





A Mountain-Focused Curriculum in Earth & Environmental Sciences for U. Central Asia

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Earth, Ocean & Atmospheric Sciences
 Geography



University
 of Central Asia



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- UCA – Dean Diana Pauna
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- 7 international course reviewers
- Fatima Mannapbekova, undergraduate, delivered parts of this presentation as a poster at the World Mtn. Forum, Bishkek.
- Others: EOAS faculty supporters, other ugrad assistants, EOAS staff.

UN International Mountain Day, Dec 11, 2019

- **2019 Theme: Mountains Matter for Youth**

- **University of Central Asia**
- Enabling youth to pursue undergraduate degrees in mountain-focused disciplines in Central Asian mountain regions.



Introduction

*Post-secondary education is an important aspect of enabling mountain communities to become active agents of change towards **resilience and sustainability**.*

*When students study, research and participate in mountain or other communities, they can become **active participants** in transforming those communities towards sustainable futures within existing cultural and environmental contexts.*

*The curriculum development partnership between **University of Central Asia (UCA)** and **University of British Columbia (UBC)** is one of many stepping-stones towards achieving sustainable futures in mountainous Central Asia.*



A university focused on development of mountain societies

- Established in 2000 as a private, English language, not for profit, secular university.
- Founded by international Treaty;
 - Kyrgyz Republic / Tajikistan / Kazakhstan
 - His Highness the Aga Khan
 - Ratified by the three respective parliaments,
 - Registered with the United Nations
- Focused on development of **mountain** societies.
- **Mission:** To promote the social and economic development of Central Asia, particularly its *mountain communities*, by ...
 - offering an internationally recognized standard of higher education, and
 - enabling peoples of the regions to preserve their rich cultural heritage as assets for the future.



<https://www.ucentralasia.org/About/Index/EN>

Achievable How?

1. Commitment & partnership of the *Aga Khan Development Network*.

2. Partnerships!

<http://www.akdn.org/>

To quote, His Highness the Aga Khan at 2016 inauguration:

“UCA is a valuable example of international cooperation for the future - not only here in the region, but also for people far beyond the region.”



<https://ucentralasia.org/Resources/Item/1252/EN>

International Partners

- Establishing excellent degree programs as a **STARTING** point.
- Partnering is the key.

UCA Academic Partners	Programmes
Seneca	Preparatory Programme 
 UNIVERSITY OF TORONTO	Computer Science 
 UTS UNIVERSITY OF TECHNOLOGY SYDNEY	Communications and Media
 THE UNIVERSITY OF BRITISH COLUMBIA	Earth and Environmental Sciences 
 Stockholm School of Economics in Riga  HIGHER SCHOOL OF ECONOMICS NATIONAL RESEARCH UNIVERSITY	Economics
 University of Victoria	Co-operative Education Programme 
 UNIVERSITY OF CAMBRIDGE	Central Asian Faculty Development Programme
 UNIVERSITY OF ALBERTA	Central Asian Faculty Development Program 

UCA structure

Undergraduate degree programs

- Computer science
- Communications & media
- **Earth & environmental sciences**
- Economics
- Business & management
- Engineering sciences

School of Arts and Sciences

Naryn Campus

Khorog Campus

Tekeli Campus

UNIVERSITY OF CENTRAL ASIA

Graduate School of Development

Institute of Public Policy and Administration

Mountain Societies Research Institute

Cultural Heritage and Humanities Unit

Civil Society Initiative

Aga Khan Humanities Project

School of Professional and Continuing Education

Tajikistan (4)

Kyrgyzstan (2)

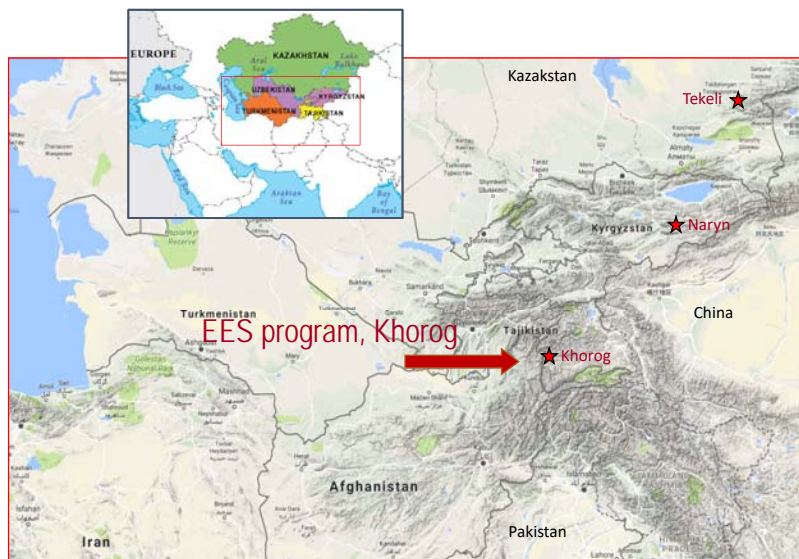
Kazakhstan (1)

Afghanistan (6)

1 University, 3 countries, 3 campuses, 6 undergrad degree programs

- Triple the “bureaucratic” challenges ... but the focus on mountain communities and concerns units the 3 campuses.
- Research:
 - Mtn. Societies Research Institute
 - Inst. of Public Policy & Admin
 - Cultural Heritage & Humanities
 - Civil Society Initiative
 - Aga Khan Humanities Project
- School of Professional and Continuing Education

<http://www.ucentralasia.org>



<https://www.youtube.com/watch?v=nDyCSWkz3qk>

UCA achievements to fall 2019:

Undergraduate student profile

- 81% from 3 host countries.
 - Remaining from Pakistan, Afghanistan, Russia, Iran, Syria, Kenya.
- 51% Women.
- 70% from small towns and rural areas.

Research

- 100+ publications from MSRI, IPPA, CHHU and CSI.

School of Professional and Continuing Education

- 143,000 learners (50% women) trained by the School of Professional and Continuing Education across 12 locations in Central Asia and Afghanistan.
- 1,700 civil servants trained in governance & public policy in Tajikistan, Kyrgyzstan & Afghanistan.



<https://www.ucentralasia.org/About/Index/EN>

UBC / UCA partnership timeline

→ **2014: UCA's EES concept.**

2016: UBC approached; proposal developed.

Jan 2017: UCA & UBC sign agreement.

Funded by UCA / AKDN; "in kind" by UBC, EOAS, Geog.

Aug 2017: 10 Science Education Specialists (SES) hired.

Oct 2017: 3 UBC SES + Project Coordinator travel to UCA

Mar 2018: Review committee at UBC, EES prereq courses

May 2018: - Training: 3 UCA instructors travel to UBC;
- Four UBC SES travel to UCA.

Sep 2018: 3 prerequisite courses are taught.

Jan 2019: Review committees, EES courses, at UBC.

May 2019: Training with EES teaching faculty, at UBC.

Sep 2019: First EES courses to be taught.

May 2021: First EES cohort graduates!



<https://blogs.ubc.ca/eescourses/>

UBC visits to Central Asia

- Oct 2017 (4 team members):
 - Dushanbe and Khorog, Tajikistan
 - Mostly meet-and-greet ... students, faculty & contributors & colleagues
- May 2018 (4 team members):
 - Khorog (and Dushanbe a little)
 - Road trips
 - 3-day trip to "shadow" field work with an MSRI-sponsored community-based conservation study.
- Oct 2018 (3 team members):
 - Khorog – mostly geoscience, including some road trips
 - Bishkek, **World Mountain Forum 2018**
 - UBC poster on EES program development
 - Meet students & Mountain Studies academics / practitioners.
 - Meet MSRI, special focus on GIS courses.
 - Visit the Naryn campus



<https://goo.gl/NKDj4q>

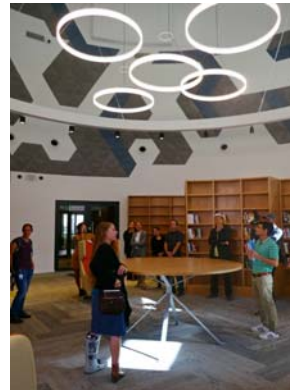
Khorog Campus



UCA's Khorog campus.
Student residences.
Oct 2017.



UCA's Khorog campus
May 2018.



UBC course
developers
meet students
& faculty,
Khorog Campus
Library, Oct
2017.



UCA visiting
prof. and
geology prof. at
Idaho State U.
David Rodgers,
Khorog Campus
Oct 2018.

UCA Khorog campus interiors



Exploring geographical & cultural context



UBC course developers visit the Barsam Debris Flow, a large landslide in 2015, near Khorog.



Home-stay accommodation in the Pamir mts, during field trip exploring conservation research and mountain society life (May 2018).

Pamir Mountains: Afghanistan from Tajikistan.



The Tajik–Afghan Friendship Bridge
Built by AKDN, USA, Norway, 2004.

https://en.wikipedia.org/wiki/Tajik%E2%80%93Afghan_Friendship_Bridge



UCA campus at Khorog, Tajikistan

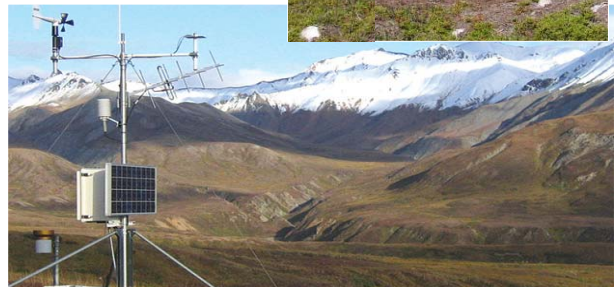
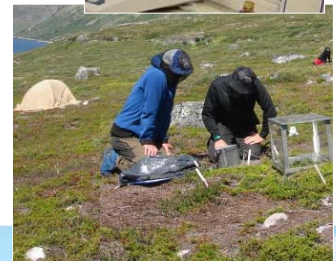
<http://www.ucentralasia.org/>

<https://blogs.ubc.ca/eescourses/>



Origin and intentions of the EES degree

- **Choice of courses** – i.e. curriculum
 - Based on 2014 concept note, then adapted for practicality
 - Balance broad exposure versus narrower, more rigorous specialization.
- **The Central Asian context:** targeted sectors for graduates
 - Biodiversity
 - Energy
 - Fossil Fuel Industry
 - Mining and By-product Management
 - Environmental Assessments
 - Environmental Risks and Natural Disasters
 - Environmental Policy
 - Ecotourism
 - Agropastoralism / Sustainable Land Management
 - Climate Change
 - Water
 - Indigenous Human Ecology



Curriculum: implications for students . . .

- Students will work their way towards specific expertise (e.g. geologist, ecologist, etc.)
- Students will acquire appropriate knowledge / skills / attitudes to work and contribute in development & sustainable management of mountain regions and communities.



A five-year undergraduate pathway

First year: Preparatory Program - English, mathematics and science.

Second year: liberal arts in languages, history, philosophy, etc.

Co-op opportunities

Third year: prerequisites in math, physics, chemistry, biology

Co-op opportunities

Fourth year: specialization courses + minor choices

Co-op opportunities

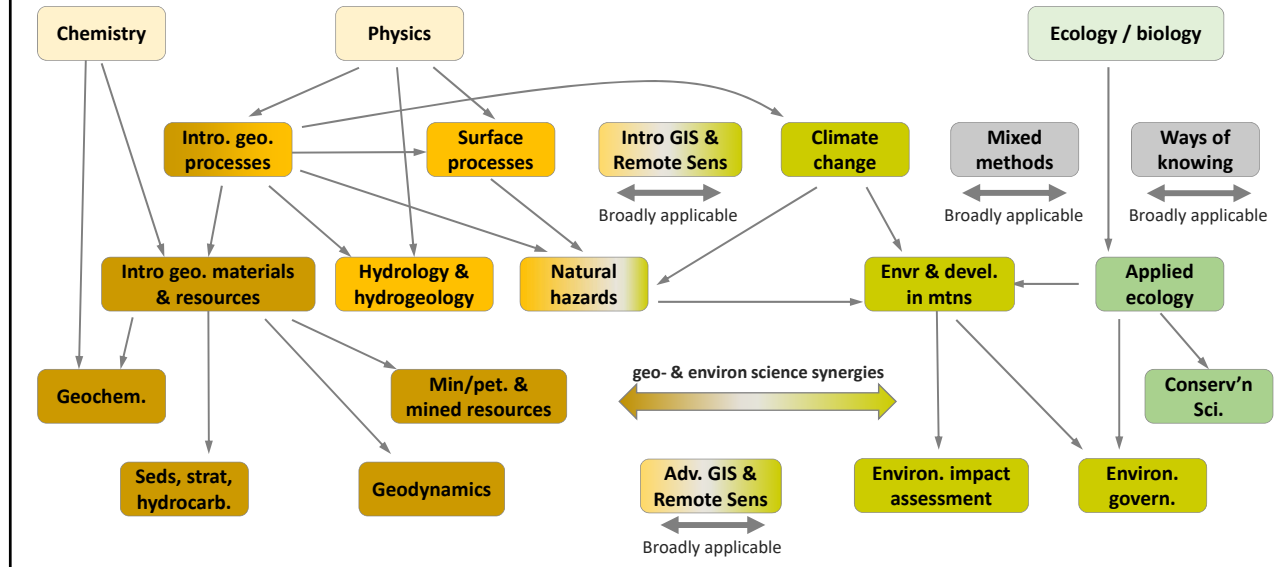
Fifth year: specialization courses + minor choices

Co-op opportunities

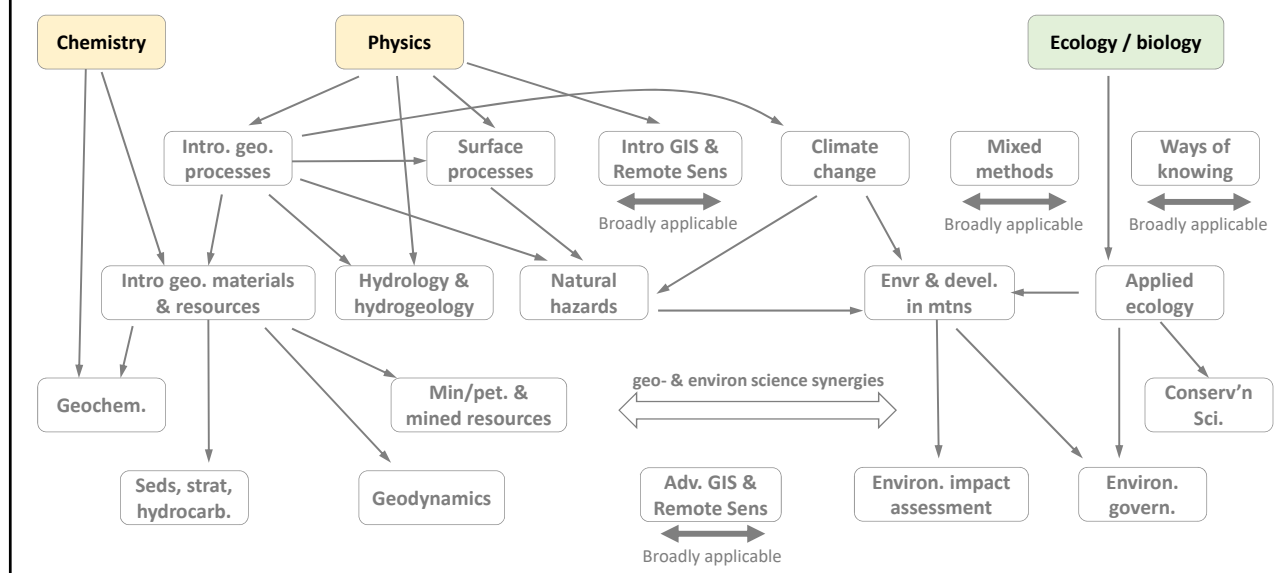


<https://www.ucentralasia.org/Admissions/UndergraduateProgramme/EN>

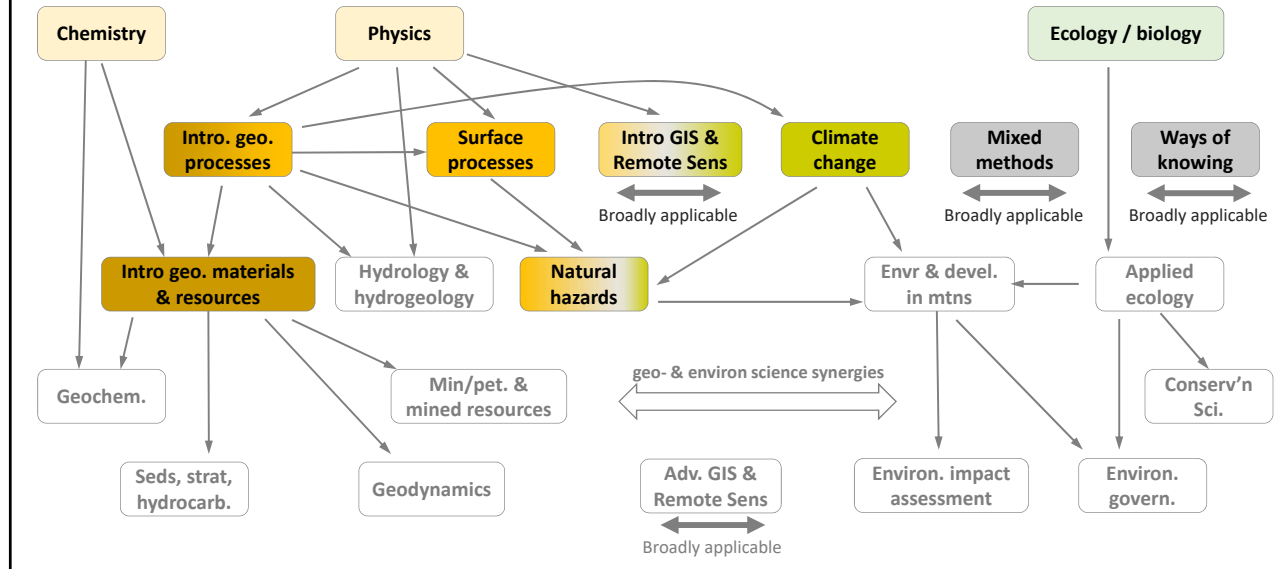
EES courses: from fundamentals towards advanced topics



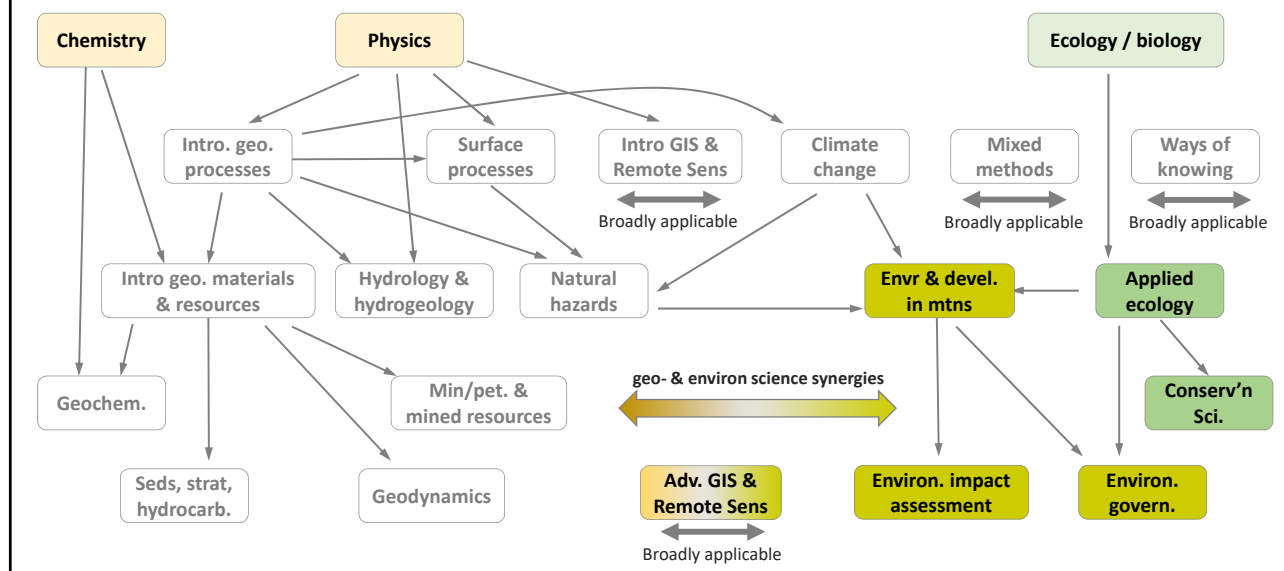
Prerequisite science skills for BSc students.



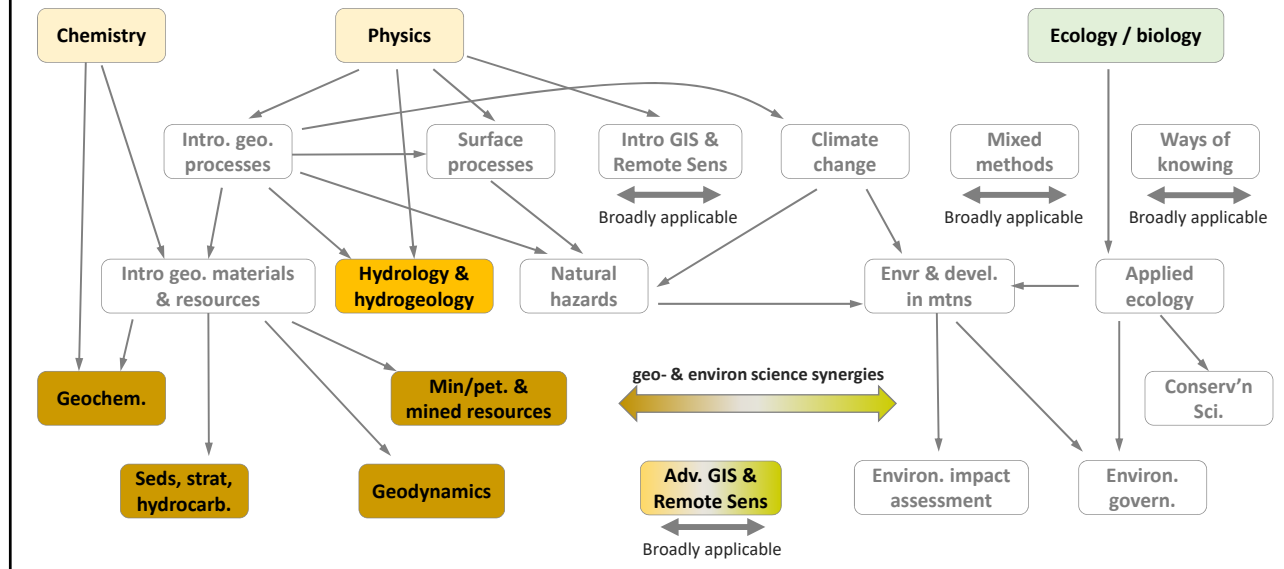
Fundamental knowledge, skills and attitudes



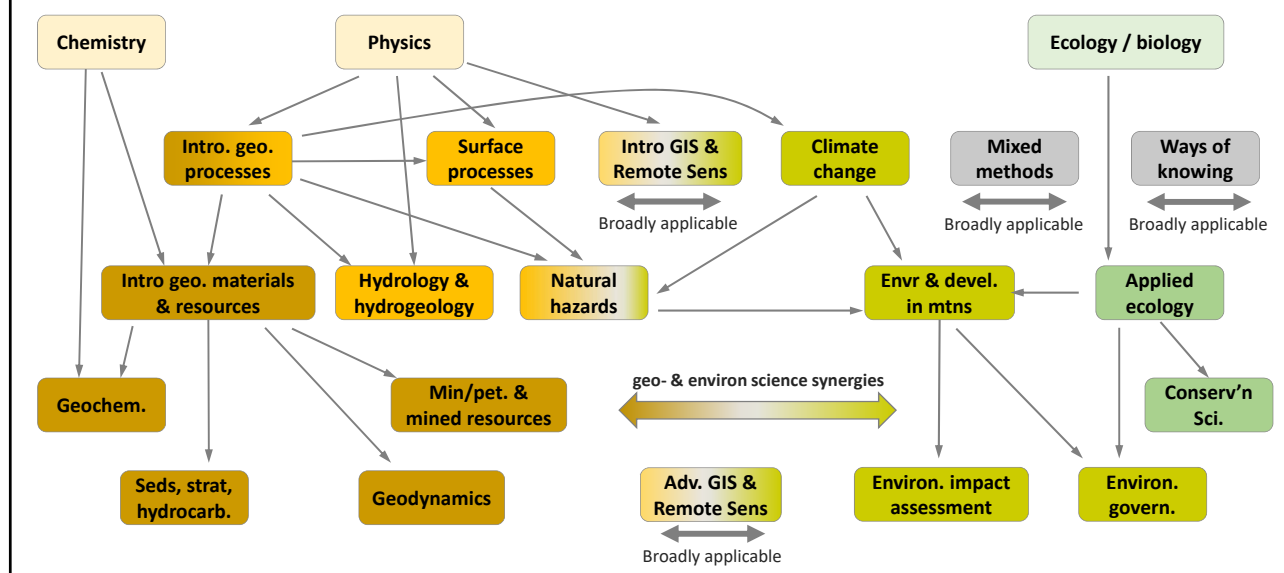
Environmental Sciences more advanced subjects



Geoscience more advanced subjects



EES courses: from fundamentals towards advanced topics



The UBC connection

- **Sources for courses:** Undergraduate courses in UBC programs:
 - Geological Sciences, <https://www.eoas.ubc.ca/academics/ugrad/specializations-programs/geologicalsciences>
 - Environmental Science, <https://www.eoas.ubc.ca/academics/ugrad/specializations-programs/environmentalsciences>
 - Geography, <https://www.geog.ubc.ca/undergraduate/programs/>
 - Earth, Environmental & Geographic Sciences <https://eegs.ok.ubc.ca/undergraduate/>
- **People:** listed at the end.
 - UBC professors and instructors
 - UBC undergraduate & graduate students
 - UBC geoscience education specialists
 - Several industry-based experts.



How is the EES degree unique?

- UCA's EES degree:
 - Prerequisite courses are science, math, law, philosophy, language, etc.
 - 8 geoscience courses.
 - 7 environmental science / ecology courses.
 - 4 broadly applicable courses (GIS 1, GIS 2, Ways of knowing, research methods).
- Example - UBC geology degree:
 - Prerequisites are math, chem, physics and earth science.
 - 19 purely geoscience courses.
- UCA's degree is broadly equivalent in terms of number of courses ...
BUT resulting qualifications are less specialized, more broadly based.

A few words about pedagogy and learning strategies

- **Student-centric practices** based on experience and fundamentals of how people learn or “how learning works”.
- **Active learning**, including (ideally !) a balance of ...
 - solo work with individual responsibility for learning
 - team, peer & group or “collective” learning scenarios
 - instructor guidance
 - instructor’s expertise *strategically* delivered to support activities
 - some lecturing, but none should be delivered as long, static presentations.
 - assessment based on a broad range of deliverables & actions, not purely on individual high-stakes sit-down exams.
- **Opportunities** for field-, lab- and community-based learning.
- *These standards are required by UCA. Faculty are trained at UCA*

Facilitating active engagement with mountain issues

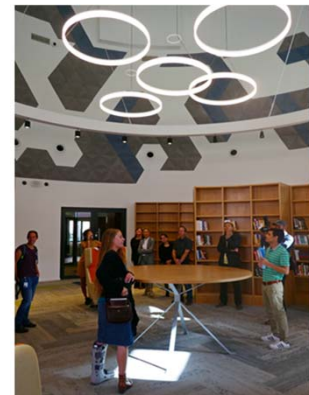
- Driven by UCA Core Literacies articulated in 2016.
- Courses derived from UBC courses.
- Adapted to incorporate Central Asian contexts.
 - Locations, environments, communities, case histories, etc.
- UBC visited Khorog & Pamirs in Oct 2017 and May & Oct 2018.



Course developers visiting in the Pamirs



UBC course developers visit the Barsam Debris Flow, a large landslide in 2015, near Khorog.



UBC course developers meet students & faculty, Khorog Campus Library, Oct 2017.

Engaging in mountain issues – con't.

Visits with local people, professionals, & organizations.

- Khorog state University
- AKAH: Aga Khan Agency for Habitat
- MSDSP: Mountain society Development Support Program
- MSRI: Mountain Societies Research Institute
- Central Asian Faculty Development Programme
- Mountain society development support program
- SPCE: UCA School of Professional & Continuing Education
 - Dushanbe office and facilities
 - Khorog director and facilities
- Wildlife management field work & community-based home-stays.
- ... Etc.



Geoscience in Tajikistan (photo D. Rodgers)

<https://blogs.ubc.ca/eescourses/trip-summary/>

Engaging in mountain issues – con't.

Research support by UBC undergraduates

- Summaries and resources about:
 - OBOR: China's Belt and Road Initiative, and Influences on the Region.
 - also

○ natural hazards	○ climate change
○ energy use & availability	○ community conservancies
○ professional opportunities in EES	○ reference collections
- Six case-histories about environmental challenges in Central Asia were developed for the Mixed Research Methods course.
 - Students will develop their own research proposal & questions.
 - This student-generated content will empower student to be knowledge creators as well as knowledge users.

Example Case History:

Community-based conservancies and snow leopards

- International organization ***Panthera*** works with Pamirs villages that are dealing with snow leopard / human conflicts [1].
- They also address illegal international trade in snow leopards in cooperation with authorities.
- After becoming familiar with conflicts around Snow Leopard habitat and population, **students will create** a research proposal.



[1] Berkes, Fikret. n.d. "Rethinking Community-Based Conservation." *Conservation Biology* 18 (3): 621–30.

Engaging in mountain issues – con't.

- Curriculum & course review committees include multinational experts.
- UCA's commitment to Co-op opportunities for all students.
 - For > 45 Co-op partners in 5 Central Asian nations, see <https://ucentralasia.org/Academics/Coop>
- UCA professors researching in their fields
 - Students will learn from people doing current, relevant research.
 - Facilitates the learning / research synergy, feasible only in research-focused universities.
- Other components
 - Prof. D. Rodgers of Idaho State U.; six months teaching & project support for geosciences.
 - Emerging scholarly relationships with partner institutions and organizations.
 - Central Asian Faculty Development Programme, including PhD. scholarships, in partnership with **Cambridge University**, UK and **University of Alberta**, Canada.



Concluding remark

“Bringing international higher education & research to mountain settings is challenging.

However, post-secondary educated people are both more mobile and better able to support and engage with local mountain communities within global societies.”



Further information about UCA

<https://www.ucentralasia.org>



facebook.com/ucentralasia
twitter.com/ucentralasia
vk.com/ucentralasia

instagram.com/ucentralasia
youtube.com/ucentralasia
www.ucentralasia.org

Designed and produced by the Department of Advancement and Public Affairs at the University of Central Asia

https://www.ucentralasia.org/Content/Downloads/UCA%20Brochure%202019_ENG.pdf

Course developers at UBC

- | | |
|---|---|
| <p>1) Elizabeth Gillis:
a. Introductory chemistry</p> <p>2) Linda Strubbe:
a. Introductory physics</p> <p>3) Erica Jeffery:
a. Introductory biology & ecology</p> <p>4) Tara Holland:
a. Environmental governance
b. Science, impact & complexity of climate change
c. Mixed research methods
d. Ways of knowing</p> <p>5) Brendan Hunt:
a. Hydrogeology & hydrogeology
b. Surface processes</p> <p>6) Chris Kopp:
a. Applied ecology
b. Conservation science</p> | <p>7) Gill Green:
a. Introductory GIS
b. Advanced GIS</p> <p>8) Lucy Porritt:
a. Introduction to geological materials
b. Minerals, petrology & mined resources</p> <p>9) Marc Foggin:
a. Environmental impact & risk assessment
b. Environment & development</p> <p>10) Ozlem Suleyman:
a. Geochemistry
b. Sedimentology and hydrocarbon resources</p> <p>11) Phil Hammer:
a. Introduction to geological processes
b. natural hazards & risk management</p> <p>12) Francis Jones:
a. Geodynamics and structural geology</p> |
|---|---|

Acknowledgements of additional support

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UBC Admin

1. Francis Jones, Project lead and coordinator
2. Loch Brown, Coordinator in Department of Geography
3. Marwan Hassan, Head, dep't Geography (until July 31, 2019)
4. Roger Beckie, Head, dep't EOAS (until July 31, 2019)

UBC Staff

5. Daphne Fogelman (EOAS HR)
6. Kathy Scott (EOAS finance)
7. Anita Lam (EOAS finance)
8. Renee Haggart (EOAS administration)
9. Mark Crosbie (Associate university counsel)
10. Bob Korzeniowski (International relations officer)

UBC undergraduate students

11. Fatima Mannapbekova
12. Qingyan Liu
13. Iram Malik
14. Akash Tirkey

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2. Lucy Porritt
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8. Nicole Williamson
9. Anais Fourny
10. Dominique Weis
11. Lucy Porritt
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13. Kyle Larson
14. Kirstie Simpson
15. Marc Bustin
16. Martyn Golding
17. Stuart Sutherland
18. Cecilia Campero

University of Central Asia (UCA)

Faculty & instructors

1. Shamsh Kassim-Lakha, Chairman, Board of Trustees, UCA.
2. Ariff Katchra (Dean, School of Arts & Sciences, UCA)
3. Diana Pauna (Dean, School of Arts & Sciences, UCA)
4. Murodbek Laldjebaev
5. David Rodgers
6. Ian Canlas
7. Maqsad Suriev
8. Trevor Davies

Reviewers

9. Valerie Lopes
10. David Rodgers
11. Sarah J. Halvorson
12. Helmut Echlert
13. Roy Sidle
14. Caleb Pan
15. Farrukh Nazarmavloev

UCA Staff

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17. Nasiba Amanova
18. Adina Asamova
19. Meerim Baialieva

Appendix: A Few Definitions

- **Lesson or “class”:** one classroom or lab session, usually 1hr, 1.5hrs or 3hrs.
- **Lecture:** A “stand and deliver” portion of a lesson. “Traditional” teaching involved 100% “lecture-based” lessons.
- **Lab:** a learning situation using equipment, materials, specimens, or other resources – not at desks with only computers or paper. (Exception: “computer labs” such as GIS courses may involve only computing facilities.
- **Assignment:** a specific task for students to complete out of class.
- **Assessment:** any method of determining a student’s degree of mastery. Could be a quiz or test, a written assignment, results recorded in a worksheet, a project or presentation, etc.
- **Inclass activity:** something students do either alone or with colleagues that is not just “listening” to the instructor. Usually well-structured and supervised, also usually with frequent check-points, discussions, etc.
- **Two stage quiz or exam:** students complete a solo “test” first, hand in results, then carry out some of that test again by discussion with colleagues. See for example http://cwsei.ubc.ca/resources/files/Two-stage_Exams.pdf
- **Two stage review:** same procedure as two stage quiz, but used as a review of knowledge that was learned earlier or in a previous course.

DO TAKE TIME TO SKIM OR STUDY THE DOCUMENT “*Course pedagogy overview & explanation.docx*” IN THE “TEACHING-LEARNING HOWTO RESOURCES.