

Bachelor of Education (B.Ed.)
Title of the Course: PZ.7 B: Chemistry
(Semester: II)

Credit: 2
MM: 50 (External: 35 Internal: 15)
Weeks: 15

Introduction of the Course

This course is aimed at developing competencies, and skills among the pupil teachers to effectively transact Chemistry curriculum and evolve as a reflective practitioner, capable of translating theoretical perspectives into pedagogical practices. The course focusses on developing proficiency in various classroom processes and teaching-learning methods, both in the traditional and digital forms. It also envisions in developing insights and skills to develop unit and lesson plans using effective student centric pedagogy. The focus extends to the evaluation sphere, encompassing formative and summative assessments, as well as the creative expression of learners.

Learning Outcomes

After completion of the course student will be able to:

1. Demonstrate proficiency in employing a repertoire of teaching-learning processes using diverse learning resources.
2. Strategically plan and execute chemistry units and lessons
3. Demonstrate proficiency in employing a repertoire of teaching-learning processes, such as inquiry-based approaches, inductive and deductive methods, experimentation,

discussion, and group work etc., fostering varied learning experiences for diverse student populations.

4. Explore the integration of digital tools, educational apps, and online platforms to enhance chemistry teaching and discuss strategies for effective online and blended learning environments.
5. Develop understanding of the nature of assessment and its myriad aspects

Number of Units: 3

Weeks 15 = 30 hours

Unit 1: Classroom Processes (6 weeks = 12 hours)

- Considerations in relation to content (curriculum and concepts) and learners (with specific reference to socio-cultural and developmental context of the learner including special needs learners).
- Current policy frameworks and their implications in the classroom
- A repertoire of teaching-learning processes: Inquiry based approach, inductive and deductive approach, experimentation, demonstration, discussion, investigatory projects, individually paced programmes, group work, peer learning, observation-based survey, problem solving, guided independent study and seminar presentation.
- Developing effective online and blended learning environment. Flipped classroom and flipped blended learning design

Unit 2: Pedagogical Planning (5 weeks = 10 hours)

- Developing unit plans, lesson plans and Remedial/Enrichment plans using combinations of various processes.
- Planning for conduct of activities, experiments, and laboratory work in Chemistry with a critique of the current practices

Unit 3: Assessment (4 weeks = 8 hours)

- Nature of learning and assessment, analysis, and critique of the present pattern of examinations.
- Design and analysis of

- Formative assessment tasks
- Summative Assessment
- Assessment of laboratory work and project work
- Assessment through creative expression-drawing, posters, drama, poetry, etc. as part of formative assessment for continuous assessment of thinking and process skills
- Contemporary assessment technologies including computer-based testing, online quizzes, and adaptive learning platforms
- Developing learner profiles and e-portfolios; participatory and peer assessment.

Practicum/ Suggested Projects/Assignments (Any Two):

1. Planning and discussion of lessons for the school experience programme.
2. Developing remedial or enrichment programmes.
3. Conduct of activities/Experiment
4. Preparation of a detailed Assessment Report of learners' continuous and comprehensive assessment.

Note: On the basis of the above, the teacher may design his/her own relevant projects/assignments.

Essential/Recommended Readings

- Bal, V. (2005). Women scientists in India: Nowhere near the glass ceiling. *Current Science*, 88(6), 872-878.
- Bevilacqua, F., Giannetto, E., & Mathews, M. R. (Eds.). (2001). *Science Education and Culture: The Contribution of History and Philosophy of Science*. Netherlands: Kluwer Academic Publishers.
- Bowling, J., & Martin, B. (1985). Science: a masculine disorder? *Science and Public Policy*, 12(6), 308-316.
- Chander, S., & Chetna Arora. (2020). Integrating Technology into Classroom Learning. *Indian Journal of Educational Technology*, 2(1).
- Cobern, W. W. (Ed.). (1998). *Socio-Cultural Perspectives on Science Education: An International Dialogue*. Netherlands: Kluwer Academic Publishers.
- Cole, J. R., & Zuckerman, H. (1987). Marriage and Motherhood and Research Performance in Science. *Scientific American*, 256, 119-125.
- Collette, Alfred T. and Eugene L. Chappetta, (1994) *Science Education in the Middle and Secondary Schools*; MacMillan : N. Y.

- Kumar, N. (Ed.). (2009). *Women and Science in India: A Reader*. India: Oxford University Press.
- Martin R., Sexton, C. Wagner, K. Gerlorich, J. (1998) *Science for all Children*: Allyn and Bacon: USA.
- NCERT (2013). *Pedagogy of Science. Physical Science Part I: Textbook for B.Ed.* New Delhi: NCERT.
- NCERT (2013). *Pedagogy of Science. Physical Science Part II: Textbook for B.Ed.* New Delhi: NCERT.
- NCERT (2019). *Vigyan Shikshashastra (Bhautik Vigyan Bhag I)*. New Delhi: NCERT.
- NCERT (2019). *Vigyan Shikshashastra (Bhautik Vigyan Bhag II)*. New Delhi: NCERT.
- Oakes, J. (2007). More than misplaced technology: A normative and political response to Hallinan on tracking. In A. R. Sadovnik (Ed.), *Sociology of Education*. New York: Routledge.
- Okebukola, O. J. (1991). The Effect of Instruction on Socio-Cultural Beliefs Hindering the Learning of Science. *Journal of Research in Science Teaching*, 28(3), 275-285.
- Osborne, J. F. (1996). Beyond Constructivism. *Science Education*, 80(1), 53-82.
- Pollard, A (2005) *Reflective Teaching*, London: Continuum.
- Routledge Publication, USA.
- Sur, A. (2011). *Dispersed Radiance: Caste, Gender and Modern Science in India*. Navayana: India.
- Taylor, P. C., & Cobern, W. W. (1998). Towards a Critical Science Education. In W. Cobern (Ed.), *Socio-Cultural Perspectives on Science Education: An International Dialogue*. Dordrecht: Kluwer Academic Publishers.
- Turner, T. & Dimatea, W. (1998) *Learning to Teach Science in Secondary School*,
- UNESCO (1966) *Source Book for Science Teaching*: UNESCO: Paris.
- Vaidya N. (1999) *Science Teaching for the 21st Century*, Deep and Deep Publishers.
- Wallace, J., & Loudon, W. (Eds.). (2002). *Dilemmas of Science Teaching: Perspectives on Problems of Practice*. Routledge: New York.
- Wellington, J. (2004) *Teaching and Learning Secondary Science – Contemporary Issues and Practical Approaches*, London: Routledge.

Teaching Learning Resources (Digital):

- Amrita Vishwa Vidyapeetham. (n.d.). Virtual Labs. <http://www.amrita.edu/virtual-labs>
- e-Yantra. (n.d.). Robotics and Embedded Systems. <http://www.e-yantra.org/>
- Google Arts & Culture - Science: Google. (n.d.). Google Arts & Culture - Science. <https://artsandculture.google.com/project/science>

- Gupta, A. (n.d.). Arvind Gupta Toys. <http://www.arvindguptatoys.com/>
- Indian Academy of Sciences. (n.d.). Journals. <https://www.ias.ac.in/Journals>
- Khan Academy. (n.d.). <https://www.khanacademy.org/science>
- Ministry of Education, Government of India. (n.d.). National Digital Library of India (NDLI). <https://ndli.iitkgp.ac.in/>
- National Aeronautics and Space Administration. (n.d.). NASA's Education Resources. <https://www.nasa.gov/audience/foreducators/index.html>
- National Council of Educational Research and Training. (n.d.). Diksha. <https://diksha.gov.in/>
- National Council of Educational Research and Training. (n.d.). National Repository of Open Educational Resources (NROER). <https://nroer.gov.in/>
- National Council of Educational Research and Training. (n.d.). NISHTHA. <https://diksha.gov.in/nistha>
- NPTEL. (n.d.). <https://nptel.ac.in/>
- OpenStax. (n.d.). <https://openstax.org/>
- University of Colorado Boulder. (n.d.). PhET Interactive Simulations. <https://phet.colorado.edu/>
- Vigyan Prasar. (n.d.). <http://www.vigyanprasar.gov.in/>
- e-PG Pathshala. (n.d.). <https://epgp.inflibnet.ac.in/>

Teaching Learning Process:

The course will be taught through interactive pedagogic methods such as classroom discussions, debates, collaborative learning tasks, laboratory methods with the appropriate use of digital processes, so as to enhance reflective practices and critical analytical thought processes among learners. Self-learning, self-exploration, creative expression, and comprehension & application of concepts will be encouraged.

Assessment Method:

The assessment will be formative in nature both in theory and practicum and will focus on rigorous student participation. Individual and group tasks will aim at developing scientific temper among learners. Assessment will also be based on development of creative expressions, critical understanding, reflections, and ethics in science.

Key words: Teaching-learning processes, Formative assessment, Summative Assessment.



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