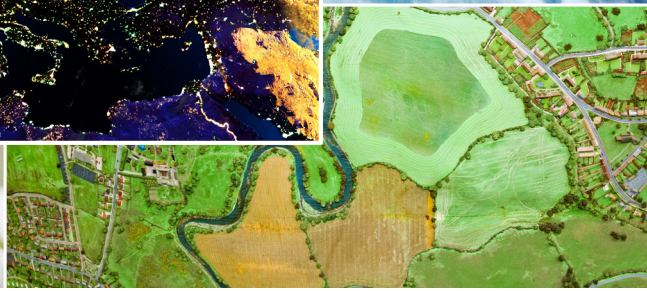
CAS

Certificate of Advanced Studies
Certificat de formation continue

Geomatics for a Sustainable Environment

July > December 2017

Presential and Distance Learning



UNEP GRID Geneva

FACULTY OF SCIENCES
INSTITUTE FOR
ENVIRONMENTAL SCIENCES

UNIVERSITÉ
DE GENÈVE

Programme Director

Prof. Anthony Lehmann, Head of the enviroSPACE laboratory, Institute for Environmental Sciences and Faculty of Sciences, University of Geneva

Steering Committee

- **Prof. Martin Kumar Patel**, Chair for Energy Efficiency, Institute for Environmental Sciences (ISE) and Faculty of Sciences, University of Geneva
- **Dr Grégory Giuliani**, Lecturer – Earth Observations/Spatial Data Infrastructure, enviroSPACE laboratory, Institute for Environmental Sciences, University of Geneva and UN Environment, Science Division, GRID-Geneva
- **Dr Pierre Lacroix**, Lecturer – Spatial Data Infrastructure, enviroSPACE laboratory, Institute for Environmental Sciences, University of Geneva and UN Environment, Science Division, GRID-Geneva
- **Dr Nicolas Wyler**, Conservatory, Head of the Geographic Information Systems and Remote Sensing Unit, Conservatory and Botanical garden of Geneva
- **Dr Douglas Cripe**, Lecturer – Scientific and Technical Officer, Group on Earth Observations (GEO) Secretariat and Climatology Unit, Institute for Environmental Sciences, University of Geneva

Coordination

Dr Yaniss Guigoz, Spatial Data Infrastructure specialist, UN Environment, Science Division, GRID-Geneva and enviroSPACE Laboratory, University of Geneva

Acquire solid capacities in environmental geomatics to address the needs for assessing different natural capitals and their sustainability

The Certificate of Advanced Studies (CAS) in Geomatics for a Sustainable Environment aims at providing attendees with an overview of the various existing tools and approaches to tackle the multidisciplinary environmental challenges.

The first module is a MOOC about ecosystem services, followed by a second module presenting different tools linked to Spatial Data Infrastructures, Web Mapping, statistics and programming, as well as specific thematic tools and approaches commonly used to address issues in biodiversity, ecosystem services or water resources. This second module is organized as a two weeks summer school, followed by a remote integrative work that attendees will have to write based on the knowledge acquired during the summer school.

This programme is organized by the Institute for Environmental Sciences and the Faculty of Sciences at University of Geneva, with an active participation of experts from UN Environment/GRID-Geneva, EAWAG Zürich, the University of Lausanne and with close collaboration and support from the Group on Earth Observations.

Target Audience

Any person interested and/or involved in environmental sustainability and natural capitals : biodiversity and ecosystem services, water resources. This CAS is targeting in particular Swiss and foreign experts in geographic information systems interested in environmental sustainability, young graduates, PhD students, experienced professionals who want to upgrade their knowledge and skills, employees and consultants from international organizations and from national or regional authorities in charge of these topics.

Goals

- Give double competencies to professionals and students in geomatics and environmental fields
- Acquire knowledge on a set of tools linked to Spatial Data Infrastructures (SDI), Web mapping (e.g. Geoserver, GeoNode, Geonetwork) and programming (e.g. Python for geoprocessing, R for geostatistics)
- Acquire specific knowledge on tools available to assess biodiversity, ecosystem services or water resources

Skills and Competencies

- Be able to design and develop environmental projects using geomatics tools
- Master the main geomatic, statistical and computer tools in the environmental field
- Become a player aware of the natural capital management in decision making at any scale and in all types of institutions

Instructors

- Anthony Lehmann, Grégory Giuliani, Marc Fasel, Martin Lacayo, Pierre Lacroix, Yaniss Guigoz, University of Geneva
- Andrea de Bono, Bruno Chatenoux, Karin Allenbach, UN Environment/ GRID-Geneva
- Antoine Guisan, University of Lausanne
- Karim Abbaspour, Swiss Federal Institute of Aquatic Science and Technology (EAWAG)

Course Design

This programme is made of two modules corresponding to 10 ETCS credits:

1) A first remote module for discovery or scientific knowledge consolidation of environmental geomatics that will be proposed as a MOOC on ecosystem services (to be completed in July-August 2017)
2) A second module in two parts:
   - 2a) A first part in presence as a block course organized as a summer school from 4 to 15 September 2017; among all the teachings proposed, some are mandatory and two of them can be chosen based on the student's interest.
   - 2b) A second part as an integrative work of end of studies, allowing each participant to tackle a professional issue based on knowledge acquired during the teachings.

This solution should allow both professionals and students to best organize themselves to fit this programme in their schedule.

Programme Structure

- Teaching: 90 hours in presence (Module 2a), 35 hours remotely
- Dissertation: 130 hours
- Number of ECTS credits: 10
- Each module is subject to an evaluation in order to be accredited
- Two thematic teachings out of three during the second week can be chosen based on the student's interest

Pedagogical Approach

- E-learning on ecosystem services through Massive Open Online Courses (MOOC)
- Most of the software taught are open source
- Hands-on exercises with tutorials and tutors

Module 1 | MOOC on Ecosystem Services

July-August 2017

Dr Martin Schlaepfer, Prof. Juliet Fall, Prof. Lehmann

- Basics of Ecosystem Services
- Understanding of the key services associated with any resource
- Mapping of the ecosystem services with GIS tools

MOOC available at: coursera.org/learn/ecosystem-services

Module 2A | Summer School in Presence at University of Geneva

GIS Introduction | 4 September 2017

Prof. Lehmann, Dr Yaniss Guigoz, Dr Pierre Lacroix

General Introduction • Basics of GIS • Quantum GIS (QGIS) Software

Remote Sensing | 5 September 2017

Ms Karin Allenbach, Mr Bruno Chatenoux

Basics of Remote Sensing • Open Source Remote Sensing Software: GRASS GIS

SDI – Metadata | 6 September 2017

Dr Andrea de Bono, Dr Grégory Giuliani, Dr Yaniss Guigoz

Spatial Data Infrastructure (SDI) General Introduction • Basics of Metadata • Geonetwork software

SDI – Data | 7 September 2017

Dr Yaniss Guigoz, Dr Pierre Lacroix

Geoserver Software • GeoNode Software

Geoprocessing | 8 September 2017

Dr Grégory Giuliani, Dr Pierre Lacroix

Overview of Geoprocessing Concepts • Python Language

Statistics and Geostatistics | 11 September 2017
Prof. Anthony Lehmann

Overview of Statistics and Geostatistics Concepts • Programming Statistics in R

Species Distribution Modeling | 12-13 September 2017

Prof. Anthony Lehmann, Prof. Antoine Guisan

Introduction to Species Distribution Modeling and Biodiversity Assessment • Modeling in R

OR

Soil and Water Assessment | 12-13 September 2017

Dr Karim Abbaspour, Mr Marc Fasel

Introduction to Hydrological Modeling • Preparing a SWAT Model with QGIS • Calibrating a SWAT Model with SWAT-CUP

Ecosystem Services Assessment | 14-15 September 2017

Prof. Anthony Lehmann, Mr Martin Lacayo

Introduction to Ecosystem Services • Assessing Ecosystem Services with InVEST • Assessing Ecosystem Services with Python

Field trip (optional) | 9 September 2017

Module 2B | Integrative Work

September-November 2017

- Personal project based on the theme defined during the enrollment and validated during the summer school, using the knowledge and tools acquired during the training
- The personal project should include some concepts learnt during the modules 1 and/or 2A
- The professional or research topic will be discussed individually during the summer school

Tutoring and Coordination

Attendees will have the possibility to interact with teachers during the hands-on activities. They will also discuss the dissertation work with the CAS director and coordinator either through email or during the summer school. All training material will be available online.

Diploma Awarded

Participants who successfully complete the whole programme will be awarded the Certificate of Advanced Studies in Geomatics for a Sustainable Environment / *Certificat de formation continue en Géomatique pour un Environnement Durable* delivered by the University of Geneva. It equates to 10 ECTS (European Credit Transfer and Accumulation System) credits.

Practical Information

Admission Criteria

- A recognized university degree (Bachelor, Master, PhD or equivalent)
- Relevant professional experience or research related to the program of the certificate
- Applicants must submit a CV and a motivation letter explaining their interest in the programme by describing a professional or research project related to geomatics and environment
- Fluency in English, particularly written and reading skills
- Applicants who have already followed the MOOC "Ecosystem Services: a Method for Sustainable Development" provided by the University of Geneva prior to their enrollment, are required to inform the coordinator.
- Applicants must have good computer skills, especially in GIS software to follow the summer school teachings. They must also have a good internet connection to follow the MOOC on ecosystem services and for the final integrative work

Application and Deadline

Online applications should be submitted via the course website at: unige.ch/formcont/casgeomatics by **15 June 2017.** Priority will be given to candidates applying for the CAS.

Selection Process

- The selection will be made by the Steering Committee upon candidates' academic qualifications and professional experience.
- A maximum of 30 participants will be selected to take part in the programme.
- It is possible to register for the summer school as a whole or for each course separately (1-2 days each). However, priority will be given to candidates who registered for the whole curriculum.

Tuition Fees

- CHF 4250.- for the complete CAS
- CHF 3900.- for the summer school only (no CAS obtained)
- CHF 1250.- per thematic day(s) of the summer school

To be paid online upon registration.

Limited number of partial scholarship available for young researchers on justified request.

Venue

University of Geneva – Uni Carl Vogt (Classroom N°C101 on 1st floor)
Bd Carl Vogt 66 – 1205 Geneva
Bus 2 (Stop Musée d'Ethnographie)
Parking with fee available at Bd d'Yvoy 22

Contact

yaniss.guigoz@unige.ch | T: +41 (0)22 379 98 34
UN Environment/GRID-Geneva and Institute for Environmental Sciences, University of Geneva

unige.ch/formcont/casgeomatics

In collaboration with

swissuniversities

Centre pour la formation continue et à distance | CFCD

Université de Genève | CH-1211 Genève 4

Tél: +41 (0)22 379 78 33 | info-formcont@unige.ch

www.unige.ch/formcont