**Bachelor of Education (B.Ed. Special Education ID & VI)**

**Title of the Course: A4 Stream Based Pedagogy Part IV : Science**

**(Semester:  II)**

**Credits: 4**

**MM: 100  (External:  70    Internal: 30)**

**Contact Week 15**

**Introduction of the Course**

**Learning Outcomes**

After completion of the course learners  will be able to

1. understand the nature of science  through a philosophical and epistemological lens.

2. promote Scientific Literacy and Critical Thinking

3. develop  critical understanding of science curriculum at various levels of school education

4. prepare learners for the technologically -driven landscape of modern science and responsible use of digital resources.

**Unit I: Nature of Science and Science Education**           **(12 hours)**

* The nature of science- science as a process and science as a body of knowledge, as a social enterprise; Science-Technology-Society-Environment (STSE) Interface.
* A historical perspective: the development of science as a discipline; awareness of the contributions of Popper and Kuhn.
* Development of Scientific Temper and scientific attitude; role of a science teacher
* Public understanding of science, ethics of science; science education in the context of developing countries.

**Unit 2 : Science Teaching and learner’ context**                                **(12 hours)**

* Children’s conceptualisation of scientific phenomena- Pre-conceptions in science and their significance in knowledge constructions (with linkages to learning at the primary level); Misconceptions and ‘alternative frameworks’ in science.
* Understanding children’s fear of science addressing their inabilities to correlate the observed phenomena with micro level processes and with their symbolic/mathematical representations
* Construction of knowledge in science: conceptual schemes, concept maps.
* Role and function of language  in science : its contribution towards expression, articulation and the understanding of science.

**Practicum : Project/assignment based on school  observations**

**Unit 3:  The Science Curriculum (12 hours)**

* Science curriculum at various stages.
* Curricular goals and competencies at various levels of school education.
* Historical development of science education in India.
* A critical review of Science Curriculum at the National Level i.e. NCERT curriculum, at the State Level i.e. SCERT curriculum.
* Approach to curriculum transaction; integrated , interdisciplinary  and multidisciplinary approach.
* Criteria for the analysis of science textbooks (including issues related to gender, the socio economic and socio-cultural context, etc.)

**Practicum: Critical analysis of existing science curriculum and textbooks.**

**Unit 4: Science Education  in diverse classrooms   (12 hours)**

* Addressing    students' diversity in science classrooms.
* History of diverse learners in science classrooms.
* Digital technology in science classrooms ; Accessibility Features, multimodal content ,adaptive learning platforms, collaborative tools. Virtual labs.
* Customizable Assessments

**Unit 5: Professional development of Science Teachers               (12 hours)**

* Continuous  professional development of science teachers and its need.
* Professional development at the individual, organizational and governmental level.
* Teacher as a researcher: Action research by teachers in collaboration with research institutions, voluntary organizations, etc.

**Practicum : Conducting Action Research in any area related to science education**

**Essential/ Recommended Readings**

* Aikenhead, W. W. (1998). Cultural aspects of learning science. Part one , pp 39-52. (B. F. Tobin, Ed.) Netherlands: Kluwer academic Publisher.
* Barba, H.R. (1997).Science in Multi-Cultural Classroom: A guide to Teaching and Learning. USA: Allyn and Bacon.
* Bevilacqua F, Giannetto E, & Mathews M.R., (eds.). Science Education and Culture: The Contribution of History and Philosophy of Science. The Netherlands: Kluwer Academic Publishers.
* Chander,S.(2017)Teaching science to learners with Visual Impairement.SR Publication New.Delhi.
* Cobern, W. W. (1998). Socio-Cultural Perspectives on Science Education. London: kluwer Academic Publisher.
* Chiappetta & koballa.jr.(2009). Science Instruction in the Middle and Secondary School: Developing Fundamental Knowledge and Skills. 7th edition.Pearson Publisher.
* Deo, M.G. & Pawar, P.V. (2011), General Article: Nurturing Science Talent in Villages, In Current Science, Vol. 101, No. 12, pp1538-1543.
* Hines, S. M. (Ed.). (2005). Multicultural science Education: Theory, Practice, and Promise (Vol. 120). New York, U.S.A: Peter Lang.
* Lee, E. & Luft, J. (2008), Experienced Secondary Science Teachers' Representation of Pedagogical Content Knowledge. International Journal of Science Education 30(10), 13431363(21), August
* National Curriculum Framework for School Education, (2023). NCERT: New Delhi
* National Curriculum Framework, (2005), NCERT: New Delhi
* New Education Policy 2020.

**Teaching Learning Process**

A blended approach of teaching learning would be adapted by integration of technology in the classroom to foster a deeper understanding of scientific principles facilitated by interactive simulations ,multimedia resources ,and digital tools. Innovative projects, Reflective expression and learning will be encouraged.

**Key words :**

**Nature of Science ,Misconceptions, Alternative frameworks, Diverse learners in science classrooms, Diverse classrooms ,Professional development ,Assessment in science**