education sciences

MDPI

Supplementary Material

Innovating Pedagogy and Experiential Learning in Geology Through the Recovery of a Historic University Geology Museum (Supplementary Material)

3. Results and Achievements

… To substantiate the claim that the museum has been "fully integrated into the curriculum," integration was verified using the official and currently valid course learning guides (AY 2025/26) and their associated assessment framework. In these guides, object-based and experiential activities supported by the Geology Museum and teaching collections are embedded within laboratory/field teaching (e.g., mineralogy, petrology, and paleontology specimen-based work; field trip activities) and are linked to assessed deliverables. Verification is therefore based on traceable evidence: (i) the formal syllabus/learning guide, (ii) assessed tasks and examination content explicitly covering laboratory/field components, and (iii) the Field Notebook rubric (available to students via Moodle) used to evaluate field-based learning outcomes. Table S1 summarizes this curriculum mapping and documents the current active programs. This integration reflects a long-standing tradition in which geological collections have been inseparable from geology education at the School over the past decades, now formalized and evidenced by the current learning guides and assessment scheme.

Table S1. Curriculum integration of the University Geology Museum/teaching collections (verified through current official learning guides and assessment evidence).

Course	Academic year	No. of students per year	Museum activity (mineralogy / petrology / paleontology)	Learning outcomes (as stated in the learning guide)	Evidence (syllabus, rubric, assessment)
Applied Geology to Civil Works (BSc Civil & Territorial Engineering; GA_04GC_45001210)	2025/26	~350 (combined with GA_04GD)	Laboratory/field practical sessions supported by the Geology Museum/collections, including mineralogy, petrology and palaeontology specimen-based learning and guided object-based activities.	Learning outcomes and indicators defined in the official learning guide for the course (AY 2025/26).	Syllabus/learning guide (AY 2025/26); assessment explicitly includes questions/tasks on laboratory practices, field trips and geological mapping/cartography; Field Notebook rubric available in Moodle.
Applied Geology to Civil Works (Double Degree: Civil & Territorial Engineering + Business; GA_04GD_45000222)	2025/26	~350 (combined with GA_04GC)	Same integration of specimen-based learning and guided museum/collection use for mineralogy, petrology and palaeontology practical sessions.	Learning outcomes and indicators defined in the official learning guide for the course (AY 2025/26).	Syllabus/learning guide (AY 2025/26); assessment explicitly includes laboratory practices, field trips and geological mapping/cartography; Field Notebook rubric available in Moodle; evaluation flow/assessment

					guidance also provided via Moodle.
Engineering Geology (MEng; "Ingeniería Geológica", 4.5 ECTS credits)	Current official guide (as provided)	~30	Object-based applied geology learning supported by teaching resources and collections (as relevant to engineering geology topics), used to reinforce observational/analytical skills in geological characterization and risk reasoning.	RA1–RA3 in the official guide (application of engineering geology concepts; analysis of geological constraints; experimental methods in geological risks).	Official course guide/syllabus; assessed coursework and exams delivered/managed via Moodle (course virtual area referenced in the guide).
Hydrogeology (Master; "Hidrogeología", 3 ECTS credits)	Current official guide (as provided)	~30	Applied hydrogeology learning supported by geological context and field-based practice (including a mandatory field trip and report), with supporting didactic materials delivered via Moodle.	RA1–RA6 in the official guide (research lines, application, structuring research, critical methodology, proposing alternatives, scientific dissemination).	Official course guide/syllabus; mandatory field trip and field report (assessment item) and additional exercises/exam; "Exercises and instructions in Moodle" explicitly stated.

As shown in Table S1, museum-supported activities are embedded in assessed laboratory/field components and aligned with declared learning outcomes, providing traceable evidence of curriculum integration.