

## **B.Ed. Two Year Programme**

### **P.2.8: Biology**

Maximum Marks: 100

#### **Course Objective**

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

#### **Unit I Pedagogical Underpinning**

- Place of Biology in school curriculum and its changing character
- The concept of Pedagogical Content Knowledge (PCK) and its implications for Biology teaching.
- Aims of teaching Biology at the senior secondary level with linkages to upper-primary and secondary level.
- Objectives of teaching Biology with special reference to the development of thinking and process skills

#### **Unit II Classroom processes**

- Pedagogical planning: 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).
- 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, seminar presentation, action research
- Developing unit plans, lesson plans and Remedial/Enrichment plans using combinations of various processes.
- Planning for conduct of activities, experiments and laboratory work in Biology with a critique of the current practices

#### **Practicum**

1. *Planning and discussion of lessons for the school experience programme.*
2. *Developing remedial or enrichment programmes.*
3. *Conduct of activities/Experiments.*

#### **Unit III Teaching- Learning Resources**

- Criteria for selecting/designing Teaching-Learning Resources: content based, learner based and context based.
- Textbook, reference books, encyclopaedia, newspaper and alike
- Improvisations and Science Kits
- Instructional aides, computer aided instruction, multi-media packages, interactive software, websites, Open Education Resources(OER) etc.
- Planning of extended experiences, science quiz, science fair, science corner/resource room, science club, excursion and related SUPW activities.

#### **Practicum: Developing Teaching-Learning resources**

#### **Unit IV Organization of the Biology Laboratory**

- Layout and design of the Biology laboratory.
- Storage of apparatus, consumable and non-consumable items/materials
- Maintenance of laboratory records.
- Making arrangements for the conduct of experiments.

*Practicum: Laboratory work- management of laboratory, activities and project work.*

#### **Unit V Assessment**

- 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
- Developing learner profiles and portfolios; participatory and peer assessment.

*Practicum: Preparation of a detailed Assessment Report of learners' continuous and comprehensive assessment.*

#### **Reading List**

Chiappetta, L. Eugene and Koballa, R. Thomas (2010) *Science Instruction in the Middle and Secondary Schools*, Seventh Edition, Allyn& Bacon.

Coll, R. K. (2007). Opportunities for Gifted Science Provision in the Context of a Learner-centered National Curriculum, In K. S. Taber (Ed.), *Science Education for Gifted Learners* (pp. 59-70). London: Routledge

Collette, Alfred T. and Eugene L. Chappetta, (1994) *Science Education in the Middle and Secondary Schools*; MacMillan : N. Y.

Driver, R., Squires, A., Rushworth, P. and Wood- Robinson, V. (2006) *Making Sense of Secondary Science: Research into Children's Ideas*, London: RoutledgeFalmer.

Eklavya, *BalVigyan – Class 6, 7, 8.* (1978) *Madhya Pradesh PathyaPustak Nigam*; Bhopal, (English & Hindi Versions both).

Friedrichsen, P.M. & Dana, T. M. (2005). Substantive-Level Theory of Highly Regarded Secondary Biology Teachers' Science Teaching Orientations. *Journal of research in science teaching* vol. 42, no. 2, pp. 218–244

Kuhn, T. S. (1970, 2nd Ed )*The Structure of Scientific Revolutions*. Chicago: the University of Chicago

Lovelock, James (2000) [1979]. *Gaia: A New Look at Life on Earth* (3rd ed.). Oxford University Press

Martin R., Sexton, C. Wagner, K. Gerlorich, J. (1998) *Science for all Children*: Allyn and Bacon: USA.

Minkoff, E. C. & Baker, P. T. (2004) *Biology Today – An Issues Approach* (III Ed.), Garland Science.

Muralidhar, K., 'What Organisms Do?' in Rangaswamy, N. S. (Ed.) *Life and Organism*, Vol. XII (Part 6) in Chattopadhyaya, D. P. (Gen. Ed.). *History of Science, Philosophy and Culture in Indian Civilization*. MunshiramManoharlal Publishers Pvt. Ltd., New Delhi.

Pollard, A (2005) *Reflective Teaching*, London: Continuum.

Reiss, M. (Ed.). (1999) *Teaching Secondary Biology*. Association for Science Education.

Siddiqi and Siddiqi. (2002) *Teaching of Science Today and Tomorrow*, Doaba House, New Delhi.

Siddiqi and Siddiqi. *Teaching of Biology*, Doaba House, New Delhi.

Sundarajan, S. (1995) *Teaching Science in Middle School : A Resource Book*. Orient Longman: Hyderabad.

Turner, T. & Dimatea, W. (1998) *Learning to Teach Science in Secondary School*, Routledge Publication, USA.

UNESCO (1966) *Source Book for Science Teaching*: UNESCO: Paris.

Vaidya N. (1999) *Science Teaching for the 21<sup>st</sup> Century*, Deep and Deep Publishers.

Wallace, J and Louden, W. (Eds.)(2001) *Dilemmas of Science Teaching: Perspectives on Problems of Practice*. Routledge, London.

Wellington, J. (2004) *Teaching and Learning Secondary Science – Contemporary Issues and Practical Approaches*, London: Routledge.

Wilson, E. O. (1999). *Consilience: The Unity of Knowledge*, Vintage Books. New York.

### **Journals**

1. School Science, NCERT, New Delhi  
The American Biology Teacher
2. National Association of Biology Teachers