



Course unit English denomination	EBSD (electron backscatter diffraction)
SS	04/GEOS-01
Teacher in charge (if defined)	Prof. Richard Spiess
Teaching Hours	12
Number of ECTS credits allocated	2
Course period	November/December 2025
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (75% minimum of presence) ☐ No
Course unit contents	In this course, the main concepts and applications of Scanning Electron microscope (SEM) techniques are presented. The course introduces the PhD students to SEM techniques, with a particular attention to the electron backscatter diffraction (EBSD) technique. This course is of potential interest for those who are dealing with microstructures in the broadest field of the geological sciences. During the practical part of the course geological as well as artificial (e.g., anthropic manufacts, concrete, modern and old building) dataset will be analyzed. Laboratory exercises are designed to maximize the students' engagements. The course will be split in three parts: (1) a theoretical part that introduces students into the fundamental principles of EBSD (3 hours), (2) an applied part (6 hours) that shows how EBSD is used (in the SEM lab), and (3) a final discussion part (3 hours) dedicated to the analysis of the acquired data.
Learning goals	By the end of the course, students will have acquired a thorough and solid understanding of the fundamental principles of SEM techniques, with a particular focus on the EBSD technique, including key theories and practices relevant to scientific research. They will learn how to apply these techniques to analyze microstructures, particularly in geological and artificial materials. Students will gain hands-on experience in SEM lab settings, learning to acquire, process, and interpret EBSD data effectively. Additionally, they will develop the ability to critically analyze and apply EBSD techniques to various research contexts, including



	geological sciences and the study of anthropic materials, enabling them to integrate these techniques into their own research projects.	
Teaching methods	Teaching methods will combine both theoretical instruction and practical, hands-on learning to ensure a comprehensive understanding of SEM and EBSD techniques. Additional teaching methods include: • Traditional lectures that provide the foundational principles of SEM techniques, with a focus on EBSD, ensuring students grasp the theoretical underpinnings of the methods. • Laboratory sessions in the SEM lab, where students will actively engage in acquiring and processing EBSD data from geological and artificial materials. These sessions will provide hands-on experience with the instruments and techniques. • Practical exercises designed to encourage critical thinking and application of the concepts learned, enabling students to work with real datasets and analyze materials from geological and anthropic contexts. • Group discussions and interactive feedback sessions, allowing students to share insights, ask questions, and collaboratively improve their data interpretation skills. • A final discussion session, where students will collectively analyze the acquired data, reinforcing their ability to process and interpret EBSD results in a variety of research settings. This integrative approach is designed to balance theoretical understanding with practical application, ensuring students gain both knowledge and hands-on skills in EBSD techniques.	
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes	☐ No
Available for PhD students from other courses	☒ Yes	☐ No
	The course is open to everyone, with priority given to PhD students from the PhD Course in Geosciences. External PhD students who wish to enroll should send an email to dottorato.geoscienze@unipd.it and will be contacted if spots become available.	
Prerequisites		



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DEGLI STUDI
DI PADOVA

GEOSCIENCES

(not mandatory)

Examination
methods
(in applicable)

PhD students are required to discuss some of the obtained EBSD results.

Suggested readings

Slides and notes prepared by the teacher plus specific material on the topic.

Additional
information
