M.Sc. Mathematics Education

IInd Year of PG Curricular Structure for Two-Year PG Programme (3+2)

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Structure I

Curricular Structure with only Course Work

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Semester III					
Discipline Specific Core (DSC) Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
III.1 DSC 7	Demystifying the power of data: Probability and Statistics	03	00	01	04
III.2 DSC 8	Emerging Trends in Learning Outcome Based Assessment and Evaluation	03	00	01	04
Discipline Specific Elective (DSE) & General Elective (GE) Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
III.3 DSE	**III.3.1** ICT in Mathematics Education	03	01	00	04
	III.3.2 Educational Policy Studies	03	00	01	04
	III.3.3 School Field Experience	01	00	03	04
	III.3.4 Educational Research Design	03	01	00	04
	III.3.5 Computational Thinking and Mathematical Reasoning	02	00	02	04
	III.3.6 Leadership and Governance in Higher Education	03	00	01	04
III.4 GE	**III.4.1** Mental Health and Well-being	03	01	00	04
	III.4.2 Fundamentals of Entrepreneurship	03	00	01	04
Skill Based Course (SBC)					

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Paper No.	Interactive Learning Modules (Paper Title)	Lecture	Tutorial	Practical	Credits
III.5 SBC (3)	**III.5.1** MOOC and E-Learning **III.5.2** Mathematics in Visual Art and Design **III.5.3** Universal Design of Learning	00	00	02	02
Dissertation/Academic Project/Entrepreneurship: Nil					

Total Credits in Semester III: 22
Note-
    The student will study:
● All Discipline Specific Core courses;
● Any Three Discipline Specific Electives (DSE) from (III.3.1 to I.3.6);
    or
    Two DSE from (III.3.1 to III.3.6) and One GE from (III.4.1-III.4.2);
● The student can take one Skill Based Course (SBC (3)) out of the three given options (III.5.1-III.5.3).					

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Semester IV					
Discipline Specific Core (DSC) Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
IV.1 DSC 9	Pedagogical Explorations in Ancient Indian Geometry and Mathematics	03	00	01	04
IV.2 DSC 10	Statistics in Educational Research	03	00	01	04
Discipline Specific Elective (DSE) & General Elective (GE) Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
IV.3 DSE	**IV.3.1** AI and Machine Learning Algorithms for Educational Data Mining	02	00	02	04
	IV.3.2 Education for a Futuristic Paradigm	03	01	00	04
	IV.3.3 Statistical Tools for Research Analysis	02	00	02	04
	IV.3.4 International and Comparative Education	03	01	00	04
	IV.3.5 Education Management and Supervision	03	01	00	04
	IV.3.6 Economics of Education	03	01	00	04
IV.4 GE	**IV.4.1** Guidance and Counselling	03	01	00	04
	IV.4.2 Design Thinking, Innovation and Entrepreneurial Pathways	02	00	02	04
Skill Based Course (SBC)					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
	IV.5.1 Family and Community				

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SBC (4)	Studies				
	IV.5.2 Ethnomathematics and Cultural Practices	00	00	02	02
	IV.5.3 Innovation Skills: Learning from Innovators				
Dissertation/Academic Project/Entrepreneurship: Nil					

Total Credits in Semester IV: 22
Note-
　　　The student will study:
- All Discipline Specific Core courses;
- Any Three Discipline Specific Electives (DSE) from (IV.3.1 to IV.3.6);
  or
  Two DSE from (IV.3.1 to IV.3.6) and One GE from (IV.4.1-IV.4.2);
- The student can take one Skill Based Course (SBC (4)) out of the three given options (IV.5.1-IV.5.3).

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Structure II

Curricular Structure with Course Work + Research

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Semester III					
Discipline Specific Core (DSC) Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
III.1 DSC 7	Demystifying the power of data: Probability and Statistics	03	00	01	04
III.2 DSC 8	Emerging Trends in Learning Outcome Based Assessment and Evaluation	03	00	01	04
Discipline Specific Elective (DSE) & General Elective (GE) Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
III.3 DSE	**III.3.1** ICT in Mathematics Education	03	01	00	04
	III.3.2 Educational Policy Studies	03	00	01	04
	III.3.3 School Field Experience	01	00	03	04
	III.3.4 Educational Research Design	03	01	00	04
III.4 GE	**III.4.1** Mental Health and Well-Being in Education	03	01	00	04
	III.4.2 Fundamental of Entrepreneurship	03	00	01	04
Skill Based Course (SBC): Nil					
Dissertation/Academic Project/Entrepreneurship					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
III.5	Dissertation/Academic Project/Entrepreneurship	-	-	-	06

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Total Credits in Semester III: 22
Note-
· The student will study:
- All Discipline Specific Core courses;
- Any Two Discipline Specific Electives (DSE) from (III.3.1 to III.3.4);
  or
  One DSE from (III.3.1 to III.3.4) and One GE from (III.4.1-III.4.2);
- For those opting for the 'Entrepreneurship' track, one GE related to Entrepreneurship should be studied. For those who opt for writing Dissertation or Academic Projects, they may opt any GE of their choice or study only the DSEs.

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Semester IV					
Discipline Specific Core (DSC) Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
IV.1 DSC 9	Pedagogical Explorations in Ancient Indian Geometry and Mathematics	03	00	01	04
IV.2 DSC 10	Statistics in Educational Research	03	00	01	04
Discipline Specific Elective (DSE) & General Elective (GE) Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
IV.3 DSE	**IV.3.1** AI and Machine Learning Algorithms for Educational Data Mining	02	00	02	04
	IV.3.2 Education for a Futuristic Paradigm	03	01	00	04
	IV.3.3 Statistical Tools for Research Analysis	02	00	02	04
	IV.3.4 International and Comparative Education	03	01	00	04
IV.4 GE	**IV.4.1** Guidance and Counselling	03	01	00	04
	IV.4.2 Design Thinking, Innovation and Entrepreneurial Pathways	02	00	02	04
Skill Based Course (SBC): Nil					
Dissertation/Academic Project/Entrepreneurship					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
IV.5	Dissertation/Academic Project/Entrepreneurship	-	-	-	06

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Total Credits in Semester IV: 22
Note-
· The student will study:
- All Discipline Specific Core courses;
- Any Two Discipline Specific Electives (DSE) from (IV.3.1 to IV.3.4);
  or
  One DSE from (IV.3.1 to IV.3.4) and One GE from (IV.4.1-IV.4.2);
- For those opting for the 'Entrepreneurship' track, one GE related to Entrepreneurship should be studied. For those who opt for writing Dissertation or Academic Projects, they may opt any GE of their choice or study only the DSEs.

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Structure III

Curricular Structure with only Research

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Semester III					
Discipline Specific Core Courses (DSC)					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
III.1 DSC 7	Foundations of Teacher Education: Theory, Practice and Research	03	01	00	04
Discipline Specific Elective Courses (DSE)					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
III.2 DSE	**III.2.1** ICT in Mathematics Education	03	01	00	04
	III.2.2 Educational Policy Studies	03	00	01	04
	III.2.3 School Field Experience	01	00	03	04
	III.2.4 Educational Research Design	03	01	00	04
Research Methods/Tools/Writing Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
III.3	Advanced Research Methodology	02	00	00	02
III.4	Research and Statistical Tools in Mathematics Education	00	00	02	02
Problem-Based Research Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
III.5	Problem-Based Research	-	-	-	10
Total Credits in Semester III: 22					

Total Credits in Semester III: 22

   Note-

   The student will study:

   ● All Discipline Specific Core courses;
   ● Any One Discipline Specific Electives (DSE) from (III.2.1 to III.2.4);
   ● All Research Methods/Tools/Writing Courses.

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Semester IV					
Discipline Specific Core Courses (DSC): Nil					
Discipline Specific Elective Courses (DSE)					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
IV.1 DSE	**IV.1.1** AI and Machine Learning Algorithms for Educational Data Mining	02	00	02	04
	IV.1.2 Education for a Futuristic Paradigm	03	01	00	04
	IV.1.3 Statistical Tools for Research Analysis	02	00	02	04
	IV.1.4 International and Comparative Education	03	01	00	04
Research Methods/Tools/Writing Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
IV.2	Techniques of Research Writing	01	01	00	02
Problem-Based Research Courses					
Paper No.	**Interactive Learning Modules (Paper Title)**	**Lecture**	**Tutorial**	**Practical**	**Credits**
IV.3	Problem-Based Research	-	-	-	16

Total Credits in Semester IV: 22
   Note-
     The student will study:
     ● Any One Discipline Specific Electives (DSE) from (IV.1.1 to IV.1.4);

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STRUCTURE -I (SEMESTRER -III)
SYLLABUS

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Discipline Specific Core (DSC): 04 Credits

DSC 7 (III.1) Demystifying the Power of Data: Probability and Statistics
Discipline Specific Core

1. Credit Distribution of the course

Course title & Code DSC 7 (III.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Demystifying the Power of Data: Probability and Statistics	4	3	0	1	Undergraduate	NIL

2. Learning Objectives

This paper aims to provide a basic understanding of the uncertainty in decision-making, testing sample compatibility in day-to-day applications. Students will gain insights into the concepts, contexts, and the tools used to understand these uncertainties. This course will concentrate on probability, random variables, distributions, concepts of the central limit theorem, joint, marginal, and conditional distributions, and computer programs in R and its application to simple models, hypothesis testing, and interval estimation. This course will also expose the students to various real-life applications of probability and statistics.

3. Learning Outcomes

- A good understanding of application of Statistics to daily life problems.
- Able to describe probability distributions and hypothesis formation.
- Able to represent data both graphically and numerically.
- Able to statistically analyze data.
- Create projects using fundamental knowledge in order to provide a hands-on experience of the same.
- Able to work on statistical package R.
- Make data driven and statistically robust decisions in probability based real-life applications.

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4. Syllabus **[45 hours]**

Unit I Probability and Random Variables - Sample spaces and events, random experiments, axioms of probability, intersections of events and multiplication and total probability rules, independence, Bayes' theorem, conditional probability, random variables, real life probability problems. **[12 hours]**

Unit II Probability Distributions - Discrete distributions (Bernoulli, binomial, and Poisson) with their properties and applications, Continuous distributions (Uniform, Normal, Exponential) with their properties and applications, concept of central limit theorem.
[12 hours]

Unit III Curve fitting and Regression Models using R - Joint, marginal, and conditional distributions, curve fitting, regression model, test statistic and their significance. Computer program in R and its application to simple models. **[12 hours]**

Unit IV: Sampling and Testing of Hypothesis - Sampling distributions, hypothesis testing, interval estimation, p-value interpretation, Type I/II errors. **[9 hours]**

5. Practicals **[30 hours]**

● Statistical procedures and their implementation through the statistical package R
● Data import from CSV/excel, cleaning and arranging.
● Introduction to basic syntax of R for arithmetic operations, creating arrays and matrices
● Getting data into R
● Visualization and basic data analysis in R
● Case study: Problems with data
● Mini projects using real, publicly available datasets from different domains

6. Essential Readings

● Bowker, B. & Liberman, G.J. (1972). *Engineering Statistics.* Asia.
● Hogg, R.V. & Tanis, E.A. (1983). *Probability and Statistical Inference*, Macmilan.
● Johnson, N.L. & Leone, F.C. (1977). *Statistics and Experimental Design in Engineering and the Physical Sciences*, Vol. I and II, Wiley Inter Science.
● Montgomery, D.C., Fricker, R. & Rigdon, S.E. (2024). *Introduction to Probability and Statistics for Data Science: With R*. Cambridge University Press.
● Matloff, N. (2020). *Probability and Statistics for Data Science: Math + R + Data.* CRC Press.
● Chan, S.H. (2021). *Introduction to Probability for Data Science.* Michigan Publisher.

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7. Suggestive Readings

- Montgomery, D.C. & Runger, G.C. (2018). *Applied Statistics and Probability for Engineers*, 7th edition. John Wiley and Sons.
- Miller, I., Freund's, J.E. & Johnson, R.A. (2017). *Probability and Statistics for Engineers*, 9th edition. Pearson.

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DSC 8 (III.2) Emerging Trends in Learning Outcome Based Assessment and Evaluation
Discipline Specific Core

1. Credit Distribution of the course

Course title & Code DSC 8 (III.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Emerging Trends in Learning Outcome Based Assessment and Evaluation	**4**	**3**	**0**	**1**	**Undergraduate**	**NIL**

2. Learning Objectives

The course aims to develop a critical understanding of learning outcome-based assessment, and evaluation within the educational landscape focusing on how changing theories, technologies, and global practices shape the evaluation perspectives of learning. It goes beyond conventional testing methods to investigate learner centric assessment processes that support, evaluate, and enhance personalized learning. Additionally, the course experience will emphasize the importance of students as partners in the assessment process and how it influences the NEP 2020 aligned principles of equity, inclusion, and excellence. Learners will gain practical experiences of both classroom assessment strategies, systemic innovations, AI integrated adaptive assessment, examining how feedback, analytics, and culturally responsive practices can foster learning and promote a culture of learner centric assessment.

3. Learning Outcomes ·

- Distinguish between assessment & evaluation and using assessment dossiers for personalized learning;
- Explain the concept of assessment with special focus on holistic assessment, learning outcomes & competency-based assessment, continuous & comprehensive assessment, assessment of/for/by learning;
- Design, evaluate, and use assessment rubrics for evidence-based decision-making and learning improvement;

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- Critically examine innovations and global trends in assessment practices and its relevance in Indian context;
- Integrate NEP aligned assessment principles of fairness, validity, reliability, and inclusivity in assessment design.

4. Syllabus [45 hours]

Unit 1 Assessment, Evaluation, and Beyond: Changing Paradigms - Evolution of assessment, evaluation, and measurement; Assessment for learning, of learning, and through learning; Assessment as evidence of what is learned vs what is not learned (learning deficit model), Marks/grades-based assessment vs learning outcomes based evaluation, Emerging paradigms: Authentic assessment, diagnostic assessment , performance based assessment, culturally responsive and social context-sensitive assessment practices. **[12 hours]**

Unit II Learner Engagement, Teacher Agency, and Ethical Frameworks in Assessment - Key Stakeholders in Assessment; Functions of students, teachers, institutional leaders, and policy systems in designing, interpreting, and using assessment outcomes; learner's role as an active participant in assessment through self-assessment, peer-feedback, and reflective practices, Academic integrity, ethical code of conduct and challenges of plagiarism; Fairness, transparency, and authenticity in teacher-led assessment. **[12 hours]**

Unit III Strategies and Innovations in Assessment - Assessment strategies: formative, diagnostic, summative, and authentic approaches; Innovations in assessment: e-assessment, AI-based adaptative assessment, learning analytics, portfolios, and gamification; Reliability, validity, and quality assurance in assessment results; Standardized testing and grading; Achieving and scaling learning improvement through evidence-based assessment; Assessment insights for teachers, schools and policymakers. **[12 hours]**

Unit IV Assessment for Improvement, Equity, and Global Comparability - Using assessment data for learning improvement and accountability; Addressing learning gaps, inclusion, and excellence; NEP aligned assessment principles for inclusivity, fairness, and responsibility, Issues of misuse of test data, consequences of high-stakes testing, and the ethics of AI-based evaluation systems; Global and comparative perspectives and assessment reforms (OECD, PISA, TIMSS, NAEP); Meta-trends in assessment research. **[9 hours]**

5. Practical [30 hours]

- Analyse assessment systems across two boards (CBSE/IB/Cambridge).
- Construct and validate a feedback questionnaire and implement it with a small group of math students. Prepare a summary report.
- Develop a prototype of a digital or performance-based assessment tool for secondary grade math students.
- Examine how formative assessment improved learning outcomes. Use classroom observation details.

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- Evaluate a standardized assessment instrument for bias and cultural sensitivity; suggest modifications for inclusivity.
- Design a holistic assessment plan for primary grade students.
- Prepare an assessment blueprint for assessment for/of/through learning for any math unit of your choice.
- Design a mathematical game as an assessment tool. Develop a rubric for evaluation.
- Design a diagnostic assessment tool for any math topic of your choice.

6. Essential Readings

- Brookhart, S. (2013). *How to Create and Use Rubrics for Formative Assessment and Grading.* ASCD.
- Richard, J.S. (2014). *Revolutionize Assessment (Ed. 1).* Corwin Press.
- Earl, L. (2013). *Assessment as Learning.* Corwin Press.
- Black, P. & Wiliam, D. (1998). *Inside the Black Box: Raising Standards Through Classroom Assessment.* United Kingdom: GL Assessment.

7. Suggestive Readings

- OECD (2020). *The Future of Education and Skills 2030: Assessment for Learning.*
- Secolsky, C. & Denison, B.D. (2018). *Handbook on Measurement, Assessment, and Evaluation in Higher Education.* Routledge.
- Black, P. & William, D. (1998). *Assessment and Classroom Learning.* Assessment in Education: Principles, Policy & Practice, 5(1), 7-74. https://doi.org/10.1080/0969595980050102

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Discipline Specific Electives (DSE): 04 Credits

DSE (III.3.1) ICT in Mathematics Education
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.3.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
ICT in Mathematics Education	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

ICT has a transformative impact on teaching learning practices and education administration. Blended learning is no more a choice but a norm. This course focuses on reviewing contemporary knowledge on this broad area of research. The course focuses on developing rigorous understanding of pros and cons of all aspects of ICT, impact of ICT in education in general and its impact on Mathematics Education in particular.

3. Learning Outcomes

- Scope and impact of emerging ICT in education
- Means of ICT
- ICT tools in teaching
- ICT for inclusive classroom
- Safety, security, misuse and psychological concerns of ICT usage

4. Syllabus [45 hours]

Unit I ICT in Curriculum and Pedagogy - TPCK framework. Instrumental Orchestration. Place and purpose of ICT in the curriculum, Means of ICT. ICT embedded pedagogy. Digital resources. Content planning and curriculum designing using ICT. Role of ICT in content differentiation. Models of Blended learning. ICT and self-paced learning. ICT for inclusive classrooms. **[12 hours]**

Unit II ICT Tools and Classroom Discourse - Augmenting teaching-learning process using social networks, blogs, discussion forums etc. Online teaching and learning. ICT tools for

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assessment. Analytics for monitoring progress and achievements. Learning Management Systems. School management ERP.   **[12 hours]**

Unit III Scope and Challenges of using ICT in Education - Technology in the hands of teacher and student. e-content versus authentic information. Cybercrime, Software Piracy, Online bullying, Privacy concerns.   **[12 hours]**

Unit IV Ethical Practices of Using ICT - Plagiarism and fair use of ICT. Socio-economic and ethical aspects of adopting ICT.   **[9 hours]**

5. Tutorials   **[15 hours]**

- Searching current, high impact research publications, reviews, and case studies;
- How to read and summarize research papers;
- Propose methods to overcome ICT phobia;
- Design innovative assessment tools and analytics;
- Online Repository of digital resources for mathematics education;

6. Essential Readings

- Moursund, D. (2005). *Introduction to Information and Communication Technology in Education*. Teacher Education, University of Oregon.
- UNESCO (2012). *ICT in Primary Education: Analytical survey*.
- Athanassios, J. (ed.) (2012). *Research on e-Learning and ICT in Education*. Springer
- Oldknow, A., Taylor R. & Tetlow, L. (2010). *Teaching Mathematics Using ICT 3rd Edition*. Continuum International Publishing Group.

7. Suggestive Readings

- Abbott, C. (2001). *ICT: Changing Education*. Psychology Press.
- Kozma, R.B. (2003). *Technology, Innovation, and Educational Change: A Global Perspective: A Report of the Second Information Technology in Education Study, Module 2*. International Society for Technology in Education.
- Wilder, S.J. & Pimm, D. (2004). *Teaching Secondary Mathematics with ICT*. McGraw-Hill International.

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DSE (III.3.2) Educational Policy Studies
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
DSE (III.3.2)		Lecture	Tutorial	Practical/ Practice		
Educational Policy Studies	4	3	0	1	Undergr aduate	NIL

2. Learning Objectives

This course provides students with the theoretical understanding and practical competencies required to engage with educational policy processes. It emphasizes skills in policy interpretation, critical analysis, evidence-based reasoning, and policy evaluation. Students examine how historical, political, social, and economic forces shape educational policy at national and global levels. Through NEP 2020 and other key documents, students learn to apply conceptual and empirical frameworks to analyze, critique, and design effective policy implementation strategies.

3. Learning Outcomes

- Demonstrate conceptual clarity and analytical skills to explain the nature, scope, and stages of educational policy formulation.
- Use historical and philosophical reasoning to understand the foundations of educational policy in India.
- Critically evaluate Indian and global education policies using equity, access, inclusion, and quality-based frameworks.
- Apply policy analysis models and evidence-based tools to interpret, review, and critique policy documents.
- Develop competencies in drafting policy briefs, conducting policy reviews, and designing implementation strategies appropriate to educational contexts.

4. Syllabus **[45 hours]**

Unit I Conceptual Foundations of Educational Policy — Philosophical, sociological, political, economic, and critical theories that shape educational policies at national and global levels. Major foundational ideas—idealism, pragmatism, humanism, functionalism, conflict

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theory, human capital theory, neoliberalism, feminist theory, and indigenous perspectives focusing on how values, ideologies, and power dynamics influence policy design, goals, and implementation. **[8 hours]**

Unit II Contemporary Concerns of Policies and Practices — Education policy in colonial and post-independence India, major commissions and committees in Indian education (e.g., Kothari Commission, NPE 1968, 1986, 1992). SSA, RMSA, RUSA. Constitutional provisions for education: Article 21A, Right to Education Act (RTE) 2009, and state dimensions. Right to Information Act, Delors Commission, National Knowledge Commission, NCF for School, Teacher Education. Issues and Challenges in Indian Education. Teacher Education. Problem, Issues and Challenges in Indian Education. **[14 hours]**

Unit III Major Policy Frameworks and Global Perspectives — National Education Policy (NEP 2020): vision, reforms, and implementation challenges. Comparison with previous policies: continuity and change. Global initiatives: Education for All (EFA), Sustainable Development Goals (SDG 4), and UNESCO frameworks. Role of international agencies (UNESCO, UNICEF, World Bank) in shaping education policy. **[12 hours]**

Unit IV Policy Analysis and Implementation Research in Education — Approaches to policy analysis: political, economic, sociological, and critical. Models of policy analysis. Role of school leadership, teachers, and community in policy implementation. Tools for policy analysis SWOT. **[11 hours]**

5. Practicals **[30 hours]**

- Prepare a comprehensive report on a national or state education policy document.
- Write a review article on the application of any one Indian education policy.
- Presentation on NEP 2020 implementation strategies.
- Case studies of successful and failed education policy implementations in India.
- Prepare a comparative report on two educational policies (e.g., NEP 2020 and Education for All, or RTE Act and Sarva Shiksha Abhiyan), highlighting key similarities, differences, and impact on access and quality.

6. Essential Readings

- Government of India (2020). *National Education Policy 2020.* Ministry of Education, New Delhi.
- Kothari Commission Report (1964–66). *Education and National Development.* Ministry of Education, Government of India.
- National Policy on Education (1986, modified 1992). Ministry of Human Resource Development, New Delhi.
- UNESCO (2015). *Rethinking Education: Towards a Global Common Good?* Paris: UNESCO Publishing.
- NCERT (2017). *School Education Policies in India: Historical Overview and Future Directions.* New Delhi: NCERT.

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7. Suggestive Readings

- Ball, S. J., & Bowe, R. (1992). *Reforming Education and Changing Schools: Case Studies in Policy Sociology.* Routledge.
- Levin, H. M. (1998). *Educational Reform: Its Meaning and Role in Policy Making.* Falmer Press.
- Weaver-Hightower, M. (2008). *An Ecology Metaphor for Educational Policy Analysis: A Call to Complexity.* Educational Researcher, 37(3), 153–167.
- Apple, M. W. (2004). *Ideology and Curriculum.* Routledge Falmer.
- Ball, S. J. (2013). *The Education Debate.* Policy Press.
- Jandhyala, B. G. Tilak (2019). *Education and Development in India: Essays on Policy, Process and Practice.* Orient BlackSwan.

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DSE (III.3.3) School Field Experience
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.3.3)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
School Field Experience	4	1	0	3	Undergraduate	NIL

2. Learning Objectives

This course provides students exposure to teaching-learning practices, curriculum implementation, and learner development in real school settings. Students will engage with government schools or alternative educational organizations to explore developmental perspectives in mathematics education. The experience is designed to integrate theory with practice, develop observation and analytical skills, and encourage reflective professional growth. The course also enables students to identify a classroom-based problem, collect data, implement an intervention, and analyze outcomes. Students learn how to conduct small-scale educational research projects within schools.

3. Learning Outcomes

- Apply developmental and pedagogical theories in real classroom contexts.
- Identify learner difficulties and adapt teaching strategies effectively.
- Conduct small-scale applied research in mathematics education.
- Critically reflect on teaching-learning practices and professional growth.
- Work collaboratively and independently in field-based educational projects.
- Document daily insights with a research lens, linking practice to evidence, theory, and inquiry.

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Syllabus **[15 hours]**

Unit I   School as an Educational Experience - School as a socio-cultural and learning environment, Vision, mission, and institutional ethos, Structural organization, roles, and responsibilities of school personnel, School as a space for curriculum transaction and hidden curriculum, Community-school linkages and social participation (SMC, PTA, local governance), Policies shaping school functioning (RTE, NEP 2020 provisions), Student diversity, inclusion, and equity issues. **[7 hours]**

Unit II Classroom processes: seating, grouping, interaction patterns - Teacher's role: facilitation, questioning, scaffolding, differentiation, Understanding learner behaviour, engagement, misconceptions in mathematics, Forms of assessment used: diagnostic, formative, summative, Intervention planning: TLM development, activity-based learning, micro-teaching, Maintaining a Pro-Journal: Daily reflections, Observation summaries, Evidence-based insights, Self-evaluation and goal-setting, Ethical conduct and professional behaviour during internship. **[8 hours]**

5. Practicals **[90 hours]**

- Prepare a School Profile Report covering vision, mission, structure, timetable, and staff organization.
- Study record maintenance (attendance, assessment, staff registers).
- Analyze school management committee (SMC) functions and community participation.
- Observe the physical and digital infrastructure of the school.
- Prepare a classroom observation report with critical reflection.
- Participate in timetable preparation, duty rosters, or co-curricular scheduling.
- Assist in managing assemblies, parent-teacher meetings, or community events.
- Observe administrative decision-making and documentation processes.
- Discuss school budgeting, resource mobilization, and institutional planning.
- Organize or participate in cultural programs, exhibitions, sports, or literacy drives.
- Coordinate parent-teacher meetings, awareness campaigns, or school clubs.
- Conduct a workshop or seminar for students or teachers on relevant topics
- Maintain a reflective internship diary throughout the internship period.
- Prepare a reflective report summarizing the internship experience.
- Planning and execution of lesson plans and TLM; peer observation; school projects; math fairs; designing math theme walls.
- Conduct small-scale educational research projects within schools.

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6. Essential Readings

- NCERT (2005). *National Curriculum Framework for School Education. NCERT.*
- NEP (2020). Ministry of Education, Government of India. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- National Council of Educational Research and Training. (2022). *National curriculum framework for school education.* NCERT.

7. Suggestive Readings

- Zeichner, K. (2010). *Rethinking the connections between campus courses and field experiences in college and university based teacher education.* Journal of Teacher Education, 61(1-2), 89–99. https://doi.org/10.1177/0022487109347671
- Passi, B.K. (1976). *Becoming Better Teachers: Microteaching Approach. http://125.22.75.155:8080/jspui/handle/123456789/4828?mode=full*

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DSE (III.3.4) Educational Research Design
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.3.4)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Educational Research Design	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

This course deepens the students' understanding of research paradigms, quantitative and qualitative designs, mixed-method approaches, and advanced data analysis techniques in educational research. It focuses on developing competence in formulating complex research problems, designing robust studies, using statistical and qualitative tools, and interpreting data ethically and meaningfully.

3. Learning Outcome

- Articulate the theoretical and philosophical underpinnings of different research paradigms.
- Design and execute advanced quantitative, qualitative, and mixed-method studies.
- Apply statistical and interpretive tools for meaningful data analysis.
- Develop and validate research tools using reliability and validity measures.
- Demonstrate ethical and scholarly competence in research writing and reporting.

4. Syllabus   **[45 hours]**

Unit I Philosophical and Paradigmatic Foundations of Research - Nature and purpose of educational research, Ontological, epistemological, and methodological assumptions, Positivist, interpretivist, and critical paradigms, Emerging paradigms: postmodernism, feminist research, indigenous research traditions, Ethical issues in advanced research.
[12 hours]

Unit II Quantitative Research: Advanced Designs and Techniques - Experimental, quasi-experimental, and ex-post facto designs; longitudinal, causal-comparative, and multivariate designs. Mixed-Methods and Action Research.   **[9 hours]**

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Unit III Qualitative Research: Approaches and Analysis - Qualitative designs: ethnography, case study, phenomenology, grounded theory, narrative inquiry, Data collection methods: interview, observation, document analysis, Data analysis: thematic analysis, trustworthiness, reflexivity, and triangulation.   **[12 hours]**

Unit IV Proposal Development, Data Interpretation, and Reporting - Structure of a research proposal, Review of literature: synthesis and critical analysis, Data interpretation and visualization, APA 7th edition referencing style and citation management (Zotero/Mendeley), Academic writing for journals, dissertations, and reports, Reporting qualitative findings.   **[12 hours]**

5. Tutorials   [15 hours]

- Prepare a research proposal using a selected methodology.
- Conduct a pilot study with data collection and preliminary analysis.
- Conduct a mini qualitative study (e.g., case study/interview-based inquiry).
- Write a review paper or conceptual framework based on recent research literature.

6. Essential Readings

- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches.* Sage Publications.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education.* Routledge.
- Kothari, C. R., & Garg, G. (2019). *Research Methodology: Methods and Techniques.* New Age International.

7. Suggestive Reading

- Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook.* Sage.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2015). *How to Design and Evaluate Research in Education.* McGraw-Hill.
- Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and Conducting Mixed Methods Research.* Sage.

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DSE (III.3.5) Computational Thinking and Mathematical Reasoning
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.3.5)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Computational Thinking and Mathematical Reasoning	4	2	0	2	Undergr aduate	NIL

2. Learning Objectives

This course develops an understanding of how computational thinking can enhance mathematical reasoning and problem solving in learners. It examines the meta cognitive foundations of pattern recognition, abstraction, logical inference, generalization, decomposition and algorithmic generation and connects these with the structures of mathematical thinking. It proposes pedagogical strategies linking processes of computational thinking along with digital tools, modeling environments, and real classroom scenarios, Students will explore the foundations of reasoning and logic, examine classroom practices that foster these skills, and integrate the digital environments in fostering computational thinking.

3. Learning Outcomes

After completing this course, students should be able to:

- Explain the nature and key dimensions of computational thinking and its relation to mathematical structures;
- Review and reflect on major theoretical perspectives on mathematical cognition and thinking processes;
- Apply metacognition skills in delineating the process of computational thinking and algorithm building;
- Integrate computational thinking into curriculum design, lesson planning, and assessment;
- Process reflective teaching-learning practices that promote reasoning, systems of proof, and creative problem solving.

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4. Syllabus [30 hours]

Unit I Perspectives and Foundations of Computational Thinking - Evolution of Computational Thinking (CT) and its' role in mathematical reasoning; Constructs of CT: decomposition, pattern recognition, abstraction, and algorithmic design; CT, problem-solving and creativity; Positioning CT in pedagogical structures, educational frameworks and global policy directions. **[8 hours]**

Unit II Cognitive Foundations of Mathematical Reasoning - Mathematical Reasoning (MR): inductive, dedicative, analogical, abductive; Cognitive theories on mathematical thinking (Piaget, Vygotsky, Bruner, Polya); Mathematical proofs, argumentation, reasoning and explanations; Mathematical reasoning, misconceptions and errors. **[6 hours]**

Unit III Computational Thinking and Mathematical Reasoning - Relation between computational and mathematical thinking; Abstraction and generalization in CT and MR; Algorithms generation using expressions of reasoning; Pseudocode and flow representation; Data modelling, simulation and visualization using dynamic and graphic software; Computational activities and algorithm development. **[8 hours]**

Unit IV Logical and algorithmic thinking - CT framework illustration from math curriculum; Pedagogical strategies for CT integration through reflective and evidence based classroom practices. **[8 hours]**

5. Practical [60 hours]
- Developing and verifying algorithm for everyday mathematical task
- Creating patterns and generalization using GeoGebra
- Visual and computational exploration using GeoGebra
- Creating flowchart with/without loops for computational approach
- Computational verification for formal mathematical proofs
- Designing CT integrated word problems
- Developing CT based project and lesson planning

6. Essential Readings
- Shute V., Sun C. & Asbell-Clarke J. (2021). *Demystifying Computational Thinking.* Educational Research Review 31.
- Stylianides A. (2020). *Reasoning and Proving in Mathematics Education.* Springer.
- Sengupta P., Farris A.V. & Lee V.R. (2022). *Integrating Computational Modelling in STEM Education.* Routledge.

7. Suggestive Readings

- Mailund, T. (2021). *Introduction to Computational Thinking*. Springer.
- Wing J.M. (2024). *Computational Thinking: A 21st-Century Skill for Everyone.* Communications of the ACM.

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DSE (III.3.6) Leadership and Governance in Higher Education
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
DSE (III.3.6)		Lecture	Tutorial	Practical/ Practice		
Leadership and Governance in Higher Education	4	3	0	1	Undergraduate	NIL

2. Learning Objectives

This course aims to develop a deep understanding of the foundations of leadership, management, and governance in higher education institutions (HEIs). It explores the conceptual and operational pillars of academic leadership and how institutional autonomy & accountability guides strategic planning. Drawing upon case studies and best practices in HEIs both from Indian and global contexts, the course enables learners to analyze how leaders can create inclusive, ethically sound and stimulating ecosystems for teaching, research, and community engagement.

3. Learning Outcomes

- Understand the symbiotic relation between leadership and governance in higher education;
- Analyse different leadership styles and governance models in HEIs;
- Examine models of institutional governance, decision-making processes and transformational practices in academic leadership;
- Analyse the implications of NEP 2020 and global policy frameworks for higher education governance.

4. Syllabus [45 hours]

Unit I Foundations of Leadership and Governance in HEIs - Relationship between leadership, governance and management; Evolution of governance in universities: from collegiality to managerialism; Distributed and visionary leadership, institutional excellence and social responsibility. **[12 hours]**

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Unit II Theories and Models of Leadership in Education - Classical and modern leadership theories (trait, situational, transformational, and distributed models); Leadership styles and institutional culture; Institutional autonomy, accountability, and academic freedom.

[9 hours]

Unit III Governance Structures in HEIs - Institution and regulatory frameworks: Institution conception, vision and mission; Bylaws and policies, Statutory bodies, Affiliation and accreditation, Professional, technical, liberal and vocational institutions; Indian higher-education governance (UGC, AICTE, NCTE, NMC, BCI and professional bodies). **[12 hours]**

Unit IV Strategic Leadership, Excellence and Innovation - Leading institutional change, innovation and performance indicators; Academic and administrative excellence through data driven decisions; Quality assurance and accreditation systems (NAAC, NIRF, QS, THE); Institutional development plans and funding frameworks (RUSA, HEFA); NEP 2020 principles of "light-but-tight" regulation. **[12 hours]**

5. Practical **[30 hour]**

- Institutional governance mapping by analysing formal and functional structure of leadership and decision-making of any HEI
- Compare the governance structure and IDP of a professional and liberal HEIs
- Prepare a comparative analysis of different accreditation bodies and its impact on institutions ranking
- Case study of leadership styles of three different HEIs leaders
- An analytical report describing the governance framework of any HEI and suggesting one improvement aligned with NEP 2020 principles of "light-but-tight" regulation
- Prepare a governance audit report using NAAC/UGC Framework
- Prepare a visual organisation structure chart showing decision flows, reporting and accountability.

6. Essential Readings

- Bush, T. (2020). *Theories of Educational Leadership and Management.* Sage.
- Shattock, M. (2021). *University Governance in the Twenty-First Century.* Routledge.
- NEP 2020. *Ministry of Education, Government of India.*
- UGC Guidelines for Transforming Higher Education Institutions into Multidisciplinary. Institutionshttps://www.ugc.gov.in/pdfnews/5599305_Guidelines-for-Transforming-Higher-Education-Institutions-into-Multidisciplinary-Institutions.pdf

7. Suggestive Readings

- Gurr, D. & Liu, P. (2024). *Educational Leadership Preparation and Development.* Springer.
- Tomlinson, H. (2004). *Educational Leadership: Personal Growth for Professional Development.* Sage Publication.

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General Elective (GE): 04 Credits

GE (III.4.1) Mental Health and Well-being
General Elective

1. Credit Distribution of the Course

Course title & Code GE (III.4.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Mental Health and Well-being	4	3	1	0	Undergraduate	NIL

2. Learning Objectives

This course focuses on understanding the concepts, determinants, and strategies for promoting mental health and psychological well-being in educational contexts. It helps teacher educators and school leaders develop insight into students' mental health needs, resilience, stress management, and emotional intelligence. The course also explores institutional and community-based interventions for fostering positive mental health in schools.

3. Learning Outcomes

- Explain key concepts and determinants of mental health and well-being.
- Identify symptoms and causes of common mental health problems in schools.
- Apply psychological and educational strategies for promoting well-being.
- Integrate socio-emotional learning (SEL) and mindfulness into school curricula.
- Design intervention and support systems for positive school mental health.

4. Syllabus [45 hours]

Unit I Understanding Mental Health and Well-being - Meaning, nature, and dimensions of mental health and well-being. Determinants of mental health: biological, psychological, and social factors. WHO and NCERT perspectives on school mental health. Theories and models of well-being. Role of education in promoting positive mental health. **[12 hours]**

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Unit II Mental Health Concerns in Educational Settings - Mental health issues in childhood and adolescence: anxiety, depression, ADHD, conduct disorders, and learning difficulties. Teacher stress, burnout, and coping mechanisms; stigma and myths about mental illness. Gender inclusion and socio-cultural influences on mental health. Role of family, peers, and school environment. **[12 hours]**

Unit III Promoting Mental Health and Well-being in Schools - Preventive and promotive approaches: school-based interventions. Emotional intelligence, resilience, mindfulness, and positive psychology. Guidance and counselling services for mental health. Integrating well-being into curriculum and pedagogy. **[9 hours]**

Unit IV Policies, Programmes, and Emerging Issues - National Mental Health Programme (NMHP), School Health Programme, and NEP 2020 recommendations. Role of NCERT, NIMHANS, and UNESCO in promoting mental health education. Use of ICT and social media: impact on mental health. Ethics, confidentiality, and crisis intervention in school settings. **[12 hours]**

5. Tutorials **[15 hours]**

- Case study of students with mental health challenges.
- Conducting a workshop/seminar on stress management or emotional literacy.
- Reflective journal on one's own mental health journey.

6. Essential Readings

- NIMHANS (2018). *School Mental Health Manual for Teachers.* Bengaluru.
- NCERT (2020). *Guidelines on School Mental Health Programmes.* New Delhi.

7. Suggestive Readings

- World Health Organization (2020). *Promoting Mental Health: Concepts and Evidence.* Geneva.
- WHO (2022): *Mental Health Action Plan* 2013–2030 – https://www.who.int

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GE (III.4.2) Fundamentals of Entrepreneurship
General Elective

1. Credit Distribution of the Course

Course title & Code GE (III.4.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Fundamentals of Entrepreneurship	4	3	0	1	Undergr aduate	NIL

2. Learning Objectives

The course aims to develop entrepreneurial skills among students to transform educational challenges into social impact initiatives. This course provides an understanding of the foundational concepts, processes, and applications of entrepreneurship with special focus on educational entrepreneurship. It allows students to investigate how entrepreneurial thinking can be incorporated into education to boost creativity, innovation, and employability. The course combines theoretical foundations, case analysis, and project work.

3. Learning Outcomes

- Demonstrate understanding of entrepreneurial concepts and processes.
- Identify and design innovative educational ventures or projects.
- Examine national and institutional initiatives to promote entrepreneurship in education.
- Apply entrepreneurial skills to curriculum design, educational leadership, and teacher development.
- Exhibit entrepreneurial competencies: problem-solving, innovation, and leadership.

4. Syllabus   [45 hours]

Unit I Introduction to Entrepreneurship - Concept, meaning, and scope of entrepreneurship, Evolution and types of entrepreneurship: Business, social, and educational, Entrepreneur vs. Manager vs. Intrapreneur, Role of entrepreneurship in economic and educational development, Entrepreneurial ecosystem in India.   **[9 hours]**

Unit II The Entrepreneur: Traits, Competencies, and Motivation - Characteristics of successful entrepreneurs, Entrepreneurial motivation and leadership, Creativity and

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innovation in entrepreneurship, Emotional intelligence and risk management, Case studies of educational and social entrepreneurs (e.g., Teach For India, Khan Academy, Akshaya Patra Foundation). **[12 hours]**

Unit III Entrepreneurship in Education and Policy Framework - Role of incubation centers (e.g. Atal Tinkering Labs, Startup India), Entrepreneurship development in teacher education institutions, Role of ICT, digital platforms, and open education in entrepreneurial innovation, Identifying educational needs and business opportunities. **[12 hours]**

Unit IV Project Planning and Management in Education - Project proposal writing and feasibility analysis, Resource mobilization and financial planning, Legal aspects, registration, and institutional supports (MSME, NIESBUD, EDII, etc.), Developing entrepreneurial attitudes among teacher educators. **[12 hours]**

5. Practicals **[30 hours]**

- Preparation and presentation of an innovative educational venture or model.
- Develop a business plan or project proposal for an educational or training venture.
- Conduct a case study of a successful educational entrepreneur or social enterprise.
- Organize a workshop or seminar on innovation and startup culture in education.
- Develop an entrepreneurial training module for pre-service teachers.
- Undertake a micro-project on school-based income-generating or community-oriented activities.
- Visit an incubation center/startup ecosystem and prepare a reflection report.

6. Essential Readings

- UNESCO (2018). *Entrepreneurship Education for the 21st Century Learners.*
- Drucker, P. F. (1985). *Innovation and Entrepreneurship: Practice and Principles.* Harper & Row
- Gupta, C. B., & Srinivasan, N. P. (2018). *Entrepreneurship Development in India.* Sultan Chand & Sons.
- Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2013). *Entrepreneurship.* McGraw-Hill Education.

7. Suggestive Readings

- National Institute for Entrepreneurship and Small Business Development (NIESBUD) (2023). *Entrepreneurship Development Resource Materials. https://niesbud.nic.in/e-book/EDP-Handbbook-2023.pdf*
- Gibb, A. (2005). *The Future of Entrepreneurship Education—Determining the Basis for Coherent Policy and Practice?* In P. Kyro, & C. Carrier (Eds.), The Dynamics of Learning Entrepreneurship in a Cross-Cultural University Context (pp. 44-67). University of Tampere, Research Centre for Vocational and Professional Education.

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Skill Based Course (SBC): 02 Credits

SBC (3) (III.5.1) MOOC and E-Learning
Skill Based Course

1. Credit Distribution of the Course

Course title & Code SBC (3) (III.5.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
MOOCs and E-Learning	2	0	0	2	Undergr aduate	NIL

2. Learning Objectives

This course will be delivered in the practical mode giving students hands-on experience on Massive Open Online Courses (MOOCs) and E-Learning ecosystems. Students will develop MOOC structures based on pedagogical frameworks. They will learn essential skills to create simple MOOC programs by embedding various technology components. The course will also explore existing initiatives, such as SWAYAM, Coursera, edX and others for their pedagogical framework, instructional design and suitability of learners' needs. Students will gain hands-on experiences in developing digital learning modules and will analyse the analytical models of learners' engagement.

3. Learning Outcomes ·

- Create vision board and technical blueprint for an E-learning and MOOC based course;
- Draw concept maps for different types of MOOCs;
- Write content script for a Learner Centric MOOC (LCM);
- Create high dimension videos and digital content for a MOOC course;
- Design evaluation rubric based on learning outcomes of a MOOC course;
- Design interactive, engaging and inclusive LCM;
- Integrate online and blended learning strategies in curriculum design.

4. Syllabus

The course will be transacted in the practical mode supplemented through conceptual and theoretical knowledge.

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5. Practical   **[60 hours]**

- Prepare a summary sheet for technological and pedagogical foundations of MOOCs and E-learning
- Conduct structural analysis of different kinds of MOOCs (cMOOCs, xMOOCs, synchronised and asynchronized MOOCs, hybrid MOOCs)
- Prepare a review report on challenges of online learning engagement
- Suggest gamification in a running MOOC
- Review different pedagogy frameworks for learner-centric MOOCs;
  Prepare a blue print of different elements of a course based on MOOC structure
- Review of available digital platforms for MOOCs (e.g. SYAYAM, Coursera, edx)
- Create a pedagogically sound script plan for a MOOC development
- Review any 5 MOOC courses available on different platform and compare them on program relevance, quality of content and scope of students engagement
- Do content mapping of a MOOC based on a math course
- Design a learner-centric MOOC of any math topic from
- Conduct a critical Review and Pedagogical Analysis of Existing Mathematics MOOCs
- Design a storyboard of a School Mathematics Concept through Instructional Design Frameworks
- Creating a concept explainer video for a mathematics MOOC
- Designing Interactive Mathematics Learning Tasks using digital tools (H5P/GeoGebra)
- Analysing assessment and feedback models in mathematics MOOCs
- Developing a two-Week MOOC module outline for a selected mathematics topic
- Designing peer-interaction and discussion prompts for online mathematics learners
- Evaluating accessibility, inclusivity, and Universal Design in mathematics MOOCs
- Designing, hosting, and reflecting on a mini-MOOC in school mathematics

6. Essential Readings

- Horton, W. (2020). *E-Learning by Design (2nd Ed.)*. Wiley.
- Smith, B., Eng, M. (2013). MOOCs: *A Learning Journey*. In: Cheung, S.K.S., Fong, J., Fong, W., Wang, F.L., Kwok, L.F. (eds) Hybrid Learning and Continuing Education. ICHL 2013. Lecture Notes in Computer Science, vol 8038. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-39750-9_23
- NEP 2020, Ministry of Education, Government of India.
- British Educational Research Association [BERA] (2018). *Ethical Guidelines for Educational Research*, fourth edition, London. https://www.bera.ac.uk/researchers-resources/publications/ethicalguidelines-for-educational-research-2018

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7. Suggestive Readings

- Aparicio, M., Oliveira, T., Bacao, F., & Painho, M. (2019). *Gamification: A key determinant of massive open online course (MOOC) success.* Information & Management, 56(1), 39-54.
- Fidalgo-Blanco, Á., Sein-Echaluce, M.L. & García-Peñalvo, F.J. *From massive access to cooperation: lessons learned and proven results of a hybrid xMOOC/cMOOC pedagogical approach to MOOCs.* International Journal of Educational Technology in Higher Education, 13, 24 (2016). https://doi.org/10.1186/s41239-016-0024-z

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SBC (3) (III.5.2) Mathematics in Visual Art and Design
Skill Based Course

1. Credit Distribution of the Course

Course title & Code SBC (3) (III.5.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Mathematics in Visual Art and Design	2	0	0	2	Undergraduate	NIL

2. Learning Objectives

The course aims to develop an understanding of the mathematical foundations underlying visual patterns, symmetry, and perspective, while fostering an appreciation of how geometry appears in art, architecture, and natural forms. It enables learners to explore mathematical ideas through visual, creative, and digital activities, and introduces them to the geometric principles of linear perspective and projection used in visual representation. Overall, the course cultivates the ability to analyze and construct visual compositions using mathematical concepts.

3. Learning Outcomes

- Explain the geometrical concepts of symmetry, symmetry groups, and linear perspective, and apply these ideas to analyse visual and spatial forms.
- Identify and classify different types of symmetry—reflectional, rotational, translational, and glide reflection—in natural patterns, architectural elements, and artworks.
- Design and create wallpaper patterns and tessellations using both manual and digital techniques with tools such as GeoGebra and EscherSketch.
- Analyse traditional and cultural art forms (e.g., rangoli, jaali patterns, temple carvings) from a mathematical perspective to reveal principles of proportion and symmetry.
- Apply one-, two-, and three-point perspective techniques to construct accurate spatial representations in drawings.
- Determine vanishing points and viewing positions in artworks and photographs.
- Engage in project-based inquiry and photographic explorations to reflect critically on the relationship between mathematics, art, and culture.

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4. Syllabus

The classroom and laboratory activities will be based on the following topics.

Symmetry: Geometrical definition of symmetry; Symmetry around us; Symmetry of finite plane figures; Symmetry of wall paper patterns; Symmetry groups; Symmetry in monuments and ornamental art.

Linear Perspective: Mathematical principles of linear perspective and projection; One, two and three point linear perspective; Vanishing points; Duplicating simple geometric figures (circle and polygons) in one and two point perspective; Finding the viewing point of a painting in one point perspective.

5. Practicals **[60 hours]**

- Observe and sketch symmetrical patterns found in nature and architecture.
- Group discussion on examples of geometry in design and monuments.
- Explore reflectional, rotational, and translational symmetry using mirrors and tracing paper.
- Classify real-world objects and patterns according to symmetry type.
- Capture photographs of symmetrical patterns around the campus or neighborhood.
- Create a digital collage showing various symmetry types.
- Design wallpaper patterns manually on grid paper.
- Recreate the same using GeoGebra or EscherSketch to identify symmetry groups.
- Create tessellations using geometric shapes.
- Modify tessellations into living forms (birds, fish, reptiles) inspired by Escher.
- Study and reproduce rangoli, kolam, and jaali patterns.
- Overlay geometric shapes on these designs to analyze symmetry and proportion.
- Demonstrate horizon lines, vanishing points, and eye levels using simple sketches.
- View and discuss famous artworks demonstrating perspective (e.g., Renaissance art).
- Draw interior or corridor scenes using one-point perspective.
- Practice finding the viewing point in sample paintings.
- Draw cubes, boxes, and buildings using two vanishing points.
- Construct tall structures and aerial views using three-point perspective.
- Analyze perspective geometry in selected artworks or photographs.
- Identify horizon line and vanishing points digitally using phone cameras or GeoGebra
- Take photographs of architectural spaces (corridors, streets, bridges).Overlay vanishing lines digitally to locate the perspective geometry.

6. Essential Readings

- Frantz, M. & Crannel, A. (2011). *Viewpoints: Mathematics Perspective and Fractal Geometry in Art*. Princeton University Press.
- Pedoe. D. (2011). *Geometry and Visual Art*. Dover Publication, New York.
- Bagai, S., Habib, A. & Venkataraman, G. (2024). *Mathematics by Social Scientists*. Taylor and Francis.

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7. Suggestive Readings

- Anderson, L. (2022). *Linear Perspective and Model drawing.* Legare Street Press.
- Weyl, H. (2016). *Symmetry*, Princeton University Press.
- Farris, F.A. (2015). *Creating Symmetry: The Artful Mathematics of Wallpaper Pattern*. Princeton University Press.

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SBC (3) (III.5.3) Universal Design of Learning
Skill Based Course

1. Credit Distribution of the Course

Course title & Code SBC (3) (III.5.3)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Universal Design of Learning	2	0	0	2	Undergraduate	NIL

2. Learning Objectives

The course will be delivered in the practical mode developing theoretical understanding and practical applications of Universal Design of Learning (UDL) principles in a learning ecosystem. The course emphasizes hands-on approach where students get practical experience in designing and testing UDL based learning-teaching resources. Students will learn and design UDL based learning resources for inclusive and accessible education. The UDL concepts will be applied specifically for math learners.

3. Learning Outcomes

- Develop UDL need assessment rubric for inclusive education in schools;
- Apply UDL principles to curriculum, pedagogy, and assessment design;
- Develop UDL based learning - teaching resources for accessibility and inclusivity;
- Create and map variability to UDL checkpoints;
- Create flexible instructional pathways (choice-boards, scaffolded tasks, individualised plans, differentiated instructions and assessments);
- Propose UDL aligned classroom support plans for inclusivity and autonomy.

4. Syllabus

The course will be taught in the practical form where the principles of Universal Design of Learning (UDL) will be applied to curriculum design, pedagogy and assessment. The reference subject domain will be mathematics/STEM. Students will learn about UDL principles and use them to create learning-teaching & assessment resources for inclusive classrooms.

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5. Practical [60 hours]

- Learner variability observation record sheet of learner variability and participation barriers
- Designing a UDL-based mathematics content unit
- Creating a UDL-aligned assessment task
- Developing assistive technology integrated unit plan
- Institutional audit on UDL framework
- Create a resource portfolio for inclusive math material for any concept of your choice.
- Write a Tech integration report linking digital accessibility with UDL principles.
- Create a short math quiz or performance based assessment that allows multiple means of expression.
- Design a prototype of an inclusive math game with usage instructions.
- Conduct four-five micro-teaching sessions of a math concept applying at least two UDL principles. Write a review report on "how UDL strategies improved engagement and understanding."
- Write a UDL Lesson Audit Report with redesign suggestions for any math unit of any math textbook.
- Design UDL-aligned math lesson plan with rationale and expected learning outcomes.

6. Essential Readings

- CAST (2018). *Universal Design for Learning Guidelines, Version 2.2.*
- Rose, D. H. & Meyer, A. (2021). *Universal Design for Learning: Theory and Practice.* CAST.
- Henderson, A. (2012). *Dyslexia, Dyscalculia and Mathematics: A Practical Guide.* Routledge, Taylor & Francis Group, London & New York.
- Burton, D. & Kappenberg, J. (2013). *Mathematics, the Common Core, and RTI: An Integrated Approach to Teaching in Today's Classrooms.* Corwin Press.

7. Suggestive Readings

- Martin, N., Wray, M. & Krupa, J. (2025). *Universal Design for learning: A Critical Approach (ed.).* Routledge.
- Burton, D. & Kappenberg, J. (2013). *Mathematics, the Common Core, and RTI: An Integrated Approach to Teaching in Today's Classrooms.* Corwin Press.
- National Education Policy 2020. Ministry of Education, New Delhi.
- UNESCO (2022). *Reimagining Inclusion and Education: Global Policy Framework.*

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STRUCTURE -I (SEMESTRER -IV)
SYLLABUS

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Discipline Specific Core (DSC): 04 Credits

DSC 9 (IV.1) Pedagogical Explorations in Ancient Indian Geometry and Mathematics
Discipline Specific Core

1. Credit Distribution of the course

Course title & Code DSC 9 (IV.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Pedagogical Explorations in Ancient Indian Geometry and Mathematics	4	3	0	1	Undergra duate	NIL

2. Learning Objectives

This course aims to engage learners in exploring the rich mathematical traditions of ancient India through a pedagogical lens, emphasizing the geometry, trigonometry, and early calculus ideas that emerged from texts such as the *Sulba-sutras* and *Siddhantas*. It seeks to cultivate an understanding of how mathematical thought evolved through practical needs—altar constructions, measurement, astronomy—and how these contexts can serve as powerful learning tools in modern classrooms. The course encourages participants to reconstruct ancient geometric methods using both traditional materials (rope, pegs, and sand diagrams) and modern technological tools such as GeoGebra and dynamic geometry software. Learners will analyze original mathematical problems, interpret their conceptual underpinnings, and reframe them as inquiry-based activities that connect historical insights with contemporary pedagogical practices. Through this exploration, participants will develop pedagogical content knowledge (PCK) to design culturally rooted, hands-on learning experiences that promote conceptual understanding, creativity, and appreciation of India's mathematical heritage.

3. Learning Outcomes

By the end of this course, students will be able to:

- Interpret, model, and reconstruct geometrical and algebraic ideas from ancient Indian mathematical sources using both hands-on and digital tools.

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- Design classroom activities, lesson plans, and teaching modules that integrate historical mathematical concepts—such as altar geometry, sine computation, and early notions of series—into modern mathematics education.
- Translate abstract mathematical ideas into tangible learning experiences through constructivist, inquiry-based, and visual pedagogies.
- Critically evaluate the educational value of ancient mathematical approaches and understand how indigenous reasoning and problem-solving methods can enrich the teaching of geometry, trigonometry, and calculus.
- Develop the skills and insight necessary to bridge cultural and conceptual dimensions of mathematics in contemporary classroom practice.

4. Syllabus [45 hours]

Unit I Sulba Geometry - Introduction to *Sulba*-sutras; Constructing a square of given side; Constructing a square of area equal to a given rectangle; Constructing a rectangle of area equal to a given square; Squaring the circle and its inverse problem; Geometrical representation of Ö2; Application to the construction of different types of Fire Altars - *Caturasrsa citi, Parimandala Smasana citi, Rathachakra citi, Ubhayata-Prauga citi, Prauga citi, Shyena citi.* [15 hours]

Unit II Circle & Shadow Geometry - Chord of one sixth circle; Circumference-Diameter ratio; Computation of Sine table geometrically; Derivation of sine differences (Method of interpolation); Testing of level of verticality; Radius of the shadow sphere; Application to the gnomonic shadow due to lamp post and tip of the gnomonic shadow from the lap post and height of the latter; Theorems on square of hypotenuse and on square of half chord; Arrows of intercepted arcs of intersecting circles. [12 hours]

Unit III Classical Algebra & Series - Progressive series; Permutation and Combination; Pascal triangle and Binomial Theorem; Indeterminate equations of first and second degree; Trigonometric identities; Trigonometric Series; Sine-Cosine-Tan series; Convergency of π-series. [9 hours]

Unit IV Early Indian Calculus - The concept of Differential and Integral Calculus as described in ancient Indian texts. [9 hours]

5. Practicals [30 hours]

- Rope-and-peg constructions of squares and rectangles on the ground ("Sulba Lab")
- Use of GeoGebra to simulate and compare ancient geometric constructions.
- Designing a "mini fire altar" model (using cardboard or clay) demonstrating geometric transformations.
- Outdoor shadow experiments with lamp posts and sticks to measure height and angles (gnomonic studies)
- Creating a geometric sine table using compass and ruler, followed by a digital replication using GeoGebra.

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- Exploration of chord geometry using dynamic geometry software—students reconstruct arc and chord relations.
- Pascal triangle construction through physical counters and spreadsheet modeling.
- Understand infinite series using iterative geometric patterns.
- Designing a digital visualization for series convergence inspired by π-series.
- Comparing ancient series approximations with modern calculus computations.

6. Essential Readings

- Sarasvati Amma, T.A. (2017). *Geometry in Ancient and Medieval India*. Motilal Banarsidas Publishers.
- Shukla, K.S. & Sarma, K.V. (1976). *Aryabhatiya of Aryabhat*. Indian National Science Academy, New Delhi.
- Bag, A.K. (1979). *Mathematics in Ancient and Medieval India*. Chaukhamba Orientalia.

7. Suggestive Readings

- Patwardhan, K.S., Naimpally, S.A. & Singh, S.L. (2015). *Lilavati of Bhaskaracarya: Treatise of Mathematics of Vedic Traditions*. Motilal Banarsidas Publishers.
- Bhanumurthy, T.S. (2008). *A Modern Introduction to Ancient Indian Mathematics*. New Age International Publishers.

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DSC 10 (IV.2) Statistics in Educational Research
Discipline Specific Core

1. Credit Distribution of the course

Course title & Code DSC 10 (IV.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Statistics in Educational Research	4	3	0	1	Undergraduate	NIL

2. Learning Objectives

The course will focus on understanding statistical concepts and its relevance in educational research. It explores applications of descriptive and inferential statistics on various datasets. It enables students to apply statistical tools to educational datasets. Students learn to describe, analyse and infer from real educational data for decision-making and scholarly inquiry.

3. Learning Outcomes

- Understand the role and scope of statistics in educational research;
- Organise, summarise, and interpret quantitative data using descriptive statistics;
- Apply appropriate inferential statistical techniques to test research hypotheses;
- Critically analyse and report quantitative findings in educational research.

4. Syllabus   **[45 hours]**

Unit I Meaning and scope of Statistics - Measurement scales; Parametric and Nonparametric Data; Descriptive and Inferential Analysis.   **[9 hours]**

Unit II Descriptive Statistics - Representing data (Frequency distribution; Cumulative distribution and Histogram); Measurement of Central Tendency and its 'interpretation, Measure of dispersion (Variance and Standard Deviation) and its' interpretation; Standard Scores (Z score; T Score, Percentile score and Percentile rank); Normal Probability curve and its' applications.   **[12 hours]**

Unit III Regression and Correlation - Measure of correlation: assumptions, computation and interpretation (Product movement correlation and Rank order correlation); Partial correlation; Multi-variate correlation (application and interpretation); Simple and multiple regression analysis.   **[12 hours]**

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Unit IV Data analysis and interpretation - Describing and interpreting data using case-studies with real time/synthetic educational data. **[12 hours]**

5. Practical **[30 hours]**

- Conduct a comparative analysis of class-size divisions and descriptive measures.
- Prepare an analytical report for an educational data from publicly available datasets (for example: UDISE+; OECD) and design infographics based on the data.
- Collect five small datasets in different educational settings and make a factsheet of nature, variables, measurement scales and choice of descriptive statistics.
- Make a list of variables from 20 educational research studies and describe the features and statistics of variables used by the researchers. Critically analyze the choices made by the researchers.
- Review 10 correlational research studies and identify the correlation feasibility.
- Run a simple linear regression to predict achievement outcomes based on any two dependent variables such as using online resources, previous achievement.
- Prepare 05 case studies using real/simulation data which highlight that statistical results can be misleading.
- Prepare a statistical analysis using Geogebra for a real education dataset.
- Create a Math Aptitude Test and establish its reliability and validity.
- Design an ability grouping interval scale for a normally distributed students group.
- Prepare a usability chart for conditions of correlation analysis.

6. Essential Readings

- Best, J. & Kahn, J. (2012). *Research in Education*, PHI learning Private Limited.
- Garrett, H. E. (2006). *Statistics in Psychology and Education*. Cosmo Publication.
- Creswell, W.J. and Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative and Mixed Methods*. Sage Publications.
- Lanham, M. (2011). *Practical Statistics for Educators*. Rowman & Littlefield, Toronto.

7. Suggestive Readings

- Leppink, J. (2019). *Statistical Methods for Experimental Research in Education and Psychology*. Springer.
- Tanner, E. (2011). *Using Statistics to Make Educational Decisions*. Thousand Oaks, Sage.
- Coladarci, T. & Cobb, C.D. (2013). *Fundamentals of Statistical Reasoning in Education.* Wiley.

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Discipline Specific Electives (DSE): 04 Credits

DSE (IV.3.1) AI and Machine Learning Algorithms for Educational Data Mining
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (IV.3.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
AI and Machine Learning Algorithms for Educational Data Mining	4	2	0	2	Undergraduate	NIL

2. Learning Objectives

The course focuses on Education Data Mining (EDM) as an emerging field at the intersection of education and data science using Artificial Intelligence (AI) and Machine Learning (ML). Students will learn about large scale data in education available with open sources (public repositories), government reports and other sources. Students will learn the fundamentals of AI and ML algorithms that are applied to educational datasets extracting meaningful patterns and making data-driven decisions. from educational datasets. The course blends theoretical foundations with hands-on practical using real and synthetic educational datasets.

3. Learning Outcomes

- Understand the types and sources of educational data (institutional, virtual platform, learner-generated, research specific);
- Explore the core principles of AI, ML at the intersection of data mining in educational contexts;
- Apply basic and advanced ML algorithms (classification, clustering, regression) to educational data;
- Interpret learning analytics for early predictions, interventions and designing personalized learning environments.

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4. Syllabus **[30 hours]**

Unit I Introduction to Educational Data Mining (EDM) - Understanding educational data and learning analytics; AI applications in early predications, adaptive learning, assessment, and educational policy; Sources of large scale educational data; Data privacy and ethical practices in educational research. **[6 hours]**

Unit II Data Mining Techniques in Educational Datasets - Data types, data structures, data cleaning, pre-processing and feature selection; Descriptive statistics and exploratory data analysis; Visualization of data using descriptive measures; Common educational datasets. **[8 hours]**

Unit III Understanding Machine Learning Algorithms for Educational Datasets - Introduction to different ML algorithms relevant for educational datasets (Classification algorithms (Decision tree), Regression analysis (Linear regression), Clustering algorithms (K-Means), Ensemble models (Random Forest, Gradient Boosting)); Model evaluation; Interpreting results for decision making. **[8 hours]**

Unit IV Deep Learning and Natural Language Processing - Basics of deep learning and neural network; Understanding text mining processes in educational contexts such as students' feedback/discussion forum; Interpreting sentiment analysis reports; Understanding process behind Chatbots and Intelligent/Adaptative Tutoring Systems; Bias and ethical issues in using AI algorithms in EDM. **[8 hours]**

5. Practicals **[60 hours]**
- Prepare codebooks for raw educational datasets and present it meaningfully for analysis and interpretation.
- Create a data dashboard depicting relationships between variables.
- Prepare a feature chart and catergorization table for raw and pre-processing data from educational data repositories.
- Make a comparative sheet for AI models for their efficiency on different kinds of datasets (two variables; multi-variables, linear and non-linear).
- Preparing a report and suggestive measures based on sentiment analysis.
- Prepare a protocol design for clustering students based on learning behaviour.
- Review 20 research papers to identify meta trends in EDM research.
- Make an advisory guideline framework for ethical and inclusive practices for EDM.
- Make a decision making map for developing ML pipelines for different datasets.

6. Essential Readings
- Romero, C. & Ventura, S. (2020). *Educational Data Mining: State of the Art.* IEEE.
- Baker, R. S. (2020). *Big Data and Education.* Routledge.
- Holmes, W. et al. (2019). *Artificial Intelligence in Education.* CCR.
- Luckin, R. (2020). *Machine Learning and Human Intelligence.* UCL Press.

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7. Suggestive Readings

- Khan, B., Corbeil, J. R. & Corbeli, M. E. (2018). Responsible Analytics and Data Mining in Education: Global Perspectives on Quality, Support, and Decision Making, (ed.). Routledge.
- Sweta, S. (2021). Modern Approach to Educational Data Mining and Its Applications. Springer.

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DSE (IV.3.2) Education for a Futuristic Paradigm
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
DSE (IV.3.2)		Lecture	Tutorial	Practical/ Practice		
Education for a Futuristic Paradigm	4	3	1	0	Undergraduate	NIL

2. Learning Objectives

This course explores emerging paradigms in education that address the challenges and opportunities of a rapidly changing global society. It focuses on 21st-century competencies, digital transformation, sustainability, equity, and innovation in education, aligning with the vision of NEP 2020 and Education for Sustainable Development (ESD). The course encourages critical reflection on how education systems can be re-envisioned to nurture creativity, adaptability, ethical values, and global citizenship for a sustainable and inclusive future.

3. Learning Outcomes

- Explain the philosophical and sociological foundations of futuristic education.
- Analyze global and national trends influencing educational change.
- Design learning experiences fostering creativity, critical thinking, and sustainability.
- Evaluate the implications of technology, AI, and digital learning on pedagogy and equity.
- Conceptualize strategies for building resilient, inclusive, and sustainable educational futures.

4. Syllabus   [45 hours]

Unit I: Concept of Futuristic Education - Meaning and need for a futuristic paradigm in education, characteristics of a future-oriented education system. Futures thinking and foresight approaches in education. Vision of NEP 2020 and UNESCO Futures of Education Report (2021).   **[10 hours]**

Unit II Emerging Trends and Global Challenges - Globalisation, sustainability, and human development. Digital revolution, artificial intelligence, and automation in education.

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Changing nature of knowledge, skills, and lifelong learning. Equity, inclusion, and diversity as central themes of future education.   **[12 hours]**

Unit III Curriculum and Pedagogy for the Future - 21st-century skills: creativity, critical thinking, communication, and collaboration. Curriculum integration for sustainability, STEAM, and life skills. Innovative pedagogical approaches: Blended learning, project-based learning, and design thinking. Interdisciplinary and experiential learning. Assessment reforms for competency-based education.   **[12 hours]**

Unit IV: Policy, Innovation, and Institutional Transformation - Educational leadership and governance for future-ready systems. Role of teachers as innovators, mentors, and facilitators. NEP 2020 and SDG 4: Policy perspectives on future learning. Role of technology, open education, and digital universities.   **[11 hours]**

5. Tutorials   **[15 hours]**

- Develop a digital learning or sustainability project.
- Case studies: India, Finland, Singapore, and UNESCO educational initiatives.
- Mapping curriculum goals to 21st century skills
- Exemplary lesson plan based on innovative pedagogy

6. Essential Readings

- UNESCO (2021). *Reimagining Our Futures Together: A New Social Contract for Education.* Paris: UNESCO.
- Government of India (2020). *National Education Policy 2020.* Ministry of Education.
- Mishra, S. (2021). *Futures of Learning: Educational Transformations in India.* NIEPA.
- Sterling, S. (2011). *Transformative Learning for a Sustainable Future.* Earthscan.

7. Suggestive Readings

- Drucker, P. (1993). *Post-Capitalist Society.* Harper Business.
- Sterling, S. (2011). *Transformative Learning for a Sustainable Future.* Earthscan.

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DSE (IV.3.3) Statistical Tools for Research Analysis
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (IV.3.3)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Statistical Tools for Research Analysis	4	2	0	2	Undergr aduate	NIL

2. Learning Objectives

This course focuses on the application of advanced statistical tools for making inferences from the sample data to the larger population. It connects conceptual understanding with hands-on data analysis using digital tools and statistical software such as **S**PSS**,** STATA, Excel & NVIVO. Students will learn how to select appropriate statistical tests and make inferences based on research questions, data types, and sampling designs.

3. Learning Outcomes

- Understand the concepts, reasoning and interpretation of inferential statistics;
- Examine the need and usability of non-parametric statistics;
- Choose appropriate statistical tools for analysing quantitative data;
- Choose appropriate statistical tools for analysing quantitative data.

4. Syllabus   [30 hours]

Unit I Foundations of Inferential Statistics - The central limit theorem; Testing null hypothesis; Significance of difference between the means; level of significance; Degree of freedom; One sample Z test; Significance of difference between means of two small and independent samples; Significance of difference between means of two matched or correlated groups (non- independent samples); Statistical significance of coefficient of correlation.
                                                                                                    [8 hours]

Unit II Non-Parametric Statistics in Educational Research - Concept and rationale for using non-parametric tests; Statistical tests for non-parametric data: Mann–Whitney U, Wilcoxon Signed-Rank; Chi-square tests for independence and goodness of fit; Comparison between parametric and non-parametric testing.   **[6 hours]**

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Unit III Statistical Software for Quantitative Analysis - Descriptive and inferential analysis of quantitative data using SPSS/STATA. **[8 hours]**

Unit IV Statistical Software for Qualitative analysis - Open and axial coding and thematic analysis of qualitative data using NVIVO/MaxQDA. **[8 hours]**

5. Practicals [60 hours]

- Collect, organise and visualize raw educational data manually/using spreadsheet/SPSS/STATA. Classify the distinguished features and interpret the results based on visualized data.
- Prepare an analytical table for statistical inferences and interpretive reflection on learning diversity among learners using any existing research studies.
- Conduct non-parametric analysis for ordinal and categorical data.
- Assess the reliability and construct validity of an educational measurement tool.
- Select two independent group datasets, use Mann Whitney U Test and interpret the result
- Prepare a correlation and regression analysis report for variables parents' math background and students'math achievement.
- Do sentiment analysis of metacognitive skills of students in math learning.
- Do axial coding for an opinion poll on students' preference for practical exam vs theory exam.
- Overlap npc on a skewed data graph and do correction to pull it towards normality.
- Use appropriate software to conduct chi square analysis for categorical dataset using teachers' professional competency scale and their association with professional networks.
- Use a small data set to compare two groups using an independent t-test.
- Use rank order correlation for ordering students based on inputs on attitudinal scale.
- Use 10-item attitude scale responses and compute Cronbach's Alpha in SPSS.
- Use a small dataset of study hours (X) and achievement (Y) and run a linear regression model and interpret slope and R^2.
- Collect short written feedback on a week long math lessons and do sentiment analysis using manual coding and thematic coding using NVIVO. Compare the findings.

6. Essential Readings

- Pallant, J. (2022). *SPSS Survival Manual.* McGraw-Hill.
- Creswell, J. W. & Poth, C. (2023). *Qualitative Inquiry and Research Design.* Sage.
- Gravetter, F. J. & Wallnau, L. B. (2021). *Essentials of Statistics for the Behavioral Sciences.* Cengage.
- Braun, V. & Clarke, V. (2022). *Thematic Analysis: A Practical Guide.* Sage.

7. Suggestive Readings

- Beekhuyzen, J. & Bazeley, P. (2024). *Qualitative Data Analysis with NVivo,* (4th ed.). Sage Publication.

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● Peers, I. (1996). *Statistical Analysis for Education and Psychology Researchers: Tools for Researchers in Education and Psycholog*y. Routledge.

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DSE (IV.3.4) International and Comparative Education
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (IV.3.4)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
International and Comparative Education	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

This course provides a global perspective on education by examining how social, political, economic, and cultural factors influence educational systems worldwide. It introduces the field of comparative education and explores issues such as globalization, international reforms, equity, access, quality, and governance in education. The course aims to equip students with analytical tools to compare educational systems, interpret international policies, and understand the role of global organisations in shaping education.

3. Learning Outcomes

- Explain the nature, scope, and significance of comparative education.
- Compare education systems using theoretical and analytical frameworks.
- Evaluate global educational trends and their policy implications.
- Analyse the role of globalization and internationalization in shaping education.

4. Syllabus [45 hours]

Unit I Introduction to International and Comparative Education - Meaning, nature, and scope of comparative education. Historical development and evolution of the field. Purposes and challenges of comparative studies. Relevance of comparative education in teacher education and policy. **[11 hours]**

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Unit II Education and its Contexts - Relationship between education & society, economy, culture, and politics. Determinants of educational development: Demographic, technological, and ideological. Comparative study of educational aims, structures, and governance. Education and social change in developing and developed contexts.   **[12 hours]**

Unit III Comparative Study of Selected Education Systems - Educational systems of India, Finland, Japan, United States, and United Kingdom. Comparative perspectives on access, equity, quality, and inclusion. Curriculum, pedagogy, and assessment reforms. Teacher education models across countries.   **[11 hours]**

Unit IV Globalization and Internationalization of Education - Impact of globalization on education systems. Role of international organizations: UNESCO, UNICEF, OECD, World Bank, and WTO. Global initiatives: Education for All (EFA), SDG 4, and the Education 2030 Agenda. Issues of equity, cultural identity, and policy borrowing/lending in global education.   **[11 hours]**

5. Tutorials   **[15 hours]**

- Comparative analysis of the education systems of two countries.
- Review of UNESCO or OECD education reports.
- Preparation of a short paper on globalisation and its impact on Indian education.

6. Essential Readings

- UNESCO (2015). *Rethinking Education: Towards a Global Common Good?* Paris: UNESCO.
- Crossley, M., & Watson, K. (2003). *Comparative and International Research in Education: Globalisation, Context and Difference.* Routledge.
- OECD (2020). *Education at a Glance: OECD Indicators.* OECD Publishing.
- Government of India (2020). *National Education Policy 2020.* Ministry of Education.

7. Suggestive Readings

- Carnoy, M. (1999). *Globalization and Educational Reform: What Planners Need to Know.* UNESCO-IIEP.
- Phillips, D., & Schweisfurth, M. (2014). *Comparative and International Education: An Introduction to Theory, Method, and Practice.* Bloomsbury.

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DSE (IV.3.5) Education Management and Supervision
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (IV.3.5)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Education Management and Supervision	4	3	1	0	Undergraduate	NIL

2. Learning Objectives

This course explores theoretical foundations, approaches, and practices in educational management, leadership, and supervision. It emphasises the development of managerial and supervisory skills essential to effective educational leadership in schools, colleges, and other educational organisations. Drawing on both Indian and international perspectives, it integrates concepts of strategic management, instructional supervision, participatory governance, and quality assurance to promote institutional excellence.

3. Learning Outcomes

- Analyze educational organisations using management and leadership theories.
- Apply supervision models for professional growth and instructional improvement.
- Design institutional development plans based on strategic and participatory approaches.
- Evaluate quality assurance mechanisms in national and international contexts.
- Demonstrate leadership and supervisory skills for effective institutional functioning.

4. Syllabus   **[45 hours]**

Unit I Foundations of Educational Management and Administration - Concept, nature, and scope of educational management. Theories and models: Classical, human relations, systems, and contingency approaches. Educational governance: Centralized vs decentralized structures. Functions of management planning, organizing, staffing, leading, and controlling. Decision making, communication, and change management in educational organizations.
[10 hours]

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Unit II Educational Leadership: Theories and Practices - Leadership in educational contexts: meaning and dimensions. Theories: Trait, Behavioral, Situational, Transformational, Servant, and Distributed Leadership. Leadership and school effectiveness. Ethical leadership and emotional intelligence in education. Comparative perspectives: Leadership practices in India, UK, and Finland. **[12 hours]**

Unit III Educational Supervision and Professional Development - Evolution of supervision: From inspection to developmental and instructional supervision. Models: Scientific, Human Relations, Clinical, and Collaborative. Observation techniques, feedback mechanisms, and mentoring. Supervision for teacher development and curriculum improvement. Case studies of supervision models in India and abroad. **[12 hours]**

Unit IV Institutional Planning, Governance, and Quality Assurance - Institutional planning: concept, process, and implementation. Human resource management and team building. Monitoring and evaluation of institutional performance. Quality assurance systems: NAAC, NCTE, ISO, and international accreditation frameworks (Ofsted, TESQA). Educational accountability and transparency. **[11 hours]**

5. Tutorials **[15 hours]**

- International case studies on school leadership and supervision (OECD, UNESCO, World Bank).
- Preparation of an institutional development plan.
- Field observation of school leadership and supervision practices.
- Review of global best practices in education management.

6. Essential Readings

- Bray, M., Adamson, B., & Mason, M. (2007). *Comparative Education Research: Approaches and Methods.* Springer.
- Phillips, D., & Schweisfurth, M. (2014). *Comparative and International Education: An Introduction to Theory, Method, and Practice.* Bloomsbury.
- Arnove, R. F., Torres, C. A., & Franz, S. (Eds.) (2013). *Comparative Education: The Dialectic of the Global and the Local.* Rowman & Littlefield.
- Tilak, J. B. G. (2021). *Education and Development in India: Critical Issues in Public Policy and Development.* Springer.

7. Suggestive Readings

- UNESCO (2015). *Rethinking Education: Towards a Global Common Good?* UNESCO.
- OECD (2020). *Education at a Glance: OECD Indicators.* OECD Publishing.
- Government of India (2020). *National Education Policy 2020.* Ministry of Education.

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DSE (IV.3.6) Economics of Education
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
DSE (IV.3.6)		Lecture	Tutorial	Practical/ Practice		
Economics of Education	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

This course introduces students to the fundamental principles of economics and their application to the field of education, with an emphasis on quantitative reasoning and data-driven decision-making. It focuses on understanding education as both a consumption and investment good, exploring how economic tools can be used to plan, finance, and evaluate educational systems.

3. Learning Outcomes

- Explain economic principles relevant to education and human capital development.
- Apply quantitative techniques to analyze cost, efficiency, and returns in education.
- Critically examine educational financing mechanisms in India and globally.
- Use mathematical reasoning to interpret data for educational policy decisions.
- Design models and frameworks for efficient educational planning and evaluation.

4. Syllabus   [45 hours]

Unit I Introduction to Economics of Education - Nature and scope of economics of education. Education as an investment and consumption good, Education and economic development, Contribution of education to productivity, income, and social welfare, Role of mathematics in economic and educational modeling.   [10 hours]

Unit II Education, Demand, and Supply - Concept of demand and supply in education, Determinants of demand for education (private & social), Rate of return to education: Private

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vs. social, Use of statistical and regression techniques to estimate returns, Enrollment projections and manpower forecasting models. **[12 hours]**

Unit III Education and Human Capital Formation - Human capital theory and its implications for educational planning, Relationship between education, employment, and earnings, Education, income inequality, and social mobility, Measurement of educational outcomes and productivity, Quantitative models for human capital estimation. **[12 hours]**

Unit IV Planning, Policy, and Evaluation - Role of economics in educational planning, Use of mathematical models in educational decision-making, Optimization and linear programming in resource allocation, Policy analysis: NEP 2020 and educational financing in India, Evaluation of education systems using cost-effectiveness and equity criteria. **[11 hours]**

5. Tutorials [15 hours]

- Analyze public expenditure on education (school or higher education level) using government data (e.g., UDISE, NSSO, or RBI reports).
- Develop a simple mathematical model showing the relationship between education and income or cost-benefit ratio.
- Conduct a cost-effectiveness analysis of a government or NGO education initiative.
- Present a policy analysis of NEP 2020 focusing on funding, equity, and access.

6. Essential Readings

- UNESCO (2017). *Financing Education: Investments and Returns.*
- Tilak, J. B. G. (2003). *Economics of Education. Indian Council of Social Science Research.*
- Psacharopoulos, G., & Woodhall, M. (1997). *Education for Development: An Analysis of Investment Choices.* Oxford University Press.
- Blaug, M. (1970). *An Introduction to the Economics of Education.* Penguin Books.
- Becker, G. S. (1993). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education.* University of Chicago Press.

7. Suggestive Readings

- NCTE (2014). *Curriculum Framework for Teacher Education.*
- NEP (2020). *National Education Policy 2020.* Government of India.

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General Elective (GE): 04 Credits

GE (IV.4.1) Guidance and Counselling
General Elective

1. Credit Distribution of the Course

Course title & Code GE (IV.4.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Guidance and Counselling	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

This course aims to develop theoretical and practical understanding of the principles, approaches, and techniques of guidance and counselling. It equips prospective educators with the knowledge and skills to address students' academic, personal, social, and career concerns, promoting their holistic development. The course integrates Indian perspectives and modern global trends in counselling.

3. Learning Outcomes

- Understand the nature, scope, and importance of guidance and counselling in education.
- Describe and differentiate major theories and approaches of guidance and counselling.
- Apply tools, techniques, skills and ethical practices in Guidance & counselling situations
- Design and implement guidance and career development programmes in educational settings.
- To familiarise the students with various approaches, techniques and skills of counselling and psychotherapy in mental health problems.

4. Syllabus   [45 hours]

Unit I Foundations of Guidance and Counselling - Meaning, nature, principles, Aim, objectives and scope of Guidance and Counselling. Historical development of guidance and counselling in India. Difference between Guidance & Counselling and Counselling &

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Psychotherapy. Types and areas of guidance: Educational, vocational, personal, and social. Organisation of Guidance programmes at different levels of Education. **[12 hours]**

Unit II Theories and Approaches to Counselling - Major theories: Psychoanalytic, Behaviouristic, Humanistic, and Cognitive. Counselling approaches: directive, non-directive, eclectic. Group, family, and multicultural counselling. **[9 hours]**

Unit III Tools, Testing and Non-testing techniques, in Guidance & Counselling - Tools of guidance-.Interviewing, observation, and case study. Testing techniques-Intelligence, achievement, interest, aptitude, adjustment & interpersonal relations, personality (Objective, self-report, Projective). Sociometric devices. Non-testing technique: Systematic Case study, interview-counselling interview, observation role and method. Ethics and confidentiality in counselling. **[12 hours]**

Unit IV Guidance Services and Programme in Educational and Vocational Contexts - Vocational guidance and decision-making. Career development theories (Super, Holland). Guidance services-self-inventory, occupational information, placement, follow-up, and evaluation. Guidance for diverse learners and students with special needs. School guidance programmes: organisation and evaluation. **[12 hours]**

5. Tutorials **[15 hours]**

- Conduct a mock counselling session.
- Prepare a case study report.
- Design a school guidance plan.
- Need assessment of behavioural counselling among adolescent learners.
- Counseling logs for learners' overall well-being.

6. Essential Readings

- Gibson, R.L. & Mitchell, M.H. (2019). *Introduction to Counselling and Guidance.* Pearson.
- NCERT(2022). Guidance and Counselling. New Delhi: NCERT (Chapter 8) (pp.157-165)
- Gladding, S (2018). Counselling: A Comprehensive Profession. New Delhi
- Seth, S., Bhatia, H. and Chaddha, N.K. (2018). Counselling Skills: Knowing self and others
- https://www.egyankosh.ac.in/bitstream/123456789/74662/3/Unit-4.pdf

7. Suggestive Readings

- Corey, G. (2016). *Theory and Practice of Counselling and Psychotherapy.* Cengage.
- Rao, S.N. (2017). *Counselling and Guidance.* Tata McGraw-Hill.
- NCERT (2015). *Guidance and Counselling: Manual for Teachers and Counsellors.*

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GE (IV.4.2) Design Thinking, Innovation and Entrepreneurial Pathways
General Elective

1. Credit Distribution of the Course

Course title & Code GE (IV.4.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Design Thinking, Innovation, and Entrepreneurial Pathways	4	2	0	2	UG	NIL

2. Learning Objectives

The course provides both theoretical understanding and practical foundation in innovation, entrepreneurship and the role of design thinking in this endeavor. Advent of newer technologies opens new pedagogic practices, which in turn opens possibilities to develop new applications, products and services useful in teaching and educational administration. The course imparts knowledge and skills to develop new applications and take them to a wider user base, either through commercial or non-commercial pathways.

3. Learning Outcomes

- Explaining Design thinking as a working framework for user research, product/process development and iterative improvement, user testing and user adoption.
- Differentiate between Innovation vs Invention, and IPR.
- Classify types of innovation and entrepreneurship.
- Analyze the nature and limitations of student or teacher entrepreneurship.
- Apply theories and practices of innovation and entrepreneurship.

4. Syllabus   [30 hours]

Unit 1 Design Thinking - Key concepts of design. Models of design thinking (honeycomb vs double diamond vs synergy). Empathy research, identifying user needs and validation.

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User persona and design brief. Methods of ideation and building solution space. Rapid prototyping. User Testing and Pilot. Iterative improvement. UX/UI designing.   **[8 hours]**

Unit 2 Innovation - Innovation vs Invention. Aspects of innovation. Innovation matrix. Diffusion theory of innovation and technology adoption curve. Theories of Innovation. Principles of innovation. Types of innovation.   **[7 hours]**

Unit 3 Entrepreneurship - Traits of an entrepreneur. Theories of entrepreneurship. Types of Entrepreneurships. Classification of Entrepreneurship. Barriers to entrepreneurship. Opportunity and scope for entrepreneurship. Market research and unmet customer needs. Customer segment and total accessible market (TAM).   **[8 hours]**

Unit 4 Model & Product - Minimum viable product and Business model canvas. Product/service development and IPR. Branding and Product launch plan. Types of business enterprises and their legal compliances. Business pitch and funding. Resource allocation, growth and valley of death.   **[7 hours]**

5. Practicals   [60 hours]
- Case study of a design using DFV model (Desirability, Feasibility, Viability)
- Search a user problem using a synergy model.
- Draw empathy map and stakeholder map of the problem space.
- Ideate an exhaustive list of innovative solutions.
- Case study of Doblin's 10 types of innovation in the Indian market.
- Reconstruction of UX/UI of a successful e-commerce portal/app.
- Market research in search for an unmet consumer need and assess TAM.
- Project: Build a dummy startup: company documents, product brochure, branding document, business model canvas, business pitch.

6. Essential Readings

- Brown, T. (2020). *HBR's 10 must reads on Design Thinking*. Harvard Business Review Press.
- Drucker, P.F. (2013). *HBR's 10 must reads on Innovation*. Harvard Business Review Press.
- Drucker, P.F. (1985). *Innovation and Entrepreneurship.* Harper Business.
- Blank, S. & Dorf, B. (2020). *The Startup Owner's Manual: The step-by-step guide for building a great company.* Wiley

7. Suggestive Readings

- Christensen, C.M. (1997). *The Innovator's Dilemma*. Harvard Business Review Press.
- Thiel, P. & Masters, B. (2014). *Zero to One: Notes on Start Ups or How to build the Future*. Random House.
- Ries, E. (2011). *The Lean Startup*. Random House.

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Skill Based Course (SBC): 02 Credits

SBC (4) (IV.5.1) Family and Community Studies
Skill Based Course

1. Credit Distribution of the Course

Course title & Code SBC (4) (IV.5.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Family and Community Studies	2	0	0	2	Underg raduate	NIL

2. Learning Objectives

This course explores the dynamics of educational institutes in relation to family and community, and their collective role in shaping the learning and well-being of learners. Through participatory activities, field work and reflective logs, learners will engage in contemporary issues emerging from societal and family based practices, such as gender roles, and how education empowers learners to challenge such stereotypes and promotes equity and excellence.

3. Learning Outcomes

- Understand the nature and roles of families and communities in educational systems;
- Develop skills & strategies for engaging communities and families in educational processes;
- Critically analyze the parenting styles and their impact on child's overall development;
- Analysis role of family in learners' well-being, resilience and conflict resolution.

4. Syllabus

Concept of family, community and school as context of socialization; Situating child at the intersection of family, school and learning; Family structure, belief system and its influence on the child; Community participation in school governance; Role of NGOs, civil society and welfare organization in strengthening inclusive education system.

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5. Practicals (Suggestive)   **[60 hours]**
- Comparing parenting style and anxiety disorder in learners
- Conducting a family case study to analyse family structure, communication and practicing beliefs
- Review of PTMs in schools
- Organizing community sensitization program in an urban slum for their responsible and participative role in their children's education
- Design community awareness campaign for quality and inclusive education

6. Essential Readings

- Redding, S., Murphy, M., & Sheley, P. (2011). Handbook on Family and Community Engagement (ed.) Academic Development Institute / Center on Innovation & Improvement: USA.
- Morgan, N.S. (2017). *Engaging Families in Schools Practical Strategies to Improve Parental Involvement*. Routledge.

7. Suggestive Readings

- Hornby, G. (2011). *Parental Involvement in Childhood Education: Building Effective School-Family Partnership.* Springer.
- Sanders, M.R., Healy, K.L., Grice, C., & Del Vecchio, T. (2017). *Evidence-Based Parenting Programs: Integrating Science into School-Based Practice*. In: Thielking, M., Terjesen, M. (eds) Handbook of Australian School Psychology. Springer. https://doi.org/10.1007/978-3-319-45166-4_27

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SBC (4) (IV.5.2) Ethnomathematics and Cultural Practices
Skill Based Course

1. Credit Distribution of the Course

Course title & Code SBC (4) (IV.5.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Ethnomathematics and Cultural Practices	2	0	0	2	Undergraduate	NIL

2. Learning Objectives

The course presents the conceptual foundations of ethnomathematics and how mathematical ideas and practices are embedded in traditional societies. Students will examine mathematical ideas used by traditional societies in art, games, measurement, handicraft, agriculture practices and how these practices can be integrated into the present mathematics curriculum. Students will gain hands-on experiences on indigenous mathematical practices, local artefacts such as puppetry, rangoli, Kolam art, measurement & calculation by tribal communities, and how to integrate this for culturally responsive mathematics pedagogy.

3. Learning Outcomes

- Understand the evolution and scope of ethnomathematics;
- Explore indigenous mathematical practices existing in cultural, historical, and social contexts;
- Develop culturally responsive pedagogical approaches for teaching mathematics;
- Review the existing research trends in ethnomathematics studies.

4. Syllabus

Concept, meaning, and origin of ethnomathematics; Importance of contextualised mathematics in NEP 2020; Mathematical reasoning in traditional crafts, weaving, embroidery, and Kolam/rangoli designs; Case studies of tribal and rural communities; Integrating ethnomathematics into mathematics curriculum and pedagogy; Ethnomathematics as a research field and latest research trends.

5. Practicals   [60 hours]

- Create a blog to promote indigenous mathematical practices.

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- Construct a scaled model of any architectural monument depicting proportional principles.
- Designing an ethnomathematics-integrating unit plan.
- Conduct systematic review of ethnomathematics research in the last 5 years.
- Draw ethnomathematics based practices on the map.
- Create a historical timeline of ethnomathematics practices in India.
- Design a workbook of mathematical patterns in Indian handicraft.
- Make a documented account of ethnomathematical practices of any chosen Indian state/tribe.
- Design a social innovation project to promote and sustain ethnomathematical practices.

6. Essential Readings

- Ascher, M. (1991). *Ethnomathematics: A Multicultural View of Mathematical Ideas.* Routledge.
- Rosa, M. & Coppe de Oliveira, C. (2020). *Ethnomathematics in Action.* Springer.
- Gerdes, P. (2020). *Cultural Expressions of Mathematical Ideas.* UNESCO.

7. Suggestive Readings

- Rosa, M., D'Ambrosio, U., Orey, D.N., Shirley, L., Alangui, W. V., Palhares, P. & Gavarrete, M. E. (2016). *Current and Future Perspectives of Ethnomathematics as a Program.* Springer.
- D'Ambrosio, U. (1985). *Ethnomathematics and its Place in the History and Pedagogy of Mathematics*. *For the Learning of Mathematics,* 5 (1). FLM Publishing Association, Montreal, Quebec, Canada.

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SBC (4) (IV.5.3) Innovation Skills: Learning from Innovators
Skill Based Course

1. Credit Distribution of the Course

Course title & Code SBC (4) (IV.5.3)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Innovation Skills: Learning from Innovators	2	0	0	2	Underg raduate	NIL

2. Learning Objectives

Innovation is an essential skill to convert ideas into action. This course aims to develop an insight and hands on learning experience into the process of innovation; inculcate among learners' ways of using knowledge, experience, creativity and out of box ideas to transform existing products, processes and applications; and how to target realistic problems both at the local and global levels. One must understand that the role of technological advances and learning from innovators' experiences is essential for growth and development.

3. Learning Outcomes

- Familiarization with essential concepts of innovation
- Learn to implement ideas to reality
- Exploring lifecycle of innovators to understand problem solving techniques
- Designing hands-on activities to showcase innovation skills

4. Syllabus (Practical's)   [60 hours]

Activities to perform based on the concept of Innovation and its aspects.

- Gaining an understanding of the concept of "Innovation" and exploring its four main types-supported by real-world examples.
- Exploring innovation skills connecting with real world problem solving
- Interlinking innovation and entrepreneurship
- Identifying innovative practices from study of innovators lifecycle
- Exploring innovation in education sector: Case Studies
- Examining impact of existing innovation cases on our society and its outcomes
- Identifying factors necessary for creating an environment for innovation at work places
- Presenting innovators as role model and mentors
- Positive impact of innovation and industry linkage

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- Use of technology for Innovation: Examples from real world
- Innovators as Role Models and Mentors: Examples from real world
- Building up prototypes to depict innovative aspects

6. Essential Readings

- Ridley, M. (2021). *How innovation works?* Fourth Estate Ltd. Harper Collins Publishers (ISBN: 9780008334840)
- Dodgson, M. & Gann, D. (2018). *Innovation: A very short introduction.* Oxford University Press, India. (ISBN: 9780192558619)
- Kelley, T. & Littman, J. (2005). *The ten faces of innovation*. Doubleday, Random House Inc. (ISBN: 0385512074)

7. Suggestive Readings

- Radjou, N., Prabhu, J. & Ahuja, S. (2012). *Juggad Innovation - A frugal and flexible approach to innovation for the 21st century*. Random House Publishers India Pvt. Limited. (ISBN: 9788184002058)
- Narang, S. (2016). *Innovation: Why What and How*. Vitasta Publishing (ISBN: 9789382711322)

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STRUCTURE -II (SEMESTRER -III)
SYLLABUS

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Discipline Specific Core (DSC): 04 Credits

DSC 7 (III.1) Demystifying the Power of Data: Probability and Statistics
Discipline Specific Core

1. Credit Distribution of the course

Course title & Code DSC 7 (III.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Demystifying the Power of Data: Probability and Statistics	4	3	0	1	Undergraduate	NIL

2. Learning Objectives

This paper aims to provide a basic understanding of the uncertainty in decision-making, testing sample compatibility in day-to-day applications. Students will gain insights into the concepts, contexts, and the tools used to understand these uncertainties. This course will concentrate on probability, random variables, distributions, concepts of the central limit theorem, joint, marginal, and conditional distributions, and computer programs in R and its application to simple models, hypothesis testing, and interval estimation. This course will also expose the students to various real-life applications of probability and statistics.

3. Learning Outcomes

- A good understanding of application of Statistics to daily life problems.
- Able to describe probability distributions and hypothesis formation.
- Able to represent data both graphically and numerically.
- Able to statistically analyze data.
- Create projects using fundamental knowledge in order to provide a hands-on experience of the same.
- Able to work on statistical package R.
- Make data driven and statistically robust decisions in probability based real-life applications.

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4. Syllabus **[45 hours]**

Unit I Probability and Random Variables - Sample spaces and events, random experiments, axioms of probability, intersections of events and multiplication and total probability rules, independence, Bayes' theorem, conditional probability, random variables, real life probability problems. **[12 hours]**

Unit II Probability Distributions - Discrete distributions (Bernoulli, binomial, and Poisson) with their properties and applications, Continuous distributions (Uniform, Normal, Exponential) with their properties and applications, concept of central limit theorem.
[12 hours]

Unit III Curve fitting and Regression Models using R - Joint, marginal, and conditional distributions, curve fitting, regression model, test statistic and their significance. Computer program in R and its application to simple models. **[12 hours]**

Unit IV: Sampling and Testing of Hypothesis - Sampling distributions, hypothesis testing, interval estimation, p-value interpretation, Type I/II errors. **[9 hours]**

5. Practicals **[30 hours]**

- Statistical procedures and their implementation through the statistical package R
- Data import from CSV/excel, cleaning and arranging.
- Introduction to basic syntax of R for arithmetic operations, creating arrays and matrices
- Getting data into R
- Visualization and basic data analysis in R
- Case study: Problems with data
- Mini projects using real, publicly available datasets from different domains

7. Essential Readings

- Bowker, B. & Liberman, G.J. (1972). *Engineering Statistics.* Asia.
- Hogg, R.V. & Tanis, E.A. (1983). *Probability and Statistical Inference*, Macmilan.
- Johnson, N.L. & Leone, F.C. (1977). *Statistics and Experimental Design in Engineering and the Physical Sciences*, Vol. I and II, Wiley Inter Science.
- Montgomery, D.C., Fricker, R. & Rigdon, S.E. (2024). *Introduction to Probability and Statistics for Data Science: With R*. Cambridge University Press.
- Matloff, N. (2020). *Probability and Statistics for Data Science: Math + R + Data.* CRC Press.
- Chan, S.H. (2021). *Introduction to Probability for Data Science*. Michigan Publisher.

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7. Suggestive Readings

- Montgomery, D.C. & Runger, G.C. (2018). *Applied Statistics and Probability for Engineers*, 7th edition. John Wiley and Sons.
- Miller, I., Freund's, J.E. & Johnson, R.A. (2017). *Probability and Statistics for Engineers*, 9th edition. Pearson.

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DSC 8 (III.2) Emerging Trends in Learning Outcome Based Assessment and Evaluation
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)
DSC 8 (III.2)		Lecture	Tutorial	Practical/ Practice		
Emerging Trends in Learning Outcome Based Assessment and Evaluation	**4**	**3**	**0**	**1**	**Undergr aduate**	**NIL**

2. Learning Objectives

The course aims to develop a critical understanding of learning outcome-based assessment, and evaluation within the educational landscape focusing on how changing theories, technologies, and global practices shape the evaluation perspectives of learning. It goes beyond conventional testing methods to investigate learner centric assessment processes that support, evaluate, and enhance personalized learning. Additionally, the course experience will emphasize the importance of students as partners in the assessment process and how it influences the NEP 2020 aligned principles of equity, inclusion, and excellence. Learners will gain practical experiences of both classroom assessment strategies, systemic innovations, AI integrated adaptive assessment, examining how feedback, analytics, and culturally responsive practices can foster learning and promote a culture of learner centric assessment.

3. Learning Outcomes ·

- Distinguish between assessment & evaluation and using assessment dossiers for personalized learning;
- Explain the concept of assessment with special focus on holistic assessment, learning outcomes & competency-based assessment, continuous & comprehensive assessment, assessment of/for/by learning;
- Design, evaluate, and use assessment rubrics for evidence-based decision-making and learning improvement;

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- Critically examine innovations and global trends in assessment practices and its relevance in Indian context;
- Integrate NEP aligned assessment principles of fairness, validity, reliability, and inclusivity in assessment design.

4. Syllabus [45 hours]

Unit 1 Assessment, Evaluation, and Beyond: Changing Paradigms - Evolution of assessment, evaluation, and measurement; Assessment for learning, of learning, and through learning; Assessment as evidence of what is learned vs what is not learned (learning deficit model), Marks/grades-based assessment vs learning outcomes based evaluation, Emerging paradigms: Authentic assessment, diagnostic assessment , performance based assessment, culturally responsive and social context-sensitive assessment practices. **[12 hours]**

Unit II Learner Engagement, Teacher Agency, and Ethical Frameworks in Assessment - Key Stakeholders in Assessment; Functions of students, teachers, institutional leaders, and policy systems in designing, interpreting, and using assessment outcomes; learner's role as an active participant in assessment through self-assessment, peer-feedback, and reflective practices, Academic integrity, ethical code of conduct and challenges of plagiarism; Fairness, transparency, and authenticity in teacher-led assessment. **[12 hours]**

Unit III Strategies and Innovations in Assessment - Assessment strategies: formative, diagnostic, summative, and authentic approaches; Innovations in assessment: e-assessment, AI-based adaptative assessment, learning analytics, portfolios, and gamification; Reliability, validity, and quality assurance in assessment results; Standardized testing and grading; Achieving and scaling learning improvement through evidence-based assessment; Assessment insights for teachers, schools and policymakers. **[12 hours]**

Unit IV Assessment for Improvement, Equity, and Global Comparability - Using assessment data for learning improvement and accountability; Addressing learning gaps, inclusion, and excellence; NEP aligned assessment principles for inclusivity, fairness, and responsibility, Issues of misuse of test data, consequences of high-stakes testing, and the ethics of AI-based evaluation systems; Global and comparative perspectives and assessment reforms (OECD, PISA, TIMSS, NAEP); Meta-trends in assessment research. **[9 hours]**

5. Practical [30 hours]

- Analyse assessment systems across two boards (CBSE/IB/Cambridge).
- Construct and validate a feedback questionnaire and implement it with a small group of math students. Prepare a summary report.
- Develop a prototype of a digital or performance-based assessment tool for secondary grade math students.
- Examine how formative assessment improved learning outcomes. Use classroom observation details.

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- Evaluate a standardized assessment instrument for bias and cultural sensitivity; suggest modifications for inclusivity.
- Design a holistic assessment plan for primary grade students.
- Prepare an assessment blueprint for assessment for/of/through learning for any math unit of your choice.
- Design a mathematical game as an assessment tool. Develop a rubric for evaluation.
- Design a diagnostic assessment tool for any math topic of your choice.

6. Essential Readings

- Brookhart, S. (2013). *How to Create and Use Rubrics for Formative Assessment and Grading.* ASCD.
- Richard, J.S. (2014). *Revolutionize Assessment (Ed. 1).* Corwin Press.
- Earl, L. (2013). *Assessment as Learning.* Corwin Press.
- Black, P. & Wiliam, D. (1998). *Inside the Black Box: Raising Standards Through Classroom Assessment.* United Kingdom: GL Assessment.

7. Suggestive Readings

- OECD (2020). *The Future of Education and Skills 2030: Assessment for Learning.*
- Secolsky, C. & Denison, B.D. (2018). *Handbook on Measurement, Assessment, and Evaluation in Higher Education.* Routledge.
- Black, P. & William, D. (1998). *Assessment and Classroom Learning*. Assessment in Education: Principles, Policy & Practice, 5(1), 7-74. https://doi.org/10.1080/0969595980050102

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Discipline Specific Electives (DSE): 04 Credits

DSE (III.3.1) ICT in Mathematics Education
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.3.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
ICT in Mathematics Education	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

ICT has a transformative impact on teaching learning practices and education administration. Blended learning is no more a choice but a norm. This course focuses on reviewing contemporary knowledge on this broad area of research. The course focuses on developing rigorous understanding of pros and cons of all aspects of ICT, impact of ICT in education in general and its impact on Mathematics Education in particular.

3. Learning Outcomes

- Scope and impact of emerging ICT in education
- Means of ICT
- ICT tools in teaching
- ICT for inclusive classroom
- Safety, security, misuse and psychological concerns of ICT usage

4. Syllabus [45 hours]

Unit I ICT in Curriculum and Pedagogy - TPCK framework. Instrumental Orchestration. Place and purpose of ICT in the curriculum, Means of ICT. ICT embedded pedagogy. Digital resources. Content planning and curriculum designing using ICT. Role of ICT in content differentiation. Models of Blended learning. ICT and self-paced learning. ICT for inclusive classrooms. **[12 hours]**

Unit II ICT Tools and Classroom Discourse - Augmenting teaching-learning process using social networks, blogs, discussion forums etc. Online teaching and learning. ICT tools for

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assessment. Analytics for monitoring progress and achievements. Learning Management Systems. School management ERP. **[12 hours]**

Unit III Scope and Challenges of using ICT in Education - Technology in the hands of teacher and student. e-content versus authentic information. Cybercrime, Software Piracy, Online bullying, Privacy concerns. **[12 hours]**

Unit IV Ethical Practices of Using ICT - Plagiarism and fair use of ICT. Socio-economic and ethical aspects of adopting ICT. **[9 hours]**

5. Tutorials **[15 hours]**

- Searching current, high impact research publications, reviews, and case studies;
- How to read and summarize research papers;
- Propose methods to overcome ICT phobia;
- Design innovative assessment tools and analytics;
- Online Repository of digital resources for mathematics education;

6. Essential Readings

- Moursund, D. (2005). *Introduction to Information and Communication Technology in Education*. Teacher Education, University of Oregon.
- UNESCO (2012). *ICT in Primary Education: Analytical survey*.
- Athanassios, J. (ed.) (2012). *Research on e-Learning and ICT in Education*. Springer
- Oldknow, A., Taylor R. & Tetlow, L. (2010). *Teaching Mathematics Using ICT 3rd Edition*. Continuum International Publishing Group.

7. Suggestive Readings

- Abbott, C. (2001). *ICT: Changing Education*. Psychology Press.
- Kozma, R.B. (2003). *Technology, Innovation, and Educational Change: A Global Perspective: A Report of the Second Information Technology in Education Study, Module 2*. International Society for Technology in Education.
- Wilder, S.J. & Pimm, D. (2004). *Teaching Secondary Mathematics with ICT*. McGraw-Hill International.

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DSE (III.3.2) Educational Policy Studies
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.3.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Educational Policy Studies	4	3	0	1	Undergr aduate	NIL

2. Learning Objectives

This course provides students with the theoretical understanding and practical competencies required to engage with educational policy processes. It emphasizes skills in policy interpretation, critical analysis, evidence-based reasoning, and policy evaluation. Students examine how historical, political, social, and economic forces shape educational policy at national and global levels. Through NEP 2020 and other key documents, students learn to apply conceptual and empirical frameworks to analyze, critique, and design effective policy implementation strategies.

3. Learning Outcomes

- Demonstrate conceptual clarity and analytical skills to explain the nature, scope, and stages of educational policy formulation.
- Use historical and philosophical reasoning to understand the foundations of educational policy in India.
- Critically evaluate Indian and global education policies using equity, access, inclusion, and quality-based frameworks.
- Apply policy analysis models and evidence-based tools to interpret, review, and critique policy documents.
- Develop competencies in drafting policy briefs, conducting policy reviews, and designing implementation strategies appropriate to educational contexts.

4. Syllabus   **[45 hours]**

Unit I Conceptual Foundations of Educational Policy — Philosophical, sociological, political, economic, and critical theories that shape educational policies at national and global levels. Major foundational ideas—idealism, pragmatism, humanism, functionalism, conflict

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theory, human capital theory, neoliberalism, feminist theory, and indigenous perspectives focusing on how values, ideologies, and power dynamics influence policy design, goals, and implementation. **[8 hours]**

Unit II Contemporary Concerns of Policies and Practices — Education policy in colonial and post-independence India, major commissions and committees in Indian education (e.g., Kothari Commission, NPE 1968, 1986, 1992). SSA, RMSA, RUSA. Constitutional provisions for education: Article 21A, Right to Education Act (RTE) 2009, and state dimensions. Right to Information Act, Delors Commission, National Knowledge Commission, NCF for School, Teacher Education. Issues and Challenges in Indian Education. Teacher Education. Problem, Issues and Challenges in Indian Education. **[14 hours]**

Unit III Major Policy Frameworks and Global Perspectives — National Education Policy (NEP 2020): vision, reforms, and implementation challenges. Comparison with previous policies: continuity and change. Global initiatives: Education for All (EFA), Sustainable Development Goals (SDG 4), and UNESCO frameworks. Role of international agencies (UNESCO, UNICEF, World Bank) in shaping education policy. **[12 hours]**

Unit IV Policy Analysis and Implementation Research in Education — Approaches to policy analysis: political, economic, sociological, and critical. Models of policy analysis. Role of school leadership, teachers, and community in policy implementation. Tools for policy analysis SWOT. **[11 hours]**

5. Practicals [30 hours]

- Prepare a comprehensive report on a national or state education policy document.
- Write a review article on the application of any one Indian education policy.
- Presentation on NEP 2020 implementation strategies.
- Case studies of successful and failed education policy implementations in India.
- Prepare a comparative report on two educational policies (e.g., NEP 2020 and Education for All, or RTE Act and Sarva Shiksha Abhiyan), highlighting key similarities, differences, and impact on access and quality.

6. Essential Readings

- Government of India (2020). *National Education Policy 2020.* Ministry of Education, New Delhi.
- Kothari Commission Report (1964–66). *Education and National Development.* Ministry of Education, Government of India.
- National Policy on Education (1986, modified 1992). Ministry of Human Resource Development, New Delhi.
- UNESCO (2015). *Rethinking Education: Towards a Global Common Good?* Paris: UNESCO Publishing.
- NCERT (2017). *School Education Policies in India: Historical Overview and Future Directions.* New Delhi: NCERT.

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7. Suggestive Readings

- Ball, S. J., & Bowe, R. (1992). *Reforming Education and Changing Schools: Case Studies in Policy Sociology.* Routledge.
- Levin, H. M. (1998). *Educational Reform: Its Meaning and Role in Policy Making.* Falmer Press.
- Weaver-Hightower, M. (2008). *An Ecology Metaphor for Educational Policy Analysis: A Call to Complexity.* Educational Researcher, 37(3), 153–167.
- Apple, M. W. (2004). *Ideology and Curriculum.* Routledge Falmer.
- Ball, S. J. (2013). *The Education Debate.* Policy Press.
- Jandhyala, B. G. Tilak (2019). *Education and Development in India: Essays on Policy, Process and Practice.* Orient BlackSwan.

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DSE (III.3.3) School Field Experience
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.3.3)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
School Field Experience	4	1	0	3	Undergr aduate	NIL

2. Learning Objectives

This course provides students exposure to teaching-learning practices, curriculum implementation, and learner development in real school settings. Students will engage with government schools or alternative educational organizations to explore developmental perspectives in mathematics education. The experience is designed to integrate theory with practice, develop observation and analytical skills, and encourage reflective professional growth. The course also enables students to identify a classroom-based problem, collect data, implement an intervention, and analyze outcomes. Students learn how to conduct small-scale educational research projects within schools.

4. Learning Outcomes

- Apply developmental and pedagogical theories in real classroom contexts.
- Identify learner difficulties and adapt teaching strategies effectively.
- Conduct small-scale applied research in mathematics education.
- Critically reflect on teaching-learning practices and professional growth.
- Work collaboratively and independently in field-based educational projects.
- Document daily insights with a research lens, linking practice to evidence, theory, and inquiry.

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Syllabus [15 hours]

Unit I School as an Educational Experience - School as a socio-cultural and learning environment, Vision, mission, and institutional ethos, Structural organization, roles, and responsibilities of school personnel, School as a space for curriculum transaction and hidden curriculum, Community-school linkages and social participation (SMC, PTA, local governance), Policies shaping school functioning (RTE, NEP 2020 provisions), Student diversity, inclusion, and equity issues. **[7 hours]**

Unit II Classroom processes: seating, grouping, interaction patterns - Teacher's role: facilitation, questioning, scaffolding, differentiation, Understanding learner behaviour, engagement, misconceptions in mathematics, Forms of assessment used: diagnostic, formative, summative, Intervention planning: TLM development, activity-based learning, micro-teaching, Maintaining a Pro-Journal: Daily reflections, Observation summaries, Evidence-based insights, Self-evaluation and goal-setting, Ethical conduct and professional behaviour during internship. **[8 hours]**

5. Practicals [90 hours]

- Prepare a School Profile Report covering vision, mission, structure, timetable, and staff organization.
- Study record maintenance (attendance, assessment, staff registers).
- Analyze school management committee (SMC) functions and community participation.
- Observe the physical and digital infrastructure of the school.
- Prepare a classroom observation report with critical reflection.
- Participate in timetable preparation, duty rosters, or co-curricular scheduling.
- Assist in managing assemblies, parent-teacher meetings, or community events.
- Observe administrative decision-making and documentation processes.
- Discuss school budgeting, resource mobilization, and institutional planning.
- Organize or participate in cultural programs, exhibitions, sports, or literacy drives.
- Coordinate parent-teacher meetings, awareness campaigns, or school clubs.
- Conduct a workshop or seminar for students or teachers on relevant topics
- Maintain a reflective internship diary throughout the internship period.
- Prepare a reflective report summarizing the internship experience.
- Planning and execution of lesson plans and TLM; peer observation; school projects; math fairs; designing math theme walls.
- Conduct small-scale educational research projects within schools.

7. Essential Readings

- NCERT (20*05*). *National Curriculum Framework for School Education. NCERT.*
- NEP (2020). Ministry of Education, Government of India. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

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- National Council of Educational Research and Training. (2022). *National curriculum framework for school education.* NCERT.

7. Suggestive Readings

- Zeichner, K. (2010). *Rethinking the connections between campus courses and field experiences in college and university based teacher education.* Journal of Teacher Education, 61(1-2), 89–99. https://doi.org/10.1177/0022487109347671
- Passi, B.K. (1976). *Becoming Better Teachers: Microteaching Approach. http://125.22.75.155:8080/jspui/handle/123456789/4828?mode=full*

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DSE (III.3.4) Educational Research Design
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.3.4)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Educational Research Design	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

This course deepens the students' understanding of research paradigms, quantitative and qualitative designs, mixed-method approaches, and advanced data analysis techniques in educational research. It focuses on developing competence in formulating complex research problems, designing robust studies, using statistical and qualitative tools, and interpreting data ethically and meaningfully.

4. Learning Outcome

- Articulate the theoretical and philosophical underpinnings of different research paradigms.
- Design and execute advanced quantitative, qualitative, and mixed-method studies.
- Apply statistical and interpretive tools for meaningful data analysis.
- Develop and validate research tools using reliability and validity measures.
- Demonstrate ethical and scholarly competence in research writing and reporting.

4. Syllabus   [45 hours]

Unit I Philosophical and Paradigmatic Foundations of Research - Nature and purpose of educational research, Ontological, epistemological, and methodological assumptions, Positivist, interpretivist, and critical paradigms, Emerging paradigms: postmodernism, feminist research, indigenous research traditions, Ethical issues in advanced research.
[12 hours]

Unit II Quantitative Research: Advanced Designs and Techniques - Experimental, quasi-experimental, and ex-post facto designs; longitudinal, causal-comparative, and multivariate designs. Mixed-Methods and Action Research.   [9 hours]

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Unit III   Qualitative Research: Approaches and Analysis - Qualitative designs: ethnography, case study, phenomenology, grounded theory, narrative inquiry, Data collection methods: interview, observation, document analysis, Data analysis: thematic analysis, trustworthiness, reflexivity, and triangulation.   **[12 hours]**

Unit IV Proposal Development, Data Interpretation, and Reporting - Structure of a research proposal, Review of literature: synthesis and critical analysis, Data interpretation and visualization, APA 7th edition referencing style and citation management (Zotero/Mendeley), Academic writing for journals, dissertations, and reports, Reporting qualitative findings.   **[12 hours]**

5. Tutorials   [15 hours]

- Prepare a research proposal using a selected methodology.
- Conduct a pilot study with data collection and preliminary analysis.
- Conduct a mini qualitative study (e.g., case study/interview-based inquiry).
- Write a review paper or conceptual framework based on recent research literature.

6. Essential Readings

- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches.* Sage Publications.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education.* Routledge.
- Kothari, C. R., & Garg, G. (2019). *Research Methodology: Methods and Techniques.* New Age International.

7. Suggestive Reading

- Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook.* Sage.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2015). *How to Design and Evaluate Research in Education.* McGraw-Hill.
- Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and Conducting Mixed Methods Research.* Sage.

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General Elective (GE): 04 Credits

GE (III.4.1) Mental Health and Well-being
General Elective

1. Credit Distribution of the Course

Course title & Code GE (III.4.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Mental Health and Well-being	4	3	1	0	Undergraduate	NIL

2. Learning Objectives

This course focuses on understanding the concepts, determinants, and strategies for promoting mental health and psychological well-being in educational contexts. It helps teacher educators and school leaders develop insight into students' mental health needs, resilience, stress management, and emotional intelligence. The course also explores institutional and community-based interventions for fostering positive mental health in schools.

3. Learning Outcomes

- Explain key concepts and determinants of mental health and well-being.
- Identify symptoms and causes of common mental health problems in schools.
- Apply psychological and educational strategies for promoting well-being.
- Integrate socio-emotional learning (SEL) and mindfulness into school curricula.
- Design intervention and support systems for positive school mental health.

6. Syllabus   [45 hours]

Unit I Understanding Mental Health and Well-being - Meaning, nature, and dimensions of mental health and well-being. Determinants of mental health: biological, psychological, and social factors. WHO and NCERT perspectives on school mental health. Theories and models of well-being. Role of education in promoting positive mental health.   **[12 hours]**

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Unit II Mental Health Concerns in Educational Settings - Mental health issues in childhood and adolescence: anxiety, depression, ADHD, conduct disorders, and learning difficulties. Teacher stress, burnout, and coping mechanisms; stigma and myths about mental illness. Gender inclusion and socio-cultural influences on mental health. Role of family, peers, and school environment. **[12 hours]**

Unit III Promoting Mental Health and Well-being in Schools - Preventive and promotive approaches: school-based interventions. Emotional intelligence, resilience, mindfulness, and positive psychology. Guidance and counselling services for mental health. Integrating well-being into curriculum and pedagogy. **[9 hours]**

Unit IV   Policies, Programmes, and Emerging Issues - National Mental Health Programme (NMHP), School Health Programme, and NEP 2020 recommendations. Role of NCERT, NIMHANS, and UNESCO in promoting mental health education. Use of ICT and social media: impact on mental health. Ethics, confidentiality, and crisis intervention in school settings. **[12 hours]**

7. Tutorials   **[15 hours]**

- Case study of students with mental health challenges.
- Conducting a workshop/seminar on stress management or emotional literacy.
- Reflective journal on one's own mental health journey.

7. Essential Readings

- NIMHANS (2018). *School Mental Health Manual for Teachers.* Bengaluru.
- NCERT (2020). *Guidelines on School Mental Health Programmes.* New Delhi.

8. Suggestive Readings

- World Health Organization (2020). *Promoting Mental Health: Concepts and Evidence.* Geneva.
- WHO (2022): *Mental Health Action Plan* 2013–2030 – https://www.who.int

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GE (III.4.2) Fundamentals of Entrepreneurship
General Elective

1. Credit Distribution of the Course

Course title & Code GE (III.4.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Fundamentals of Entrepreneurship	4	3	0	1	Undergraduate	NIL

2. Learning Objectives

The course aims to develop entrepreneurial skills among students to transform educational challenges into social impact initiatives. This course provides an understanding of the foundational concepts, processes, and applications of entrepreneurship with special focus on educational entrepreneurship. It allows students to investigate how entrepreneurial thinking can be incorporated into education to boost creativity, innovation, and employability. The course combines theoretical foundations, case analysis, and project work.

3. Learning Outcomes

- Demonstrate understanding of entrepreneurial concepts and processes.
- Identify and design innovative educational ventures or projects.
- Examine national and institutional initiatives to promote entrepreneurship in education.
- Apply entrepreneurial skills to curriculum design, educational leadership, and teacher development.
- Exhibit entrepreneurial competencies: problem-solving, innovation, and leadership.

4. Syllabus   [45 hours]

Unit I Introduction to Entrepreneurship - Concept, meaning, and scope of entrepreneurship, Evolution and types of entrepreneurship: Business, social, and educational, Entrepreneur vs. Manager vs. Intrapreneur, Role of entrepreneurship in economic and educational development, Entrepreneurial ecosystem in India.   **[9 hours]**

Unit II The Entrepreneur: Traits, Competencies, and Motivation - Characteristics of successful entrepreneurs, Entrepreneurial motivation and leadership, Creativity and innovation in entrepreneurship, Emotional intelligence and risk management, Case studies of

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educational and social entrepreneurs (e.g., Teach For India, Khan Academy, Akshaya Patra Foundation). **[12 hours]**

Unit III   Entrepreneurship in Education and Policy Framework - Role of incubation centers (e.g. Atal Tinkering Labs, Startup India), Entrepreneurship development in teacher education institutions, Role of ICT, digital platforms, and open education in entrepreneurial innovation, Identifying educational needs and business opportunities. **[12 hours]**

Unit IV   Project Planning and Management in Education - Project proposal writing and feasibility analysis, Resource mobilization and financial planning, Legal aspects, registration, and institutional supports (MSME, NIESBUD, EDII, etc.), Developing entrepreneurial attitudes among teacher educators. **[12 hours]**

6. Practicals **[30 hours]**

- Preparation and presentation of an innovative educational venture or model.
- Develop a business plan or project proposal for an educational or training venture.
- Conduct a case study of a successful educational entrepreneur or social enterprise.
- Organize a workshop or seminar on innovation and startup culture in education.
- Develop an entrepreneurial training module for pre-service teachers.
- Undertake a micro-project on school-based income-generating or community-oriented activities.
- Visit an incubation center/startup ecosystem and prepare a reflection report.

6. Essential Readings

- UNESCO (2018). *Entrepreneurship Education for the 21st Century Learners.*
- Drucker, P. F. (1985). *Innovation and Entrepreneurship: Practice and Principles.* Harper & Row
- Gupta, C. B., & Srinivasan, N. P. (2018). *Entrepreneurship Development in India.* Sultan Chand & Sons.
- Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2013). *Entrepreneurship.* McGraw-Hill Education.

7. Suggestive Readings

- National Institute for Entrepreneurship and Small Business Development (NIESBUD) (2023). *Entrepreneurship Development Resource Materials. https://niesbud.nic.in/e-book/EDP-Handbbook-2023.pdf*
- Gibb, A. (2005). *The Future of Entrepreneurship Education—Determining the Basis for Coherent Policy and Practice?* In P. Kyro, & C. Carrier (Eds.), The Dynamics of Learning Entrepreneurship in a Cross-Cultural University Context (pp. 44-67). University of Tampere, Research Centre for Vocational and Professional Education.

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STRUCTURE -II (SEMESTRER -IV)

SYLLABUS

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Discipline Specific Core (DSC): 04 Credits

DSC 9 (IV.1) Pedagogical Explorations in Ancient Indian Geometry and Mathematics
Discipline Specific Core

1. Credit Distribution of the course

Course title & Code DSC 9 (IV.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Pedagogical Explorations in Ancient Indian Geometry and Mathematics	4	3	0	1	Undergraduate	NIL

2. Learning Objectives

This course aims to engage learners in exploring the rich mathematical traditions of ancient India through a pedagogical lens, emphasizing the geometry, trigonometry, and early calculus ideas that emerged from texts such as the *Sulba-sutras* and *Siddhantas*. It seeks to cultivate an understanding of how mathematical thought evolved through practical needs—altar constructions, measurement, astronomy—and how these contexts can serve as powerful learning tools in modern classrooms. The course encourages participants to reconstruct ancient geometric methods using both traditional materials (rope, pegs, and sand diagrams) and modern technological tools such as GeoGebra and dynamic geometry software. Learners will analyze original mathematical problems, interpret their conceptual underpinnings, and reframe them as inquiry-based activities that connect historical insights with contemporary pedagogical practices. Through this exploration, participants will develop pedagogical content knowledge (PCK) to design culturally rooted, hands-on learning experiences that promote conceptual understanding, creativity, and appreciation of India's mathematical heritage.

3. Learning Outcomes

By the end of this course, students will be able to:

- Interpret, model, and reconstruct geometrical and algebraic ideas from ancient Indian mathematical sources using both hands-on and digital tools.

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- Design classroom activities, lesson plans, and teaching modules that integrate historical mathematical concepts—such as altar geometry, sine computation, and early notions of series—into modern mathematics education.
- Translate abstract mathematical ideas into tangible learning experiences through constructivist, inquiry-based, and visual pedagogies.
- Critically evaluate the educational value of ancient mathematical approaches and understand how indigenous reasoning and problem-solving methods can enrich the teaching of geometry, trigonometry, and calculus.
- Develop the skills and insight necessary to bridge cultural and conceptual dimensions of mathematics in contemporary classroom practice.

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4. Syllabus [45 hours]

Unit I Sulba Geometry - Introduction to *Sulba*-sutras; Constructing a square of given side; Constructing a square of area equal to a given rectangle; Constructing a rectangle of area equal to a given square; Squaring the circle and its inverse problem; Geometrical representation of Ö2; Application to the construction of different types of Fire Altars - *Caturasrsa citi, Parimandala Smasana citi, Rathachakra citi, Ubhayata-Prauga citi, Prauga citi, Shyena citi.* **[15 hours]**

Unit II Circle & Shadow Geometry - Chord of one sixth circle; Circumference-Diameter ratio; Computation of Sine table geometrically; Derivation of sine differences (Method of interpolation); Testing of level of verticality; Radius of the shadow sphere; Application to the gnomonic shadow due to lamp post and tip of the gnomonic shadow from the lap post and height of the latter; Theorems on square of hypotenuse and on square of half chord; Arrows of intercepted arcs of intersecting circles. **[12 hours]**

Unit III Classical Algebra & Series - Progressive series; Permutation and Combination; Pascal triangle and Binomial Theorem; Indeterminate equations of first and second degree; Trigonometric identities; Trigonometric Series; Sine-Cosine-Tan series; Convergency of π-series. **[9 hours]**

Unit IV Early Indian Calculus - The concept of Differential and Integral Calculus as described in ancient Indian texts. **[9 hours]**

5. Practicals [30 hours]

- Rope-and-peg constructions of squares and rectangles on the ground ("Sulba Lab")
- Use of GeoGebra to simulate and compare ancient geometric constructions.
- Designing a "mini fire altar" model (using cardboard or clay) demonstrating geometric transformations.
- Outdoor shadow experiments with lamp posts and sticks to measure height and angles (gnomonic studies)
- Creating a geometric sine table using compass and ruler, followed by a digital replication using GeoGebra.

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- Exploration of chord geometry using dynamic geometry software—students reconstruct arc and chord relations.
- Pascal triangle construction through physical counters and spreadsheet modeling.
- Understand infinite series using iterative geometric patterns.
- Designing a digital visualization for series convergence inspired by π-series.
- Comparing ancient series approximations with modern calculus computations.

6. Essential Readings

- Sarasvati Amma, T.A. (2017). *Geometry in Ancient and Medieval India*. Motilal Banarsidas Publishers.
- Shukla, K.S. & Sarma, K.V. (1976). *Aryabhatiya of Aryabhat*. Indian National Science Academy, New Delhi.
- Bag, A.K. (1979). *Mathematics in Ancient and Medieval India*. Chaukhamba Orientalia.

7. Suggestive Readings

- Patwardhan, K.S., Naimpally, S.A. & Singh, S.L. (2015). *Lilavati of Bhaskaracarya: Treatise of Mathematics of Vedic Traditions*. Motilal Banarsidas Publishers.
- Bhanumurthy, T.S. (2008). *A Modern Introduction to Ancient Indian Mathematics*. New Age International Publishers.

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DSC 10 (IV.2) Statistics in Educational Research
Discipline Specific Core

1. Credit Distribution of the course

Course title & Code DSC 10 (IV.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Statistics in Educational Research	4	3	0	1	Undergr aduate	NIL

2. Learning Objectives

The course will focus on understanding statistical concepts and its relevance in educational research. It explores applications of descriptive and inferential statistics on various datasets. It enables students to apply statistical tools to educational datasets. Students learn to describe, analyse and infer from real educational data for decision-making and scholarly inquiry.

3. Learning Outcomes

- Understand the role and scope of statistics in educational research;
- Organise, summarise, and interpret quantitative data using descriptive statistics;
- Apply appropriate inferential statistical techniques to test research hypotheses;
- Critically analyse and report quantitative findings in educational research.

4. Syllabus   [45 hours]

Unit I Meaning and scope of Statistics - Measurement scales; Parametric and Nonparametric Data; Descriptive and Inferential Analysis.   **[9 hours]**

Unit II Descriptive Statistics - Representing data (Frequency distribution; Cumulative distribution and Histogram); Measurement of Central Tendency and its 'interpretation, Measure of dispersion (Variance and Standard Deviation) and its' interpretation; Standard Scores (Z score; T Score, Percentile score and Percentile rank); Normal Probability curve and its' applications.   **[12 hours]**

Unit III Regression and Correlation - Measure of correlation: assumptions, computation and interpretation (Product movement correlation and Rank order correlation); Partial correlation; Multi-variate correlation (application and interpretation); Simple and multiple regression analysis.   **[12 hours]**

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Unit IV Data analysis and interpretation - Describing and interpreting data using case-studies with real time/synthetic educational data.   **[12 hours]**

5. Practical   **[30 hours]**

- Conduct a comparative analysis of class-size divisions and descriptive measures.
- Prepare an analytical report for an educational data from publicly available datasets (for example: UDISE+; OECD) and design infographics based on the data.
- Collect five small datasets in different educational settings and make a factsheet of nature, variables, measurement scales and choice of descriptive statistics.
- Make a list of variables from 20 educational research studies and describe the features and statistics of variables used by the researchers. Critically analyze the choices made by the researchers.
- Review 10 correlational research studies and identify the correlation feasibility.
- Run a simple linear regression to predict achievement outcomes based on any two dependent variables such as using online resources, previous achievement.
- Prepare 05 case studies using real/simulation data which highlight that statistical results can be misleading.
- Prepare a statistical analysis using Geogebra for a real education dataset.
- Create a Math Aptitude Test and establish its reliability and validity.
- Design an ability grouping interval scale for a normally distributed students group.
- Prepare a usability chart for conditions of correlation analysis.

6. Essential Readings

- Best, J. & Kahn, J. (2012). *Research in Education*, PHI learning Private Limited.
- Garrett, H. E. (2006). *Statistics in Psychology and Education*. Cosmo Publication.
- Creswell, W.J. and Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative and Mixed Methods*. Sage Publications.
- Lanham, M. (2011). *Practical Statistics for Educators*. Rowman & Littlefield, Toronto.

7. Suggestive Readings

- Leppink, J. (2019). *Statistical Methods for Experimental Research in Education and Psychology*. Springer.
- Tanner, E. (2011). *Using Statistics to Make Educational Decisions*. Thousand Oaks, Sage.
- Coladarci, T. & Cobb, C.D. (2013). *Fundamentals of Statistical Reasoning in Education.* Wiley.

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Discipline Specific Electives (DSE): 04 Credits

DSE (IV.3.1) AI and Machine Learning Algorithms for Educational Data Mining
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (IV.3.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
AI and Machine Learning Algorithms for Educational Data Mining	4	2	0	2	Undergraduate	NIL

2. Learning Objectives

The course focuses on Education Data Mining (EDM) as an emerging field at the intersection of education and data science using Artificial Intelligence (AI) and Machine Learning (ML). Students will learn about large scale data in education available with open sources (public repositories), government reports and other sources. Students will learn the fundamentals of AI and ML algorithms that are applied to educational datasets extracting meaningful patterns and making data-driven decisions. from educational datasets. The course blends theoretical foundations with hands-on practical using real and synthetic educational datasets.

3. Learning Outcomes

- Understand the types and sources of educational data (institutional, virtual platform, learner-generated, research specific);
- Explore the core principles of AI, ML at the intersection of data mining in educational contexts;
- Apply basic and advanced ML algorithms (classification, clustering, regression) to educational data;
- Interpret learning analytics for early predictions, interventions and designing personalized learning environments.

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4. Syllabus [30 hours]

Unit I Introduction to Educational Data Mining (EDM) - Understanding educational data and learning analytics; AI applications in early predications, adaptive learning, assessment, and educational policy; Sources of large scale educational data; Data privacy and ethical practices in educational research. [6 hours]

Unit II Data Mining Techniques in Educational Datasets - Data types, data structures, data cleaning, pre-processing and feature selection; Descriptive statistics and exploratory data analysis; Visualization of data using descriptive measures; Common educational datasets. [8 hours]

Unit III Understanding Machine Learning Algorithms for Educational Datasets - Introduction to different ML algorithms relevant for educational datasets (Classification algorithms (Decision tree), Regression analysis (Linear regression), Clustering algorithms (K-Means), Ensemble models (Random Forest, Gradient Boosting)); Model evaluation; Interpreting results for decision making. [8 hours]

Unit IV Deep Learning and Natural Language Processing - Basics of deep learning and neural network; Understanding text mining processes in educational contexts such as students' feedback/discussion forum; Interpreting sentiment analysis reports; Understanding process behind Chatbots and Intelligent/Adaptative Tutoring Systems; Bias and ethical issues in using AI algorithms in EDM. [8 hours]

5. Practicals [60 hours]
- Prepare codebooks for raw educational datasets and present it meaningfully for analysis and interpretation.
- Create a data dashboard depicting relationships between variables.
- Prepare a feature chart and catergorization table for raw and pre-processing data from educational data repositories.
- Make a comparative sheet for AI models for their efficiency on different kinds of datasets (two variables; multi-variables, linear and non-linear).
- Preparing a report and suggestive measures based on sentiment analysis.
- Prepare a protocol design for clustering students based on learning behaviour.
- Review 20 research papers to identify meta trends in EDM research.
- Make an advisory guideline framework for ethical and inclusive practices for EDM.
- Make a decision making map for developing ML pipelines for different datasets.

6. Essential Readings
- Romero, C. & Ventura, S. (2020). *Educational Data Mining: State of the Art.* IEEE.
- Baker, R. S. (2020). *Big Data and Education.* Routledge.
- Holmes, W. et al. (2019). *Artificial Intelligence in Education.* CCR.
- Luckin, R. (2020). *Machine Learning and Human Intelligence.* UCL Press.

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7. Suggestive Readings

- Khan, B., Corbeil, J. R. & Corbeli, M. E. (2018). Responsible Analytics and Data Mining in Education: Global Perspectives on Quality, Support, and Decision Making, (ed.). Routledge.
- Sweta, S. (2021). Modern Approach to Educational Data Mining and Its Applications. Springer.

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DSE (IV.3.2) Education for a Futuristic Paradigm
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (IV.3.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Education for a Futuristic Paradigm	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

This course explores emerging paradigms in education that address the challenges and opportunities of a rapidly changing global society. It focuses on 21st-century competencies, digital transformation, sustainability, equity, and innovation in education, aligning with the vision of NEP 2020 and Education for Sustainable Development (ESD). The course encourages critical reflection on how education systems can be re-envisioned to nurture creativity, adaptability, ethical values, and global citizenship for a sustainable and inclusive future.

3. Learning Outcomes

- Explain the philosophical and sociological foundations of futuristic education.
- Analyze global and national trends influencing educational change.
- Design learning experiences fostering creativity, critical thinking, and sustainability.
- Evaluate the implications of technology, AI, and digital learning on pedagogy and equity.
- Conceptualize strategies for building resilient, inclusive, and sustainable educational futures.

4. Syllabus   [45 hours]

Unit I: Concept of Futuristic Education - Meaning and need for a futuristic paradigm in education, characteristics of a future-oriented education system. Futures thinking and foresight approaches in education. Vision of NEP 2020 and UNESCO Futures of Education Report (2021).   **[10 hours]**

Unit II Emerging Trends and Global Challenges - Globalisation, sustainability, and human development. Digital revolution, artificial intelligence, and automation in education.

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Changing nature of knowledge, skills, and lifelong learning. Equity, inclusion, and diversity as central themes of future education. **[12 hours]**

Unit III Curriculum and Pedagogy for the Future - 21st-century skills: creativity, critical thinking, communication, and collaboration. Curriculum integration for sustainability, STEAM, and life skills. Innovative pedagogical approaches: Blended learning, project-based learning, and design thinking. Interdisciplinary and experiential learning. Assessment reforms for competency-based education. **[12 hours]**

Unit IV: Policy, Innovation, and Institutional Transformation - Educational leadership and governance for future-ready systems. Role of teachers as innovators, mentors, and facilitators. NEP 2020 and SDG 4: Policy perspectives on future learning. Role of technology, open education, and digital universities. **[11 hours]**

5. Tutorials **[15 hours]**

- Develop a digital learning or sustainability project.
- Case studies: India, Finland, Singapore, and UNESCO educational initiatives.
- Mapping curriculum goals to 21st century skills
- Exemplary lesson plan based on innovative pedagogy

6. Essential Readings

- UNESCO (2021). *Reimagining Our Futures Together: A New Social Contract for Education.* Paris: UNESCO.
- Government of India (2020). *National Education Policy 2020.* Ministry of Education.
- Mishra, S. (2021). *Futures of Learning: Educational Transformations in India.* NIEPA.
- Sterling, S. (2011). *Transformative Learning for a Sustainable Future.* Earthscan.

7. Suggestive Readings

- Drucker, P. (1993). *Post-Capitalist Society.* Harper Business.
- Sterling, S. (2011). *Transformative Learning for a Sustainable Future.* Earthscan.

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DSE (IV.3.3) Statistical Tools for Research Analysis
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (IV.3.3)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Statistical Tools for Research Analysis	4	2	0	2	Undergr aduate	NIL

2. Learning Objectives

This course focuses on the application of advanced statistical tools for making inferences from the sample data to the larger population. It connects conceptual understanding with hands-on data analysis using digital tools and statistical software such as **S**PSS**,** STATA, Excel & NVIVO. Students will learn how to select appropriate statistical tests and make inferences based on research questions, data types, and sampling designs.

3. Learning Outcomes

- Understand the concepts, reasoning and interpretation of inferential statistics;
- Examine the need and usability of non-parametric statistics;
- Choose appropriate statistical tools for analysing quantitative data;
- Choose appropriate statistical tools for analysing quantitative data.

4. Syllabus [30 hours]

Unit I Foundations of Inferential Statistics - The central limit theorem; Testing null hypothesis; Significance of difference between the means; level of significance; Degree of freedom; One sample Z test; Significance of difference between means of two small and independent samples; Significance of difference between means of two matched or correlated groups (non- independent samples); Statistical significance of coefficient of correlation.
[8 hours]

Unit II Non-Parametric Statistics in Educational Research - Concept and rationale for using non-parametric tests; Statistical tests for non-parametric data: Mann–Whitney U, Wilcoxon Signed-Rank; Chi-square tests for independence and goodness of fit; Comparison between parametric and non-parametric testing. [6 hours]

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Unit III Statistical Software for Quantitative Analysis - Descriptive and inferential analysis of quantitative data using SPSS/STATA. **[8 hours]**

Unit IV Statistical Software for Qualitative analysis - Open and axial coding and thematic analysis of qualitative data using NVIVO/MaxQDA. **[8 hours]**

5. Practicals **[60 hours]**

- Collect, organise and visualize raw educational data manually/using spreadsheet/SPSS/STATA. Classify the distinguished features and interpret the results based on visualized data.
- Prepare an analytical table for statistical inferences and interpretive reflection on learning diversity among learners using any existing research studies.
- Conduct non-parametric analysis for ordinal and categorical data.
- Assess the reliability and construct validity of an educational measurement tool.
- Select two independent group datasets, use Mann Whitney U Test and interpret the result
- Prepare a correlation and regression analysis report for variables parents' math background and students'math achievement.
- Do sentiment analysis of metacognitive skills of students in math learning.
- Do axial coding for an opinion poll on students' preference for practical exam vs theory exam.
- Overlap npc on a skewed data graph and do correction to pull it towards normality.
- Use appropriate software to conduct chi square analysis for categorical dataset using teachers' professional competency scale and their association with professional networks.
- Use a small data set to compare two groups using an independent t-test.
- Use rank order correlation for ordering students based on inputs on attitudinal scale.
- Use 10-item attitude scale responses and compute Cronbach's Alpha in SPSS.
- Use a small dataset of study hours (X) and achievement (Y) and run a linear regression model and interpret slope and R^2.
- Collect short written feedback on a week long math lessons and do sentiment analysis using manual coding and thematic coding using NVIVO. Compare the findings.

6. Essential Readings

- Pallant, J. (2022). *SPSS Survival Manual.* McGraw-Hill.
- Creswell, J. W. & Poth, C. (2023). *Qualitative Inquiry and Research Design.* Sage.
- Gravetter, F. J. & Wallnau, L. B. (2021). *Essentials of Statistics for the Behavioral Sciences.* Cengage.
- Braun, V. & Clarke, V. (2022). *Thematic Analysis: A Practical Guide.* Sage.

7. Suggestive Readings

- Beekhuyzen, J. & Bazeley, P. (2024). *Qualitative Data Analysis with NVivo,* (4th ed.). Sage Publication.

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● Peers, I. (1996). *Statistical Analysis for Education and Psychology Researchers: Tools for Researchers in Education and Psycholog*y. Routledge.

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DSE (IV.3.4) International and Comparative Education
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (IV.3.4)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
International and Comparative Education	4	3	1	0	Undergraduate	NIL

2. Learning Objectives

This course provides a global perspective on education by examining how social, political, economic, and cultural factors influence educational systems worldwide. It introduces the field of comparative education and explores issues such as globalization, international reforms, equity, access, quality, and governance in education. The course aims to equip students with analytical tools to compare educational systems, interpret international policies, and understand the role of global organisations in shaping education.

3. Learning Outcomes

- Explain the nature, scope, and significance of comparative education.
- Compare education systems using theoretical and analytical frameworks.
- Evaluate global educational trends and their policy implications.
- Analyse the role of globalization and internationalization in shaping education.

4. Syllabus   [45 hours]

Unit I Introduction to International and Comparative Education - Meaning, nature, and scope of comparative education. Historical development and evolution of the field. Purposes and challenges of comparative studies. Relevance of comparative education in teacher education and policy.   **[11 hours]**

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Unit II Education and its Contexts - Relationship between education & society, economy, culture, and politics. Determinants of educational development: Demographic, technological, and ideological. Comparative study of educational aims, structures, and governance. Education and social change in developing and developed contexts. **[12 hours]**

Unit III Comparative Study of Selected Education Systems - Educational systems of India, Finland, Japan, United States, and United Kingdom. Comparative perspectives on access, equity, quality, and inclusion. Curriculum, pedagogy, and assessment reforms. Teacher education models across countries. **[11 hours]**

Unit IV Globalization and Internationalization of Education - Impact of globalization on education systems. Role of international organizations: UNESCO, UNICEF, OECD, World Bank, and WTO. Global initiatives: Education for All (EFA), SDG 4, and the Education 2030 Agenda. Issues of equity, cultural identity, and policy borrowing/lending in global education. **[11 hours]**

5. Tutorials **[15 hours]**

- Comparative analysis of the education systems of two countries.
- Review of UNESCO or OECD education reports.
- Preparation of a short paper on globalisation and its impact on Indian education.

6. Essential Readings

- UNESCO (2015). *Rethinking Education: Towards a Global Common Good?* Paris: UNESCO.
- Crossley, M., & Watson, K. (2003). *Comparative and International Research in Education: Globalisation, Context and Difference.* Routledge.
- OECD (2020). *Education at a Glance: OECD Indicators.* OECD Publishing.
- Government of India (2020). *National Education Policy 2020.* Ministry of Education.

7. Suggestive Readings

- Carnoy, M. (1999). *Globalization and Educational Reform: What Planners Need to Know.* UNESCO-IIEP.
- Phillips, D., & Schweisfurth, M. (2014). *Comparative and International Education: An Introduction to Theory, Method, and Practice.* Bloomsbury.

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General Elective (GE): 04 Credits

GE (IV.4.1) Guidance and Counselling
General Elective

1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
GE (IV.4.1)		Lecture	Tutorial	Practical/ Practice		
Guidance and Counselling	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

This course aims to develop theoretical and practical understanding of the principles, approaches, and techniques of guidance and counselling. It equips prospective educators with the knowledge and skills to address students' academic, personal, social, and career concerns, promoting their holistic development. The course integrates Indian perspectives and modern global trends in counselling.

3. Learning Outcomes

- Understand the nature, scope, and importance of guidance and counselling in education.
- Describe and differentiate major theories and approaches of guidance and counselling.
- Apply tools, techniques, skills and ethical practices in Guidance & counselling situations
- Design and implement guidance and career development programmes in educational settings.
- To familiarise the students with various approaches, techniques and skills of counselling and psychotherapy in mental health problems.

4. Syllabus   [45 hours]

Unit I Foundations of Guidance and Counselling - Meaning, nature, principles, Aim, objectives and scope of Guidance and Counselling. Historical development of guidance and counselling in India. Difference between Guidance & Counselling and Counselling &

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Psychotherapy. Types and areas of guidance: Educational, vocational, personal, and social. Organisation of Guidance programmes at different levels of Education.   **[12 hours]**

Unit II Theories and Approaches to Counselling - Major theories: Psychoanalytic, Behaviouristic, Humanistic, and Cognitive. Counselling approaches: directive, non-directive, eclectic. Group, family, and multicultural counselling.   **[9 hours]**

Unit III Tools, Testing and Non-testing techniques, in Guidance & Counselling - Tools of guidance-.Interviewing, observation, and case study. Testing techniques-Intelligence, achievement, interest, aptitude, adjustment & interpersonal relations, personality (Objective, self-report, Projective). Sociometric devices. Non-testing technique: Systematic Case study, interview-counselling interview, observation role and method. Ethics and confidentiality in counselling.   **[12 hours]**

Unit IV Guidance Services and Programme in Educational and Vocational Contexts - Vocational guidance and decision-making. Career development theories (Super, Holland). Guidance services-self-inventory, occupational information, placement, follow-up, and evaluation. Guidance for diverse learners and students with special needs. School guidance programmes: organisation and evaluation.   **[12 hours]**

5. Tutorials   **[15 hours]**

- Conduct a mock counselling session.
- Prepare a case study report.
- Design a school guidance plan.
- Need assessment of behavioural counselling among adolescent learners.
- Counseling logs for learners' overall well-being.

6. Essential Readings

- Gibson, R.L. & Mitchell, M.H. (2019). *Introduction to Counselling and Guidance.* Pearson.
- NCERT(2022). Guidance and Counselling. New Delhi: NCERT (Chapter 8) (pp.157-165)
- Gladding, S (2018). Counselling: A Comprehensive Profession. New Delhi
- Seth, S., Bhatia, H. and Chaddha, N.K. (2018). Counselling Skills: Knowing self and others
- https://www.egyankosh.ac.in/bitstream/123456789/74662/3/Unit-4.pdf

7. Suggestive Readings

- Corey, G. (2016). *Theory and Practice of Counselling and Psychotherapy.* Cengage.
- Rao, S.N. (2017). *Counselling and Guidance.* Tata McGraw-Hill.
- NCERT (2015). *Guidance and Counselling: Manual for Teachers and Counsellors.*

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GE (IV.4.2) Design Thinking, Innovation and Entrepreneurial Pathways
General Elective

1. Credit Distribution of the Course

Course title & Code GE (IV.4.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Design Thinking, Innovation, and Entrepreneurial Pathways	4	2	0	2	UG	NIL

2. Learning Objectives

The course provides both theoretical understanding and practical foundation in innovation, entrepreneurship and the role of design thinking in this endeavor. Advent of newer technologies opens new pedagogic practices, which in turn opens possibilities to develop new applications, products and services useful in teaching and educational administration. The course imparts knowledge and skills to develop new applications and take them to a wider user base, either through commercial or non-commercial pathways.

3. Learning Outcomes

- Explaining Design thinking as a working framework for user research, product/process development and iterative improvement, user testing and user adoption.
- Differentiate between Innovation vs invention, and IPR.
- Classify types of innovation and entrepreneurship.
- Analyze the nature and limitations of student or teacher entrepreneurship.
- Apply theories and practices of innovation and entrepreneurship.

4. Syllabus   [30 hours]

Unit 1 Design Thinking - Key concepts of design. Models of design thinking (honeycomb vs double diamond vs synergy). Empathy research, identifying user needs and validation. User persona and design brief. Methods of ideation and building solution space. Rapid prototyping. User Testing and Pilot. Iterative improvement. UX/UI designing.   **[8 hours]**

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Unit 2 Innovation - Innovation vs Invention. Aspects of innovation. Innovation matrix. Diffusion theory of innovation and technology adoption curve. Theories of Innovation. Principles of innovation. Types of innovation.   **[7 hours]**

Unit 3 Entrepreneurship - Traits of an entrepreneur. Theories of entrepreneurship. Types of Entrepreneurships. Classification of Entrepreneurship. Barriers to entrepreneurship. Opportunity and scope for entrepreneurship. Market research and unmet customer needs. Customer segment and total accessible market (TAM).   **[8 hours]**

Unit 4 Model & Product - Minimum viable product and Business model canvas. Product/service development and IPR. Branding and product launch plan. Types of business enterprises and their legal compliances. Business pitch and funding. Resource allocation, growth and valley of death.   **[7 hours]**

5. Practicals   [60 hours]

- Case study of a design using DFV model (Desirability, Feasibility, Viability)
- Search a user problem using a synergy model.
- Draw empathy map and stakeholder map of the problem space.
- Ideate an exhaustive list of innovative solutions.
- Case study of Doblin's 10 types of innovation in the Indian market.
- Reconstruction of UX/UI of a successful e-commerce portal/app.
- Market research in search for an unmet consumer need and assess TAM.
- Project: Build a dummy startup: company documents, product brochure, branding document, business model canvas, business pitch.

6. Essential Readings

- Brown, T. (2020). *HBR's 10 must reads on Design Thinking*. Harvard Business Review Press.
- Drucker, P.F. (2013). *HBR's 10 must reads on Innovation*. Harvard Business Review Press.
- Drucker, P.F. (1985). *Innovation and Entrepreneurship.* Harper Business.
- Blank, S. & Dorf, B. (2020). *The Startup Owner's Manual: The step-by-step guide for building a great company.* Wiley

7. Suggestive Readings

- Christensen, C.M. (1997). *The Innovator's Dilemma*. Harvard Business Review Press.
- Thiel, P. & Masters, B. (2014). *Zero to One: Notes on Start Ups or How to build the Future*. Random House.
- Ries, E. (2011). *The Lean Startup*. Random House.

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STRUCTURE -III (SEMESTRER -III)

SYLLABUS

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Discipline Specific Core (DSC): 04 Credits

DSC 7 (III.1) Foundations of Teacher Education: Theory, Practice and Research
Discipline Specific Core

1. Credit Distribution of the Course

Course title & Code DSE (III.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Foundations of Teacher Education: Theory, Practice and Research	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

The course provides research-intensive learning experience on the historical, conceptual, and policy dimensions of teacher education in India and globally, focusing on governance, curriculum reform, professional identity, and quality management. Students learn about the evolving paradigms in teacher education through seminal research and contemporary debates. The course provides the evidence-based research perspectives on governance, practices and partnerships between universities, regulatory bodies, and schools; highlights emerging models such as Open and Distance Learning (ODL), and emphasizes the need for reimagining teacher education in light of emerging global trends.

3. Learning Outcomes ·

- Critically analyse the evolution trajectories and paradigmatic shifts in teacher education;
- Evaluate research frameworks used to study teacher education as a field of professional and academic inquiry;
- Conduct Meta analysis of research trends in teacher education;
- Identify research gaps in existing conceptualisations of teacher preparation and teacher identity formation;
- Design research proposal to study emerging trends, global discourses, and future challenges in teacher education.

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4. Syllabus [45 hours]

Unit I Historical and Research-based Trajectories in Teacher Education - Development and transformation of teacher education in India; Policy reforms in teacher education (NPE 1986 to NEP 2020); Rethinking the concept of teacher from training to transformative practice; Theoretical perspectives on teacher education: Situated, reflective, and critical paradigms. **[12 hours]**

Unit II Governance, Quality, and Accountability in Teacher Education - Teacher education as an evolving professional practice; Governance and quality assurance in teacher education institutions in India; Role of universities, NCTE, SCERTs, and NCERT in policy implementation; Financing and accountability in teacher education; Quality assurance and governance in teacher education. **[12 hours]**

Unit III Pedagogical and Research Frameowrks in Teacher Education - Pedagogical framework in teacher education; Exploring pre-service teachers' self-efficacy, professional identity, and agency; Leadership preparation and development policies for teacher educators; Teachers at the cutting edge of educational change and innovation; Capacity building and continuous professional development of in-service teachers; Trends and highlights of mathematics teacher education. **[12 hours]**

Unit IV Emerging Research Trends, Technologies, and Global Discourses in Teacher Education - ICT and digital innovation in teacher education (MOOCs, blended models, virtual mentorship); Comparative and international perspectives in teacher education reform; Assessment and quality benchmarking in teacher preparation programmes; Teacher education for sustainable development and global citizenship; Meta-trends in research and policy shifts. **[9 hours]**

5. Tutorials [15 hours]

- Conduct metanalysis of emerging research trends in teacher education
- Review key teacher education policies and present a comparative analysis
- Case Study analysis of any one teacher education institution's governance model (university/DIET/ODL).
- Develop a self-efficacy scale to pre-service teachers and interpret patterns in confidence and professional readiness
- Compare the curriculum of two teacher education programs of two different institutes and map their objectives and structures with NEP 2020-aligned goals.
- Conduct a small-scale review to identify research gaps in teacher education.
- Conduct a panel discussion on discussion simulation *Who owns teacher education?*
- Conduct a comparative analysis of teacher's preparation model, governance structure, and professional development framework of any two countries.
- Prepare a policy brief of 2000 words on *Strengthening Teachers' Professional Network through Technology.*

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6. Essential Readings

- Panda, P. (2024). *Teacher Education Landscapes in India: Governance and Quality Management (ed.)*. Routledge India.
- Mifsud, D. & Day, S.P. (2023). *Teacher Education as an Ongoing Professional Trajectory: Implications for Policy and Practice.* Springer.
- NEP 2020, Ministry of Education, Government of India.
- Khine, M.S. & Liu, Y. (2022). *Handbook of Research on Teacher Education: Innovations and Practices in Asia.* Springer. https://link.springer.com/book/10.1007/978-981-16-9785-2
- National Council for Teacher Education. (2009). *National Curriculum Framework for Teacher Education in India.* https://ncte.gov.in/website/PDF/NCFTE_2009.pdf

7. Suggestive Readings

- Loughran, J. (2006). *Developing a Pedagogy of Teacher Education: Understanding Teaching & Learning about Teaching.* Routledge.
- Zeichner, K. (2018). *The Struggle for the Soul of Teacher Education.* Routledge.

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Discipline Specific Electives (DSE): 04 Credits

DSE (III.2.1) ICT in Mathematics Education
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.2.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
ICT in Mathematics Education	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

ICT has a transformative impact on teaching learning practices and education administration. Blended learning is no more a choice but a norm. This course focuses on reviewing contemporary knowledge on this broad area of research. The course focuses on developing rigorous understanding of pros and cons of all aspects of ICT, impact of ICT in education in general and its impact on Mathematics Education in particular.

3. Learning Outcomes

- Scope and impact of emerging ICT in education
- Means of ICT
- ICT tools in teaching
- ICT for inclusive classroom
- Safety, security, misuse and psychological concerns of ICT usage

4. Syllabus **[45 hours]**

Unit I ICT in Curriculum and Pedagogy - TPCK framework. Instrumental Orchestration. Place and purpose of ICT in the curriculum, Means of ICT. ICT embedded pedagogy. Digital resources. Content planning and curriculum designing using ICT. Role of ICT in content differentiation. Models of Blended learning. ICT and self-paced learning. ICT for inclusive classrooms. **[12 hours]**

Unit II ICT Tools and Classroom Discourse - Augmenting teaching-learning process using social networks, blogs, discussion forums etc. Online teaching and learning. ICT tools for

assessment. Analytics for monitoring progress and achievements. Learning Management Systems. School management ERP. **[12 hours]**

Unit III Scope and Challenges of using ICT in Education - Technology in the hands of teacher and student. e-content versus authentic information. Cybercrime, Software Piracy, Online bullying, Privacy concerns. **[12 hours]**

Unit IV Ethical Practices of Using ICT - Plagiarism and fair use of ICT. Socio-economic and ethical aspects of adopting ICT. **[9 hours]**

5. Tutorials [15 hours]

- Searching current, high impact research publications, reviews, and case studies;
- How to read and summarize research papers;
- Propose methods to overcome ICT phobia;
- Design innovative assessment tools and analytics;
- Online Repository of digital resources for mathematics education;

6. Essential Readings

- Moursund, D. (2005). *Introduction to Information and Communication Technology in Education*. Teacher Education, University of Oregon.
- UNESCO (2012). *ICT in Primary Education: Analytical survey*.
- Athanassios, J. (ed.) (2012). *Research on e-Learning and ICT in Education*. Springer
- Oldknow, A., Taylor R. & Tetlow, L. (2010). *Teaching Mathematics Using ICT 3rd Edition*. Continuum International Publishing Group.

7. Suggestive Readings

- Abbott, C. (2001). *ICT: Changing Education*. Psychology Press.
- Kozma, R.B. (2003). *Technology, Innovation, and Educational Change: A Global Perspective: A Report of the Second Information Technology in Education Study, Module 2*. International Society for Technology in Education.
- Wilder, S.J. & Pimm, D. (2004). *Teaching Secondary Mathematics with ICT*. McGraw-Hill International.

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DSE (III.2.2) Educational Policy Studies
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.2.2)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Educational Policy Studies	4	3	0	1	Undergr aduate	NIL

2. Learning Objectives

This course provides students with the theoretical understanding and practical competencies required to engage with educational policy processes. It emphasizes skills in policy interpretation, critical analysis, evidence-based reasoning, and policy evaluation. Students examine how historical, political, social, and economic forces shape educational policy at national and global levels. Through NEP 2020 and other key documents, students learn to apply conceptual and empirical frameworks to analyze, critique, and design effective policy implementation strategies.

3. Learning Outcomes

- Demonstrate conceptual clarity and analytical skills to explain the nature, scope, and stages of educational policy formulation.
- Use historical and philosophical reasoning to understand the foundations of educational policy in India.
- Critically evaluate Indian and global education policies using equity, access, inclusion, and quality-based frameworks.
- Apply policy analysis models and evidence-based tools to interpret, review, and critique policy documents.
- Develop competencies in drafting policy briefs, conducting policy reviews, and designing implementation strategies appropriate to educational contexts.

4. Syllabus   [45 hours]

Unit I Conceptual Foundations of Educational Policy — Philosophical, sociological, political, economic, and critical theories that shape educational policies at national and global levels. Major foundational ideas—idealism, pragmatism, humanism, functionalism, conflict

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theory, human capital theory, neoliberalism, feminist theory, and indigenous perspectives focusing on how values, ideologies, and power dynamics influence policy design, goals, and implementation. **[8 hours]**

Unit II Contemporary Concerns of Policies and Practices — Education policy in colonial and post-independence India, major commissions and committees in Indian education (e.g., Kothari Commission, NPE 1968, 1986, 1992). SSA, RMSA, RUSA. Constitutional provisions for education: Article 21A, Right to Education Act (RTE) 2009, and state dimensions. Right to Information Act, Delors Commission, National Knowledge Commission, NCF for School, Teacher Education. Issues and Challenges in Indian Education. Teacher Education. Problem, Issues and Challenges in Indian Education. **[14 hours]**

Unit III Major Policy Frameworks and Global Perspectives — National Education Policy (NEP 2020): vision, reforms, and implementation challenges. Comparison with previous policies: continuity and change. Global initiatives: Education for All (EFA), Sustainable Development Goals (SDG 4), and UNESCO frameworks. Role of international agencies (UNESCO, UNICEF, World Bank) in shaping education policy. **[12 hours]**

Unit IV Policy Analysis and Implementation Research in Education — Approaches to policy analysis: political, economic, sociological, and critical. Models of policy analysis. Role of school leadership, teachers, and community in policy implementation. Tools for policy analysis SWOT. **[11 hours]**

5. Practicals [30 hours]

- Prepare a comprehensive report on a national or state education policy document.
- Write a review article on the application of any one Indian education policy.
- Presentation on NEP 2020 implementation strategies.
- Case studies of successful and failed education policy implementations in India.
- Prepare a comparative report on two educational policies (e.g., NEP 2020 and Education for All, or RTE Act and Sarva Shiksha Abhiyan), highlighting key similarities, differences, and impact on access and quality.

6. Essential Readings

- Government of India (2020). *National Education Policy 2020.* Ministry of Education, New Delhi.
- Kothari Commission Report (1964–66). *Education and National Development.* Ministry of Education, Government of India.
- National Policy on Education (1986, modified 1992). Ministry of Human Resource Development, New Delhi.
- UNESCO (2015). *Rethinking Education: Towards a Global Common Good?* Paris: UNESCO Publishing.
- NCERT (2017). *School Education Policies in India: Historical Overview and Future Directions.* New Delhi: NCERT.

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7. Suggestive Readings

- Ball, S. J., & Bowe, R. (1992). *Reforming Education and Changing Schools: Case Studies in Policy Sociology.* Routledge.
- Levin, H. M. (1998). *Educational Reform: Its Meaning and Role in Policy Making.* Falmer Press.
- Weaver-Hightower, M. (2008). *An Ecology Metaphor for Educational Policy Analysis: A Call to Complexity.* Educational Researcher, 37(3), 153–167.
- Apple, M. W. (2004). *Ideology and Curriculum.* Routledge Falmer.
- Ball, S. J. (2013). *The Education Debate.* Policy Press.
- Jandhyala, B. G. Tilak (2019). *Education and Development in India: Essays on Policy, Process and Practice.* Orient BlackSwan.

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DSE (III.2.3) School Field Experience
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.2.3)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
School Field Experience	4	1	0	3	Undergr aduate	NIL

2. Learning Objectives

This course provides students exposure to teaching-learning practices, curriculum implementation, and learner development in real school settings. Students will engage with government schools or alternative educational organizations to explore developmental perspectives in mathematics education. The experience is designed to integrate theory with practice, develop observation and analytical skills, and encourage reflective professional growth. The course also enables students to identify a classroom-based problem, collect data, implement an intervention, and analyze outcomes. Students learn how to conduct small-scale educational research projects within schools.

5. Learning Outcomes

- Apply developmental and pedagogical theories in real classroom contexts.
- Identify learner difficulties and adapt teaching strategies effectively.
- Conduct small-scale applied research in mathematics education.
- Critically reflect on teaching-learning practices and professional growth.
- Work collaboratively and independently in field-based educational projects.
- Document daily insights with a research lens, linking practice to evidence, theory, and inquiry.

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Syllabus [15 hours]

Unit I School as an Educational Experience - School as a socio-cultural and learning environment, Vision, mission, and institutional ethos, Structural organization, roles, and responsibilities of school personnel, School as a space for curriculum transaction and hidden curriculum, Community-school linkages and social participation (SMC, PTA, local governance), Policies shaping school functioning (RTE, NEP 2020 provisions), Student diversity, inclusion, and equity issues. **[7 hours]**

Unit II Classroom processes: seating, grouping, interaction patterns - Teacher's role: facilitation, questioning, scaffolding, differentiation, Understanding learner behaviour, engagement, misconceptions in mathematics, Forms of assessment used: diagnostic, formative, summative, Intervention planning: TLM development, activity-based learning, micro-teaching, Maintaining a Pro-Journal: Daily reflections, Observation summaries, Evidence-based insights, Self-evaluation and goal-setting, Ethical conduct and professional behaviour during internship. **[8 hours]**

5. Practicals [90 hours]

- Prepare a School Profile Report covering vision, mission, structure, timetable, and staff organization.
- Study record maintenance (attendance, assessment, staff registers).
- Analyze school management committee (SMC) functions and community participation.
- Observe the physical and digital infrastructure of the school.
- Prepare a classroom observation report with critical reflection.
- Participate in timetable preparation, duty rosters, or co-curricular scheduling.
- Assist in managing assemblies, parent-teacher meetings, or community events.
- Observe administrative decision-making and documentation processes.
- Discuss school budgeting, resource mobilization, and institutional planning.
- Organize or participate in cultural programs, exhibitions, sports, or literacy drives.
- Coordinate parent-teacher meetings, awareness campaigns, or school clubs.
- Conduct a workshop or seminar for students or teachers on relevant topics
- Maintain a reflective internship diary throughout the internship period.
- Prepare a reflective report summarizing the internship experience.
- Planning and execution of lesson plans and TLM; peer observation; school projects; math fairs; designing math theme walls.
- Conduct small-scale educational research projects within schools.

8. Essential Readings

- NCERT (20*05*). *National Curriculum Framework for School Education. NCERT.*
- NEP (2020). Ministry of Education, Government of India. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

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● National Council of Educational Research and Training. (2022). *National curriculum framework for school education.* NCERT.

7. Suggestive Readings

● Zeichner, K. (2010). *Rethinking the connections between campus courses and field experiences in college and university based teacher education.* Journal of Teacher Education, 61(1-2), 89–99. https://doi.org/10.1177/0022487109347671
● Passi, B.K. (1976). *Becoming Better Teachers: Microteaching Approach. http://125.22.75.155:8080/jspui/handle/123456789/4828?mode=full*

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DSE (III.2.4) Educational Research Design
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (III.2.4)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Educational Research Design	4	3	1	0	Undergr aduate	NIL

2. Learning Objectives

This course deepens the students' understanding of research paradigms, quantitative and qualitative designs, mixed-method approaches, and advanced data analysis techniques in educational research. It focuses on developing competence in formulating complex research problems, designing robust studies, using statistical and qualitative tools, and interpreting data ethically and meaningfully.

5. Learning Outcome

- Articulate the theoretical and philosophical underpinnings of different research paradigms.
- Design and execute advanced quantitative, qualitative, and mixed-method studies.
- Apply statistical and interpretive tools for meaningful data analysis.
- Develop and validate research tools using reliability and validity measures.
- Demonstrate ethical and scholarly competence in research writing and reporting.

4. Syllabus [45 hours]

Unit I Philosophical and Paradigmatic Foundations of Research - Nature and purpose of educational research, Ontological, epistemological, and methodological assumptions, Positivist, interpretivist, and critical paradigms, Emerging paradigms: postmodernism, feminist research, indigenous research traditions, Ethical issues in advanced research.

[12 hours]

Unit II Quantitative Research: Advanced Designs and Techniques - Experimental, quasi-experimental, and ex-post facto designs; longitudinal, causal-comparative, and multivariate designs. Mixed-Methods and Action Research. [9 hours]

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Unit III   Qualitative Research: Approaches and Analysis - Qualitative designs: ethnography, case study, phenomenology, grounded theory, narrative inquiry, Data collection methods: interview, observation, document analysis, Data analysis: thematic analysis, trustworthiness, reflexivity, and triangulation.   **[12 hours]**

Unit IV Proposal Development, Data Interpretation, and Reporting - Structure of a research proposal, Review of literature: synthesis and critical analysis, Data interpretation and visualization, APA 7th edition referencing style and citation management (Zotero/Mendeley), Academic writing for journals, dissertations, and reports, Reporting qualitative findings.   **[12 hours]**

5. Tutorials   **[15 hours]**

- Prepare a research proposal using a selected methodology.
- Conduct a pilot study with data collection and preliminary analysis.
- Conduct a mini qualitative study (e.g., case study/interview-based inquiry).
- Write a review paper or conceptual framework based on recent research literature.

6. Essential Readings

- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches.* Sage Publications.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education.* Routledge.
- Kothari, C. R., & Garg, G. (2019). *Research Methodology: Methods and Techniques.* New Age International.

7. Suggestive Reading

- Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook.* Sage.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2015). *How to Design and Evaluate Research in Education.* McGraw-Hill.
- Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and Conducting Mixed Methods Research.* Sage.

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Research Methods/Tools/Writing Course: 02 Credits

III.3 Advanced Research Methodology

1. Credit Distribution of the Course

Course title & Code III.3	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Advanced Research Methodology	2	2	0	0	Undergr aduate	NIL

2. Learning Objectives

This course deepens the students' understanding of experimental research design and non-experimental research design and advanced research techniques in educational research. It focuses on developing competence in formulating complex research problems, designing robust studies, using statistical and qualitative tools, and interpreting data ethically and meaningfully for experimental and non-experimental research design.

3. Learning Outcome

- Understand the characteristics, forms, utility and limitations of different types of experimental research designs in education
- Compare non-experimental designs and experimental designs
- Differentiate non-experimental designs in educational research

4. Syllabus   [30 hours]

Unit 1 Experimental Research Designs - Experimental Research: Key characteristics, Matching versus Randomization, Control of extraneous variables, treatments, Outcome measures, Group comparisons; Threats to internal and external validities; Steps in conducting experimental research: purpose and principles, research design as variance control, and types of experimental research design: true experiments, quasi-experimental designs, and factorial designs.   **[15 hours]**

Unit 2 Non-experimental Research Designs - Non-Experimental Research: Concept, Basic differences between experimental and non-experimental research, Large- and smaller-scale non-experimental research, Correlational Designs: Concept, use, and characteristics; types,

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steps, evaluation, and ethical issues. Survey Designs: Concept, use, characteristics, types, steps in conducting survey research, tools, techniques, evaluation, and ethical issues. Mixed Methods Designs: Concept, use, and characteristics; types, steps, evaluation, and ethical issues. **[15 hours]**

5. Essential Readings

- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches.* Sage Publications.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education.* Routledge.
- Kothari, C. R., & Garg, G. (2019). *Research Methodology: Methods and Techniques.* New Age International.

6. Suggestive Readings

- Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook.* Sage.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2015). *How to Design and Evaluate Research in Education.* McGraw-Hill.
- Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and Conducting Mixed Methods Research.* Sage.

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Research Methods/Tools/Writing Course: 02 Credits

III.4 Research and Statistical Tools in Mathematics Education

1. Credit Distribution of the Course

Course title & Code III.4	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Research and Statistical Tools in Mathematics Education	2	0	0	2	Undergraduate	NIL

2. Learning Objectives

This course will be conducted in the practical mode providing students opportunities to work with educational data for research and statistical analysis. Students will gain experience in selecting and modelling statistical models/techniques relevant to different kinds of educational/ STEM education data sets. The course will help them to develop competence in selecting, designing, and using research instruments and generate data suitable for diverse Indian classrooms across government, private, rural, and urban settings. Students will learn to apply descriptive and inferential statistics to real educational datasets with specific examples in math/STEM related experiences using statistical tools: JASP (Open-source), PSPP, AMOS (quantitative analysis) and ATLAS.ti, Taguette (Open-source) for qualitative analysis.

3. Learning Outcomes

- Design quantitative & qualitative research instruments (tests, surveys, rubrics) and evaluate them using statistical reliability and validity measures;
- Organise, clean, and transform datasets and prepare data for analysis;
- Conduct descriptive statistical analysis using appropriate statistical tools;
- Choose appropriate statistical tools to perform inferential statistical analysis;
- Integrate digital statistical tools to generate evidence-based insights for Mathematics/STEM curriculum and pedagogy.

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4. Syllabus (Practicals) **[60 hours]**

- Create a classroom observation schedule for analysing questioning patterns in a math classroom. (aligned with NCF 2023).
- Design and pilot a Google Forms survey on students' misconceptions in science or mathematics in an Indian school setting. Conduct thematic analysis and create a brief report.
- Analyse real datasets from a public repository available on government platforms to study learning patterns in STEM subjects.
- Use free or open-source tools to collect data on students' error patterns in geometrical concepts.
- Conduct a Focus Group Discussion with teachers on challenges in accessible math curriculum. Make codes and analyse the responses.
- Use STATA or parallel software to conduct descriptive statistics on a small dataset from an Indian school context (ASSET/PISA/NAS).
- Compare learning outcomes across three teaching interventions using Post-Hoc Tests.
- Use a real dataset on two variables, creativity and problem solving, and run a linear regression model and interpret slope and R^2.

5. Essential Readings

- Creswell, J. W. & Poth, C. (2023). *Qualitative Inquiry and Research Design.* Sage.
- Cohen, L., Manion, L., & Morrison, K. (2007). Research Methods in Education (6th Ed.) Routledge.
- Acock, A.C. (2018). *A Gentle Introduction to Stata* (6th Ed.). College Station, Texas : A Stata Press Publication.
- Braun, V. & Clarke, V. (2022). *Thematic Analysis: A Practical Guide.* Sage.

6. Suggestive Readings

- Peers, I. (1996). *Statistical Analysis for Education and Psychology Researchers: Tools for Researchers in Education and Psycholog*y. Routledge.

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STRUCTURE -III (SEMESTRER -IV)

SYLLABUS

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Discipline Specific Electives (DSE): 04 Credits

DSE (IV.1.1) AI and Machine Learning Algorithms for Educational Data Mining
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code DSE (IV.1.1)	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
AI and Machine Learning Algorithms for Educational Data Mining	4	2	0	2	Undergraduate	NIL

2. Learning Objectives

The course focuses on Education Data Mining (EDM) as an emerging field at the intersection of education and data science using Artificial Intelligence (AI) and Machine Learning (ML). Students will learn about large scale data in education available with open sources (public repositories), government reports and other sources. Students will learn the fundamentals of AI and ML algorithms that are applied to educational datasets extracting meaningful patterns and making data-driven decisions. from educational datasets. The course blends theoretical foundations with hands-on practical using real and synthetic educational datasets.

3. Learning Outcomes

- Understand the types and sources of educational data (institutional, virtual platform, learner-generated, research specific);
- Explore the core principles of AI, ML at the intersection of data mining in educational contexts;
- Apply basic and advanced ML algorithms (classification, clustering, regression) to educational data;
- Interpret learning analytics for early predictions, interventions and designing personalized learning environments.

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4. Syllabus   **[30 hours]**

Unit I Introduction to Educational Data Mining (EDM) - Understanding educational data and learning analytics; AI applications in early predications, adaptive learning, assessment, and educational policy; Sources of large scale educational data; Data privacy and ethical practices in educational research.   **[6 hours]**

Unit II Data Mining Techniques in Educational Datasets - Data types, data structures, data cleaning, pre-processing and feature selection; Descriptive statistics and exploratory data analysis; Visualization of data using descriptive measures; Common educational datasets.   **[8 hours]**

Unit III Understanding Machine Learning Algorithms for Educational Datasets - Introduction to different ML algorithms relevant for educational datasets (Classification algorithms (Decision tree), Regression analysis (Linear regression), Clustering algorithms (K-Means), Ensemble models (Random Forest, Gradient Boosting)); Model evaluation; Interpreting results for decision making.   **[8 hours]**

Unit IV Deep Learning and Natural Language Processing - Basics of deep learning and neural network; Understanding text mining processes in educational contexts such as students' feedback/discussion forum; Interpreting sentiment analysis reports; Understanding process behind Chatbots and Intelligent/Adaptive Tutoring Systems; Bias and ethical issues in using AI algorithms in EDM.   **[8 hours]**

5. Practicals   **[60 hours]**
- Prepare codebooks for raw educational datasets and present it meaningfully for analysis and interpretation.
- Create a data dashboard depicting relationships between variables.
- Prepare a feature chart and catergorization table for raw and pre-processing data from educational data repositories.
- Make a comparative sheet for AI models for their efficiency on different kinds of datasets (two variables; multi-variables, linear and non-linear).
- Preparing a report and suggestive measures based on sentiment analysis.
- Prepare a protocol design for clustering students based on learning behaviour.
- Review 20 research papers to identify meta trends in EDM research.
- Make an advisory guideline framework for ethical and inclusive practices for EDM.
- Make a decision making map for developing ML pipelines for different datasets.

6. Essential Readings
- Romero, C. & Ventura, S. (2020). *Educational Data Mining: State of the Art.* IEEE.
- Baker, R. S. (2020). *Big Data and Education.* Routledge.
- Holmes, W. et al. (2019). *Artificial Intelligence in Education.* CCR.
- Luckin, R. (2020). *Machine Learning and Human Intelligence.* UCL Press.

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7. Suggestive Readings

- Khan, B., Corbeil, J. R. & Corbeli, M. E. (2018). Responsible Analytics and Data Mining in Education: Global Perspectives on Quality, Support, and Decision Making, (ed.). Routledge.
- Sweta, S. (2021). Modern Approach to Educational Data Mining and Its Applications. Springer.

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DSE (IV.1.2) Education for a Futuristic Paradigm
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
DSE (IV.1.2)		Lecture	Tutorial	Practical/ Practice		
Education for a Futuristic Paradigm	4	3	1	0	Undergraduate	NIL

2. Learning Objectives

This course explores emerging paradigms in education that address the challenges and opportunities of a rapidly changing global society. It focuses on 21st-century competencies, digital transformation, sustainability, equity, and innovation in education, aligning with the vision of NEP 2020 and Education for Sustainable Development (ESD). The course encourages critical reflection on how education systems can be re-envisioned to nurture creativity, adaptability, ethical values, and global citizenship for a sustainable and inclusive future.

3. Learning Outcomes

- Explain the philosophical and sociological foundations of futuristic education.
- Analyze global and national trends influencing educational change.
- Design learning experiences fostering creativity, critical thinking, and sustainability.
- Evaluate the implications of technology, AI, and digital learning on pedagogy and equity.
- Conceptualize strategies for building resilient, inclusive, and sustainable educational futures.

4. Syllabus   [45 hours]

Unit I: Concept of Futuristic Education - Meaning and need for a futuristic paradigm in education, characteristics of a future-oriented education system. Futures thinking and foresight approaches in education. Vision of NEP 2020 and UNESCO Futures of Education Report (2021).   **[10 hours]**

Unit II Emerging Trends and Global Challenges - Globalisation, sustainability, and human development. Digital revolution, artificial intelligence, and automation in education.

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Changing nature of knowledge, skills, and lifelong learning. Equity, inclusion, and diversity as central themes of future education.   **[12 hours]**

Unit III Curriculum and Pedagogy for the Future - 21st-century skills: creativity, critical thinking, communication, and collaboration. Curriculum integration for sustainability, STEAM, and life skills. Innovative pedagogical approaches: Blended learning, project-based learning, and design thinking. Interdisciplinary and experiential learning. Assessment reforms for competency-based education.   **[12 hours]**

Unit IV: Policy, Innovation, and Institutional Transformation - Educational leadership and governance for future-ready systems. Role of teachers as innovators, mentors, and facilitators. NEP 2020 and SDG 4: Policy perspectives on future learning. Role of technology, open education, and digital universities.   **[11 hours]**

5. Tutorials   **[15 hours]**

- Develop a digital learning or sustainability project.
- Case studies: India, Finland, Singapore, and UNESCO educational initiatives.
- Mapping curriculum goals to 21st century skills
- Exemplary lesson plan based on innovative pedagogy

6. Essential Readings

- UNESCO (2021). *Reimagining Our Futures Together: A New Social Contract for Education.* Paris: UNESCO.
- Government of India (2020). *National Education Policy 2020.* Ministry of Education.
- Mishra, S. (2021). *Futures of Learning: Educational Transformations in India.* NIEPA.
- Sterling, S. (2011). *Transformative Learning for a Sustainable Future.* Earthscan.

7. Suggestive Readings

- Drucker, P. (1993). *Post-Capitalist Society.* Harper Business.
- Sterling, S. (2011). *Transformative Learning for a Sustainable Future.* Earthscan.

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DSE (IV.1.3) Statistical Tools for Research Analysis
Discipline Specific Elective

1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
DSE (IV.1.3)		Lecture	Tutorial	Practical/ Practice		
Statistical Tools for Research Analysis	4	2	0	2	Undergr aduate	NIL

2. Learning Objectives

This course focuses on the application of advanced statistical tools for making inferences from the sample data to the larger population. It connects conceptual understanding with hands-on data analysis using digital tools and statistical software such as **S**PSS**,** STATA, Excel & NVIVO. Students will learn how to select appropriate statistical tests and make inferences based on research questions, data types, and sampling designs.

3. Learning Outcomes

- Understand the concepts, reasoning and interpretation of inferential statistics;
- Examine the need and usability of non-parametric statistics;
- Choose appropriate statistical tools for analysing quantitative data;
- Choose appropriate statistical tools for analysing quantitative data.

4. Syllabus   [30 hours]

Unit I Foundations of Inferential Statistics - The central limit theorem; Testing null hypothesis; Significance of difference between the means; level of significance; Degree of freedom; One sample Z test; Significance of difference between means of two small and independent samples; Significance of difference between means of two matched or correlated groups (non- independent samples); Statistical significance of coefficient of correlation.
                                                                                                            [8 hours]

Unit II Non-Parametric Statistics in Educational Research - Concept and rationale for using non-parametric tests; Statistical tests for non-parametric data: Mann–Whitney U, Wilcoxon Signed-Rank; Chi-square tests for independence and goodness of fit; Comparison between parametric and non-parametric testing.   [6 hours]

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Unit III Statistical Software for Quantitative Analysis - Descriptive and inferential analysis of quantitative data using SPSS/STATA.   **[8 hours]**

Unit IV Statistical Software for Qualitative analysis - Open and axial coding and thematic analysis of qualitative data using NVIVO/MaxQDA.   **[8 hours]**

5. Practicals   **[60 hours]**

- Collect, organise and visualize raw educational data manually/using spreadsheet/SPSS/STATA. Classify the distinguished features and interpret the results based on visualized data.
- Prepare an analytical table for statistical inferences and interpretive reflection on learning diversity among learners using any existing research studies.
- Conduct non-parametric analysis for ordinal and categorical data.
- Assess the reliability and construct validity of an educational measurement tool.
- Select two independent group datasets, use Mann Whitney U Test and interpret the result
- Prepare a correlation and regression analysis report for variables parents' math background and students'math achievement.
- Do sentiment analysis of metacognitive skills of students in math learning.
- Do axial coding for an opinion poll on students' preference for practical exam vs theory exam.
- Overlap npc on a skewed data graph and do correction to pull it towards normality.
- Use appropriate software to conduct chi square analysis for categorical dataset using teachers' professional competency scale and their association with professional networks.
- Use a small data set to compare two groups using an independent t-test.
- Use rank order correlation for ordering students based on inputs on attitudinal scale.
- Use 10-item attitude scale responses and compute Cronbach's Alpha in SPSS.
- Use a small dataset of study hours (X) and achievement (Y) and run a linear regression model and interpret slope and R^2.
- Collect short written feedback on a week long math lessons and do sentiment analysis using manual coding and thematic coding using NVIVO. Compare the findings.

6. Essential Readings

- Pallant, J. (2022). *SPSS Survival Manual.* McGraw-Hill.
- Creswell, J. W. & Poth, C. (2023). *Qualitative Inquiry and Research Design.* Sage.
- Gravetter, F. J. & Wallnau, L. B. (2021). *Essentials of Statistics for the Behavioral Sciences.* Cengage.
- Braun, V. & Clarke, V. (2022). *Thematic Analysis: A Practical Guide.* Sage.

7. Suggestive Readings

- Beekhuyzen, J. & Bazeley, P. (2024). *Qualitative Data Analysis with NVivo,* (4th ed.). Sage Publication.

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● Peers, I. (1996). *Statistical Analysis for Education and Psychology Researchers: Tools for Researchers in Education and Psycholog*y. Routledge.

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DSE (IV.1.4) International and Comparative Education
Discipline Specific Elective

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1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
DSE (IV.1.4)		Lecture	Tutorial	Practical/ Practice		
International and Comparative Education	4	3	1	0	Undergraduate	NIL

2. Learning Objectives

This course provides a global perspective on education by examining how social, political, economic, and cultural factors influence educational systems worldwide. It introduces the field of comparative education and explores issues such as globalization, international reforms, equity, access, quality, and governance in education. The course aims to equip students with analytical tools to compare educational systems, interpret international policies, and understand the role of global organisations in shaping education.

3. Learning Outcomes

- Explain the nature, scope, and significance of comparative education.
- Compare education systems using theoretical and analytical frameworks.
- Evaluate global educational trends and their policy implications.
- Analyse the role of globalization and internationalization in shaping education.

4. Syllabus   [45 hours]

Unit I Introduction to International and Comparative Education - Meaning, nature, and scope of comparative education. Historical development and evolution of the field. Purposes and challenges of comparative studies. Relevance of comparative education in teacher education and policy.   **[11 hours]**

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Unit II Education and its Contexts - Relationship between education & society, economy, culture, and politics. Determinants of educational development: Demographic, technological, and ideological. Comparative study of educational aims, structures, and governance. Education and social change in developing and developed contexts. **[12 hours]**

Unit III Comparative Study of Selected Education Systems - Educational systems of India, Finland, Japan, United States, and United Kingdom. Comparative perspectives on access, equity, quality, and inclusion. Curriculum, pedagogy, and assessment reforms. Teacher education models across countries. **[11 hours]**

Unit IV Globalization and Internationalization of Education - Impact of globalization on education systems. Role of international organizations: UNESCO, UNICEF, OECD, World Bank, and WTO. Global initiatives: Education for All (EFA), SDG 4, and the Education 2030 Agenda. Issues of equity, cultural identity, and policy borrowing/lending in global education. **[11 hours]**

5. Tutorials **[15 hours]**

- Comparative analysis of the education systems of two countries.
- Review of UNESCO or OECD education reports.
- Preparation of a short paper on globalisation and its impact on Indian education.

6. Essential Readings

- UNESCO (2015). *Rethinking Education: Towards a Global Common Good?* Paris: UNESCO.
- Crossley, M., & Watson, K. (2003). *Comparative and International Research in Education: Globalisation, Context and Difference.* Routledge.
- OECD (2020). *Education at a Glance: OECD Indicators.* OECD Publishing.
- Government of India (2020). *National Education Policy 2020.* Ministry of Education.

7. Suggestive Readings

- Carnoy, M. (1999). *Globalization and Educational Reform: What Planners Need to Know.* UNESCO-IIEP.
- Phillips, D., & Schweisfurth, M. (2014). *Comparative and International Education: An Introduction to Theory, Method, and Practice.* Bloomsbury.

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Research Methods/Tools/Writing Course: 02 Credits

IV.2 Techniques of Research Writing

1. Credit Distribution of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
IV.2		Lecture	Tutorial	Practical/ Practice		
Techniques of Research Writing	2	1	1	0	Undergr aduate	NIL

2. Learning Objectives

This course aims to equip students with the writing skills, techniques, and norms required for academic and educational-research writing. Emphasis is on structuring research papers, theses/dissertations, journal articles, and professional reports, with attention to argumentation, clarity, citation, ethics, and publication processes. Students will engage in workshops, peer review, draft writing, and revision to develop competence in producing high-quality research writing.

3. Learning Outcome

- Write clear, coherent, and well-structured research papers and reports.
- Apply correct academic style, citation, and referencing techniques.
- Review, edit, and improve research writing through feedback.
- Uphold ethical standards and avoid plagiarism in academic writing.
- Prepare manuscripts, abstracts, and proposals for publication or presentation.

4. Syllabus **[15 hours]**

Unit I Foundations and Structure of Research Writing - Nature, purpose, and process of research writing in education. Forms of research writing - dissertations, theses, journal articles, and research reports- structure and purpose. Stages of research writing, academic precision, and logical flow. Development of introductions, literature reviews, methodology descriptions, and discussion sections with coherence and clarity, argumentation in writing, academic tone, data presentation, and development of scholarly narrative. **[8 hours]**

Unit II   Ethics, Referencing, and Publication Techniques - Ethical and technical dimensions of research writing, standard referencing styles, APA (7th edition) citation

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management software. plagiarism awareness, paraphrasing techniques, and academic honesty to ensure research integrity, authorship ethics, acknowledgements, peer-review process, writing abstracts, preparing proposals writing, digital dissemination, research platforms (ORCID, ResearchGate, and Google Scholar) **[7 hours]**

5. Tutorials **[15 hours]**

- Draft and revise a short research article or dissertation chapter.
- Conduct a peer-review session and submit revision notes.
- Prepare a reference list using APA 7th style.
- Write an abstract and conference proposal.

6. Essential readings

- Day, R. A., & Gastel, B. (2016). *How to Write and Publish a Scientific Paper.* Cambridge University Press.
- American Psychological Association. (2020). *Publication Manual of the APA (7th ed.).*
- Turabian, K. L. (2018). *A Manual for Writers of Research Papers, Theses, and Dissertations.* University of Chicago Press.

7. Suggested reading

- Williams, J. M. (2014). *Style: Lessons in Clarity and Grace.* Pearson.
- Booth, W. C., Colomb, G. G., & Williams, J. M. (2016). *The Craft of Research.* University of Chicago Press.