deforestation in Mountains
- Environmental Change in Mountains
- Forestry
- Glacial Processes and Landforms: Rocky Mountain NP, Yosemite NP, North Cascades NP, Olympic NP, Glacier NP, Denali NP
- Global Morphology and Tectonics: Rocky Mountain NP
- Igneous Activity Landforms: Mount Rainier NP, Yellowstone NP, Hawaii NP, Crater Lake NP
- Mining
- Mountain Biodiversity
- Mountain Geomorphology
- Mountain Hazards and Risks (Earthquakes, GLOFs, Landslides)
- Mountain Vegetation
- Mountain Weather and Climate
- Mountain Wildlife (Mountain Gorilla, Mountain Lion)
- Mountains and City Planning
- Planetary Mountains
- Submarine Mountains
- The Fourteen 8,000+ Peaks
- The Seven Summits

**Regional Papers: Mountains in the United States**

- Central Montana (Crazy Mountains, Milk River, Giant Springs)
- Hawaiian Islands
- Mountain Ranges of Alaska
- Mountain Ranges and of the lower 48 (Adirondacks, Appalachians, Blue Ridge, Cascades, Ozarks, Pacific Border, Rocky Mountains, Sierra Nevada)
- Northwestern Montana (Glacier NP, Glacial Lake Missoula, Rattlesnake Mountains, Mission Range, Swan Valley)
- Southwestern Montana (Yellowstone NP, Boulder Batholith, Elk Horn Mountains, Highland Range, Garnet Range, Idaho Batholith, Bitterroot Valley)

**Regional Papers: Mountains in Other World Regions**

- Antarctica
- Central and Southern Asia: Altai; Himalayas; Hindu Kush; Karakoram; Pamirs; Tien Shan
- Europe: Alps; Carpathians; Central Massif; Pyrenees
- Mountains of Australia
- Mountains of Central America
- Mountains of East Africa
- Mountains of Germany
- Mountains of Great Britain
- Mountains of Mexico
- Mountains of Northern Africa: Atlas; Hoggar; Tibesti; Gilf Kebir
- Mountains of Norway
- New Zealand: Southern Alps
- South America: Andes; Tepui Mountains
- Southern Africa: Drakensberg / Maloti Mountains; Table Mountain
- Southeast and East Asia: Japanese Alps

**Movies**

- *A River Runs Through*. 1993, 123 min, UM: DVD 01281
- *Bhutan. The last Shangri-la*. 1997, 60 min, UM: VT 07848
- *Brokeback Mountain*. 2006, 135 min, UM: DVD 791.43 B867b 2006
- *Everest. (IMAX)*. 1998, 45 min, UM: DVD 00417
- *Everest. The Death Zone*. 1998, 57 min, UM: VT 08333
- *Exploring the Himalayas*. 1990, 60 min, UM: VT 03105
- *Great Peaks*. 2006, 280 min, UM: DVD 01603
- *Himalaya*. 2002, 104 min, UM: DVD 00158
- *Journals of Lewis and Clark*. 1990, 54 min, UM: 21199
- *Mountain Islands*. 1990, 30 min, UM: VT 13031
- *Ladakh*. 1986, 86 min, UM: VT 06101
• *Seven Years in Tibet.* 1997, 143 min, UM: DVD 02244
• *Sculpted by Floods.* The Northwest Ice Legacy. 2001, 57 min, UM: Kamp
• *Taller than Everest.* UM: Kamp
• *The Trail. Lewis and Clark Expedition 1803-1806.* 1996, 88 min, UM: VT 08731
• *Tibet’s Holy Mountain.* 1994, 52 min, UM: VT 06091

**Mountain Explorers and Mountaineers**
Hillary, Edmund and Norgay, Tenzing; Lewis, Meriwether and Clark, William; Messner, Reinhold; Muir, John; von Humboldt, Alexander

**Mountain Researchers**
Barry, Roger; Byers, Alton; Fagre, Daniel; Haeberli, Wilfried; Hewitt, Kenneth; Ives, Jack; Messerli, Bruno; Price, Martin; Troll, Carl