Bachelor of Education (B.Ed.)

Title of the Course: P2.9 B: Integrated Science

(Semester: II)

Credits: 4

MM: 50 (External: 35 Internal: 15)

Contact Week: 15

Introduction of the Course

This course is aimed at developing the insights, competencies and skills among the pupil-teachers to effectively transact the science curriculum so as to evolve as a reflective practitioner, capable of translating theoretical perspectives into pedagogical practices.

Learning Outcomes

After completion of the course, student will be able to:

1. Demonstrate proficiency with a repertoire of teaching-learning processes, such as inquiry-based approaches, inductive and deductive methods, experimentation, discussion, and group work etc., for providing varied teaching learning experiences for diverse student populations.
2. Plan units and lessons in science at middle and secondary level.
3. Explore the integration of digital tools, educational apps, and online platforms to enhance science teaching-learning experiences and prepare for effective online and blended learning environments.
4. Develop insights and critically analyze the nature and role of assessment in science.
5. Develop competency and skills in designing and developing formative assessment tasks, summative assessment tasks, learner's profile, portfolio etc utilizing various means and contemporary assessment technology.

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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 contexts of the learner including special needs). Inclusive teaching practices for diverse learners including those with different abilities and socio- cultural background.

- A repertoire of teaching-learning processes: Inquiry based approach, inductive and deductive approach, experimentation, demonstration, discussion, investigatory projects, individually paced programs, group work, peer learning, observation- based survey, problem solving, guided independent study and seminar presentation.

- Teaching-Learning in physical, virtual and blended environments: digital tools, educational apps and online platforms for science. Flipped classroom and blended learning design.

- Role of action research in science education

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

- Developing unit plans, lesson plans and remedial/enrichment plans using combinations of various processes.

- Planning for activities, experiments and laboratory work in science with a critique of the current practices

Unit 3: Assessment **(4 weeks = 8 hours)**

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

Practicum/ Suggested Projects / Assignments (Any Two)

1. Planning and discussion of lessons for the School Experience Programme(SEP).
2. Developing remedial and enrichment programmes.
3. planning for a blended learning classroom
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

- 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. Chiappetta, (1994) *Science Education in the Middle and*

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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.
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- 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.
- Singhal,M. & Baveja, B. (2022). *Science Education Teaching Learning and Assessment* (1st ed.). Paragon International publisher.
- Wallace, J., & Louden, 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.

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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://ndl.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

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temper among learners. Assessment will also be based on development of creative expressions, critical understanding, reflections, and ethics in science.

Key words: Inquiry Based Approach, Inductive, Deductive, Action Research.

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