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## Advanced geomatics (3BL2220)

| Filières concernées | Nombre d'heures | Validation | Crédits ECTS |
|---|---|---|---|
| **Master en biologie** | **Cours: 28 pg** | **Voir ci-dessous** | 3 |

ph=période hebdomadaire, pg=période globale, j=jour, dj=demi-jour, h=heure, min=minute

**Période d'enseignement:**

- Semestre Printemps

**Equipe enseignante**

Dr. Sébastien Boillat ; Magnus Onyiriagwu

**Contenu**

This course builds on the fundamental concepts of Geographic Information Systems (GIS) acquired in Geomatics 1 (introduction to geomatics for biodiversity conservation). We learn more advanced methods to characterize the earth's surface focusing on remote sensing (RS) datasets and processes. The main objective of the course is to provide practical basic skills on how to access and interpret remotely sensed data for the assessment of ecological and social-ecological dynamics. Students will become familiar with the general principles of RS and satellite image processing tools with a focus on vegetation and land use. We work with open-source and user-friendly tools (QGIS and plugins), as well as with Google Earth Engine, a web-based application. The course consists of a mix of lectures, practical exercises and homework. Participants will develop hands-on skills in using basic RS tools including: satellite images sourcing; land use/land cover classification; land cover change assessment; elaboration of land change timelapses; interpretation of LIDAR/point cloud data; landscape metrics and object-based classification. Finally, they will learn how to apply these tools to ecology and conservation biology at different scales of analysis.

**Forme de l'évaluation**

Evaluation in form of continuous control, with graded exercises at the end of some practical sessions. In order to pass the course, students are to submit the practical exercises within the given deadlines.

**Modalités de rattrapage**

In case of failure registration in next session and re-submission of exercices

**Documentation**

• Lectures notes and tutorials for the practical exercises will be provided as pdf on Moodle

Textbooks
• Heywood I, Cornelius S, Carver S (2011). An introduction to Geographical Information System (4th Edition). Pearson Prentice Hall.
• Cavender-Bares J, Gamon JA, Townsend PA (eds) (2020). Remote Sensing of Plant Biodiversity. Springer Open: Cham Switzerland. Download from https://link.springer.com/content/pdf/10.1007%2F978-3-030-33157-3.pdf
• Chuvieco E, Huete A (2016). Fundamentals of Satellite Remote Sensing CRC Press ISBN 9780415310840 - CAT# TF1686; 448 Pages
Tool descriptions:
• Jung, M. (2016). LecoS — A python plugin for automated landscape ecology analysis. Ecological Informatics, 31: 18-21 https://www.sciencedirect.com/science/article/pii/S1574954115001879
• Congedo, L., (2021). Semi-Automatic Classification Plugin: A Python tool for the download and processing of remote sensing images in QGIS. Journal of Open Source Software, 6(64), 3172, https://doi.org/10.21105/joss.03172

**Pré-requis**

• Introduction to geomatics for biodiversity conservation (3BL2198 – Master) (offered in Autumn Semester) OR
• Basic knowledge of Geographic Information Systems (QGIS or ArcGIS)

**Forme de l'enseignement**

Computer-based practical labs, some lectures

**Objectifs d'apprentissage**

Au terme de la formation l'étudiant-e doit être capable de :

- Present results as maps, pictures and charts

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- Discover the basic functioning of remote sensing techniques
- Interpret remotely sensed data to assess ecological and social-ecological dynamics
- Select appropriate remotely sensed data

**Compétences transférables**

- Use satellite image processing software
- Interpret remotely sensed data
- Review remotely sensed data sources