Course Title: Pedagogy of Teaching Mathematics
Credit Units: 4
Course Code:
Level: UG

L	T	P/ S	SW/F W	TOTAL CREDIT UNITS
3	1	-	-	4

Course Objectives:

After completing this course the pupil-trainees will be able to

- Explain the nature of Mathematics and its historical development with contribution of Mathematicians.
- Describe the aims and objectives of teaching Mathematics at school level.
- Demonstrate and apply skills to select and use different methods of teaching Mathematics.
- Demonstrate competencies of planning for teaching Mathematics, organizing laboratory facilities and equipment designing pupil centered teaching learning experiences.
- Demonstrate skills to design and use various evaluation tools to measure learner achievement in Mathematics.

Student Learning Outcome

- Pupil trainee will be able to develop clear perspective of the nature of mathematics and its historical development with special emphasis on contributions of mathematicians.
- Pupil trainee will be able to acquire skills in teaching mathematics.
- Pupil trainee will be able to recognize mathematics outside the classroom.
- Pupil trainee will be able to acquire competency of selecting and structuring instructional strategies.
- Pupil trainee will be able to develop skill of transacting the different kinds of mathematical knowledge.
- Pupil trainee will be able to develop skills in preparation and use of support materials for teaching specific topics in mathematics.
- Pupil trainee will be able to develop competencies for planning mathematics instruction, developing tools for evaluating mathematical learning, conducting pedagogical analysis, and planning action research.

Course Contents/Syllabus:

	Weightage (%)
MODULE I : Nature of Mathematics	20
Descriptors/Topics • Meaning, Nature, Importance and Value of Mathematics • Axioms, Postulates, Assumptions and Hypothesis in Mathematics • Historical Development of Notations and Number Systems • Contribution of Mathematicians (Ramanujam, Aryabhatta, Bhaskaracharya, Euclid, Pythagoras) • Perspectives on Psychology of Teaching and Learning of Mathematics- Constructivism, Enactivism, Vygotskyian Perspectives, and Zone of Proximal Development	
MODULE II : Objectives and Instructional Planning in Mathematics	20
Descriptors/Topics • Aims and Objectives of Teaching Mathematics in Elementary and Secondary Schools • Bloom's Taxonomy of Educational Objectives and Writing Objectives in Behavioural Terms • Lesson Planning– Importance and Basic Steps. Planning Lesson of Arithmetic, Algebra and Geometry • Unit Planning – Format of A Unit Plan • Pedagogical Analysis: Meaning and Need and Procedure for Conducting Pedagogical Analysis. Classification of Content, Objective, Evaluation, etc	
MODULE III : Strategies for Learning and Teaching Mathematics	20
Descriptors/Topics • Concept Formation and Concept Attainment: Concept Attainment Model for Learning • and Teaching of Concepts • Learning By Exposition: Advanced Organizer Model • Methods of Teaching- Lecture, Discussion, Demonstration, Inductive-Deductive, Analytic-Synthetic, Problem-Solving, And Project • Techniques of Teaching Mathematics: Oral Work, Written Work, Drill-Work, Brain-Storming and Computer Assisted Instruction (CAI) • Creating Different Situations of Learning Engagement: Group Learning, Individual Learning, Small-Group, Cooperative (Peer-Tutoring, Jigsaw, etc.), and Situational/Contextual Learning	
MODULE IV : Teaching-Learning Resources in Mathematics for Students with Disabilities	20
Descriptors/Topics • Mathematics Laboratory- Concept, Need, and Equipment for Setting Up a Mathematics Laboratory • Utilization of Learning Resources in Mathematics: Charts and Pictures, Weighing and Measuring Instruments, Drawing Instruments, Models, Concrete	

Materials, Surveying Instruments With Reference To Children With Disabilities • Bulletin Boards and Mathematics Club • Abacus, Cussionaire Rods, Fractional Discs, Napier Strips Calculators, Computers, Smart Boards, Multimedia Presentations, and Special Aids and Appliances For Children With Disabilities	
MODULE V : Assessment and Evaluation for Mathematics Learning	20
Descriptors/Topics • Assessment and Evaluation- Concept, Importance and Purpose • Error Analysis, Diagnostic Tests, Identification of Hard Spots and Remedial Measures • Tools and Techniques for Formative and Summative Assessments of Learner Achievement in Mathematics, Comprehensive and Continuous Evaluation in Mathematics • Preparation of Diagnostic and Achievement Test • Adaptations in Evaluation Procedure for Students With Disabilities	

Pedagogy for Course Delivery:

- Lecture
- Tutorials
- Presentation and Discussions
- Demonstrations
- Seminar
- Workshop

Lab/ Practicals details, if applicable:

Practical/ Field Engagement/Project Work

Any one of the following

- Pedagogical analysis of a unit of content from secondary school Mathematics Syllabus
- Preparation of a multimedia presentation on a topic with special reference to students with disabilities
- Construction of a question paper based on current CBSE format/concerned State Board of education, preparing its Scoring key, and marking scheme
- Analyzing errors committed by school children in Mathematics and preparing a remedial plan
- Developing an Action Research proposal for a problem related to teaching and learning of Mathematics with reference to students with disabilities

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
20	N.A	80

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment				End Term Examination
Components (Drop down)	Class Test	Project	Attendance	End Term Examination
Weightage (%)	10	5	5	80

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination		
Components (Drop down							
Weightage (%)							

Text & References:

Essential Readings:

- Carey, L.M. (1988). *Measuring and Evaluating School Learning*, Boston: Allyn and Bacon.
- Chambers, P. (2010).*Teaching Mathematics*, Sage Publication, New Delhi.
- Chapman, L.R. (1970). *The Process of Learning Mathematics*, New York: Pregamon Press.
- David, A.H., Maggie, M.K., & Louann, H.L. (2007). *Teaching Mathematics Meaningfully: Solutions for Reaching Struggling Learners*, Canada: Amazon Books.
- David, W. (1988). *How Children Think and Learn*, New York: Blackwell Publishers Ltd.
- Gupta, H. N., & Shankaran, V. (Ed.), (1984). Content-Cum-Methodology of Teaching Mathematics. NCERT, New Delhi.
- James, A. (2005). *Teaching of Mathematics*, New Delhi: Neelkamal Publication.
- Kumar, S. (2009). Teaching of Mathematics, New Delhi: Anmol Publications.
- Mangal, S.K. (1993). *Teaching of Mathematics*, New Delhi: Arya Book Depot.
- Mani, M. N. G. (1992). *Techniques of Teaching Blind Children*, New Delhi: Sterling Publishers.
- Mukhopadhyaya, S., Jangira, N. K., Mani, M.N. G., & Raychaudhary, N. (1987).
- *Sourcebook for Training Teachers of Visually Handicapped*, New Delhi: NCERT.
- Nemeth, A. (1973). *Nemeth Code for Mathematics and Scientific Notation*, Loviseville K: American Printing House.
- Siddhu, K.S. (1990). *Teaching of Mathematics*, New Delhi: Sterling Publishers.

Suggested Readings

- Keeley, P. K., & Cheryl, T. R. (2011). *Mathematics Formative Assessmen*t, Canada: Sage Publications.
- *National Curriculum Framework.* (2005). NCERT, New Delhi: NCERT.
- *National Curriculum Framework for Teacher Education*. (2009). NCTE, New Delhi.
- *Teaching of Mathematics (ES-342), Blocks 1-4.* (2000). IGNOU, New Delhi.
- *Text Books of Mathematics for Class-VI to X.* (2006). NCERT, New Delhi.

Any other Study Material:

- Power Point Presentations
- Resource material collected and compiled from reference books