

MSCI101 Science Education: Pedagogy and Curriculum Development

ECTS Value: 5 ECTS

Overall Objectives and Outcomes

The way science is taught inevitably provides implicit messages to learners concerning the nature of science - and even explicit messages about questioning, experimentation or evidence are undermined if these processes are not central to the learning process.

In our modern world science and its applications are so pervasive and powerful that they impinge on virtually every aspect of life including: ethical, legal, economic, environmental, cultural, social, medical, spiritual and religious. The module aims to explore the role of philosophical enquiry in educational discourse by introducing participants to philosophical concepts and core themes in science education and aims to lay the fundamentals for the other two science methodology modules that follow.

- i. Introduction and philosophy of science teaching;
- ii. Pedagogical approaches including technology integrated science teaching;
- iii. Critical evaluation of core science methodologies and research;
- iv. Curriculum development.

By the end of this module, the learner will be able to:

Competences

- a. organise the respective science curriculum into meaningful episodes of learning for one's students;
- b. develop curriculum building skills taking into consideration student, school and local contexts;
- c. develop a critical understanding of the underpinning methodological framework of science teaching;
- d. develop various pedagogical approaches that challenge established methodologies and pedagogies through the use of appropriate strategies that are relevant and contextualised for the students.

Knowledge

- a. critically analyse the characteristics of the main scientific paradigms;
- b. critically analyse the characteristics of human perspectives on ethics and nature;
- c. demonstrate an understanding of the various science pedagogies;
- d. interpret the effectiveness of the various core science methodologies;
- e. create relevant curricula that take into consideration the various variables at the individual, group, regional, local and global levels;
- f. create various mediums of teaching and learning through the use of technology enhanced media.

Skills

- a. demonstrate a general understanding of the field of philosophy of science;
- b. demonstrate knowledge and understanding of some of the central problems, concepts and positions in the philosophy of science;
- c. know how to apply this understanding to questions concerning the nature and status of scientific knowledge;
- d. know and understand learning and learners through the history, philosophies, sociology and current issues and practices of science education;
- e. know the methods of science and why current scientific knowledge is both contestable and testable by further inquiry;
- f. synthesise theoretical understanding and practical skills to interpret community and individual learning needs;
- g. gather, synthesise and critically evaluate information from a range of sources.

Assessment Methods

This module will be assessed through: Presentation; Assignment.

Suggested Readings

Core Reading List:

1. Wellington JJ and Ireson G, (2012) Science Learning, Science Teaching. London: Routledge
2. Osborne J & Dillion J (eds 2010) Good Practice in Science Teaching: What Research has to Say, Maidenhead: McGraw-Hill
3. Oversby, J. (2012). ASE Guide to Research in Science Education, Hatfield: ASE

Supplementary Reading List:

1. Sang D & Wood-Robinson V (2002) Teaching Secondary Scientific Enquiry London: John Murray Ltd
2. Toplis, R. ed. (2011). How Science Works: Exploring Effective Pedagogy and Practice, Abingdon: Routledge
3. Bishop, K. and Denley, P. (2007) Learning Science Teaching: Developing a Professional Knowledge Base, Open University Press