

TRENDS & CONTEMPORARY ISSUES IN CHEMISTRY EDUCATION

Course Code: EDBESc358

Credit Hours: 3

Course Description

The broad purpose of this course is to develop students' knowledge, skills, and abilities as Chemistry educationist. In particular, this course aims to develop at high level of understanding and a critical analytic perspective across a diverse range of trends and issues in Chemistry Education by focusing on conceptual, theoretical and substantive research findings found in the academic research literature in the field.

Learning Outcomes Upon completion of this course, the students:

1. Will develop knowledge and skills that enable the student to evaluate, critique, and ultimately contribute to the scholarly literature in Chemistry Education.
2. Should have improved their written and verbal communication and analytical skills and feel comfortable discussing theoretical and methodological issues in a scholarly manner.
3. Will gain an appreciation of the development of knowledge in a range of topic areas.
4. will learn about the institutions, systems, and practices found in academic as well as research process in Chemistry Education

Contents

1. Chemistry as a Discipline of Science

- 1.1 Scientific method of study in Chemistry.
- 1.2 Research approaches in field of Chemistry.
- 1.3 Chemistry in different periods and societies

2. Modern careers in Chemistry

- 2.1 Careers related to organic Chemistry
- 2.2 Careers related to inorganic Chemistry
- 2.3 Careers related to Physical Chemistry
- 2.4 Integrated careers of Chemistry and other Science disciplines

3. Trends in research practices in Chemistry Education

- 3.1 Researches in classroom practices & Pedagogy
- 3.2 Curriculum interventions in school Chemistry
- 3.3 Assessment interventions in school Chemistry

4. Gender Disparity in Chemistry

- 4.1 Gender disparity in attitudes towards school Chemistry
- 4.2 Gender disparity in attitudes towards Chemistry related careers
- 4.3 Steps towards reducing gender disparity in Chemistry related careers
- 4.4 Global statistics about trends towards Chemistry related fields
- 4.5 Regional statistics about trends towards Chemistry related fields

5. Role of Chemistry in human welfare

- 5.1 Medicine.
- 5.2 House utilities & Life style
- 5.3 Climate Change
- 5.4 Industrial & economic development
- 5.5 Steps towards population planning and welfare.

6. Environmental Awareness through Chemistry

- 6.1 Types of pollution
- 6.2 Causes of pollution
- 6.3 Environmental education
- 6.4 Role of Chemistry in reducing pollution

7. Curriculum innovations in Chemistry

- 7.1 Standards and benchmarks of a quality Chemistry Curriculum
- 7.2 NSF Nuffield Science Foundation Curriculum
- 7.3 Challenges of quality curriculum in Chemistry
- 7.4 National Curriculum of Chemistry for Pakistan: Strengths and Limitations

8. ICT in Chemistry Education

- 8.1 New concept of information explosion
- 8.2 Expanding learning resources in Chemistry Classroom
- 8.3 Role of Information and communication technology (ICT) in Chemistry
- 8.4 Virtual Learning in Chemistry
- 8.5 Learning through simulations in Chemistry

Having studied these contents, the students will reflect over following trends and issues in specific context of Chemistry education

Issues in Chemistry Education

1. Chemistry contents and religious conflicts
2. Globalization of Chemistry education
3. Practical assessment in Chemistry education
4. One size fits all? Comparative effectiveness of various methodologies in teaching Chemistry
5. Problems of Chemistry education in Pakistan
6. Declining attitude of students towards Chemistry Education
7. Gender disparity in Chemistry Education
8. Regional disparity in Chemistry Education
9. Should Chemistry curriculum be diversified?
10. Medium of Instruction for Chemistry Education. An exploratory approach
11. Demands of 21st century and our Chemistry curriculum. An analytical approach
12. Our Chemistry textbooks: source of knowledge or source of misconceptions

Trends in Chemistry Education

1. Scientific literacy: goal of Chemistry education in 21st century
2. Trend in international Math and Scientific Studies (TIMSS): Introduction & Major findings in Chemistry domain
3. Program for International Students Assessment (PISA): Introduction & Major findings in Chemistry domain
4. Constructivism in Chemistry Education: Theoretical background
5. Constructivism in Chemistry Education: Practices in classroom and challenges
6. Constructivism in Chemistry Education: Assessment practices and challenges
7. Use of concept mapping technique in teaching Chemistry
8. Scientific Inquiry
9. Nature of Chemistry

10. The role of Chemistry education in environmental literacy
11. Curricular reforms in Chemistry Education
12. ICT in Chemistry Education
13. Chemistry teacher recruitment standards: A comparative approach
14. Modern Assessment practices in Chemistry disciplines
15. Introduction to major research journals in Chemistry Education
16. Role of argumentation in Chemistry Education
17. Standards for 21st century Chemistry laboratory
18. Career opportunities with Chemistry Education
19. Chemistry education at higher education level: an introduction to degree programs offered in Chemistry Education round the world
20. Use of low cost no cost material in Chemistry Education

Teaching-learning Strategies

The instructional strategies will focus on constructionist learning approach. These strategies will be diverse in line with the course contents. Therefore, these strategies will include but not limited to demonstration, cooperative learning, collaborative learning, teacher and student-led discussion, individual and group presentations, reflective practices and classroom activities.

Assessment and Examinations

The students will be assessed according to the following criteria.

Examination	Marks Distribution
Sessional work	25 %
Mid Semester	35%
Final Semester	40%

Suggested Readings

- Akar, E. (2005). Effectiveness of 5E learning cycle model on students' understanding of acid-base concepts. Available at <http://etd.lib.metu.edu.tr/upload/12605747/index.pdf>.
- American Association for the Advancement of Science. (1990). *Science for all Americans: Project 2061*. NY: Oxford University Press.
- Bennet, J. (2003). *Teaching and learning science: A guide to recent research and its applications*. New York: Continuum.
- Childrens' Learning in Science Project (CLISP).(1987). *Approaches to teaching the particulate nature of matter*. Leeds: Centre for studies in Mathematics and Science Education.
- Driver, R., Squires, A., Rushworth, P., & Wood – Robinson, V. (2005). *Making sense of secondary science: research into children's ideas*. London: Routledge Falmer.

- Haltak, I. (1990). *Investing in the future, setting educational priorities in the developing world*. Paris, UNESCO. McGraw-Hill Kogakusha.
- Jones, G.M., & Carter, G. (2007). Science teacher attitudes and beliefs. In S.K. Abell, & N.G. Lederman (Eds.), *Handbook of research on science education*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Rao, V. K. (2004). *Population Education*. New Delhi: Efficient Offset Printers
- UNESCO, Pakistan (2004). *Quality of education in Pakistan*. UNESCO Office, Islamabad.