UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
EDUS-411	Science Teaching Methods	6
Prerequisites	**Department**	**Semester**
None	Education	Spring
Type of Course	**Field**	**Language of Instruction**
Elective	Biology Education	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr Maria Evagorou Dr Stella Nicolaou	4th
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	None	None

Course Objectives:

The main objective of the course is to introduce the student to the field of Science Education and Science Teaching Methods. More specifically, the student will become familiar with theories of learning and teaching as well as with new trends in the teaching of science, and examples of innovative teaching methodologies. The course will provide examples from Biology education, and classroom and laboratory practice. Finally, assessment in the Science classroom with be explored.

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Discuss the significance of science teaching.
2. Outline current educational theories and discuss their implementation in science courses.
3. Identify and explain novel teaching methodologies used in the science classroom and laboratory.
4. Discuss current issues in science education as they relate to Citizenship Education, Responsible Research and Innovation and Socio-scientific Issues.
5. Identify classroom management methods and evaluate their effectiveness in student learning and organization of teaching.
6. Design and deliver a Biology lesson.
7. Discuss the use of ICT in science education.

8. Appraise assessment methods used in the science classroom and laboratory

Course Content:

1. Introduction: What is science and why is it important to teach science?
2. An overview of current educational theories (socio-cultural theories of learning, collaborative learning, group work, lectures)
3. New Trends in the Teaching of Science (inquiry-based learning, scientific practices, Nature of Science (NOS))
4. Citizenship Education, Responsible Research and Innovation, Socio-scientific Issues
5. Argumentation and Modelling
6. Classroom management (group work, lab work, organizing classroom for teaching)
7. Biology Education and Curriculum Reforms (Examples from the local curricula)
8. Teaching a Biology lesson (pedagogical skills; microteaching in groups)
9. Designing and Teaching a Biology lesson (designing lesson plans and worksheets; microteaching in groups)
10. Use of ICT in science education
11. Assessment (formative VS summative)
12. Classroom management and lab safety

Learning Activities and Teaching Methods:

Inquiry based learning; microteaching; problem based learning, poster and/or oral presentations based on research papers. After a set of lectures on a topic, a problem based learning section will follow to encourage learning through collaborative work and literature research. There will be an individual student presentation on a current science education topic where students will have to discuss and evaluate critically the papers while the lecturer is acting as a moderator.

Assessment Methods:

Attendance and active participation, microteaching, assignment (design of lesson, microteaching and reflection on teaching process), Final Examination

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Taking science to school: Learning and teaching science in grades K-	Duschl, R. A., Schweingruber, A., & Shouse, A. W.	The National Academy Press	2007	available online
Science Education: An International Course Companion	*Taber, K. & Akpan, B	Sense Publishers	2016	Link below
	https://www.sensepublishers.com/media/3012-science-education.pdf			

*Selected chapters per week based on the topic

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Beyond 2000: Science education for the future	Millar, R., & Osborne, J. F. (Eds.).	London: King's College London	1998	ISBN-187198478 5
Good Practice in Science Teaching: What Research has to say	Osborne, J. & Dillon, J	London: Open University Press	2010	ISBN-13: 978-0335238583 ISBN-10: 0335238580

Recommended Journal Papers:

1. Driver, R., Newton, P., & Osborne, J. (2000). Establishing the norms of scientific argumentation in classrooms. *Science Education, 84*(3), 287-312.
2. Herrenkohl, L., & Guerra, M. (1998). Participant Structures, Scientific Discourse, and Student Engagement in Fourth Grade. *Cognition and Instruction*, *16*(4), 431-473.
3. Hofer, B. K., & Pintrich, P. R. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research*, *67*(1), 88–140.

4. Hogan, K. (2000). Exploring a Process View of Students' Knowledge about the Nature of Science. *Science Education*, *84*, 51-70.
5. Lederman, N. G. (1992). Students' and Teachers' Conceptions on the Nature of Science. A Review of the Research. *Journal of Research in Science Teaching*, *29*, 331-359.
6. Millar, R. (2006). Twenty First Century Science: Insights from the Design and Implementation of a Scientific Literacy Approach in School Science. *International Journal of Science Education*, *28*(13), 1499-1521.
7. Moje, E., Collazo, T., Carrillo, R., & Marx, R. W. (2001). Maestro, what is quality? Language, literacy, and discourse in project-based science. *Journal of Research in Science Teaching*, *38*(4), 469-498.
8. Norris, S., & Phillips, L. (2003). How literacy in its fundamental sense is central to scientific literacy. *Science Education, 87*, 224-240.
9. Newton, P., Driver, R., & Osborne, J. (1999). The Place of Argumentation in the Pedagogy of School Science. *International Journal of Science Education*, *21*(5), 553-576.
10. Osborne, J. F., Erduran, S., Simon, S., & Monk, M. (2001). Enhancing the Quality of Argument in School Science. *School Science Review*, *82*(301), 63-70.
11. Osborne, J. F., Duschl, R., & Fairbrother, R. (2002*). Breaking the Mould: Teaching Science for Public Understanding*. London: Nuffield Foundation. (http://www.kcl.ac.uk/schools/sspp/education/staff/josbornepubs.html)
12. Osborne, J. F., Simon, S., & Collins, S. (2003). Attitudes towards Science: A Review of the Literature and its Implications. *International Journal of Science Education*, *25*(9), 1049–1079.
13. Sampson, V., & Clark, D. (2008). Assessment of the Ways Students Generate Arguments in Science Education: Current Perspectives and Recommendations for Future Directions. *Science Education*, *92*(3), 447-472.
14. Schwartz, R., Lederman, N. G., & Crawford, B. A. (2004). Developing Views of Nature of Science in an Authentic Context: An Explicit Approach to Bridging the Gap Between Nature of Science and Scientific Inquiry. *Science Education*, *88*(4), 610-645.