

## INSTRUCTIONAL TECHNOLOGY FOR TEACHING OF CHEMISTRY

Course Code: **EDBESc357**

Credit Hours: **3**

### Course Description

The course "Instructional Technology for teaching of Chemistry" is designed to provide basic knowledge and **understanding of the modern instructional technology used for teaching of Chemistry**. Upon completing of this course the students should be able to select, use and use reliable and valid instructional technology. They should also be able to select the most appropriate instructional best suited for the topic. The students will become familiar with the professional as well as ethical issues in use of using instructional technology. The course will also provide an understanding of the basic terminology, methods, designs and models as they relate to the area of Chemistry Education. It develops awareness about the procedures and options available worldwide in Instructional Technology in professional pursuit.

### Learning Outcomes

After successful completion of this course the students will be able to:

1. Understand the concept of instructional technology.
2. Recognize the importance of instructional technology in Chemistry Education.
3. Relate the use of instructional technology with various methods of teaching.
4. Know the modern instructional technologies being used worldwide.
5. Design instructional technology with the help of low cost no cost material.
6. Plan science lessons incorporating instructional aides and best teaching method.
7. Know the advantages and limitations of various instructional technologies.
8. Make effective use of computers in teaching Chemistry
9. Make effective use of laboratory apparatus in teaching concepts of Chemistry

### Contents

#### 1. Nature of Chemistry as a field of science

- 1.1 What is the nature of Chemistry?
- 1.2 Application of Scientific Method to study Chemistry
- 1.3 How do Biologists conduct research? Some classic work in field of Chemistry
- 1.4 Chemistry and the human welfare

#### 2. Classroom Communication

- 2.1 What is teaching, learning and instruction
- 2.2 Elements of classroom communication
- 2.3 Barriers to classroom communication

#### 3. Instructional Aids or Teaching Aids

- 3.1 What are the Instructional or teaching Aids
- 3.2 Importance of teaching aids
- 3.3 Different types of teaching aid material
- 3.4 Principles for selection of teaching aids
- 3.5 Principles for using of teaching aids

#### 3. Media in Teaching and Learning of Chemistry

- 3.1 Materials for visual communications: Bulletin Boards, Chalk Boards, Flannel Boards, etc.
- 3.2 Graphic Materials: Graphs, Charts, Cartoons, Maps and Globes
- 3.3 Still Pictures:
  - 3.3.1 Opaque projector
  - 3.3.2 Over-head projector and transparencies
  - 3.3.3 Slide projector and film slides
  - 3.3.4 Filmstrip projector and filmstrip

- 3.4 Audio-Materials, Radio and Tape-Recorder
- 3.5 Motion Pictures, Films and Video
- 3.6 Real things, Models and Demonstrations
- 3.7 Games, Simulations
- 4. Methods and Procedures in Individualized Teaching Strategies for Chemistry**
  - 4.1 Rationales and significant features
  - 4.2 Methods of Individualization
  - 4.3 Programmed Instruction
  - 4.4 Computer Assisted Instruction and Computer Managed Instruction
  - 4.5 Modular Instruction
  - 4.6 Personalized System of Instruction
  - 4.7 Individually Prescribed Instruction
  - 4.8 Audio-tutorial Method
- 5. Designing Instruction in Chemistry**
  - 5.1 Designing Instructional Sequence
  - 5.2 Model for Systematic Planning of Instruction
  - 5.3 Steps in Instructional Planning
  - 5.4 Designing Individual Lesson/unit Planning
- 6. Designing Conceptual Toolkit for teaching Chemistry**
  - 6.1 What is the significance of low cost no material in teaching
  - 6.2 Types of low cost no material
  - 6.3 Use of low cost no cost material
  - 6.4 Concept of toolkit
  - 6.5 Use of low cost no material in developing toolkit for different Chemical concepts
- 7. Use of modern Instructional Technology in teaching of Chemistry**
  - 7.1 Use of smart interactive white boards for teaching Chemistry
  - 7.2 Use of LCD projector for teaching Chemistry
  - 7.3 Creating blogs and websites for teaching Chemistry
  - 7.4 Use of on line media for teaching Chemistry
- 8. Designing Instructional modules for teaching Chemistry**
  - 8.1 What is modular instruction?
  - 8.2 Lesson planning for modular instruction for teaching Chemistry
  - 8.3 Planning technology for modular instruction

#### 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

- Bates, S., & Galloway, R. (2013) Student-generated assessment. *Education in Chemistry*, 50(1), 18–21.
- Lancaster, S., & Read, D. (2013). Flipping lectures and inverting classrooms. *Education in Chemistry*, 50(5), 14-17.
- Moore, E. B., Herzog, T. A., & Perkins, K. K. (2013) Interactive simulations as implicit support for guided-inquiry. *Chemistry Education Research and Practice*, 14(3), 257-268.
- Read, D. & Lancaster, S. (2012) Unlocking video: 24/7 learning for the iPod generation. *Education in Chemistry*, 49(4), 13–16.
- Sweller, J. (2008). Human cognitive architecture. In J. M. Spector, M. D. Merrill, J. van Merriënboer, & M. P. Driscoll, (Eds.), *Handbook of research on educational communications and technology* (3<sup>rd</sup> ed)( pp. 369–381), New York, NY: Routledge..
- Seery, M. (2012). Jump-starting lectures. *Education in Chemistry*, 49(5), 22-25.
- See: <http://www.ramseymusallam.com/resources/Dissertation.musallam.pdf>
- Seery, M. K., & Donnelly, R. (2012). The implementation of pre-lecture resources to reduce in-class cognitive load: A case study for higher education chemistry. *British Journal of Educational Technology*, 43(4), 667–677.
- Shwartz, Y., & Katchevitch, D. (2013). Using wiki to create a learning community for chemistry teacher leaders. *Chemistry Education Research and Practice*, 14(3), 312-323.
- Seery, M. K., & Mc-Donnell, C. (2012). Designing and Evaluating Context and Problem Based Learning Resources, presented to the *Biennial Conference in Chemical Education*, Pennsylvania State (see <http://www.rsc.org/learn-chemistry/resource/res00000932/faster-greener-chemistry>) See: <http://flippedclassroom.org/>.
- Bates, S., & Galloway, R. (2013). Student-generated assessment. *Education in Chemistry*, 50(1), 18–21.
- Lancaster, S., & Read, D. (2013). Flipping lectures and inverting classrooms. *Education in Chemistry*, 50(5), 14-17.
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