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| 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  2 face to face meetings – 4 hours  Readings - 12  Preparation of homeworks - 14  Preparation of final essay - 10 |
| 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.  *J. Chem. Educ*., , 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 |