

# Micro-Credential Idea Proposal

## Intro

The micro-credential can be framed as a jointly developed, 2 ECTS online course offer on Earth Observation for landscape change and sustainability, co-led by UdA and TUIASI and open to Master's/PhD students and professionals across INGENIUM.

Partners and staff involved (indicative list)

UdA

*Department of Science*

Lucia Marinangeli

Tommaso Piacentini

TUIASI

*Faculty of Hydrotechnics, Geodesy and Environmental Engineering*

*Department of Terrestrial Measurements and Cadastre*

Loredana-Mariana Crenganis: [loredana-mariana.crenganis@academic.tuiasi.ro](mailto:loredana-mariana.crenganis@academic.tuiasi.ro)

Ana-Maria Loghin: [ana-maria.loghin@academic.tuiasi.ro](mailto:ana-maria.loghin@academic.tuiasi.ro)

*Department of Hydrotechnical Engineering and Constructions*

Marius Telisca: [marius.telisca@academic.tuiasi.ro](mailto:marius.telisca@academic.tuiasi.ro)

## Micro-Credential Design

**7. What is the working title of your Micro-Credential?**

**Digital Earth Observation and Landscape Change Detection: Tools for Sustainable Land Management - DEOLand**

**8. What type of micro-credential are you proposing?**

A "Jointly-Developed Micro-Credential" (an MC that will be developed in cooperation with other INGENIUM partners)

**9. Which INGENIUM institutions are involved?**

- Gabriele d'Annunzio University Chieti – Pescara
- Gheorghe Asachi Technical University of Iași
- Involvement of University of Oviedo is under evaluation

**10. Who are the expected learners?**

**EFQ 7 (Master's Students)**

**11. What is the expected number of students?**

20–30 participants from across the INGENIUM alliance, ensuring small-group interaction while allowing multi-institutional participation

**12. How many credits (ECTS) will your Micro-Credential issue?**

2 ECTS (50-54 hours of study), in line with INGENIUM guidance for 2 ECTS Micro-Credentials.

- 16-20 hours of synchronous online teaching (2-3 days)
- 28 hours of personal and group work (project-based assignments, data analysis, reading)
- 6 hours for final project presentations and discussion of results

## Micro-Credential Idea Proposal

## Outline Your Micro-Credential Idea

### 9. What is your idea?

Details of the content: *In about 150 words, please describe your proposed Micro-Credential idea. What is the Micro-Credential about? What is the topic? Does your Micro-Credential fill a needs gap or address a problem? Are there any connections to industry or working life?*

The micro-credential introduces participants to how modern Earth Observation (EO) technologies support landscape geomorphological analysis, sustainable management, and climate-resilient decision-making. It combines a digital, introductory EO focus with an applied, research-based concept on landscape change analysis, integrating satellite data, LiDAR, UAV imagery, digital surface and terrain models, GIS and selected field-based information.

Participants explore how Copernicus Sentinel missions, open EO datasets, and user-friendly GIS tools can be used to monitor geomorphological, hydrological, and environmental change in diverse landscapes such as coasts, watercourses, mountain slopes, and urban regions. Through guided online sessions and a collaborative group project, learners work on a real-world case study related to sustainable development challenges (e.g. climate adaptation, biodiversity, natural hazards, urban resilience) from the Uda and TUIASI regions.

The micro-credential responds to the growing need for digitally literate professionals able to interpret EO data and communicate spatial evidence to stakeholders in public agencies, NGOs and private companies. It is designed for Master's and PhD students and early-stage professionals from diverse disciplinary backgrounds, offering an accessible yet research-informed introduction to EO for sustainability and landscape change.

### 10. What are the intended learning outcomes?

Details of the content: *Shortly explain what are the intended learning outcomes of your Micro-Credential? What will students learn or what will they be able to do after finishing completing the Micro-Credential? You can think about these in terms of knowledge, skills, or competences.*

By the end of the micro-credential, participants will be able to:

#### KNOWLEDGE

- Explain fundamental concepts of Earth Observation, remote sensing, photogrammetry, and LiDAR, and how they support landscape change detection and geomorphological analysis, sustainable development.
- Describe main EO data sources (e.g. Copernicus Sentinel, national orthophotos, UAV imagery, DTMs, LiDAR data) and their strengths and limitations for landscape change analysis.
- Understand the role of EO data in supporting evidence-based sustainability decision-making and policy development.
- Connection among Earth Observation and climate data and policies.

#### SKILLS

- Access, visualise, preprocess, and combine open EO and climate datasets using freely available web platforms and entry-level GIS/remote sensing software.
- Integrate satellite imagery, DSMs, DTMs, LiDAR/UAV data, and simple field observations in a GIS to detect and quantify landscape and land-cover changes.
- Design and implement a small group project to analyse an environmental or geomorphological problem (e.g. erosion, flooding, land-use change) using EO and GIS workflows.
- Apply critical thinking to interpret EO data, consider uncertainties, and propose actionable solutions.

#### COMPETENCES

- Interpret EO/landscape-derived indicators in relation to sustainability challenges such as climate adaptation, biodiversity monitoring, urban planning, and disaster risk reduction.
- Communicate EO-based findings to non-expert stakeholders through maps, visuals, and concise reports, highlighting uncertainties and policy implications.
- Collaborate in international, interdisciplinary teams and reflect on ethical, open-science, and data-sharing principles in EO applications.
- Reflect on the societal and environmental impact of EO-based analyses in supporting sustainable decision-making.

## 11. How is your Micro-Credential delivered?

Details of the content: *What is the format and teaching methods of your Micro-Credential?*

*Is this a single course or a stackable series of courses? Are you planning on teaching the Micro-Credential in person or online? Is this a taught course, a self-study online course, hybrid or blended? If this is a taught course, are you planning on delivering lecturers, seminars, workshops or others?*

### FORMAT AND MODE

- **Fully online**, jointly delivered micro-credential integrated with a BIP-style structure (intensive synchronous block plus project work), aligned with INGENIUM Micro-Credentials and BIP strategies.
- **2-3 intensive online days** (synchronous) combining interactive lectures, live demonstrations, hands-on practicals, and guest talks from external stakeholders.

### TEACHING METHODS

- Short conceptual lectures introducing EO principles, sustainability frameworks (e.g. SDGs), and landscape geomorphological processes.
- Guided hands-on exercises with open EO/GIS tools using case studies from Italy and Romania (e.g. coastal change in Abruzzo, urban or riverine dynamics in Iași region...we can stay more general).
- Collaborative group project work using EO datasets provided by Uda/TUIASI and, where possible, partner agencies (e.g. parks, environmental agencies).
- Online interactive tutoring, peer feedback and Q&A sessions, and final presentations in a joint symposium-style event.

### LANGUAGE

- The Micro Credential will be held in English.

### INCLUSION

- The fully online teaching methods ensure inclusiveness for participants from all the INGENIUM network partners.
- The online tutoring and the lecturers recording will ensure a comprehensive understanding of the course topics for participants with different backgrounds and knowledge levels.

## 12. When are you planning on delivering your Micro-Credential?

Details of the content: *Is it a continuous course running for one or more academic years? Or will it run during a specific time period?*

### TIMING

- Delivered as a short, intensive course over 2–3 weeks during a single academic year and will not interfere with the regular academic activities.
- Provisional structure:
  - Week 1: preparatory materials and asynchronous activities (introductory videos, readings, basic tool setup).
  - Week 2: lectures, labs, and stakeholder inputs.
  - Week 3: group project work, consultations, and a final online presentation session (6 hours) with feedback and reflection.

### REPETITION

- Can be repeated annually and integrated in the INGENIUM Course Catalogue and Micro-Credentials e-learning platform as a regular offer.

## 13. How will students participate and be assessed?

Details of the content: *Think about the learning activities and assessment in your Micro-Credential. What sort of learning activities will you include? For example, will there be teaching, practical projects, personal study? Will you assess learning diaries or essays or grade participation in some other way?*

### LEARNING ACTIVITIES

- Active participation in online lectures, demonstrations, and discussions.
- Completion of guided practical exercises using EO and GIS tools (individual and small-group).
- Collaborative development of a mini-project focusing on a real case study (e.g., coastal erosion, land-cover change, flood-prone areas), ideally linked to partner regions and external stakeholders.

#### ASSESSMENT METHODS

- Group/individual project portfolio (maps, short technical note, brief policy or management-oriented summary) demonstrating the use of EO data for landscape geomorphological change and sustainability questions.
- Oral presentation (synchronous or asynchronous) of individual/group project results during the final session (including Q&A and reflection on methods and limitations).

#### FEEDBACK

- Individual questionnaire on skills acquired, challenges faced, and potential application in the learner's research or professional context, and for the evaluation of the Micro-Credential.

#### WORKLOAD ALIGNMENT

- Assessment and activities are calibrated for 50 hours total workload corresponding to 2 ECTS.

## Consent and Supplementary Information

### 14. Do you have any supplementary information to include?

For example, if your Micro-Credential is based on an existing course, you can provide a link here to course page or include links to your teaching portfolio.

The micro-credential builds on:

- TUIASI Expression of Interest “Digital Earth Observation for a Sustainable Future”, which focuses on an accessible, fully online introduction to EO for diverse learners.
- UdA Expression of Interest “Innovative Earth Observation for Landscape Change Analysis: Integrating Remote Sensing, GIS, and Field Data”, which emphasises advanced methods and real case studies for geomorphological and environmental change.

The micro-credential is based on the following existing university courses:

- Remote Sensing (UdA, Chieti-Pescara)
- Climatology applied to geomorphological hazard (UdA, Chieti-Pescara)
- Photogrammetry, Point Cloud Processing (TUIASI)
- Geographic Information Systems (GIS) (TUIASI)

The micro-credential is based on the experiences of previous projects:

- VOLTA: innoVation in geOspatial and 3D daTA (Horizon 2020): <https://cordis.europa.eu/project/id/734687> (TUIASI)
- ReKlaSat3D: Three-dimensional reconstruction and classification of high-resolution optical satellite data (TUIASI): <https://sdg.esa.int/reklasat-3d>
- HAZARM: Integrated Networks for Hazard Risk Management: <https://www.hazarm.ci.tuiasi.ro/en/home/> (TUIASI)
- Europlanet 2024 EU Research Infrastructure fund, task GMAP (UdA) - Geologic MAPPING of Planetary bodies aimed to build an European infrastructure to deliver tools and services for geological mapping of any Solar System body. <https://www.europlanet-gmap.eu/>.
- Project TESI, Study of Geospheres Interactions in the Earth System (UdA-INGV). <https://www.ingv.it/stampa-urp/ufficio-stampa/comunicati-stampa/earth-telescope-al-via-la-call-internazionale-per-il-programma-di-ricerca-dedicato-allo-studio-del-pianeta-terra>

Relevant external resources (non-exhaustive):

- Book: Watercourses Dynamics Analysis - Methodologies using laser scanning technology (TUIASI) <https://www.alibris.com/Watercourses-Dynamics-Analysis-Ana-Maria-Loghin/book/56178307>
- UN SDGs and geospatial information pages. <https://unstats.un.org/sdgs/>
- Copernicus Data Space and Copernicus Land/Marine/Climate services. <https://dataspace.copernicus.eu/>
- ESA EO for Sustainable Development, USGS GIS explanations, NOAA LiDAR information, ISPRS, and introductory photogrammetry resources.
- Open EO and GIS Platforms (<https://www.esri.com/en-us/industries/sustainable-development/resources>)

The expected learners (in addition to EFQ 7, Master's Students, mentioned at point 10 of the form), could be also:

- EFQ 8 (PhD Students)
- External professionals.

Other possible INGENIUM partners:

- University of Oviedo (Spain)

**15. Do you have any questions?**

**16. If my idea is approved, I confirm that I am ready to produce and deliver the proposed Micro- Credential. \***

Yes