

## Bachelor of Education (B.Ed.)

### Title of the Course: P.1.3B: Mathematics (Semester: II)

Credits: 2  
MM: 50 (External: 35 Internal:15)  
Contact Week 15

#### Introduction of the Course

This course has been designed for student-teachers to understand the Pedagogical, psychological and sociological foundations of learning mathematics. The course delineates some of the prime assumptions behind a range of theoretical perspectives on the nature of learning and teaching mathematics. The course engages in conceptualizing and analyzing the processes that promote learning of mathematics from a disciplinary perspective

#### Learning Outcomes

After completion of the course student will be able to:

1. Understand the pedagogical concerns related to teaching of mathematics.
2. Conduct content and conceptual analysis of various concepts taught in school mathematics.
3. Learn and differentiate the psychological perspectives of Learning Mathematics.
4. Study and understand the cultural aspects related to learning and development of mathematical concepts.
5. Analyse the recommendations of various policies with respect to important of learning mathematics at school level.

Number of Units: 2

Weeks 15 = 30 hours

#### Unit 1: Pedagogical Concerns of Learning Mathematics

(7 weeks = 14 hours)

- Approaches of Teaching Mathematics: Behaviourist, Constructivist, Social-constructivist, Art and Sports- Integrated Learning, Interdisciplinary and Multidisciplinary Approaches.
- Methods of Teaching Mathematics: Lecture cum Demonstration, Inductive-Deductive, Activity and Hands-on, Group-Centric: Problem-Solving, Project Based, Inquiry based, Collaborative and Cooperative Learning, Problem-Solving, STEM and STEAM, Blended Learning.

#### Unit 2: Psychological and Sociological perspectives of Learning Mathematics

(8 weeks = 16 hours)

- Developmental progression in the learning of mathematical concepts- Richard Skemp, Vygotsky, Fischbein on intuitive thinking, Zoltan Dienes

- Focus on mathematical processes- Problem solving, problem-posing, proving and reasoning
- Sociocultural perspectives in mathematics learning- Situated learning; social construction of knowledge; social interaction and community of practice.

#### Practicum/ Suggested Projects / Assignments (Any Two)

1. Compare the different school curriculum and make a comparison on how the place of mathematics as evolved in different policies.
2. Observe some children around you while they are engaged in a mathematical task. Make a table on their developmental of concepts
3. Make a format for setting up of a mathematics lab at home for a child
4. Research and present on the use of manipulatives in mathematics instruction. Highlight specific manipulatives that align to curriculum standards and model hands-on activities.
5. Evaluate educational math software and apps. Identify strengths and limitations. Design a lesson integrating the technology to build conceptual understanding.

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

#### Essential/ Recommended Readings

- Gandhi H (2016). *A Complete Resource for Mathematics and its Pedagogy*. Pearson Publications.
- Boaler, J. (2010). *The elephant in the classroom. Helping children love and learn maths*. Souvenir Press Ltd
- Burns, M. (2007). *About teaching mathematics: A K-8 resource*, Third Ed. Math Solutions Publications.
- Skemp, R. (1978). Relational understanding and instrumental understanding. *Arithmetic Teacher* 26 (3), 1-16.
- Kazemi, E. (1998). Discourse that promotes conceptual understanding. *Teaching Children Mathematics*, 4(7), 410- 414.
- Knuth, E., Choppin, J., & Bieda, K. (2009). Proof: Examples and beyond. *Mathematics Teaching in the Middle School*, 15(4), 206-211.
- Kanvaria, V. K. (2017). *A resource book on pedagogy of mathematics*. Scholar Publishing House. New Delhi. ISBN 9788193203552.

#### Additional Readings

  
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 शिक्षा विभाग/Dept. of Education  
 दिल्ली विश्वविद्यालय, दिल्ली-110007  
 University of Delhi, Delhi-110007

- Boaler, J. & Staples, M. (2005). Transforming students' lives through an equitable mathematics approach: The case of Railsideschool. Available for download on: [www.stanford.edu/~jboaler/](http://www.stanford.edu/~jboaler/)
- Boaler, J. (2013, March). Ability and Mathematics: The mindset revolution that is reshaping education. In Forum (Vol. 55, No. 1, pp. 143-52). Symposium Journals.
- Kazemi, E., & Stipek, D. (2001). Promoting conceptual thinking in four mathematics classrooms. *The Elementary School Journal*, 102(1), 59-80.
- Kanvaria, V. K. (2016). Semantics and pragmatics in mathematical events: A linguistics view. In E. Railean, G. Walker, & L. Jackson (Eds.), *Handbook of research on applied learning theory and design in modern education* (pp. 772-785). IGI Global. ISBN 9781-66696341.

#### Teaching Learning Resources (Digital and others): Across Units (If any)

- <https://www.youtube.com/watch?v=KZnGSVwIpeU>, Jo Boaler: How to Learn Math | Lex Fridman Podcast #226
- <https://www.youtube.com/watch?v=UKiKpwc5m8Y>, Skemp' Learning Theory in Mathematics
- <https://www.youtube.com/@haneetgandhi7828>: Do you have mathematical eye?

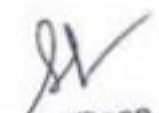
#### Teaching Learning Process

The course will be taught through interactive pedagogic methods such as classroom discussion, debates, film discussions, critical media analysis, collaborative learning tasks which enhance reading comprehension of core writings in the area and innovative projects. Reflective expression and learning will be encouraged.

#### Assessment Method

The assessment will be formative in nature and will factor in student participation. Individual and group tasks and assignments will be given. Summative evaluation will be done through end-semester examination.

**Key words:** Psychological and Sociological aspects, National Education Policies, NCF

  
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