

**Course Title: Teaching Mathematics Pedagogy III
B. Ed (4 years) Program**

Semester :	VII
Class	B. Ed
Duration of Course:	16(sixteen) Week
Credit Hours:	3

Course Description:

The course will focus initially on the processes of learning and teaching mathematics, and then consider the role of the teacher in enhancing learning. Student Teachers will review pedagogical approaches to mathematics and consider priorities for the future in learning and teaching mathematics. It will help them learn from their cultural context and link school mathematics with out-of-school mathematics. Theoretical approaches to learning mathematics will be examined and applied to better understand the key problems and challenges in mathematics education today, which include language issues, technology, contexts, feelings, beliefs, and attitudes. This course will provide Student Teachers with ICT knowledge, and they will look at ways in which ICT can successfully be applied to and integrated into the curriculum. It will help Student Teachers develop cognitive ability (reasoning, decision-making, and reflection) that may be useful to enhance the critical mathematical thinking of students in the context of practice.

Learning Outcomes:

After completion of this course prospective teachers will be able to:

- Acquire a deeper understanding of the ways in which learners learn and teachers teach mathematics, and of connections between learning and teaching mathematics
- Develop skills of reading literature on mathematics education critically and of expressing arguments in mathematics education cogently
- Challenge the beliefs, ideas, and perceptions about teaching and learning mathematics
 - Appraise theoretical approaches to learning and teaching mathematics and test these ideas in planning for teaching
 - Recognize and use connections between mathematical ideas and between mathematics and other disciplines | develop positive attitudes towards mathematics | produce imaginative and creative work arising from mathematical ideas

Learning and Teaching Approaches

The following approaches will be used in the course.

- Activity based teaching
- Inquiry method
- Discovery method
- Exploration method

- Demonstration method
- Lecture method
- Discussion with peers and instructor
- Use of ICTs to facilitate learning and teaching

Time	Lesson	Theory	Related Material
Week 1	1-3 Different views and perspective about mathematics, mathematics teaching and learning. Teachers' conceptions about the nature of mathematics	(i) Different views and perspective about mathematics and mathematics teaching and learning a. Absolutistic and Fallibilist. b. Humanistic, Constructivist and Social constructivist c. Instrumentalist and Platonic view of mathematics d. Historical development in mathematics: Patterns and Relationships.	Use of research papers
Week2	4-6 How children learn mathematics, Methods of teaching mathematics	(ii) Methods of teaching mathematics i. Conductive method ii. Inductive method iii. Problem solving iv. Learning mathematics with manipulative & visual aids Project method • Heuristic method • Peer-teaching • Demonstration	Use of shapes, activities with charts and cards.
Week 3	7-9 Understanding mathematical processes (critical thinking, abstract-concrete) Communication in mathematics classroom Connections (establishing relationship among ideas and facts)	(i) How has mathematics evolved? (ii) Teaching core vocabulary in advance. b. Connections (Establishing relationship among ideas and facts) c. Representation: Abstraction and Symbolic Representation	Discussion with peers and instructor

Week4	10-12	National Curriculum for Mathematics (2006) (Grades I–VIII) The use of mathematics learning in daily	(i)Identifying the underlying philosophy of mathematics in curriculum standards (ii) Student learning outcomes defined in the National Curriculum (iii) Aligning the student learning outcomes with approved textbooks and other resources (iv) The relationship of mathematics to other subjects	Discussion with peers and Instructor
Week 5	13-15	Teachers’ beliefs, perceptions, and attitudes. Defining beliefs, perceptions, and attitudes and discussing their effects on students’ learning	(i)Reviewing research studies conducted in both the Western and the local context in order to identify mathematics teachers’ beliefs about mathematics and its teaching and learning (ii) Identifying common misconceptions people generally have about (learning) maths.	Discussion with peers and instructor
Week 6	16-18	Challenging teachers’ beliefs, perceptions, and attitudes	(i)Identifying their own beliefs and attitudes towards mathematics and its teaching and learning based on their learning experiences in school (ii) Challenging their own beliefs and attitudes towards mathematics and its teaching and learning Week 8: Conceptual learning (iii) What is conceptual learning? (iv) How does conceptual learning make math	Use of research papers to identify new methods of teaching .
Week 7	19-21	Conceptual learning	(i)What is conceptual learning? (ii) How does conceptual learning make mathematics meaningful?	Use of shapes examples from real life, worksheets and use of ICT.
Week 8	22-24	Contextual learning	(i)Contextual learning (ii) How does contextual learning enhance	Lecture notes, Use of worksheets.

Week 9	25-27	<p>understanding? (iii) Cards, use of Introducing different charts. activities based on contextual learning Mid Term</p>	
Week 10	<p>28-30 Reflection on research papers</p>	<p>(i)Searching relevant Research paper research papers that discuss and power point mathematics processes to presentation teach for conceptual understanding (ii) Reviewing the identified research studies (iii) Discussing different teaching practices highlighted in the papers (iv)Writing key lessons learnt or a critical reflection on the reviewed research papers Week 12: Identification of best prac</p>	
Week 11	<p>31-33 Identification of best practices</p>	<p>(i)Discussing the benefits of Use of cards, practices indicated in charts and research across the globe puzzles. (ii) Discussing the usability Mathematics of the identified practices in games a Pakistani context in light of the National Curriculum for Mathematics (iii) Presenting some concrete examples on best practices for teaching mathematical concepts, rules, and formulae Unit</p>	
Week 12	<p>34-36 Assessment techniques and their use in mathematics learning. The difference between assessment and evaluation.</p>	<p>(i)Understanding the Power point purposes and tools of presentation assessment (ii) Different types of assessment (a) Formative assessment (b) Portfolio (c) Project work (d) Mathematical investigation ; Summative</p>	

		assessment Test and rubric construction (iii) Designing questions to promote thinking.	
Week 13	37-39	The integration of ICTs. Exploring mathematics concepts using ICT	(i)Exploring mathematics concepts using ICT (ii) Identifying appropriate and relevant technologies that could facilitate mathematics learning Week resources, including ICT
			Lecture notes, worksheets.
Week 14	40-42	Classroom management. Resource management	(i)Teaching resources, including ICT (ii) Time management (iii) Handling students' responses
			Worksheets, power point presentation.
Week 15	43-45	Unit planning. Key components of unit planning	(i)Different models of lesson planning (a) LES (Launch, Explore, and Summarize) (b) 5E (Engage, Explore, Explain, Elaborate, and Evaluate) (c) 4P (Preparation, Presentation, Practice, and Production) (d) MTA (Motivate, Teach, and Assess)
			Teaching learning activities
Week 16	46-48	Developing unit plans with integrated lesson plans to achieve the unit aims and objectives .	(i)Micro-teaching: Delivering lessons to peers (ii) Reviewing the unit planning based on the feedback received Course assignments and assessment Student Teachers will be assessed using both formative and summative assessment.
			Micro teaching, discussion with peers.
Week 17	Final term		

Assessment Scheme:

Mid Term Marks:40

- i- Lesson planning:5
- ii- Presentation:5
- iii- Mid term exam:30

Total marks 100

Final Term Marks: 60

- i- Assignment :5
- ii- Test : 5
- iii- Final Term Exam: 50

Recommended Books and References:

- 1- Ball, D. L., & Bass, H. (2000). *Interweaving content and pedagogy in teaching and learning to teach: Knowing and using mathematics*. In J. Boaler (Ed.), *Multiple perspectives on mathematics teaching and learning* (pp. 83–104).
- 2- Dossey, J. A. (1992). *The nature of mathematics: Its role and its influence*. In Grouws, D. A. (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 39-48). New York: Macmillan.
- 3- de Lange, J. (2006). *Mathematical literacy for living OECD-PISA perspective*. Utrecht: Freudenthal Institute, Utrecht University.
- 4- Darling-Hammond, L., & Cobb, V. L. (1996). *The changing context of teacher education*. In F. B. Murrey (Ed.), *The instructor's handbook*. San Francisco:
- 5- Jossey-Bass. Dossey, J. A. (1992). *The nature of mathematics: Its role and its influence*. In D. A. Grouws (Ed.), D. A. (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 39–48). New York:
- 6- Leon, B., & Jaworski, B. (Eds.) (1995). *Technology in mathematics teaching: A bridge between teaching and learning*. Chartwell-Bratt.
- 7- Mathematical Association of America (2001). *The mathematical education of teachers*, Washington DC: Conference Board of Mathematical Sciences.
- 8- Macmillan. Fauvel, J., & Jeremy, G. (Eds.). (1990). *The history of mathematics: A reader*. London:
- 9- Macmillan. Lacombe, A. (1995). *Mathematical learning difficulties in the secondary school: Pupils' needs and teacher's role*. Milton Keynes: Open University Press.
- 10- National Council of Teachers of Mathematics (2004). *Handbook of research on mathematics teaching and learning* (p. 111).
- 11- Stone Wiske, M. (1998). *Teaching for understanding: Linking research with practice*. San Francisco: Jossey-Bass Publishers, San Francisco.

12- Westport, CT: Ablex. Ball, D. L., & Cohen, D. K. (Eds.). (1999). *Developing practice, developing practitioners: Towards a practice-based theory of professional education*. San Francisco: Jossey-Bass Publishers.