More about the Teaching in University Science Laboratories (Developing Best Practice) Massive Open Online Course

(to register, just go to:

http://ectn.eu/work-groups/lecturing-qualifications-and-innovative-teaching-methods/online-course-for-lecturers/)

This online course is targeted at relatively inexperienced university teachers who teach on lab courses and is delivered on the MOOC platform Coursera. It is free to participate in but there is a charge if you wish to receive a certificate. The course runs for 6 weeks and it should require two to two and a half hours per week of your time.

This course has been developed to improve the effectiveness of laboratory classes in higher education. It aims to support teachers to improve their teaching skills for active learning in university science laboratory courses. It will show you how laboratory sessions can differ with respect to their aim and expected learning outcomes, how to engage students for learning and how to cope with their different levels of pre-knowledge and experience and probe their understanding. Last but not least it will show how you could assess students in laboratory courses. This course was developed by the ECTN (European Chemistry Thematic Network) working group on Lecturing Qualifications and Innovative Teaching Methods.

The titles, aims and learning outcomes for the six weekly modules are presented below. Further detail on the course is provided by presenting learner tasks & activities for module 1 as an example.

Module 1: Welcome and introduction

In this module you will learn about different types of laboratory sessions and get acquainted with strategies that can improve student's engagement in lab sessions. You will get an introduction about this course as a whole and set your personal goals for it.

Learning outcomes; after finishing this module, learners will be able to:

- Explain why we should have laboratory classes.
- Describe different types of laboratory sessions with respect to their aim.
- Compare different types of laboratory sessions.
- Provide strategies on how to increase student engagement during demonstrations and hands on practical sessions.
- Reflect on your current opinions on learning in the laboratory.
- Establish your personal learning goal for this course.

Module 2: The Good Laboratory Teacher - Tips and Strategies

This module is about qualities needed to be a good laboratory teacher.

Learning outcomes; after finishing this module, learners will be able to:

- Summarize the qualities required for a good laboratory teacher.
- Develop strategies to cope with different levels of pre-knowledge and lab experience in one group.
- Produce a laboratory teaching plan for individual experiments (including defining timelines).
- Propose strategies that could be used to ensure students understand the objectives of the laboratory class.
- Recommend techniques to motivate and activate students for learning in laboratory classes.
- Develop strategies to ensure students prepare for the lab.

Module 3: Learning Theories in Practice

This module is about the learning theories that can be applied to ensure effective teaching of laboratory work.

Learning outcomes; after finishing this module, learners will be able to:

- Describe learning theories that apply to lab work.
- Document the key intended learning outcomes for a laboratory class that you teach.
- Give examples of how to integrate theory into lab sessions

Module 4: Giving Instructions and Questioning Skills

This module is about giving instruction in a lab session. We present different strategies how to support learning by questioning and how to prevent information overload.

Learning outcomes; after finishing this module, learners will be able to:

- Discuss how good questioning skills can enhance learning.
- Gives clear and concise instructions during the lab class, without information overload.
- Employ questioning to revise lab safety.
- Develop a series of questions to probe student understanding of laboratory practices.

Module 5: Assessment and Feedback

In this module we present the rubric, a tool which can be used for assessing and giving feedback to students on their learning goals. We also consider the concept of constructive alignment of learning outcomes, teaching and learning activities and assessment.

Learning outcomes; after finishing this module, learners will be able to:

- Summarize the steps required to create a rubric.
- Explain how a rubric can be used for assessment and for feedback.
- Apply constructive alignment to teaching in the laboratory and consider its consequences for teaching and learning
- Create a rubric for assessing a student performing a lab activity.

Module 6: Reflection

In this module we ask you to look back on what you have learned in this online course and to make your own plan about the improvements of the laboratory course in which you teach.

Learning outcomes; after finishing this module, learners will be able to:

- Summarize what was for the participant the most important concepts or ideas that were learned in this course.
- Reflect on own learning process in this online course.
- Reflect on learning process in this course in relation to own teaching practice.

Module 1: Welcome and introduction

-About This Course

- About this Course - one page summary – 2 minutes to read
- About this Module - one page summary – 2 minutes to read
- Reflection on your teaching – completion of online survey – 10 minutes

-Introduction & Establishing your personal learning goal for this course

- The role of laboratory work in the science curriculum – poll – 2 minutes
- Introductory video about the module – 2 minutes to watch video
- Discussion prompt – introducing yourself to other participants and (if you would like to) sharing your learning goal for the course) – 5 minutes to contribute to discussion

-Why do we have laboratory classes?

- The role of laboratory work in university chemistry – reading 18 minutes
- Discussion Prompt: Laboratory classes? – reflect on why we should have them - 5 minutes to contribute to discussion

-Types of Laboratory Instruction Styles

- A Review of Laboratory Instruction Styles – reading 23 minutes
- Discussion Prompt: New and different types of lab session - 5 minutes to contribute to discussion

-Strategies to increase student engagement during laboratory sessions

- Discussion Prompt: How can we increase student engagement in laboratory work? Exchange of good practice examples - 5 minutes to contribute to discussion
- Context-based learning and role play – reading 17 minutes

-Peer-graded Assignment: 45 minutes

Please write your response to the question below and provide an example as outlined (between 300 and 500 words)

Could you use role play / scenarios / context-based learning in your laboratory classes and where might be a suitable area in the curriculum to introduce it? (If you already use these strategies, could they be extended to another topic?)

Propose an example taking into account what you have learned in this module (including e.g. a description of a type of laboratory session you teach on), justify your choice.