

MSE-495

Advanced ceramic technologies

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Cursus	Sem.	Type
Materials Science and Engineering	MA2, MA4,	Opt.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Oral
Workload	90h
Weeks	14
Hours	3 weekly
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

Advanced ceramic processing concepts and technologies will be presented. Students will learn concepts on advanced technologically-relevant ceramic materials for a wide range of applications from MedTech, energy conversion & storage, with insights on sustainability & material lifecycle.

Learning Outcomes

By the end of the course, the student must be able to:

- Apply the acquired notions on ceramic processing
- Acquired knowledge on how to produce a ceramic in an industrial environment or a laboratory
- Select the appropriated shaping method based on the application
- Explain the mechanisms behind the different sintering phenomena
- Understood relationship between microstructure and properties in ceramics

Transversal skills

- Use both general and domain specific IT resources and tools
- Take responsibility for health and safety of self and others in a working context.
- Negotiate effectively within the group.
- Give feedback (critique) in an appropriate fashion.
- Take feedback (critique) and respond in an appropriate manner.

Assessment methods

The final grade is attributed based on the final oral exam and the active participation during lectures. "Plus" (+) is assigned during third hour based questions and replies. An example will be given during the first class. (+++) will count in the final grade as +0.5 max. Oral exam will start with a free topic, among those proposed during the course.

Additional information:

During the classes, mainly at the third hour, the major concepts of the slides presented that day will be summarized. Students are asked to formulate questions on the topic of that day. The questions are then used to initiate a discussion among students. Questions and discussion will be assessed providing "+" to students. No "-" are considered in any circumstances. During the oral exam the gained + will be evaluated as follow: +++ = 0.50; ++ = 0.25. The gained points will be added to the grade achieved at the oral exam.

Example: Oral exam, 4.5; Participation ++; Final grade 4.75

Resources

Bibliography

The Colloidal Domain: where physics, chemistry, biology, and technology meet. D. F. Evans and H. Wennerstrom. Wiley-VCM, New York, Year:1999. ISBN:0-471-24247-0

CERAMIC PROCESSING AND SINTERING M. N. Rahaman Taylor & Francis, London, 2003 0: ISBN-10-8247-0988-8

French

Traité des Matériaux, vol 16, Céramiques et Verres, Principes et techniques d'élaboration, J-M Haussonne, C.P.Carry, P. Bowen, J. Barton, Press Polytechnique et Universitaires Romandes2005

Resources in library

The Colloidal Domain: where physics, chemistry, biology, and technology meet/ Evans

Principles of Ceramics Processing / Stalford

Fundamentals of ceramic powder processing and synthesis / Ring T.A.

Céramiques et verres : principes et techniques d'élaboration / Haussonne

Ceramic Processing and Sintering / Rahaman

Ressources en bibliothèque

- [Find the references at the Library](#)

Moodle Link

- <https://go.epfl.ch/MSE-495>