

Title of the Course: Applications of Scanning Electron Microscopy (SEM) and Image Analysis (IA)			
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Number of CFU 4	Activities Classes will be held in October- November 2021.	Lectures	10 (hours)
		Laboratory	18 (hours)
		Seminars	(hours)
		Other activities (please indicate the activity)	(hours)
<u>Objectives</u>			
<p>The course aims to provide the theoretical and applied aspects of Scanning Electron Microscopy (SEM) and Image Analysis (IA) in Agricultural Sciences.</p> <p>The microstructural experiments will be selected according to the interests of course attendants.</p>			
<u>Learning outcome</u>			
<p>After studying this course, the attendees will be able to develop protocols for the evaluation at a microstructural level of food or biological matrices in general, depending on the desired information. The attendees will also be able to use different software solutions for image analysis.</p>			
<u>Topics</u>			
<ol style="list-style-type: none"> 1. A brief introduction on the theory of Electron Microscopy (2 hours) 2. The main types of electron microscope (4 hours): <ul style="list-style-type: none"> • Transmission Electron Microscopy (TEM) • Scanning Electron Microscopy (SEM) • Environmental Scanning Electron Microscopy (ESEM) 3. Sample Preparation for Electron Microscopy: food and biological samples (6 hours) 4. Application of Scanning Electron Microscopy to the study of foods and biological samples (8 hours) 5. Principles of Image processing and Analysis (IA), digital image processing techniques and basic elements of an Image Analysis system (2 hours) 6. Image-capturing devices: video camera, electron microscopy etc. and IA software (2 hours) 7. Application of Image Analysis to the study of foods and biological samples (4 hours) 			
<u>Evaluation</u>			
<p>Presentation of an application of Scanning Electron Microscopy (SEM) or Image Analysis (IA) to be defined with the teacher.</p>			
<u>Recommended readings</u>			
<p>Egerton R.F. (2016). Physical Principles of Electron Microscopy. An Introduction to TEM, SEM and AEM. Springer International Publishing Switzerland, pp 1- 196. ISBN 978-3-319-39877-8. Doi.org/10.1007/978-3-319-39877-8</p> <p>Aguilera J.M. and Stanley D.W. (1999). Microstructural Principles of Food Processing and Engineering, Second Edition, Ed. Aspen Publisher Inc., Gaithersburg, Maryland, 1-70</p> <p>Deserno T.M. (2011). Biomedical Image Processing, Biological and Medical Physics, Biomedical Engineering, DOI: 10.1007/978-3-642-15816-2 1, Springer-Verlag Berlin Heidelberg</p>			