## Discipline Specific Core

### 1. Credit Distribution of the Course

| Course title & Code<br><br>DSC 5 (II.2) | Credits | Credit distribution of the course | | | Eligibility criteria | Pre-requisite of the course (if any) |
|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical/ Practice | | |
| Arts of Teaching Mathematics | 4 | 3 | 0 | 1 | Undergraduate | Mathematics in Class XII |

### 2. Learning Objectives

The paper develops pedagogical and assessment paradigms to facilitate math learning for all. Students will develop creativity, logic and concept building skills. The humanistic and realistic approach developed through the paper is rooted in belief that leaners construct the knowledge on their own in a stimulating environment.

### 3. Learning Outcomes

- able to understand theoretical framework for theories of teaching of Mathematics;
- able to learn the strategies to facilitate the culture of learning in math classroom;
- able to identify critical content areas in math classroom and to relate it to the
- research practices;
- able to understand different approaches of assessment;
- able to develop and interpret assessment plans for diverse abilities learners;
- able to develop content specific resources for math teachers.

### 4. Syllabus

**Unit I Theories of Teaching and learning of Mathematics** - Styles and strategies for teaching mathematics, theories of learning (Dewey, Bruner, Piaget, Denies, Vygotsky) connecting theory and practice in mathematics teaching, facilitating culture of learning in mathematics classroom. **[10 hours]**

**Unit II Addressing Pedagogical Concerns in Mathematics classroom** - Critical content of school mathematics: Numbers, Algebra, Geometry, Probability and Statistics, Calculus, limits and continuity with emphasis on research in teaching and learning. **[10 hours]**

**Unit III Assessment for Active Mathematics learning** - Models of assessment, Assessment for learning and assessment of learning, assessment for teaching, interpreting assessment, developing assessment plan for diverse learners. **[9 hours]**

**Unit IV Resources for Mathematics Teacher across Curriculum** - Mathematics as a discipline of interdisciplinary approach, creative ways of developing mathematical ideas across curriculum; Learning Mathematics through Minds on and Hands on, facilitating learning using active use of resources, developing innovative resources to develop mathematical ability (games, puzzles, models, hands on kits) Practicum: Focused Discussion Forum to initiate dialogue and sharing on School Internship Experiences. **[16 hours]**

**5. Illustrative Practical Details:** **[30 hours]**

- Develop concept maps of a mathematical unit.
- Prepare unit plan based using one or more learning theories.
- Develop differentiated instructional strategy based learning-teaching resource.
- Develop relevant home assignment using multidisciplinary or interdisciplinary approach.
- Make a blueprint of formative and summative assessment for a math unit of your choice.
- Design a layout of constructive math classroom.

**6. Essential Readings**


- Skemp R. (1987). The Psychology of Learning Mathematics. Lawrence E Hillsdale.
- Black P., Harrison C., Lee C., Marshall B. & Wiliam. D (2003). *Assessment for Learning: Putting it into Practice*, Open University Press.
- Wiliam D. (2005). *Inside the Black Box: Raising Standards Through Classroom Assessment,* NFER Nelson.
- Mitchelmore M. & White P. (2010). *Teaching Mathematical Concepts: Instruction for Abstraction,* Australian Catholic University National, Sidney Australia.


**7. Suggestive Reading**


- Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education, 59*(5), 389–407. https://doi.org/10.1177/0022487108324554
- Skemp, R. R. (2006). *Relational understanding and instrumental understanding*. Mathematics Teaching in the Middle School, *12*(2), 88–95.
- National Council of Teachers of Mathematics (NCTM). (2014). *Principles to actions: Ensuring mathematical success for all.*
- Polya, G. (1957). *How to solve it: A new aspect of mathematical method* (2nd ed.). Princeton University Press.
- Dienes, Z. P. (1960). *Building up mathematics*. Hutchinson Educational.