

Course unit (module) title	Teaching in University Science Laboratories. Developing Best Practice
International Standard Classification of Education ISCED	01/05
Language of instruction	English
Course objectives	To improve effectiveness of laboratory classes. To support relatively inexperienced university teachers in order to improve their teaching skills for active learning university science laboratory courses.
Learning outcomes	Participant when completed the course will be able to: ● Identify the purposes of implementing laboratory classes in higher education. ● Compare different types of laboratory sessions with respect to their aim and expected learning outcomes. ● Provide strategies on how to increase student engagement. ● Develop strategies to cope with different levels of pre-knowledge and lab experience in one group. ● Develop effective questions to probe student understanding of laboratory practice. ● Create a rubric for assessing a student performing a lab activity and subsequent reports. ● Reflect on how this course can impact on your own teaching practice.
Type of course unit (compulsory/optional)	optional
Preliminary and additional requirements	Some experience in teaching science laboratory classes and being an active lab teacher/teaching assistant.
Mode of delivery (face-to-face, distance learning)	Blended learning
Delivery length	8 weeks

Number of ECTS credits allocated	2
Estimation of the student workload needed in order to achieve expected learning outcomes	6 on-line modules – 12 hours 3 face to face meetings –4 hours Readings - 12 Preparation of homeworks, on-line activities - 20
Teaching & learning methods	Readings, video, forum discussions, quizzes, written assignments
Assessment methods and criteria; course grading	Peer-assessment, Quizzes, Case study (rubric)
Course topics/content	The role of laboratory work in university chemistry . Laboratory Instruction Styles Strategies to increase student engagement during laboratory sessions Learning outcomes of laboratory classes Threshold concepts in chemistry Johnstone's triangle Important qualities of a laboratory instructor. Diversity in the classroom Student and teacher preparation for a class Giving instruction Assessment – designing and teaching with scoring rubrics (criteria)
Recommended reading	● Reid ,N. & Shah, I. (2007) The role of laboratory work in university chemistry . Chem. Educ. Res. Pract., 8, 172-185 (DOI: 10.1039/B5RP90026C) ● Domin, S.A. (1999) Review of Laboratory Instruction Styles, J.Chem.Educ. 76 (4), 543-547 (DOI: 10.1021/ed076p543). ● Seery M. (2015) Putting chemistry in context, Education in Chemistry, available on https://eic.rsc.org/feature/putting-chemistry-in-context/2000106.article ● Kennedy, D., Hyland, A., Ryan, N. (2007). Writing and Using Learning Outcomes: a Practical Guide. available on http://www.tcd.ie/teaching-learning/academic-development/assets/pdf/Kennedy_Writing_and_Using_Learning_Outcomes.pdf ● Cousin G., (2006) An introduction to threshold concepts, Planet No.17, available on https://www.ee.ucl.ac.uk/~mflanaga/Cousin%20Planet%2017.pdf

	● Draper, S., (2008) The three types of knowledge in chemistry http://www.psy.gla.ac.uk/~steve/best/alex.html ● Herrington , D.G. & Nakhleh, M. B. (2003) "What Defines Effective Chemistry Laboratory Instruction?" ● Johnstone , A. (1997). Chemistry Teaching - Science or Alchemy? 1996 Brasted Lecture. <i>J. Chem. Educ.</i>, , 74 (3), p 262-268 ● Goodrich Andrade, H. (2005).Teaching with Rubrics: The Good, the Bad, and the Ugly, College Teaching, Vol. 53, No. 1 pp. 27-30, available on https://e-learn.sdu.dk/bbcswebdav/courses/E-learn_Support_Center/Andrade_2005_good_bad_ugly.pdf
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