

DSC 3 (I.3) Mathematics Education: Perspectives and Emerging Trends
Discipline Specific Core

1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSC 3 (I.3)						
Mathematics Education: Perspectives and Emerging Trends	4	3	1	0	Undergraduate	Mathematics in class XII

2. Learning Objectives

The course examines the philosophical, historical, and socio-cultural perspectives of mathematics education. The course presents mathematics education as an academic and research field. It allows learners to explore the pertinent gaps between disciplinary nature of mathematics and teaching of mathematics. Learners will engage with emerging trends in mathematics education and its integration with NEP 2020.

3. Learning Outcomes

- to understand the foundations of nature of Mathematics;
- to understand the philosophical, historical and sociological facets of mathematics education;
- to explain the constructs of language of mathematics;
- to critically examine the emerging trends in school math education w.r.t NEP 2020.

4. Syllabus

Unit I Nature, Philosophy and Foundation of Mathematics - Nature of mathematics and mathematical ideas, philosophy of mathematics and mathematics education, mathematics education in social and cultural context, mathematics as an intellectual property vs mathematics as a humanistic discipline.
[12 hours]

Unit II History of Mathematics - History of Mathematics in and for the curriculum, mathematics as an intellectual property vs mathematics as a humanistic discipline, mathematics in popular culture.
[9 hours]

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Unit III Language of Mathematics - Mathematics and symbolization, language of mathematics and language in mathematics, knowing in mathematics. [9 hours]

Unit IV Emerging trends in School Mathematics - Issues of equality and excellence in school mathematics, Gender stereotypes in Mathematics, Mathematics for future vs Mathematics for appreciation, principles and Standards for school Mathematics, Mathematics literacy and Mathematics for all. [15 hours]

5. Tutorial Details

1. Book review (*any one*)

- A Mathematician's Apology by G.H. Hardy The Mathematical Experience by Philip J. Davis & Reuben Hersh, Cambridge University Press (2004).
- Does God Play Dice? by Ian Stewart, Blackwell Publishing (1989).
- The Man Who Knew Infinity by Robert Kanigel, Little Brown Book Group (1992).

2. Open house discussion on contemporary issues in school mathematics

3. History of mathematics time line (specific time period)

6. Essential Readings

- Boaler J. (2015). *Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages, and Innovative Teaching*. Jossey-Bass.
- Eves H. (1990). *An Introduction to the History of Mathematics*, Third Edition, Cengage Learning.
- The Foundations of Mathematics by Ian Stewart and David Tall, Oxford University Press (1977).

7. Suggestive Readings

- Devlin K. (1997). *Mathematics: The Science of Patterns*, Scientific American Library.
- NCERT, National Curriculum Framework 2005. <https://ncert.nic.in/pdf/focus-group/math.pdf>
- NCERT, NCF-SE-2023. https://ncert.nic.in/pdf/NCFSE-2023-August_2023.pdf
- The Calculus Gallery, Masterpieces from Newton to Lebesgue by William Dunham (Princeton University Press) (2008).
- Ernest P. (1991). *The Philosophy of Mathematics Education*. Falmer Press.