SNDT Women's University, Mumbai

Department of Textile Science and Apparel Design

Master of Science

Textile Science and Apparel Design

as per NEP-2020

Syllabus for Semester – III & IV

(2024-25)

Master of Science in Textile Science and Apparel Design

Year I

SN	Courses	Type of Course	Credits	Marks	Int	Ext
	semester I					
114811	Chemical Processing of Textiles (Th) (U)	Major (Core)	4	100	50	50
114822	Chemical Processing of Textiles (Pr) (C)	Major (Core)	4	100	50	50
114823	Garment Design and Construction (Pr)(C)	Major (Core)	4	100	50	50
114814	Global Costumes (Th) (C)	Major (Core)	2	50	50	0
124811	Sustainability in Textile and Apparel (Th) (U)	Major (Elective)	4	100	50	50
134811	Research Methodology (Th) (U)	Minor Stream (RM)	4	100	50	50
			22	**550**	**300**	**250**
	Semester II					
214811	Quality Control for Textile & Apparel (Th) (Pr) (U)	Major (Core)	(2+2)4	100	50	50
214822	Garment Design through Draping (Pr) (C)	Major (Core)	4	100	50	50
214813	Apparel Merchandising (Th) (U)	Major (Core)	4	100	50	50
214824	International Embroideries and Paintings (Pr) (C)	Major (Core)	2	50	0	50
224821	Advance Fashion Illustration (Pr)(C)	Major (Elective)	4	100	50	50
244841	Internship (Pr)(U)	OJT	4	100	50	50
			22	**550**	**250**	**300**

Exit option (44 credit):

Post Graduate Diploma in Textile Science and Apparel Design

Year II

SN	Courses	Typeof Course	Credits	Marks	Int	Ext
Semester III						
314811	Technical Textiles (Th) (U)	Major (Core)	4	100	50	50
314812	Knitting Technology (Th) (U)	Major (Core)	4	100	50	50
314813	Research and Statistical Applications (Th) (U)	Major (Core)	4	100	50	50
314824	Garment Production Technology (Pr)(C)	Major (Core)	2	50	0	50
324811	Garment Production Technology (Th)(C)	Major (Elective)	4	100	50	50
354831	Dissertation I(Pr)(U)	RP	4	100	50	50
			22	**550**	**250**	**300**
Semester IV						
414811	Environmental aspects of Textile and Clothing (Th) (U)	Major (Core)	4	100	50	50
414812	Fabric Structures & Fabric Analysis (Th)(Pr)(U)	Major (Core)	(2+2) 4	100	50	50
414823	Project Work (Pr) (U)	Major (Core)	4	100	50	50
424851	Recent Advances in Textile Science & Apparel Design (Seminar) (C)	Major (Elective)	4	100	50	50
454831	Dissertation II (Pr)(U)	RP	6	150	100	50
			22	**550**	**300**	**250**

Semester III

3.1 Major (Core)

Course Title	**Technical Textiles (314811) (Th) (U)**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. **Analyze** the latest developments and innovations in technical fibers, yarns, and fabric structures.
	2. **Evaluate** the application of various finishing and coating techniques in enhancing the performance and functionality of technical textiles.
	3. **Synthesize** knowledge of different types of technical textiles and their specialized applications in fields such as medical, geotechnical, defense, and automotive industries
	4. **Apply** theoretical concepts of technical textiles to propose innovative solutions for real-world challenges in diverse industrial sectors.
Module 1 (Credit 1) - Introduction to Technical Fibers and Yarns	
Learning Outcomes	After learning the module, learners will be able to 1) **Revise** conventional and newly developed fibers in technical textiles. 2) **Differentiate** between various extrusion techniques used in fiber production.
Content Outline	• **Technical Textiles:** o Introduction, Definition, and Scope o Development Processes, Applications, Globalization, and Future Prospects of the Technical Textile Industry • Brief Introduction to Technical Fibers: o Overview of conventional and newly developed fibers and their applications • Brief Introduction to Technical Yarns
Module 2 (Credit 1) - Fabric Structures and Batt Formation Techniques	
Learning Outcomes	After learning the module, learners will be able to
	• **Predict** the significance of woven and non-woven structures in technical textiles. • **Suggest** improvements in the performance of batt formation processes. • **Categorize** fabric structures based on their intended uses.

Content Outline	• **Technical Fabric Structures:**
	  ○ Brief study of woven and knitted fabrics
	  ○ Detailed study of Non-woven structures:
	  ▪ Introduction, methods of batt production, different methods of web laying, flash spinning, meltblown, various methods of bonding, hydroentanglement process
	  ○ Brief introduction to Textile Reinforced Composite materials

Module 3 (Credit 1) - Finishing and Coating of Technical Textiles	
Learning Outcomes	After learning the module, learners will be able to
	• Differentiate between finishes applied on textile.
	• Recommend methods used and its importance.

Content Outline	• **Finishing of Technical Textiles:**
	  ○ Introduction, Processes (Mechanical, Heatsetting, Chemical)
	• **Coating of Technical Textiles:**
	  ○ Introduction, methods of coating, fusible interlining, laminating

Module 4 (Credit 1) - Applications of Technical Textiles in Various Industries	
Learning Outcomes	After learning the module, learners will be able to
	• Develop awareness towards about applications.
	• Prescribe suitable end uses.
Content Outline	• **Application of Technical Textiles:** ○ Medical textiles, Geotextiles, Defense textiles, Transport textiles, Automotive textiles, and others

Assignments and Activities towards Comprehensive Continuous Evaluation (CCE):

- Write an overview of Smart Textiles
- Write a Report on Advance fibers
- Collect information on fabric structures used for finishing of technical textile.
- Collect information on machineries used for finishing of technical textile.
- Collection of samples used in various technical textiles applications.

References:

- Related Published bound book of papersfrom SASMIRA & BTRA

- Stephen Eichhorn (2009) Natural Fibers structures, Volume2, Elsevier ScienceWoodhead Publishing in Textiles .
- Stephen Eichhorn (2009) Natural Fibers structures, Volume1, Elsevier ScienceWoodhead Publishing in Textiles.
- Horrocks A R (2015) Handbook of technical textiles Volume 1 - 'Technical Textile Processes2nd edition,Woodhead Publishing.
- Horrocks A R (2016) Handbook of technical textiles Volume 2 - 'Technical Textile applications2nd edition,Woodhead Publishing.
- Ryszard M. Kozlowski (2020) Handbook of Natural Fibers, Volume 1, Woodhead Publishing in Textiles.

3.2 Major (Core)

Course Title	**Knitting Technology (314812) (Theory) (U)**
Course Credits	4 (Th)
Course Outcomes	After going through course, learners will be able to 1) **Demonstrate knowledge** of knitting principles, including fabric differentiation, weft and warp techniques, and calculation parameters. 2) **Apply critical thinking** to evaluate knitting structures, machine types, and their suitability for fabrics. 3) **Evaluate finishing and coating techniques** for technical textiles, considering processes and their impact on fabric performance. 4) **Propose advancements** in knitting technology, integrating electronics for enhanced efficiency and sustainability in textile production.
Module 1 (Credit 1) - Basics of Weft Knitting	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe the basic principles of knitting and differences between knits and woven.
	2. Examine the principles of weft knitting.
	3. Evaluate parameters involved in weft knitting calculations.
Content Outline	• Evolution & chief knitting inventions. • An overview of Indian knitting industry. • Difference between knits & woven. • Common knitting terms. • Principles of knitting, knitting cams and functions. • Knitting action of the latch needle. • Principles and classification of weft knitting, knitting elements & their functions. • Weft knit stitches (knit, tuck, miss). • Four basic structures (single jersey, purl, rib, interlock). • Special weft knit structures (plated, racked, jacquard, intarsia, pile, inlay). • Yarn quality required for weft knitting. Weft knitting calculations (stitch density, loop shape factor, GSM, thickness factor, open width, weight/running meter, production in m/hr, kg/hr).
Module 2 (Credit 1) - Warp Knitting Techniques	
Learning Outcomes	After learning the module, learners will be able to
	1. Differentiate types of warps knitted fabrics.

	2. Identify function and structure of warp knitting machines.
	3. Discover difference between warp and weft knitting machines and fabrics.
Content Outline	• Principles and classifications of warp knitting, knitting elements & their function, warp knitted laps. • Warp knit calculations (fabric width, production in m/hr, m^2/hr& kg/hr). • Comparison of warp & weft knitting machines. • Comparison of warp & weft knitted fabrics. • Knitting notation of warp & weft knitted fabrics. • Lapping diagram & chain notation of warp knitted tricot, locknit, reverse locknit, satin, raised loop (pile), sharkskin, queens' cord, atlas, pillars. • Stitch and running notations, of weft knitted half milano, full milano, rib ripple, half cardigan, full cardigan, double cardigan, swiss double pique, French double pique, moss stitch, double moss stitch, basket purl, punto-di-roma, single pique, pintuck, piquette.
Module 3 (Credit 1) - Knitting Machines Overview	
Learning Outcomes	After learning the module, learners will be able to
	1. Produce circular and flat knitting machines.
	2. Develop a thorough understanding of the components and mechanisms of knitting machines.
	3. Analyze the structure of fabrics produced on tricot and Rachel machines.
Content Outline	• Principles of circular & flat knitting machines. • Function of various parts of circular and flat machines. • Yarn passage through various parts of circular and flat machines. • Principle and importance of positive and storage, feeders. • Manual operation of a hand flat knitting machine. • Comparison of circular and flat knitting machine. • Principles of tricot and Rachel knitting machines. • Knitting action of tricot and Rachel knitting machines. • Comparison of tricot and Rachel knitting machines.
Module 4 (Credit 1) - Knitwear and Machine Innovations	
Learning Outcomes	After learning the module, learners will be able to
	1. Differentiate between full fashion and socks knitting systems.
	2. Modify the various factors and causes that contribute to knit fabric faults
	3. Suggest the latest advancements in knitting machine technologies.
Content Outline	• Principles of full fashion and socks knitting systems. • Classification of knitwear garments and their features. • Production sequence of each type of knitwear garments.

	• Use of Novelty Yarns in knitting • Dyeing, printing and finishing of knitted fabrics • Formation of socks and knitting programme for heel and toe. • Steps for quality control of knit fabrics. • Definition, causes and elimination of fabric faults (fabric fall out, cracks or holes, drop stitch, laddering, vertical strips, horizontal strips, cloudiness, lowing, skewness). • Modern developments in knitting machines and use of electronics in knitting

Assignments and Activities towards Comprehensive Continuous Evaluation (CCE)

- Sample collection and development of samples
- Presentation on different knitting machines.
- Field trips to textile factories or knitting facilities where students can observe industrial-scale knitting processes and interact with professionals in the field.
- Guest lectures and discussion on topics related to knitting technology

References: -

1. David J. Spencer, (2001). *Knitting Technology,* Woodhead Publishing Limited and Technomic.
2. Samuel Raz, (1993). *Flat Knitting Technology,* Universal Maschinenfabrik.
3. Brackenbury Terry, (1992). Knitted clothing technology, Oxford Blackwell Science Ltd.
4. Sadhan Chandra Ray, (2011) *Fundamentals and Advances in Knitting Technology,* Woodhead Publishing India.
5. N. Anbumani, (2007). *Knitting Fundamentals, Machines, Structures and Developments,* New Age International (P) Limited.

3.3 Major (Core)

Course Title	**Research and Statistical Application (Th) (U) (314813)**
Course Credits	4 (Theory)
Course Outcome	On completion of the course, the student will be able to 1) Employ appropriate statistical tests and interpret results effectively. 2) Discriminate between parametric and non-parametric tests for different types of data. 3) Apply statistical tests for data analysis, distinguishing between large and small samples. 4) Demonstrate knowledge and skills to compute and incorporate the most suitable statistics in research.
Module 1 (Credit 1) - Statistics: Meaning and uses	
Learning Outcomes	On completion of the module, the student will be able to 1) Calculate different statistical tests. 2) Calculate and use both parametric and non-parametric tests. 3) Select the most appropriate method to present data.
Content Outline	• Definition and conceptual understanding of statistical measures, including popular concepts and uses. • Normal distribution: characteristics and use in statistical analysis. • Binomial distribution and its application in probability. • Parametric and non-parametric tests: understanding and application. • Data organization: tabulation, graphical presentation (histogram, frequency polygon, etc.). • Use of statistical programs like MS Excel and SPSS for data analysis.
Module 2 (Credit 1) - Data Analysis	
Learning Outcomes	On completion of the module, the student will be able to, 1. Differentiate quantitative analysis, descriptive statistic and inferential analysis 2. Calculate measures of central tendencies, measures of variability 3. Interpret big and small data by using different tests

Content Outline	• Quantitative analysis: uses and limitations in statistical interpretation. • Descriptive statistics: Summation sign and its properties. • Measures of central tendency: mean, median, mode, and their practical applications. • Measures of variability: range, variance, standard deviation, and their significance. • Big and small sample tests: Z-test, t-test, paired t-test, F-test for interpreting data. • Differentiating between quantitative analysis, descriptive statistics, and inferential analysis.
Module 3 (Credit 1) - Association, Predictions and other methods	
Learning Outcomes	On completion of the module, the student will be able to 1. Calculate and interpret correlation values 2. Calculate regression values and interpret 3. Apply ANOVA to study mean values in state significance level 4. Set design for studying different variables
Content Outline	• Correlation analysis: product moment, partial correlation, and their implications. • Regression analysis: linear regression, multiple regressions, logistic regression. • Nonparametric correlations: Kendall's tau, Spearman's rho, and their application in statistical testing. • Analysis of Variance (ANOVA): one-factor and two-factor ANOVA, interpreting mean differences. • Design of Experiments: randomized designs (completely randomized, randomized block, Latin square, factorial).
Module4 (Credit 1) - Inferential Statistics	

Learning Outcomes	On completion of the module, the student will be able to 1. Compare inferential statistics 2. Determine confidence level 3. Analyse within and among groups differences 4. Analyse multi variations in results
Content Outline	• Comparing inferential statistics: t-tests (independent and dependent samples), bootstrapping. • Correlation r-value and its implications in statistical analysis. • Multi-group differences: one-way ANOVA (independent and dependent samples), two-way ANOVA. • ANCOVA, Repeated Measure ANOVA, Wilcoxon sign-rank test, median test, U test, Kruskal-Wallis test. • MANOVA and discriminant function analysis: interpreting multivariate results.

Assignments and Activities towards Comprehensive Continuous Evaluation (CCE):

1. Applications of Measures of central tendencies
2. Application of Measures of variability
3. Develop designs to study groups comparison
4. Differentiate between different tests
5. Methods of Effective data presentation
6. Challenges of data presentations

References:

Research Methods

1. Bell, J. (1997): Doing Your Research Project: A Guide for First-time Researchers in Education and Social Science, Viva Books, New Delhi
2. Bell, J. (1997): How to Complete Your Research Project Successfully: A Guide for First-time Researchers, UBSPD, New Delhi.
3. Bulmer, M.C. (1984): Sociological Research Methods: An Introduction, Macmillan, Hong Kong.

2. Festinger, L. and Katz, D. (ed.) (1977): Research Methods in the Behavioral Sciences, Amerind Publishing, New Delhi.

3. Holloway, I. (1997): Basic Concepts of Qualitiative Research, Blackwell Science, London.

Statistics

1. Gupta, S. (2001) "Research Methodology and Statistical Techniques", Deep and Deep, New Delhi,

2. Hooda, R.P. (2003) "Statistics for Business and Economics", 3rd ed., Macmillan India Ltd., Delhi,.

3. Dey, B.R. (2005) "Textbook of Managerial Statistics", Macmillan India Ltd., Delhi,

4. Fleming, M.C. &Nellis, Joseph G. (1997) "The Essence of Statistics for Business", Prentice-Hall of India, New Delhi,

5. Gupta, S.P. (1996) "Practical Statistics", 37th ed., S. Chand,New Delhi,.

3.4 Major (Core)

Course Title	**Garment Production Technology (314824) (Pr)(C)**
Course Credits	2
Course Outcomes	After going through the course, learners will be able to
	1) Analyze key aspects of the apparel industry, encompassing export houses, garment manufacturing units, warehouses, and retail malls.
	2) Apply theoretical knowledge to solve practical challenges encountered in export houses, garment manufacturing units, warehouses, and retail malls.
	3) Demonstrate proficient reporting and presentation skills through detailed field visits and comprehensive reporting.
	4) Acquire foundational knowledge and practical insights crucial for pursuing careers in the apparel industry.
Module 1 (Credit 1)- Export House and Garment Manufacturing Unit Visits	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand practical functioning of export House
	2. Know about various equipment's used and functioning of garment manufacturing unit at ground level.
Content Outline	Field visit to an export house & presentation of the report
	Field visit to a garment manufacturing unit & presentation of the report
Module 2 (Credit 1) - Warehouse and Retail Mall Visits	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand importance, functioning and various equipment's used in warehouse
	2. Know about retail mall, available products and brands, designs available and its functioning
	3. Selection of dye class as per fiber
Content Outline	Field visit to a warehouse & presentation of the report
	Field visit to a retail mall & presentation of the report

Assignments and Activities towards Comprehensive Continuous Evaluation (CCE):

1. Write report on Customer related policies of retail organizations
2. Observation of customer preferences of garments with justification.

References:

1. Gerry Cooklin, (2006). Introduction to Clothing Manufacture, Blackwell Science
2. Harold Carr& Barbara Latham. (1994). The Technology of Clothing Manufacture, Blackwell Science.
3. Chuter. A.J..2011., Introduction to Clothing Production Management, Blackwell Science1. Rajesh Bheda "Managing Productivity in the Apparel Industry" CBS Publishers & Distributors (2006)
4. Helen Joseph Armstrong. (2009) "Pattern Making for Fashion Design", Dorling Kindersley India Pvt.Ltd.
5. Jacob Solinger.(1980) "Apparel Manufacturing Handbook", VanNostrand Reinhold Company.
6. Herold Carr and Barbara Iatham. (1994) "The technology of clothing manufacture", Om book service.

3.5 Major (Elective)

Course Title	**Garment Production Technology (324811) (Theory) (C)**
Course Credits	4 (Th)
Course Outcomes	After going through course, learners will be able to 1) Analyze garment factory organization and operations in the apparel industry. 2) Apply manufacturing technology and quality control principles for improved garment production. 3) Evaluate material joining methods, sewing technologies, and pressing techniques for garment quality. 4) Demonstrate knowledge in warehouse management, production planning, and ethical practices in apparel industry operations.
Module 1 (Credit 1) - Garment Factory Organization	
Learning Outcomes	After learning the module, learners will be able to
	1. Revise background of garment/clothing industry.
	2. Build the organizational structure of a garment factory.
	3. Identify the functions and responsibilities of various departments within a garment factory.
	4. Determine and explain the fundamental principles of management.
Content Outline	• Introduction to the background and structure of the garment/clothing industry. • The Organizational Structure of a Garment Factory. ▪ Principles of management ▪ Various departments: - 1. Design Department 2. Marketing Department 3. Finance Department 4. Purchasing Department 5. Production Department 6. Operations Department
Module 2 (Credit 1) - Sewing and Cutting Technology	
Learning Outcomes	After learning the module, learners will be able to
	1. Demonstrate the principles and applications of alternative methods of joining the materials

	2. Categorize various types of sewing machines, sewing threads, sewing problems etc.
	3. Examine testing for sew ability and tailor ability
Content Outline	**Manufacturing technology** • Placement & Cutting Room 1. Marker Planning 2. Efficiency, Methods and use of worker plan 3. Methods of spreading of fabric and requirements of the spreading process 4. Cutting the fabric – objectives and methods of cutting fabric • Fusing Technology • Sewing technology 1. Sewing – properties, types 2. Stitch – types 3. Sewing Machines – Feed mechanisms, machine Needles. 4. Sewing Threads – type of fibre, construction and finish, thread size, thread package, thread costs, thread properties and seam performance 5. Sewing problems – stitch formations, damage along the seam line puckering 6. Testing for sew ability and tailor ability 7. Sewing Machinery
Module 3 (Credit 1) - Trims, Pressing, and Productivity	
Learning Outcomes	After learning the module, learners will be able to
	1. Suggest components and trims to integrate them effectively into garment designs.
	2. Analyze the impact of pressing techniques on different types of fabrics and garment constructions,
	3. Estimate the impact of lost output on production efficiency, lead times, and overall profitability in garment manufacturing operations.
Content Outline	• Use of components and trims • Alternative method of joining materials 1. Fusing 2. Welding and adhesives 3. Moulding • Pressing technology • Production technology 1. Methods of improving productivity in Garment production 2. Balancing of production process

	3. Production and Human Resource
Module 4 (Credit 1) - Warehousing and Quality Control	
Learning Outcomes	After learning the module, learners will be able to
	• Differentiate types of warehouses used in the apparel industry.
	• Evaluate techniques for creating effective production charts and layouts in the apparel industry
	• Prescribe knowledge of quality control principles and techniques in apparel manufacturing.
Content Outline	• Warehousing. • Charting and layout. • Quality control in Apparel Industry: - 1. Principles of quality control. 2. Quality from design to dispatch. **3.** Total quality control. • Ethics in Garment Production

Assignments and Activities towards Comprehensive Continuous Evaluation (CCE)

- Presentations on the related topic
- Industry Expert Interaction
- Visits to garment factories where students can observe production processes firsthand.
- Case studies on real garment production scenarios.

References: -

1. Gerry Cooklin, (2006). Introduction to Clothing Manufacture, Blackwell Science
2. Harold Carr& Barbara Latham. (1994). The Technology of Clothing Manufacture, Blackwell Science.
3. Chuter. A.J..2011., Introduction to Clothing Production Management, Blackwell Science1. Rajesh Bheda "Managing Productivity in the Apparel Industry" CBS Publishers & Distributors (2006)
4. Helen Joseph Armstrong. (2009) "Pattern Making for Fashion Design", Dorling Kindersley India Pvt.Ltd.
5. Jacob Solinger.(1980) "Apparel Manufacturing Handbook", VanNostrand Reinhold Company .
6. Herold Carr and Barbara Iatham. (1994) "The technology of clothing manufacture", Om book servic.

3.6 Research Project

Course Title	**Dissertation I (354831) (Pr) (U)**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	Formulate research problems effectively within a specific domain or field.
	Review literature comprehensively to identify gaps and trends relevant to their research area
	Apply planning tools and techniques for systematic data collection in research projects
	Design research proposals or validate models using appropriate methodologies and frameworks.
Module 1 (Credit 1)	**Formulation of problem** • Assist students in identifying research gaps and formulating clear research questions. • Provide literature and resources to broaden understanding of current topics. • Help students align their research problem with academic interests and goals. • Discuss recent advancements and potential research directions. • Students will define a focused research problem for their study.
Module 2 (Credit 1)	**Review of Literature** • Guide students in conducting comprehensive literature reviews. • Synthesize findings and develop a robust theoretical framework. • Discuss methodologies for critically analyzing existing literature. • Ensure alignment between theoretical foundations and research objectives. • Students will establish a strong theoretical basis for their research.
Module 3 (Credit 1)	**Designing Research proposal / Model validation** • Assist students in selecting appropriate research designs. • Mentor in choosing qualitative, quantitative, or mixed-method approaches. • Develop methodologies for data collection and analysis. • Discuss ethical considerations and feasibility of chosen methods. • Students will design a rigorous research methodology for their study.
Module 4 (Credit 1)	**Planning tools & techniques for data collection** • Guide students in planning and executing data collection strategies.

	• Provide support in managing and analyzing collected data. • Discuss techniques for ensuring data validity and reliability. • Interpret findings and draw initial conclusions from data analysis. • Students will collect, analyze, and interpret data relevant to their research

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE):

1. Submission of a written research problem statement and an oral presentation to assess clarity and significance of the research question.
2. Compilation of an annotated bibliography and a comprehensive literature review to evaluate thoroughness and synthesis of existing research.
3. Submission of a critical analysis report to assess the ability to critically analyze relevant literature.
4. Writing and presentation of a detailed research proposal, including methodology and ethical considerations, to gauge research design skills.
5. Development and submission of a data collection plan, analysis report, and reflective journal to evaluate planning, execution, and interpretation of data collection strategies.

Reference:

1. Punch, K. F. (2016). *Developing effective research proposals* (4th ed.). SAGE Publications.
2. Ridley, D. (2012). *The literature review: A step-by-step guide for students* (2nd ed.). SAGE Publications.
3. Creswell, J. W. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
4. McNabb, D. E. (2015). *Research methods for public administration and nonprofit management: Quantitative and qualitative approaches* (3rd ed.). Routledge.

Semester IV

4.1 Major (Core)

Course Title	**Environmental Aspects of Textile and Clothing (414811) (Th) (U)**
Course Credits	4 (Th)
Course Outcomes	After going through course, learners will be able to: 1) Analyze and apply environmental principles and management strategies specific to the textile and clothing industry. 2) Evaluate the environmental impact of textile production processes, including wastewater management and pollution control measures. 3) Demonstrate knowledge of global regulations and standards governing environmental practices in the textile industry. 4) Identify and assess sustainable practices such as recycling, upcycling, and eco-labeling within textile manufacturing contexts.
Module 1 (Credit 1) - Introduction to Environmental Management in Textiles	
Learning Outcomes	After learning the module, learners will be able to:
	1. Describe the importance of Environmental Aspects in Textile and Clothing.
	2. Simplify the fundamental principles of Eco system.
	3. Invent the design and implementation of Environmental Management System in textile industry.

Content Outline	• **Introduction to Environmental aspects of Textile and clothing:** a. Overview of the textile and clothing industry b. Historical context and evolution. c. Importance of environmental aspects in textile industry. • **Introduction to ecosystem and environment management:** a. Ecology and textiles. b. Current ecosystem problems. c. Types of pollution and effects of stages of textiles on environment. (fiber, yarn, fabric). d. Environmental problem and human health. e. Environment ethics f. Importance of pollution control. g. Effective pollution prevention program. h. Mitigation of adverse impact on environment. i. Risk assessment and risk management. j. Assessment of socio-economic impact.
Module 2 (Credit 1) - Life Cycle, Water Footprint, and Recycling	
Learning Outcomes	After learning the module, learners will be able to
	1. Differentiate the stages of cycle of textile and fashion product including raw material extraction to till recycling.
	2. Examine the concept of a water footprint in the context of the textile industry.
	3. Evaluate different techniques and methods for upcycling textiles.
Content Outline	• **Life cycle of textile article** a. Tracking through life cycle of textile article. b. Water foot-print. c. Carbon foot-print • **Recycling and up cycling of textiles:** a. Introduction and concepts, b. methods, c. stages: fibres, yarns

	d. final outcome
Module 3 (Credit 1) - Wastewater and Pollution Management	
Learning Outcomes	After learning the module, learners will be able to
	1. Analyze the sources and composition of wastewater generated in textile and clothing production processes.
	2. Explore innovative and emerging effluent treatment technologies and approaches in the textile industry.
	3. Inspect the environmental impacts of pollution from the textile industry.
Content Outline	**Output management** • **Waste water/ effluent** ➢ Types of discharge and characteristics: - direct discharge, indirect discharge, zero liquid discharge, sludge. ➢ Effluent retreatment methods: - preliminary treatment, secondary treatment, tertiary treatment. ➢ Advance effluent treatment methods: - oxidation by biochemical method, sedimentation filtration, membrane separation, concept of zero liquid discharge, RO filtration, multiple effect evaporation. ➢ Reuse of water, cost of effluent treatment, ➢ Designing of typical ETP (Effluent treatment plant) ➢ Physical and chemical characteristics of textile waste water. a. Physical characteristics- Temperature, Color, Turbidity, Electrical Conductivity. b. Chemical characteristics- Total dissolved solids, Total suspended solids, Total solids, Total hardness, pH, dissolved oxygen, biological oxygen demand, chemical oxygen demand. ➢ Waste water management: characteristics, treatment and disposal, effect on human health and environment. • Sludge disposable: analyzing effluents

	• General solid waste categorization: hazardous and non-hazardous- ➢ Solid waste management- characteristics, method of collection, transfer and disposal, converting waste to energy, hazardous waste management. ➢ Air pollution management- source and effect, dispersion of air pollutants, control methods, air quality management. ➢ Noise pollution management- effect on humans, noise control methods.
Module 4 (Credit 1) - Global Regulations and Eco-labeling	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe key laws, regulations, and standards governing the textile industry in different countries.
	2. Analyze the objectives and principles underlying government norms and standards for the textile and clothing industry.
	3. Discover different types of eco-marks and eco-labels used in the textile industry.
Content Outline	**Global textile laws of different countries:** • Environment Impact Assessment (EIA) and Environment Protection Act. • Government norms and standards. • Legislation of major countries like India, China, EU, US • Eco conformance certification like OekoTex. GOTS- Eco labelling, Eco mark • ZDHC-Zero discharges of Hazardous Chemical

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

- Group discussion on the topic of Eco system and Environment Management in textile industry.
- Develop new product using creative techniques for repurposing textile waste.
- Field visit to Sustainable Fashion industry and submit report.
- Power point presentation on Global Textile laws of different countries.

References:

1. Claudia, E.H., Panayiota, J.A. &Goworek, H. (2017). *Sustainability in Fashion: A Cradle to Upcycle Approach*, Palgrave Macmillan- Springer Nature, Switzerland.
2. Gordon, J.F. & Hill, C. (2014). *Sustainable Fashion- Past, Present and Future*. Bloomsbury Publishing, London.
3. Manivasagam, N. (2003). *Treatment of Textile Processing Effluents Including Analysis*. Sakthi Publications, Coimbatore.
4. Miraftab, M. &Horrocks, A.R. (2007). *Eco Textile, The Way Forword for Sustainable Development in Textile.* Wood Head Publishing Ltd., England.
5. Muthu, S.S. (2014). Roadmap to Sustainable Textiles and Clothing Eco Friendly Raw Materials, Technologies, and Processing Methods. Springer Publishing, UK.
6. Nayak, R. (2020). Sustainable Technologies for Fashion and Textiles. Woodhead Publishing, UK.

4.2 Major (Core)

Course Title	**Fabric Structures & Fabric Analysis (414812)** **(Th)(Pr)(U)**
Course Credits	4 (Th)
Course Outcomes	After going through course, learners will be able to 1) Apply advanced cloth calculation techniques and understand factors like crimp and cover factor in fabric weight and dimensions. 2) Demonstrate proficiency in textile design from concept to execution using design paper and weave structure knowledge. 3) Analyze elementary weaves, their characteristics, and applications in textile production. 4) Create complex textile designs incorporating extra warp, extra weft effects, and color and weave combinations using advanced weaving techniques and graphical representation.
Module 1 (Credit 1) - Cloth Calculations and Fabric Weight	
Learning Outcomes	After learning the module, learners will be able to
	1. Modify the factors involved in cloth calculations.
	2. Create the concepts of crimp and cover factor.
Content Outline	**Cloth Calculations-** • Factors involved in cloth calculations, calculation of warp and weft per square meter, total weight of fabric per square meter (GSM), piece weight, weight per running meter. • Crimp, cover factor tape length and their calculations..
Module 2 (Credit 1) - Textile Design and Cloth Structure	
Learning Outcomes	After learning the module, learners will be able to
	1. Demonstrate the ability to create textile designs through the process of design, draft, peg plan, and denting order.
	2. Distinguishing features of each weave type.
Content Outline	**Elements of cloth structure-** • Use of design paper, concept of warp, weft and their intersection points, weave, weave repeat and their notation. • Classification of woven fabrics. • Classification of textile designs. • Design, draft, peg plan and denting order.

	Identification of warp and weft in woven fabrics
Module 3 (Credit 1) - Elementary Weaves and Characteristics	
Learning Outcomes	After learning the module, learners will be able to
	1. Discover features of elementary weaves
	2. Develop structure and characteristics of various weaves.
Content Outline	**Elementary Weaves** 1. Plain Weave – Introduction, Classification of plain cloth, Derivatives - Warp rib weave, weft rib weave, matt, Ornamentation of plain weave 2. Twill weave – Introduction, Balance and unbalance twill, angle of twill, Weaves constructed on twill bases- waved twill, Herringbone twill, broken twill, transposed twill, elongated twill, combination of twill weave 3. Sateen and satin weaves – General characteristics, regular and irregular sateen's and satin 4. Other weaves – Diamonds and Diapers, Crepe, Honeycomb, Huckaback, Mock leno, moss crepe, Honeycomb, Brighton Honeycomb/Bedford cord, Welts and Pique. • Compound colour and weave effect - Stripe and checks colour and weave effect
Module 4 (Credit 1) - Advanced Weave Effects and Color Combinations	
Learning Outcomes	After learning the module, learners will be able to
	1. Create extra warp and extra weft effect on design paper
	2. Suggest combining weave with color and representation of colour and weave
Content Outline	• Extra weft and extra warp figuring effects • Lappet and swivel figured fabrics • Warp, weft pile fabric and terry & Turkish towels • Gauze and net leno • Damask Double cloth • Tri axial weave • Simple colour and weave effects – General considerations, • combining weave with colour, representation of colour and weave effect on graph paper, classification of colour and weave effect, • producing variety of effects using same weave and colour • continuous line effect, Hound's tooth effect, Bird's eye and spot, all over effect

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE) :-

- Provide students with fabric specifications (e.g., yarn count, warp and weft density) and ask them to calculate parameters such as fabric width, warp and weft crimp, fabric weight, and fabric count.
- Development of weave samples and graphical re-presentation.
- Loom setting and sample weaving.
- group discussions on solutions to prevent or minimize common fabric defects.

References: -

1. Amalsar D.M (2017) *Yarn and Cloth Calculation*. Orient Longmans.35pg
2. F. J. Christopher. (2014). *Hand-Loom Weaving*, Read Books Ltd.
3. Watson. W. (2018). *Textile Design and Color Elementary Weaves and Figured Fabrics,* Creative Media Partners, LLC.
4. Choogin, V. V., Bandara C. P., Chepelyuk E. V. (2013). *Mechanisms of Flat Weaving Technology*, Elsevier Science.
5. A. T. Robinson. (2014). *Woven Cloth Construction*, Springer US.

4.3 Major (Core)

Course Title	**Product development (414823) (Pr) (U)**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1) Develop innovative textile products tailored to market needs
	2) Establish and manage a small-scale textile manufacturing unit.
	3) Implement quality control measures to ensure product excellence
	4) Create a viable business plan and navigate the entrepreneurial landscape in India
Module 1 (Credit 1) Introduction to Product Development	
Learning Outcomes	After learning the module, learners will be able to 1) Analyze market trends and consumer preferences to identify viable product ideas.
	2) Apply structured methodologies to translate product ideas into tangible prototypes for testing and refinement.
Content Outline	• Identifying market trends and consumer demands. • Ideation techniques and brainstorming sessions. • Stages of product development: concept, design, prototyping, and testing.
Module 2 (Credit 1) Textile Product Design and Innovation	
Learning Outcomes	After learning the module, learners will be able to 1) Utilize knowledge of textile materials and technologies to innovate new product designs.
	2) Demonstrate proficiency in prototyping and sample development techniques to refine product concepts based on user feedback.
Content Outline	• Basics of textile materials, fibers, and fabrics. • Latest advancements in textile manufacturing and processing. • Creating prototypes and samples.
Module 3 (Credit 1) Manufacturing and Quality Control	
Learning Outcomes	After learning the module, learners will be able to 1) Develop strategies for setting up and managing a textile manufacturing unit while ensuring cost-effectiveness and quality control
Content Outline	2) Implement industry-standard quality assurance practices to maintain product excellence throughout the production

	process.
Module 4 (Credit 1) Entrepreneurship and Business Management	
Learning Outcomes	After learning the module, learners will be able to
	• Formulate a detailed business plan incorporating market analysis, financial projections, and marketing strategies for a textile venture. • Navigate regulatory frameworks and legal requirements to establish and operate a textile business effectively in India
Content Outline	• Components of a comprehensive business plan. • Understanding legal structures for businesses in India. • Building a brand and developing a marketing strategy.

Assignments and Activities towards Comprehensive Continuous Evaluation (CCE)

- Assess students' ability to analyze market trends and consumer preferences, translating them into viable product ideas and tangible prototypes for testing and refinement.
- Evaluate students' proficiency in utilizing textile materials and technologies to innovate new product designs, emphasizing practical application through prototype development and user feedback.
- Measure students' competence in developing strategies for cost-effective textile manufacturing and implementing quality control measures to ensure product excellence.
- Assess students' capability to formulate comprehensive business plans that include market analysis, financial projections, and effective marketing strategies tailored to the textile industry.
- Evaluate students' understanding of regulatory frameworks and legal requirements pertinent to establishing and operating textile businesses in India, as demonstrated through their business plans and presentations

References

1. ParulBhatnagar (2004), Traditional Indian Costumes and Textiles, Abishek Publications, Chandigarh
2. Russel Gillow (1991), Traditional Indian Textiles, Nicholas Barnard, Thames and Hudson Ltd., London Traditional Indian Textiles, (1991)
3. Dhanija Jain (1989), Hand woven Fabrics of India, Mapin publishing, Ahmedabad.
4. Shailaja D. Naik (1996) Traditional Embroideries of India, Dr., APH Publishing Corporation, New Delhi
5. Ritu Kumar (1999), Costumes and Textiles of Royal India, Christie's Books, London
6. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SFDA1301.pdf

4.4 Major (Core)

Course Title	**Recent Advances in Fashion Design & Textile (Theory)** **(424851)**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1) Analyze and select research topics using secondary data sources relevant to both Textile Science and Apparel Design. 2) Effectively create comprehensive reports based on collected data, demonstrating proficiency in research methodology. 3) Develop and deliver professional PowerPoint presentations that effectively communicate research findings and proposals. 4) Demonstrate the ability to propose and justify research topics convincingly in both academic and professional settings.
Module 1 (Credit 1) - Textile Science Report	
Learning Outcomes	After learning the module, learners will be able to
	• Analyze and Select the topic trough secondary data. • Create the report on collected data.
Content Outline	• Selection of topic related to Textile Science • Collection of information from secondary data • Report writing
Module 2 (Credit 1) - Presentation Skills	
Learning Outcomes	After learning the module, learners will be able to
	• Develop Prepare power point presentation; • Propose the topic effectively.
Content Outline	• Preparation of power point presentation • Display of articles • Final presentation.
Module 3 (Credit 1) - Apparel Design Report	
Learning Outcomes	After learning the module, learners will be able to
	• Analyze and Select the topic trough secondary data. • Create the report on collected data.
Content Outline	• Selection of topic related to Apparel design • Collection of information from secondary data

	• • Report writing
Module 4 (Credit 1) - Final Presentation	
Learning Outcomes	After learning the module, learners will be able to
	• Develop Prepare power point presentation; • Propose the topic effectively.
Content Outline	• Preparation of power point presentation • Display of articles • Final presentation.

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): -

- Collection of secondary data for related field
- Prepare an article on collected information.
- Presentation of article with a suitable display.
- Survey report on related areas.

Reference: -

1. Cole, R. (2021). *Textile science and technology: An introduction*. CRC Press.
2. Duarte, N. (2019). *Slide:ology: The art and science of creating great presentations*. O'Reilly Media.
3. Teri, L. (2020). *Fashion design: Process, innovation, and practice*. Fairchild Books.
4. Reynolds, G. (2014). *Presentation Zen: Simple ideas on presentation design and delivery*. New Riders.

4.5 Research Project

Course Title	**Dissertation II (454831) (Pr) (U)**
Course Credits	6
Course Outcomes	After going through the course, learners will be able to
	1) Demonstrate advanced research aptitude by interpreting research findings and discerning their broader implications in both academic and practical contexts. 2) Produce meticulously structured and detailed research reports that adhere rigorously to academic conventions and standards. 3) Translate comprehensive research reports into succinct and compelling journal articles suitable for submission to esteemed academic journals. 4) Prepare, submit, and manage the review process for research reports and journal articles, ensuring alignment with publication ethics and effective response to peer reviewer feedback
Following Steps to be completed during the semester:	
Data Analysis, Results Interpretation and Discussion • Assist in interpreting research findings and implications. • Facilitate discussions on the significance of results in context. • Encourage critical analysis of findings vis-à-vis research objectives. • Ensure clarity and coherence in presenting results. • Students will articulate findings and their implications effectively.	
Writing Research Reports • Guide students in structuring and drafting research reports. • Discuss conventions and standards for academic writing. • Provide templates and examples for organizing content. • Emphasize clarity, conciseness, and logical flow in writing. • Students will prepare a comprehensive research report for evaluation.	
Preparation of Journal Articles • Mentor students in transforming research reports into journal articles. • Discuss strategies for adapting content for different audiences. • Guide in meeting journal submission requirements and formatting. • Emphasize the importance of concise and impactful writing. • Students will prepare a manuscript suitable for submission to a journal.	
Submission and Publication • Assist students in preparing submission packages for research outputs. • Discuss the journal submission process and publication ethics. • Provide guidance on responding to reviewer comments and revisions. • Support students in navigating the peer review and publication process. • Students will submit their research report and journal article for review and potential publication	
• Submission of dissertation	
• Viva voce	

Assignments and Activities towards Comprehensive Continuous Evaluation (CCE):

- Assess students' ability to articulate the significance of research findings and implications within academic and practical contexts.
- Evaluate the clarity and coherence of students' presentations or written reports on research findings and critical analysis.
- Assess proficiency in structuring and drafting comprehensive research reports adhering to academic standards and conventions.
- Evaluate organization, logical flow, and clarity of expression in students' research reports.
- Assess students' capability to transform research reports into concise and impactful journal articles suitable for submission.
- Review students' preparedness in navigating the journal submission process, addressing publication ethics, and responding to reviewer comments effectively.

Reference:

1. Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.
2. Turabian, K. L. (2018). *A manual for writers of research papers, theses, and dissertations: Chicago style for students and researchers* (9th ed.). University of Chicago Press.
3. Day, R. A., & Gastel, B. (2012). *How to write and publish a scientific paper* (7th ed.). Cambridge University Press.
4. Hames, I. (2015). *Publish and prosper: A strategy guide for scholars and anyone else serious about serious books* (2nd ed.). Palgrave Macmillan.