KUMARAGURU COLLEGE OF TECHNOLOGY,

An autonomous Institution affiliated to Anna University, Chennai

COIMBATORE – 641 049.

M.Tech-TECHNICAL TEXTILE

REGULATION 2024

I & II Semester

Textile Technology

VISION

To be a Centre of Excellence in textile technology and management with basic and applied research for the fulfilment of societal needs.

MISSION

- Develop industry relevant curriculum, innovative teaching and project-based learning methods that enable students to be efficient professionals.
- Motivate Faculty to update their knowledge and skills through continuous learning.
- Provide holistic student development by creating opportunities for lifelong learning and to develop entrepreneurship skills.
- Undertake inter-disciplinary research and development/Internship/Consultancy in the field of Textile Technology to support the industry and society.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of the M. Tech - Technical Textile Programme will be able to:

PEO: 1. Acquire comprehensive knowledge and technical skills in advanced textile materials, manufacturing processes, and applications, enabling them to innovate and solve complex problems in the technical textile industry.

PEO: 2. Demonstrate leadership and professional excellence in their careers, contributing to the growth and development of the textile industry through ethical practices, effective communication, and continuous learning.

PEO: 3. Engage in research and development activities to advance the field of technical textiles, leveraging cutting-edge technologies and methodologies to contribute to academic, industrial, and societal advancements.

PROGRAM OUTCOMES (POs)

Graduates of the M.Tech-Technical Textile Postgraduate Program should have the ability to:

PO1: An ability to independently carry out research/investigation and development work to solve practical problems.

PO2; An ability to write and present a substantial technical report/document.

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

PO4: Exhibit proficiency in the use of modern tools, techniques, and equipment relevant to technical textiles engineering and research.

PO5: Uphold professional and ethical responsibilities in research, industry, and academia, ensuring sustainable and responsible practices.

PO6: Communicate effectively and demonstrate leadership in multidisciplinary teams, fostering collaboration and knowledge dissemination in the technical textile industry.

PROGRAM SPECIFIC OUTCOMES (PSO'S)

Graduates of the M.Tech-Technical Textile Postgraduate Program will have the ability to:

PSO1: Design and create innovative textiles for protective, defense, automobile, medical, and industrial applications, utilizing advanced materials and technologies to meet specific industry needs.

PSO2: Perform in-depth research in technical textiles, focusing on improving performance, durability, and functionality, and contribute to advancements in protective, defense, automobile, medical, and industrial textile sectors.

KUMARAGURU COLLEGE OF TECHNOLOGY

TEXTILE TECHNOLGY
REGULATION 2024
M.Tech Technical Textile - Curriculum

Semester I

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24TXT501	Absorbable and Biodegradable Polymers	Theory	PC	3	0	0	0	3
2	24TXT502	Engineering Textiles	Theory	PC	3	0	0	0	3
3	24TXT503	Fibres and yarns for technical textile	Theory	PC	3	0	0	0	3
4	24TXT504	Theory of 3-D Fibrous Assemblies	Theory	PC	3	0	0	0	3
5	24TXT505	Protective textiles	Theory	PC	3	0	0	0	3
6	24TXT506	Research Methodology	Theory	ES	3	0	0	0	3
7	24TXP507	Technical textile laboratory I	Practical	PC	0	0	2	0	1
								Total Credits	**19**
								Total Contact Hours/week	**20**

Semester II

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24TXT508	Statistical Applications in Textile Engineering	Theory	PC	3	0	0	0	3
2	24TXT509	Textile Coating and Lamination	Theory	PC	3	0	0	0	3
3	24TXT510	Textile Reinforced Composites	Theory	PC	3	0	0	0	3
4	24TXT511	Medical Textiles and Biomaterials for Health care	Theory	PC	3	0	0	0	3
5	24TXE0__	Professional Elective I	Theory	PE	3	0	0	0	3
6	24TXE0__	Professional Elective II	Theory	PE	3	0	0	0	3
7	24TXP512	Technical Textile Lab - II	Practical	PC	0	0	2	0	1
								Total Credits	**19**
								Total Contact Hours/week	**20**

Semester III									
S.No	**Course code**	**Course Title**	**Course Mode**	**Course Type**	**L**	**T**	**P**	**J**	**C**
1	24TXE0__	Professional Elective III	Theory	PE	3	0	0	0	3
2	24TXE0__	Professional Elective IV	Theory	PE	3	0	0	0	3
3	24TXE0__	Professional Elective V	Theory	PE	3	0	0	0	3
4	24TXE0__	Professional Elective VI	Theory	PE	3	0	0	0	3
5	24TXJ613	Internship	-	PC	0	0	0	2	2
6	24TXJ614	Project Phase I	Project	PR	0	0	0	10	10
								Total Credits	**24**
								Total Contact Hours/week	**20**
Semester IV									
S.No	**Course code**	**Course Title**	**Course Mode**	**Course Type**	**L**	**T**	**P**	**J**	**C**
1	24TXJ615	Projects II /Industrial or Research Internships	Project	PR	0	0	0	20	20
								Total Credits	**20**
								Total Contact Hours/week	**20**

Semester-wise Credits	
Semester - I	19
Semester - II	19
Semester – III	24
Semester – IV	20
Total Credits	**82**

Course types	**Credits**
Basic Science	-
Engineering Science	03
Professional Core	31
Professional Electives	18
Project/Internship	30
Seminar	-
Total Credits	**82**

Professional Electives									
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
1.	24TXE001	Specialty fibres for technical textiles	Theory	PE	3	0	0	0	3
2.	24TXE002	Yarns for technical textiles	Theory	PE	3	0	0	0	3
3.	24TXE003	Technical fabric manufacturing	Theory	PE	3	0	0	0	3
4.	24TXE004	Nonwovens in technical textiles	Theory	PE	3	0	0	0	3
5.	24TXE005	Smart textiles	Theory	PE	3	0	0	0	3
6.	24TXE006	Automobile textile	Theory	PE	3	0	0	0	3
7.	24TXE007	Military textiles	Theory	PE	3	0	0	0	3
8.	24TXE008	Home textiles	Theory	PE	3	0	0	0	3
9.	24TXE009	Nano textiles	Theory	PE	3	0	0	0	3
10.	24TXE010	Auxetic textiles	Theory	PE	3	0	0	0	3
11.	24TXE011	Advances in textile bioprocessing	Theory	PE	3	0	0	0	3
12.	24TXE012	Smart Textiles for Wound Care	Theory	PE	3	0	0	0	3
13.	24TXE013	Textile preforms and prepregs	Theory	PE	3	0	0	0	3
14.	24TXE014	Laminar composites	Theory	PE	3	0	0	0	3
15.	24TXE015	3-D textile reinforcements in composite materials	Theory	PE	3	0	0	0	3
16.	24TXE016	Sustainable technical textiles	Theory	PE	3	0	0	0	3
17.	24TXE017	Filtration textiles	Theory	PE	3	0	0	0	3
18.	24TXE018	Geo textile	Theory	PE	3	0	0	0	3
19.	24TXE019	Agro textile	Theory	PE	3	0	0	0	3
20.	24TXE020	Textiles In Civil Construction and Transportation	Theory	PE	3	0	0	0	3

SEMESTER I

24TXT501	ABSORBABLE AND BIODEGRADABLE POLYMERS	L	T	P	J	C
		3	0	0	0	3
PC		SDG	7, 8, 10			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	Study the evolution and applications of absorbable and biodegradable polymers, including processing methods.
2	Analyze the design and properties of segmented copolyesters for sutures, focusing on strength retention.
3	Explore advanced chitosan-based systems and PEG-based copolyesters in biomedical and pharmaceutical applications.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Apply knowledge of the evolution of absorbable and biodegradable polymers to identify suitable materials for specific applications.	Ap
CO 2	Analyze the composition and properties of segmented copolyesters to determine their suitability for various suture applications.	An
CO 3	Evaluate advances in polyethylene glycol-based copolyesters to assess their potential in biomedical and drug delivery applications.	E
CO 4	Design innovative chitosan-based systems for pharmaceutical, biomedical, and healthcare applications using recent advancements.	C
CO 5	Examine the latest evaluation methods to determine the toxicity and biocompatibility of absorbable/biodegradable polymer systems.	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2				2
2	2	2		2		2
3	2	2		2		2
4	2		3			2
5				2	2	2

Course Content

ABSORBABLE/BIODEGRADABLE POLYMERS: TECHNOLOGY EVOLUTION Evolution of Natural Absorbable / Biodegradable Polymers and Synthetic Absorbable / Biodegradable Polymers-Heterochain Ester-Based Absorbable Synthetic Polymers-Homochain Ester-Based Absorbable Synthetic Polymers- Evolving Applications and Pertinent Processing Methods of Absorbable / Biodegradable Polymers	**9 Hours**
SEGMENTED COPOLYESTERS WITH PROLONGED STRENGTH RETENTION PROFILES Introduction-Molecular Chain Design for Tailored Properties-Composition and Properties of Typical Copolymers and Sutures-Copolymers for Monofilament- Sutures-Copolymers for Braided Sutures -Effect of Composition on Properties of Segmented Polymers and Their Braided Sutures- Perspective on the future.	**9 Hours**
POLYETHYLENE GLYCOL-BASED COPOLYESTERS Novel Gel-Forming Liquid PEG-Based Co-polyesters:Molecular Design and Attributes of Tailored Properties-Advances in Biomedical Applications and Clinical Relevance-Advances in the Applications of Controlled Delivery Systems and Clinical Relevance-Absorbable Gel Advances in Solid PEG-Based Co-polyesters: Alternating Multiblock Copolymers in Wound Healing Compositions-Nanospheres of PEG- Polycaprolactone A-B Block Copolymer as a Novel Drug Carrier- Co- polyether- In Situ Cross linkable PEG-Based Copolymers for Protein Controlled Delivery	**9 Hours**

CHITOSAN-BASED SYSTEMS (CBS) Advances in CBS-Advances in Chitosan-Based Materials and Clinical- Advances in Processing of CBS and Clinical Relevance-Advances in CBS Applications- CBS for Pharmaceutical Applications- CBS for Biomedical Applications-CBS in Healthcare Applications, for Tissue Engineering.	**9 Hours**
DEVELOPMENTS IN EVALUATION METHODS Forms of Polymer-Polymer Processing and Its Effect on Toxicity-Methods of Toxicity Testing -Specifics of Testing-In Vitro Cell Culture Toxicity Assays-In Vivo Toxicity Testing-Toxicity and Biocompatibility for Specific Absorbable / Biodegradable Systems-Absorbable / Biodegradable Devices-Cyanoacrylate- Polylactide and Polyglycolide-Alginates, Chitosans, and Absorbable / Biodegradable Drug Carriers-Critical Test Methods for Implants and Drug Carriers-Implants.	**9 Hours**

Theory Hours:	**45**	**Tutorial Hours:**	**0**	**Practical Hours:**	**0**	**Project Hours:**	**0**	**Total Hours:**	**45**

Learning Resources

Textbooks:

1. Bartel.V.T, "Handbook of medical textiles", Wood Head publishing, 2011.
2. Ray smith, "Biodegradable polymers for industrial application", CRC press, 2005.

References:

1. Shalaby W. Shalaby and Karen J.L. Burg, "Absorbable/Biodegradable Polymers", CRC Press, 2004.
2. Anand (S C) Ed.; Kennedy (J F) Ed.; Miraftab (M) Ed.; Rajendran (S) Ed., "Medical Textiles and Biomaterials for Healthcare", Woodhead Publishing Limited, 2006.
3. Samuel C. O. Ugbolue, "Polyolefin fibres for Induatrial and medical applications", Woodhead Publishing Limited, 2009.
4. Rajendran.S, "Advanced Textiles for Wound Care", Wood Head publishing in Textiles: Number 85, 2009.
5. Van Langenhove, "Smart textiles for medicine and health care – materials, systems and applications", Wood Head publishing, 2007.
6. Buddy D.Ratner and Allan S. Hoffman, "Biomaterials science – An introduction to materials in medicine", Academic press, 1996.
7. Pourdegtimi.B, "Vascular grafts: Textile structures and their performance", Textile progress, vol. 15, No. 3, the Textile Institute, 1986.
8. Cusick. GE and Teresa Hopkins, "Absorbent incontinence products", the Textile Institute, 1990.
9. Kothari.V.K., "Progress in textiles: Technology developments and applications", volume 3, IAFL Publications, 2008.
10. Kennedy (John F); Phillips (Glyn O); Williams (Peter A), "Hyaluronan: Vol.2 Biomedical, Medical and Clinical Aspects", 2012

Assessment (Theory course)

CAT, Activity and Learning Task: Socratic seminar, Mini project, MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT), Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.P.Sivakumar Mrs. R.Sukanyadevi Department of Textile
Recommended by BoS on	14.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24TXT502	ENGINEERING TEXTILES	L	T	P	J	C
		3	0	0	0	3
PC		SDG	6, 8,10			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	Understand textile engineering principles, including the evolution from traditional to function-focused textiles.
2	Explore the textile product development process, emphasizing market segmentation, lifecycle, and research.
3	Learn product design analysis and material selection techniques, including modeling, optimization, and cost-performance criteria.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Apply engineering principles and concepts to distinguish between traditional and function-focus fibrous products.	Ap
CO 2	Analyze the product development cycle to coordinate effectively in textile product development.	An
CO 3	Evaluate design conceptualization techniques to formulate effective textile product design concepts.	E
CO 4	Create textile product models using advanced modelling techniques to optimize design and performance.	C
CO 5	Analyze material selection criteria to ensure the best performance and cost-effectiveness in textile products.	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2					
2	2	2	2		3	1
3		2	2	2		1
4			2			1
5				2	2	1

Course Content

TEXTILES ENGINEERING PRINCIPLES AND CONCEPTS The evolution of engineering, Engineering attributes and concepts: Knowledge gain and problem solving-foundation of engineering-Invention, innovation, dissemination, and patenting-Natural resources, Function-focus fibrous products, The move to function-focus fibrous products, differences between traditional and function-focus fibrous products, Fiber to fabric engineering.	**9 Hours**
TEXTILE PRODUCT DEVELOPMENT Simplified view of product development, the product development cycle: Coordination in product development-Product lifecycle, Business and marketing aspects related to product development: Market Segmentation-Market shifts, Product-focus versus user-focus product development, Role of research in product development.	**9 Hours**
TEXTILE PRODUCT DESIGN Product design: the core task in product development, product design cycle, Design conceptualization: Define the design problem-Gather relevant information-Design concept formulation, Design analysis, Basic differences between design conceptualization and design analysis, General guidelines for design conceptualization, Basic tools of design conceptualization	**9 Hours**
TEXTILE PRODUCT DESIGN ANALYSIS AND MODELLING The purpose of design analysis, Textile modelling techniques: Product system classification-Model Classification- Mathematical Modelling-Empirical modelling, Artificial neural networks, Optimization analysis: linear programming, Problem solving tools: genetic algorithms and simulated annealing, Modelling human judgment: fuzzy logic, Finite element analysis, Failure analysis	**9 Hours**
MATERIAL SELECTION FOR TEXTILE PRODUCT DESIGN Basic steps of material selection, Material categorization, Common material categories: Metals and metal alloys-Ceramics-Polymers-Composites, Basic criteria for the material: Temperature-Strength-Corrosion and degradation, Material cost: Cost–performance relationship-Cost–performance equivalence, Effects of technology on material selection	**9 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 0	Total Hours: 45

Learning Resources

Textbooks:

1. Fan J and Hunter L, “Engineering Apparel Fabrics and Garments “, Woodhead Publishing Ltd., Cambridge, 2009.

References:

1. Yehia Elmogahzy, "Engineering Textiles Integrating the Design and Manufacture of Textile Products” Woodhead Publishing 2019.
2. Mastudaira T, and Suresh M N, "Design Logic of Textile Products", Volume 27, No.3, Textile Progress, Textile Institute, Manchester, 1997.

Assessment (Theory course)

CAT, Activity and Learning Task: Diagnostic questions, Mini project, MCQ, End Semester Examination (ESE)

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT), Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr. S.Natarajan Dr. N.Srikrishna Department of Textile Technology

Recommended by BoS on	14.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24TXT503	FIBERS AND YARNS FOR TECHNICAL TEXTILE	L	T	P	J	C
		3	0	0	0	3
PC		SDG	6, 7, 10			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	Study chemically and thermally resistant fibers and their applications.
2	Explore HMHT and metallic fibers, including PBO and aluminum oxide, and their uses in composites.
3	Learn about technical yarns and 3D modeling for yarn structures.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze chemically and thermally resistant fibers to distinguish their properties and applications.	An
CO 2	Evaluate the properties and applications of HMHT and metallic fibers to recommend suitable uses in technical textiles.	E
CO 3	Understand sulfur-based, elastomeric, and PBI fibers to assess their suitability for various technical applications.	U
CO 4	Create hybrid yarns and advanced composites to demonstrate their potential applications in technical textiles.	C
CO 5	Apply mathematical models for technical yarns to optimize their design and functionality using computer-aided design systems.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	2	2	1	
2	2	2	2		2	3
3	2	2		2		2
4			2	2	2	3
5	2				2	

Course Content

CHEMICALLY AND THERMALLY RESISTANT FIBRES Introduction- Chlorinated fibres: PVDC-Fluorinated fibres: PTFE, PVF, PVDF, Poly(etheretherketones): PEEK -Poly (ether imide), PEI. Introduction- Thermosets-Aromatic polyamides and polyaramids- Semi-carbon fibres: oxidized acrylics.	**9 Hours**
HMHT FIBRES AND METALLIC FIBRES Melt-spun wholly aromatic polyester- PBO and related polymers- PIPD or 'M5' rigid-rod polymer- Russian aromatic fibres- Metallic fibres - Steel fibre - Formation – Structure – Properties and application. Aluminium Oxide fibres - Preparation and manufacturing process - Properties - Applications – Composites of Aluminium Oxide fibres. Lead fibres – Fibre Preparation - Properties - Applications - Sound Control and Radiation Shielding Materials.	**9 Hours**
SULPHUR BASED FIBRES ELASTOMERIC AND PBI FIBRES Polyphenyl sulphide fibres - Fibre formation – Structure- Properties – Applications. Elastomeric (Polyurethane) fibres - manufacturing processes – Structure - Properties - Applications. Polybenzimidazole (PBI) - Fibre formation, structure, properties and applications.	**9 Hours**
YARNS FOR TECHNICAL TEXTILE Types of hybrid yarns - Manufacture of thermoplastic composites with hybrid Yarns - Potential application areas of thermoplastic composites - Thermo-mechanical behaviour of shape memory polymers (SMPs) - Manufacture of shape memory polymer (SMP) - Reflective yarns - UV protected yarns - Metallic and metalloplastic yarns - Antimicrobial yarns - Manufacture and structure of electro-conductive yarns - Glass fibers and yarns - Carbon fibers and yarns - Ceramic fibers and yarns..	**9 Hours**
MODELLING FOR TECHNICAL YARNS 3D computer graphics and visualization technologies for cloths and yarns - Microstructures of yarns and fancy yarns - Mathematical modelling of yarn and fancy yarn structures - Descriptions of a computer aided design (CAD) system for yarn and fancy yarn structures.	**9 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 0	Total Hours: 45

Learning Resources

Textbooks:

1. Hearle J W S, "High Performance Fibres", Textile Institute, Manchester, Wood Publishing, 2001.
2. R. Alagirusamy and A. das Technical textile, Yarns Woodhead Publishing Series in Textiles: Number 101, 2010.

References:

1. Mukhopadyay S.K., "High Performance Fibres", Textile Progress, Textile Institute, Manchester, Vol. 25, 1993.
2. Samuel C. O. Ugbolue "Polyolefin fibres for Industrial and medical applications", Wood Head Publishing, 2009.
3. Menachem Lewin and Jack Preston., "High Technology fibers - part B", Marcel Dekker, New York, 1989.
4. Gupta V.B. and Kothari V.K., "Manufactured Fibre Technology", Chapman Hall Publishing Company, 1997.
5. Anand S.C., "Medical textiles: Proceedings of the 2nd International conference" Bolton, UK. 2001.
6. Menachem Lewin & Jack Preston, "High Technology Fibres - Part A", Marcel Dekker, New York, 1985.
7. Samuel C. O. Ugbolue, "Polyolefin fibres for Induatrial and medical applications", Woodhead Publishing Limited, 2009.
8. Zeng, X., Tan, V. B. C. and Shin, V. P. W., 2006, 'Modelling inter-yarn friction in woven fabric armor', International Journal for Numerical Methods in Engineering, 66, 1309–1330.
9. Chen, Y., Lin, S., Zhong, H., Xu, Y.-Q., Guo, B. and Shum, H.-Y., 2003, 'Realisticrendering and animation of knitwear', IEEE Transactions on Visualizations and Computer Graphics, 9, 43–55.
10. King, M., Jearanaisilawong, P. and Scorate, S., 2005, 'A continuum constitutive model for the mechanical behavior of woven fabrics', International Journal of Solids and Structures, 42, 3867–3896.
11. Bridson, R., Fedkiw, R. and Anderson, J., 2002. 'Robust treatment of collisions, contact and friction for cloth animation', in Proceedings of SIGGRAPH '02, AC Press/ACM SIGGRAPH, pp. 594–603

Assessment (Theory course)

CAT, Activity and Learning Task Diagnostic questions, Mini project, MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT), Jalandhar, Punjab 144008. Dr. M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr. P. Chandrsaekaran Department of Textile Technology
Recommended by BoS on	14.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24TXT504	THEORY OF 3-D FIBROUS ASSEMBLIES	L	T	P	J	C
		3	0	0	0	3
PC		SDG	7, 8, 10			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	Understand 3D fibrous assemblies and their applications, including stochastic methods and fibrous characteristics.
2	Learn the manufacturing, properties, and applications of 3D woven fabrics, including multilayer and non-crimp weaves.
3	Explore the design and applications of multiaxial warp-knitted fabrics, 3D braiding, and nonwoven fabrics.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the concepts of 3D fibrous assemblies to understand their structure and application in technical textiles.	An
CO 2	Evaluate the manufacturing techniques and properties of 3D woven fabrics to recommend suitable applications.	E
CO 3	Understand the structure and behavior of multiaxial warp-knitted fabrics to assess their advantages and applications.	U
CO 4	Create 3D braided and nonwoven structures to explore their potential uses in technical textiles.	C
CO 5	Apply innovative applications of 3D fibrous assemblies in various technical textile fields to enhance performance and functionality.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	2	1	2	
2	2	3	2			1
3	2	2	2			
4	2		3	2		
5	2		2			2

Course Content

CONCEPTS OF 3D FIBROUS ASSEMBLIES Stochastic and Stereological Methods: Random fibrous assemblies, anisotropy characteristics in fibrous assemblies, Basics of two- and three-dimensional fibrous assemblies. Concept and application of 3D woven, knitted nonwoven, braided, and stitched structures.	**9 Hours**
3D WOVEN FABRIC Introduction. Advantages. Manufacturing – 3D multilayer interlock weave, 3D non crimp weave, 3D dual interlaced weave; hollow 3 woven fabrics. General structure and behavior of multilayered fabric – pattern design and cross-section view, orthogonal and layer interlock. Mechanical behavior-tensile, shear and compressive properties. Applications	**9 Hours**
MULTIAXIAL WARP KNITTED FABRIC Basics and advantages of Multiaxial warp knitted fabric, Types. Manufacturing systems, knitting action of double-needle-bar Raschel machine, knitting options with two needle bars and more than two guide bars. General structure and behavior of multiaxial warp-knitted fabrics. Application.	**9 Hours**
3D BRAIDING AND NONWOVEN FABRIC Tubular, bifurcated structures, track and column braiding processes, Color design of braided structures, 3D geometrical models, Custom machine configurator; high bulk nonwovens, shaped 3D nonwovens. General structure and behavior of braiding and nonwoven fabrics. Application.	**9 Hours**
APPLICATIONS OF 3D FIBROUS ASSEMBLIES IN TECHNICAL TEXTILES 3D Composites - Classification of textile preforms, Types of reinforcement, 3D fabric for technical textile – Medical, Sports, Geotextile, Automotive, Protective clothing and Aerospace – Materials, properties, process and applications.	**9 Hours**

Theory		Tutorial		Practical		Project		Total	
Hours:	45	Hours:	0	Hours:	0	Hours:	0	Hours:	45

Learning Resources

Textbooks:

1. Antonio Miravete., "3D Textile Reinforcements in Composite Materials", Wood head Publishing, 1999, ISBN: 1855733765 | ISBN-13: 9781855733763
2. Tong L., MouritzA.P., and Bannister M., "3D Fibre Reinforced Polymer Composites", Elsevier, 2002, ISBN: 0080439381 | ISBN-13: 9780080439389

References:

1. Xiaogang Chen, "Advances in 3D Textiles1st Edition", Woodhead Publishing, 2015 ISBN: 9781782422143.
2. YordanKyosev, "Braiding Technology for Textiles,1st Edition", Woodhead Publishing, 2014, ISBN: 9780857091352."
3. Jinlian Hu., "3D Fibrous Assemblies: Properties, Applications and Modelling of Three-Dimensional Textile structures", CRC Press, 2008, ISBN: 1420079867 | ISBN-13:9781420079869

Assessment (Theory course)

CAT, Activity and Learning Task: Open-ended questions, Mini project, MCQ, End Semester Examination (ESE)

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT), Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr. S.Ariharasudhan Department of Textile Technology

Recommended by BoS on	14.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24TXT505	PROTECTIVE TEXTILES	L	T	P	J	C
		3	0	0	0	3
PC		SDG	6, 8, 10			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	Study the development and evaluation of ballistic fabrics, including multi-layered structures and enhanced performance.
2	Explore conductive textiles and aerosol protection, focusing on conductive fabrics and filtration for chemical agents.
3	Explore conductive textiles and aerosol protection, focusing on conductive fabrics and filtration for chemical agents.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Evaluate the components and performance of ballistic fabrics to assess their suitability for protective applications.	E
CO 2	Analyze the properties and uses of conductive textiles and aerosol protection materials to differentiate their protective capabilities.	An
CO 3	Examine the applications and functionalities of intelligent textiles and surface treatments to recommend appropriate protective uses.	E
CO 4	Analyze the interactions between protection and thermal comfort to prioritize factors influencing the effectiveness of protective textiles.	An
CO 5	Create strategies for general protection requirements and applications to enhance the safety of various professional environments.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	3	2		1	1
2	2	3	2			1
3	2	2	2			
4	1	2	2			1
5	1	1	2			1

Course Content

BALLISTIC FABRICS The Concept - The Components - Other Potential Applications – Development of a Computational Fluid Dynamics Model - Metallised Film for Heat Gathering 'Pads' - Geometry of Finned and Spiral Heat Exchangers-Yarn Gripping in Ballistic Fabrics - Multi-layered Fabrics with Inter-layer Connections - Angle- interlock Woven Fabrics - Evaluation of Ballistic Performance of Fabrics with Enhanced Yarn Gripping.	**9 Hours**
CONDUCTIVE TEXTILES AND AEROSOL PROTECTION Electrically Conductive Textiles for Protection - Fabrics Coated with Inherently Conducting Polymers - Radar Barrier Fence - Piezo-resistive Fabrics for Pressure Sensors and Mapping - Electrostatic Dissipation/Discharge-Aerosol Materials - Aerosol Generation - Particle Measurement - The FIL-Tex Measurement System - The Testing of Chemical and Biological Agents - Filtration Efficiency Measurement.	**9 Hours**
INTELLIGENT TEXTILES AND SURFACE TREATMENTS FOR TEXTILES Smart textiles, Applications of smart textiles for protective purposes, Sensor function, Data processing, Actuators, Energy, Communication, Thermal protection, Electric actuation, Types of surface treatments, Early treatments for protective textiles, Progression to modern treatments, Choice of treatments in relation to fibre and fabric types, Treatment process fundamentals, Treatment application systems, Brief overview of finishes for protection.	**9 Hours**
INTERACTIONS BETWEEN PROTECTION AND THERMAL COMFORT Introduction, Definition of comfort, Test methods for heat and moisture transfer, Measurement of thermal comfort with practice-related tests, Interactions between heat and mass transfer, Moisture storage and influences on protection, Thermal manikins, Measuring the insulation of protective clothing systems, Measuring the evaporative resistance of protective clothing systems, Ensemble data, Moving manikins, Manikin tests vs fabric tests, Using manikins under transient conditions.	**9 Hours**

GENERAL PROTECTION REQUIREMENTS AND APPLICATIONS Civilian protection and protection of industrial workers from chemicals, Textiles for UV protection, Textiles for protection against cold, Thermal (heat and fire) protection, Microorganism protection, Textiles for respiratory protection. Electrostatic protection, Ballistic protection, Military protection, Fire fighters protective clothing, Protection against knives and other weapons, Flight suits for military aviators, Protection for workers in the oil and gas industry, Motorcyclists	**9 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 0	Total Hours: 45

Learning Resources

Textbooks:

1. A.R. Horoocks & D. Price "Fire Retardant Materials" Woodhead Publishing Ltd., Cambridge, 2001
2. Sabit Adanur "Handbook of Industrial Textiles" Wellington Sears, New York ,1995, eBook ISBN9780203733905

References:

1. Brian J McCarthy "Polymeric Protective Technical Textiles", published by A Smithers Group Company, UK, 2013
2. K.R. Spurny in Aerosol Measurement: Principles, Techniques and Applications, 2nd Edition, Eds., P.A. Baron and K. Willeke, Wiley Inter Science, New York, NY, USA, 2001, p.1.
3. J. Hu in Structure and Mechanics of Woven Fabrics, Woodhead Publishing, Cambridge, UK, 2004.
4. 4.A. Mauritz in Practical Basic Knowledge Regarding Aerosol Technology, PALAS GmbH, Karlsruhe, Germany, 2008.
5. BS ISO 16900-3, Respiratory Protective Devices - Methods of Test and Test Equipment - Part 3: Determination of Particle Filter Penetration, 2013.
6. Mastura Raheel., "Protective Clothing Systems and materials", Marcel Dekker, Inc. NewYork. Basel. HongKong, ISBN: 0-8247-9118-5, 1994.
7. H.R. Mattila "Intelligent Textiles & Clothing "
8. R.A. Scott "Textiles for Protection" Woodhead Publishing Ltd,2005, ISBN: 9781855739215

Assessment (Theory course)

CAT, Activity and Learning Task: Socratic seminar, Mini project, MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT), Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Mr. P.Thangeswaran Dr. P.Sivakumar Department of Textile Technology
Recommended by BoS on	14.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24TXT506	RESEARCH METHODOLOGY	L	T	P	J	C
		3	0	0	0	3
PC		SDG	7, 8, 10			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	Understand research objectives, problem formulation, and methodologies
2	Learn research design and experimental techniques, focusing on problem and sample selection.
3	Explore data collection methods, measurement techniques, and data analysis.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze research objectives and define research problems to formulate a clear research methodology.	An
CO 2	Evaluate various research designs and experimental designs to recommend appropriate data collection methods.	E
CO 3	Analyze data collection methods and measurement techniques to develop effective scaling and analysis procedures.	An
CO 4	Analyze the processing and analysis of data to test hypotheses and draw meaningful conclusions.	An
CO 5	Create comprehensive research reports by applying appropriate interpretation techniques and presentation guidelines.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	3		2		
2	2	2	2	2		2
3	2			2	2	
4	1			2		2
5			2		2	

Course Content

RESEARCH OBJECTIVES AND DEFINING THE RESEARCH PROBLEM Literature review-identification and selection of problem – Formulation. Research methodology - definition, mathematical tools for analysis, types of research, exploratory research, conclusive research, modeling research, algorithmic research, research process – steps.	**9 Hours**
RESEARCH DESIGN AND EXPERIMENTAL DESIGN Selecting the design Problem-Necessity of the problem- technique involved in defining a problem- need for research design- features of a good design- important concepts relating to research design- different research designs- basic principles of experimental designs- steps in sample design- different types of sample designs	**9 Hours**
METHODS OF DATA COLLECTION, MEASUREMENT AND SCALING TECHNIQUES Sources of data –data collection methods - primary data – observation method – personal interview – telephonic interview – mall survey – questionnaire design. Observation, questionnaire and interviews. Measurement scales – scaling techniques – scale constitution techniques – contact analysis	**9 Hours**
PROCESSING AND ANALYSIS OF DATA Processing operation-problems in processing-types of analysis-hypothesis testing - testing of hypotheses concerning means (one mean and difference between two means – one tail and two tails tests).	**9 Hours**
INTERPRETATION AND REPORT WRITING Meaning and Techniques of interpretation – Types of report – guidelines to review report – typing instructions – oral presentation - Significance of report writing – Case studies.	**9 Hours**

Theory	Tutorial	Practical	Project	Total
Hours: 45	**Hours: 0**	**Hours: 0**	**Hours: 0**	**Hours: 45**

Learning Resources

Textbooks:

1. Kothari C.R., "Research Methodology, Methods and Techniques", Wiley Eastern, New Delhi, 1990.
2. Panneer selvam.R, "Research Methodology", Printice Hall of India, New Delhi, 2004.

References:

1. Sedhu. A.M. and Singh A., "Research Methodology in Social Sciences", Himalaya Publishing House, Mumbai, 1980.
2. Bailey, Kenneth D., "Methods of social research", New York, 1978.
3. Best, John W., and Kahn, James V., "Research in education", 5th Ed., New Delhi: Prentice-Hall of India Pvt. Ltd., 1986.
4. Emory, C.William, "Businees Research Methods", Illinois: Richard D.Irwin, Inc. Homewood, 1976.
5. Ullman, Neil R., "Elementary statistics", New York: MCGraw-Hill, 1970.

Assessment (Theory course)

CAT, Activity and Learning Task: Open-ended questions, Mini project, MCQ, End Semester Examination (ESE)

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT), Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.V. Ramesh Babu Dr.S. Sundaresan Department of Textile Technology

Recommended by BoS on	14.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24TXP507	TECHNICAL TEXTILE LABORATORY I	L	T	P	J	C
		0	0	2	0	1
PC		SDG	6, 7, 8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	Develop statistical and experimental skills to analyze the influence of technical fabric parameters on mechanical and physical properties.
2	Evaluate the role of fabric construction and machine parameters on specialized textile properties.
3	Investigate and interpret the effects of fabric design and material characteristics on functional properties.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the impact of fabric parameters on stiffness and bursting strength using ANOVA and prepare a detailed report on the statistical findings.	An
CO 2	Evaluate the significance of construction details on the tenacity of medical threads using testing data, and recommend improvements based on the results.	E
CO 3	Create a comprehensive graph illustrating the effect of technical fabric construction on air permeability properties, and present findings with supporting analysis.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2		2		
2	1	2	2	1	2	
3	1		2			2

Course Content	
List of Experiments 1. Analyse the influence of technical fabric parameters on stiffness and bursting strength using ANOVA. 2. Statistically analyse the influence of thickness and abrasion parameters on heavy technical textiles using Martindale Abrasion Tester. 3. Sketch a graph that portraits the influence of technical fabric construction parameters on air permeability properties of the porous textiles using Air Tronic tester. 4. Conclude and interpret the construction details effect on tenacity of medical threads using Universal Testing Machine. 5. Investigate on the influence of heavy structured fabric on tearing strength properties using Mec Tear Elmendorf tear tester. 6. Statistically analyse the influence of machine parameters on puncture strength for geo textiles using CBR puncture tester. 7. Evaluate the fabric and flammability parameters significance on fire-retardance properties using vertical flammability tester. 8. Conclude and interpret the construction details effect on impact resistance of the composite materials using IZOD/Charpy Impact Tester. 9. Analyse the significance of fabric design on water vapor and water repellency characteristics for breathable textiles using water vapour permeability tester and spray tester. 10. Investigate on the wound dressing textile product on water absorbency and retention characteristics using water absorption tester.	**30 Hours**

Theory Hours:	Tutorial Hours:	Practical Hours:	Project Hours:	Total Hours:
0	0	30	0	30

Learning Resources
Textbooks:
1. A. Richard Horrocks and Subhash C. Anand “Handbook of Technical Textiles” Woodhead publication, Second Edition • 2016
References:
1.Sabit Adanur “Wellington Sears Handbook of Industrial Textiles” CRC Press, 1995, ISBN 9781498767477

Assessment (Practical course)
Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT), Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr. S.Ariharasudhan Dr. M.Saravanan Department of Textile Technology
Recommended by BoS on	14.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

SEMESTER II

24TXT508 (PC)	STATISTICAL APPLICATION IN TEXTILE ENGINEERING	L	T	P	J	C
		3	0	0	0	3
		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Develop Proficiency in Probability Distributions and Estimation Techniques
2	Master Statistical Hypothesis Testing and Sampling Techniques
3	Apply Advanced Statistical Methods for Process Optimization

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze probability distributions and estimation techniques to apply them in textile engineering problems.	An
CO 2	Evaluate hypothesis testing methods to select appropriate tests for textile quality parameters and sampling.	E
CO 3	Analyze variance and non-parametric tests to distinguish between different models used in textile engineering.	An
CO 4	Evaluate process control and capability analysis methods to develop and interpret control charts for variables and attributes.	E
CO 5	Create experimental designs and regression models to optimize processes and analyze multivariate data in textile engineering.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2		1	2	
2	2	2	3			2
3	2	2	3		2	
4			3	2		2
5			2	1		

Course Content	
PROBABILITY DISTRIBUTION AND ESTIMATIONS Applications of Binomial, Poisson, normal, student's, t, chi-square, f and Weibull distributions in textile engineering; point estimates and interval estimations of the parameters of the distribution functions	**9 Hours**
HYPOTHESIS TESTING Sampling distribution; significance tests applicable to textile quality parameters – normal test, t test, chi-square test and F-test; selection of sample size and significance levels with relevance to textile applications; acceptance sampling	**9 Hours**
ANALYSIS OF VARIANCE AND NON-PARAMETRIC TESTS Analysis of variance for different models; non-parametric tests	**9 Hours**
PROCESS CONTROL AND CAPABILITY ANALYSIS Control charts for variables and attributes - basis, development, interpretation, sensitizing rules, average run length; capability analysis	**9 Hours**
DESIGN AND ANALYSIS OF EXPERIMENTS Limitations of experimental design; Latin square design, Randomized block design-2k full factorial designs; development of regression models, calculation of regression coefficients; adequacy test for regression equations; process optimizations, multivariate analysis.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources

Textbooks:

1. Hayavadana. J, "Statistics for textile and apparel management" wood head publishing 6. India (P) Ltd, 2012, ISBN – 8789380308-04-3
2. Leaf G.A.V., "Practical Statistics for the Textile Industry, Part I and II", The Textile Institute, Manchester, ISBN: 0900739517, 1984

References:

1.Douglas C. Montgomery, "Design and analysis of experiments", John Wiley & Sons, Inc, Singapore, ISBN 9971 51 329 3, 2000.

2.Ronald D. Moen, Thomas W. Nolan, Lloyd P. Provost, "Quality improvement through planned experimentation', McGraw-Hill, ISBN 0-07-913781-4, 1998.

3. J.R.Nagla, "Statistics for textile engineers" woodhead publishing India (P) Ltd, 2013, 8. ISBN: 1782420673

4. Meloun, Miliky, "Statistical data analysis a practical guide" wood head publishing,, 2011, 1 ISBN: 0857091093

5. Montgomery D.C., "Introduction to Statistical Quality Control", John Wiley and Sons, 12. Inc., Singapore, ISBN: 997151351X, 2002.

Assessment (Theory course)
CAT, Activity and Learning Task: Homework tasks , Mini project, MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.V.Ramesh Babu/Textile Dr.S.Sundaresan/Textile
Recommended by BoS on	14.08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

24TXT509	TEXTILE COATING AND LAMINATION	L	T	P	J	C
		3	0	0	0	3
PC		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the Fundamentals of Fabric Finishing and Coating Techniques.
2	Master Coating Materials, Methods, and Rheological Properties
3	Evaluate Performance and Testing Standards for Coated Fabrics

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze definitions, types, and market scenarios of fabric coating and lamination to apply foundational knowledge.	An
CO 2	Evaluate coating materials and methods to select appropriate techniques for specific textile applications.	E
CO 3	Analyze the rheological behaviours and process conditions to optimize coating and lamination processes in textiles.	An
CO 4	Evaluate various types of coated fabrics to recommend suitable applications for different environmental conditions.	E
CO 5	Create testing procedures for coated fabrics to ensure compliance with industry standards and performance requirements.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2				2	
2	1	2	1			2
3				1	2	
4		2				1
5			2	2		

Course Content	
BASICS OF FABRIC FINISHING AND LAMINATION Definitions, Fabric finishing, Fabric coating, Fabric lamination, Composite materials, Types of coating and lamination, Market scenario coated and laminated textiles, dough preparation for coating and Adhesive treatments	**9 Hours**
COATING MATERIALS AND METHODS Rubbers, Synthetic Polymers: Polyurethanes, Poly (Vinyl Chloride), Poly (Tetrafluoroethylene), Polyethylene, Acrylic polymers. Knife coating, Roller coating, transfer coating, Rotary screen process, calendaring, lamination, melt coating	**9 Hours**
RHEOLOGY AND PROCESS CONDITIONS FOR COATED TEXTILES Physical properties of coated fabric, Rheology of coating pastes, Rheological Behaviours of fluids, pastes, hydrodynamic analysis of coating, factors effecting for degradation of coated fabric, process parameters influence in Lamination, Welding, Hot melt coating and Foam coating	**9 Hours**
BREATHABLE/IMPERMEABLE, AND OTHER TYPES OF COATED FABRICS Coating for foul weather protection, Impermeable cloth, breathable cloth, Non-Apparel cloth, Coating for Chemical protection, Thermo chromic coating, Temperature Adaptable coating, Camouflage nets, Metal and conducting polymer coated fabrics, Radiation cured coating, Types of Waterproof/Vapour, Permeable Fabrics, Microporous Coatings and Films, Responsive textiles	**9 Hours**
TESTING OF COATED FABRICS Coating per unit area (weight/area), Degree of fusion/curing of coating - blocking, Abrasion resistance, Test for colour- Fastness to dry and wet rubbing, Resistance to water penetration, Air permeability, water vapour permeability, low temperature bend test, low temperature impact test, Adhesion test, Microbiological degradation, Yellowing, , Tensile and Tear strength, Adhesion test, Testing Standards	**9 Hours**

Theory Hours: 45	**Tutorial Hours: --**	**Practical Hours: --**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1.Smith W C, “Smart textile Coatings and Laminates”, Woodhead Publishing Ltd, UK, 2010 2.Ashish Kumar Sen, “Coated Textiles: Principles and Applications”, CRC Press, New York 2008.
References:
1.Brown P J and Stevens K, “Nanofibers and Nanotechnology in Textiles”, Woodhead Publishing Ltd, UK, 2007. 2.Walter Fung, “Coated and Laminated Textiles”, Woodhead Publishing Ltd, UK, 2002. 3.Carr C M, “Chemistry of the Textile Industry”, Blackie Academic & Professional, UK, 1995.

Assessment (Theory course)
CAT, Activity and Learning Task: Open-ended questions, Mini project, MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.M.Saravanan/Textile
Recommended by BoS on	14.08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

24TXT510	TEXTILE REINFORCED COMPOSITES	L	T	P	J	C
		3	0	0	0	3
PC		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand materials and manufacturing processes.
2	Analyze advanced composite types and techniques.
3	Evaluate mechanical behavior and testing.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the classification and constituent materials of composites to understand their properties and applications.	An
CO 2	Evaluate various manufacturing techniques for composites to determine the most effective methods for specific applications.	E
CO 3	Apply the properties and manufacturing processes of nano and green composites to assess their benefits and limitations.	Ap
CO 4	Analyze micromechanical properties of composites to evaluate their performance under different conditions.	An
CO 5	Create testing and modeling strategies for composites to ensure quality and performance in practical applications.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2		1		2
2		2	3		2	
3	1	2		2		2
4	2		1	2		2
5			1	1	2	

Course Content	
COMPOSITES AND CONSTITUENT MATERIALS Composites-classification, constituents- reinforcement, matrix, interface, critical fibre length, rule of mixtures. Types and properties of reinforcements, matrix materials. Interface - mechanisms and theories. Prepregs - introduction - manufacturing techniques - property requirements.	**9 Hours**
COMPOSITES MANUFACTURING Hand layup, vacuum bag moulding, compression moulding, filament winding, vacuum forming, resin transfer moulding, pultrusion, injection moulding, and selection criterion. Manufacturing with thermosets and thermoplastics.	**10 Hours**
NANO AND GREEN COMPOSITES Composites manufacturing with thermosets and thermoplastics. Polymer-based and polymer-filled nanocomposites. Manufacturing process of green composites. Properties of nano composites and green composites	**8 Hours**
MICROMECHANICAL ANALYSIS OF COMPOSITES Volume and mass fraction, density and void content. Evaluation of elastic moduli, tensile, shear, compression, flexural, torsion, toughness, interlaminar fracture failure and fracture mode in fibre composites. In plane shear characteristics of textile reinforcements.	**9 Hours**
TESTING AND MODELLING OF COMPOSITES Composite properties and testing – destructive and non-destructive testing. Applications of composites. Design of fabric reinforced composite. Need for modeling, flow through porous media, liquid injection moulding simulation.	**9 Hours**

Theory Hours:	**45**	**Tutorial Hours:**	**-**	**Practical Hours:**	**-**	**Project Hours:**	**-**	**Total Hours:**	**45**

Learning Resources
Textbooks:
1.Peters S T, “Handbook of composites”, Chapman & Hall, London, 1998. 2. Long A C, “Design and Manufacture of Textile Composites”, Woodhead publishing Ltd, London, 2005
References:
1. Tsu Wei Chou and Frank K Ko, “ Textile Structural Composites”, Elsevier Science Ltd, USA, 1989. 2. Jang-Kyo Kim and Yiu-Wing Mai, “Engineered Interfaces in Fiber Reinforced Composites”, Elsevier India, 1998. 3. Liyong Tong Adrian P Mouritz and Michael K Bannister, “3D Fibre Reinforced Polymer Composites”, Elsevier Science Ltd, India, 2002. 4. Autar K Kaw, “Mechanics of Composite Materials”, CRC Press LLC, New York, 1997

Assessment (Theory course)
CAT, Activity and Learning Task: Diagnostic questions , Mini project, MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.P.Chandrasekaran
Recommended by BoS on	14.08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

24TXT511	MEDICAL TEXTILES AND BIOMATERIALS FOR HEALTH CARE	L	T	P	J	C
		3	0	0	0	3
PC		SDG	7,8,10			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand biopolymers and their evaluation.
2	Explore medical and healthcare textiles.
3	Design and application of advanced medical textiles.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the classification, properties, and applications of biopolymers to evaluate their use in medical applications.	An
CO 2	Evaluate the current market scenario and government initiatives in healthcare textiles to determine their impact on the industry.	E
CO 3	Examine the properties and applications of implantable textiles to understand their role in medical implants and tissue engineering.	E
CO 4	Compare the types, properties, and applications of non-implantable and extra corporeal textiles to assess their effectiveness in medical applications.	Ap
CO 5	Design and evaluate wound dressing materials to improve their effectiveness in wound care and healing.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	1	1		1
2					2	2
3	2		2	2		1
4		2	2			1
5			1	1	1	

Course Content	
BIOPOLYMERS Classification of biopolymers used in medicine – Natural biopolymers - properties and applications. Synthetic biopolymers - raw material, synthesis, properties, storage stability and sterilization of biopolymers. Evaluation of biopolymers - In vitro tests- direct contact, agar diffusion, elution methods, In vivo assessment of biopolymers to tissue compatibility	**9 Hours**
HEALTH CARE TEXTILES Classification of medical textiles, current market scenario in international and national level – government initiatives. Operating room garments- personal health care and hygiene products and their testing methods; applications of non- wovens in medicine; textiles in infection prevention control.	**9 Hours**
IMPLANTABLE TEXTILES Implantable textiles: hernia mesh – vascular prostheses – stents. Tissue engineering: properties and materials of scaffolds- relationship between textile architecture and cell behavior – applications of textile scaffolds in tissue engineering.	**9 Hours**
NON-IMPLANTABLE AND EXTRA CORPOREAL TEXTILES Bandages-types, properties and applications; compression garments-types, properties and applications; sutures: types and properties; Extra corporeal materials: Cartilage nerves – liver ligaments, kidney, tendons, cornea; Drug delivery textiles: classification – mechanism various fabrication methods – characterization – applications.	**9 Hours**
WOUND DRESSING MATERIALS Wound: types and healing mechanism- textile materials for wound dressing – bio active dressing – anti microbial textiles dressing – composite dressing –- testing of wound care materials; Wound compression textiles; Reusable medical textiles: types, advantages, physical properties and performance — reusable processing methods	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources

Textbooks:

1. Rajendran.S, “Advanced Textiles for Wound Care”, Wood Head publishing in Textiles:, 2009.
2. Bartel.V.T, “Handbook of medical textiles”, Wood Head publishing, 2011

References:

1.Van Langenhove, “Smart textiles for medicine and health care – materials, systems and applications”, Wood Head publishing, 2007.
2.Ray smith, “Biodegradable polymers for industrial application”, CRC press, 2005.
3. Buddy D.Ratner and Allan S. Hoffman, “Biomaterials science – An introduction to materials in medicine”, Academic press, 1996.
4. Pourdegtimi..B, “Vascular grafts: Textile structures and their performance”, Textile progress, vol. 15, No. 3, the Textile Institute, 1986.
5. Cusick. GE and Teresa Hopkins, “Absorbent incontinence products”, the Textile Institute, 1990.
6. Kothari.V.K., “Progress in textiles: Technology developments and applications”, volume 3, IAFL Publications, 2008.
7. Kennedy (John F); Phillips (Glyn O); Williams (Peter A), “Hyaluronan : Vol.2 Biomedical, Medical and Clinical Aspects”,

8. Anand (S C) Ed.; Kennedy (J F) Ed.; Miraftab (M) Ed.; Rajendran (S) Ed., “Medical Textiles and Biomaterials for Healthcare”, Woodhead Publishing Limited, 2006,
9. Samuel C. O. Ugbolue, “Polyolefin fibres for Induatrial and medical applications”, Woodhead Publishing Limited, 2009.

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.P.Sivakumar/Textile	
Recommended by BoS on	14.08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

24TXP512	TECHNICAL TEXTILE LABORATORY II	L	T	P	J	C
		0	0	2	0	1
PC		SDG	7.8,10			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Analyze the impact of fibre volume fraction on composite materials.
2	Enhance analytical and characterization skills.
3	Innovate material development and process optimization.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Hands-on expertise in composite and nonwoven fabric manufacturing	An
CO 2	Evaluate the properties of a finished fabric sample using FTIR, DSC, and TGA instruments, and judge the material quality based on the data.	E
CO 3	Apply the effectiveness of thermal bonding and needle punching methods for nonwoven materials, and propose improvements based on the comparison.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2		2		2
2	2	2		2		
3	1	1	1		2	

Course Content

List of Experiments 1. Analyse statistically and interpret the fibre volume fraction and fibre mass fraction on fibre reinforced composites using Unipolymer compression moulding machine. 2. Analyse and do characterization of the finished fabric sample using FTIR, DSC and TGA instruments. 3. Prepare a nonwoven material using thermal bonding method and determine the basic parameters of it using thermal bonding nonwoven machine. 4. Prepare a nonwoven material using needle punching method and determine the basic parameters of it using needle punching nonwoven machine. 5. Analyze and interpret the factors used in fabric finishing using contact angle instrument. 6. Develop a natural extract finished cotton fabric using pad dry cure machine and calculate the basic parameters of it. 7. Prepare a nano film with the given polymeric solution using electrospinning machine and determine the basic parameters that influences the process. 8. Prepare a single filament tubular composite with the given synthetic filament using filament winding machine. 9. Develop a 3-ply/4-ply nonwoven face mask and determine their basic parameters. 10. Develop a 3 Dimensional polymeric material structure using 3D printing and pulverize it using vacuum bagging.	**30 Hours**

Theory Hours:	Tutorial Hours:	Practical Hours:	Project Hours:	Total Hours:
-	-	30	-	30

Learning Resources

Textbooks:

1. A. Richard Horrocks and Subhash C. Anand “Handbook of Technical Textiles” Woodhead publication, Second Edition • 2016

References:

1.Sabit Adanur “Wellington Sears Handbook of Industrial Textiles” CRC Press, 1995, ISBN 9781498767477

Assessment (Practical course)			
Lab Workbook, Experimental Cycle tests, viva-voce, etc…			
Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. 3.Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.M.Saravanan/Textile Dr.S.Ariharasudhan/Textile	
Recommended by BoS on	14.08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

PROFESSIONAL ELECTIVES

24TXE001	SPECIALTY FIBRES FOR TECHNICA L TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand high-performance fibres.
2	Analyze fibre characteristics and properties.
3	Design and application of advanced fibre composites.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the structure, properties, and applications of Aramid fibers to assess their suitability for high-performance uses.	An
CO 2	Evaluate the manufacturing process and detailed properties of Gel-spun high-performance polyethylene fibers to determine their applications.	E
CO 3	Compare the physical properties and applications of various types of carbon fibers and nanotubes to understand their roles in technical textiles.	Ap
CO 4	Analyze the characteristics and applications of glass fibers and their composites to evaluate their performance in various settings.	An
CO 5	Examine the properties and applications of different ceramic fibers to assess their effectiveness in specialized technical fields.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	2			1
2	2			2		
3	2	2				1
4	1		2			1
5	1			2	1	

Course Content	
ARAMID FIBRES Requirements of high-performance fibres. Aramid fibre –Types- Spinning and fibre formation – Structure – Properties and application. Nomex fiber – formation – structure – Analysis of mechanical properties, A selection of observed mechanical properties and study on detailed applications.	**9 Hours**
GEL-SPUN HIGH-PERFORMANCE POLYETHYLENE FIBRES Introduction- manufacture- Gel spinning process- Fibre characteristics and detailed properties- mechanical, chemical, electrical, thermal, biological - Detailed applications of Gel spun HP PE fibres.	**9 Hours**
CARBON FIBRES Introduction Physical properties- PAN-based carbon fibres- Pitch-based carbon fibres- Vapour-grown carbon fibres- Carbon nanotubes – Detailed Applications of carbon fibres	**9 Hours**
GLASS FIBRES Introduction - Glass for fibres- Fibre manufacture- Fibre finish-Glass fibre properties- Fibre assemblies- Composites-Design of fibre glass composites - various applications	**9 Hours**
CERAMIC FIBRES Introduction- Silicon carbide-based fibres-Other non-oxide fibres-Alumina- based fibres- Other polycrystalline oxide fibres-Single-crystal oxide fibres- Applications in various fields**.**	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1. Hearle J W S, “High Performance Fibres”, Textile Institute, Manchester, Wood Head Publishing, 2001. 2.Samuel C. O. Ugbolue, “Polyolefin fibres for Industrial and medical applications”, Woodhead Publishing Limited, 2009.
References:
1. Mukhopadyay S.K., “High Performance Fibres”, Textile Progress, Textile Institute, Manchester, Vol. 25, 1993. 2. Menachem Lewin and Jack Preston., “High Technology fibers - part B”, Marcel Dekker, New York, 1989. 3. Gupta V.B. and Kothari V.K., “Manufactured Fibre Technology”, Chapman Hall Publishing Company, 1997. 4. Anand S.C., “Medical textiles: Proceedings of the 2nd International conference” Bolton, UK. 2001. 5. Menachem Lewin & Jack Preston, “High Technology Fibres - Part A”, Marcel Dekker, New York, 1985.

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. .Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.P.Sivakumar/Textile
Recommended by BoS on	14.08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

24TXE002	YARNS FOR TECHNICAL TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understanding technical textile yarns.
2	Explore advanced yarn structures and treatments.
3	Evaluate yarn properties and quality.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the characteristics and performance of different types of technical textile yarns to determine their applications.	An
CO 2	Evaluate the impact of various modifications on textile yarn structures to predict future trends in yarn design.	E
CO 3	Evaluate the principles and methods of yarn coating and laminating to assess their effects on yarn properties and applications.	E
CO 4	Analyze factors influencing the weavability of yarns and evaluate their suitability for industrial fabrics.	An
CO 5	Create image processing techniques for yarn characterization and assess their effectiveness in measuring yarn quality.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	2	2		1
2	2	3	2	2	2	1
3	2	2	2	2		1
4	2		2	2	2	2
5	2	2	2	2		1

Course Content	
TECHNICAL TEXTILES YARN TYPES AND PROPERTIES Types of technical textile yarn - Yarn characteristics: continuous filament, staple, core spun, plied/folded, cabled and braided yarns - Properties and performance of technical yarns - Properties of yarns: mono- and multifilament, tape, spun, wrap spun, core spun and plied/cord yarns - Applications of mono- and multifilament, tape, core spun, plied and cabled yarns	**9 Hours**
TEXTILE YARN STRUCTURES Modifying textile yarn structures by bulking - Modification of textile yarn structures by incorporating micro-pores - Twistless and hollow yarns – Future trends	**9 Hours**
COATING AND LAMINATING Textile coating and laminating - Coating formulations for technical textile yarns - Coating polymers for technical textile yarns - Principles of yarn coating - Methods and machinery for yarn coating - Applications and properties of some coated yarns	**9 Hours**
WEAVABILITY OF YARNS Importance of weavability in industrial fabrics - Factors influencing yarn weavability - Evaluation of weavability - Weavability of synthetic filament yarn - Sizing of micro-denier yarns for achieving desired Weavability	**9 Hours**
IMAGE PROCESSING TECHNIQUES Image processing techniques in fibrous material Structures - Yarn characterization - Special advances in measuring yarn characteristics - Online systems for measuring yarn quality	**9 Hours**

Theory Hours:	**45**	**Tutorial Hours:**	**-**	**Practical Hours:**	**-**	**Project Hours:**	**-**	**Total Hours:**	**45**

Learning Resources

Textbooks:

1.R. Alagirusamy and A. Das Technical textile, Yarns Woodhead Publishing, 2010

References:

1.King, M., Jearanaisilawong, P. and Scorate, S., 2005, 'A continuum constitutive model for the mechanical behavior of woven fabrics', International Journal of Solids and Structures, 42, 3867–3896.
2.Zeng, X., Tan, V. B. C. and Shin, V. P. W., 2006, 'Modelling inter-yarn friction in woven fabric armor', International Journal for Numerical Methods in Engineering, 66, 1309–1330.
3. Tang, W. 1996, 'Fancy yarn design and manufacture in a virtual real world', Proceedings of Yarn and Fibre Science Joint Conference, Manchester, UK, December.
4.Chen, Y., Lin, S., Zhong, H., Xu, Y.-Q., Guo, B. and Shum, H.-Y., 2003, 'Realistic rendering and animation of knitwear', IEEE Transactions on Visualizations and Computer Graphics, 9, 43–55.

Assessment (Theory course)

CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Mr.P.Thangeswaran/Textile
Recommended by BoS on	14.08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

24TXE003	TECHNICAL FABRIC MANUFACTURING	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Explore technical woven textiles and narrow fabrics.
2	Analyse of specialized technical textiles.
3	Innovate in energy-generating and storage textiles.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the characteristics and specifications of woven technical textiles to determine their impact on fabric properties.	An
CO 2	Evaluate the properties and manufacturing methods of cords, ropes, and nets to assess their suitability for various applications.	E
CO 3	Create the processes and techniques involved in narrow fabric manufacturing to design and implement various applications.	C
CO 4	Analyze the materials and design challenges of body armor and cut-resistant fabrics to recommend improvements for performance standards.	An
CO 5	Evaluate the technologies and applications of fabrics for energy generation and storage to predict future trends and innovations.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	3	2	2	2	2	
2	2	2	1	1	1	2
3	1	1	3	1	1	
4	1	1	1	1	1	2
5	1	1	1	1	1	

Course Content	
WOVEN TECHNICAL TEXTILES Weave structures and selvedge's, including their characteristics that affect the properties of technical fabrics. The influence of fabric specifications, fabric geometry, and cover factors.-The importance of warp preparatory and weaving processes. Technical information about different types of shedding motions and shuttle-less looms for the production of technical fabrics. A review of some interesting technical fabrics produced on various weaving machines.	**9 Hours**
ONE-DIMENSIONAL TECHNICAL TEXTILES – CORDS, ROPES AND NETS Technical definitions of cordage, range from thick ropes to fine twines.Traditional and modern cordage fibres. History of ropes and recent rope types and their means of production. Cords, twine, string, and thread manufacturing. Nets and webbings Mechanical and other properties of ropes, including failure modes.	**9 Hours**
NARROW FABRIC MANUFACTURNG & APPLICATIONS General aspects of narrow fabric weaving, Methods of weft insertion, Preparatory process for elastic, non-elastic warp and weft for narrow fabric weaving, Requirement of warp let off motion for elastic, non-elastic yarns, various shedding mechanism and its usage, Take up motion for elastic and non- elastic yarns, various types of selvedge and its mechanism, stop motions on loom, Multi colour weft insertion mechanism, Driving arrangement of loom, Designing of narrow fabrics using CAD, Velvet and Pile narrow fabric, Aerospace, Military, Fire and safety, Industrial, Automotives, Footwears, Fasteners, Luggage, Medical Textiles, Outdoor, Garments specially undergarments,	**9 Hours**
BODY ARMOR AND CUT-RESISTANT FABRICS The concept under using body Armor, Material selection, Fabric structure of soft body Armor, Body Armor systems, including stab and spike vest New generation of soft body Armor Body Armor performance standards, Challenges in designing body Armor. Cut and slash hazards. Materials and manufacturing methods of cut-resistant fabrics. Working principle and critical factors. Evaluation of cut-resistance.	**9 Hours**
FABRICS FOR ENERGY GENERATION AND STORAGE Energy-generating technologies, Photovoltaic textiles, Piezoelectric textiles, Textile-based triboelectric nanogenerators, Textile-based thermoelectric generators, Hybrid Textiles-Conclusion and future trends. Introduction to energy storage, Electrochemical energy storage, Thermal energy storage, Textiles in the traditional sense, Textile-based super capacitors, Textile-based batteries, Thermal energy-storing textiles, Conclusion and future trends	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1.Horrocks, Ed "Handbook of Technical Textiles",., Textile Institute, 2016. 2. John McLoughlin and TasneemSabir, "High-Performance Apparel" Woodhead Publishing Limited, 2018
References:
1. Advances in functional and protective textiles, Textile Institute, 2020. 2. Savvas Vassiliadis, Advances in Modern Woven Fabrics Technology, InTech publications, 2011,

3. Yordan Kyosev, Recent Developments in Braiding and Narrow Weaving, Springer, 2016
4. Advanced technical textile products, Tao, X., Ed., Taylor and Francis,2008.
5. Jacob Muller's Mubook-1 (Narrow fabrics Part -1)
6. Jacob Muller's Mubook-2 (Narrow fabrics Part -2)
7. Hand Books of Textile Industry- Narrow woven Fabrics, Vol – 2, E. A. Posselt
8. Cut Protective Textiles, Daniel, Textile Institute, ISBN: 9780128200391, 2020.
9. Research Progress of Cut-Resistant Textile Materials, Zhai, Front. Chem., 29 September 2021 Sec. Polymer Chemistry DOI 10.3389/fchem.2021.745467

Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.R.Saminathan/Textile	
Recommended by BoS on	14/08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

24TXE004	NONWOVENS IN TECHNICAL TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7.8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Gain knowledge of nonwoven processes and their properties.
2	Explore sustainable development and applications of nonwovens.
3	Foster innovation in advanced applications of nonwoven materials.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the formation processes and influencing factors of nonwovens to evaluate their impact on performance characteristics.	An
CO 2	Evaluate the design and development of biodegradable nonwovens to recommend improvements in sustainability practices.	E
CO 3	Apply the technologies and market trends for nonwoven wipes and specialized apparel to identify new opportunities and challenges.	Ap
CO 4	Analyze flame retardant systems and their application in nonwovens to assess their effectiveness for various interior applications.	An
CO 5	Evaluate the standards and requirements for nonwovens used in filters and automobile interiors to propose enhancements for performance and compliance.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	1	0	1	1	
2	1	1	1			1
3	1	1		1		
4	1		1	1	1	
5	1				1	1

Course Content	
FORMATION AND INFLUENCING FACTORS Review of the dry-laid, wet-laid, and spun-laid nonwoven processes. Overview of spun-bond, melt-blown, apertured films and the many-layered combinations of these products. Examine the various bonding processes for producing nonwovens. Influencing factors and their measurement- fiber diameter, fiber orientation, packing density and basis weight, etc. Effect on oil absorbency, air permeability, mechanical strength, thermal insulation, and filtration efficiency, etc. Correlate theoretical values of a nonwovens' properties and performance with the experimental results.	**9 Hours**
GREEN NONWOVENS Need to design and develop biodegradable nonwovens. Use of polymers such as polylactic acid (PLA) and Biomax and natural fibres in nonwoven products. Combining natural fibres and other biodegradable resins for consumer products. Measures to minimize waste during nonwoven manufacture. Developing Long- life products. Utilization of nonwoven waste – fibre recovery, re-granulation and producing polymer chips. Processing post-consumer nonwoven waste on KEMAFIL machine and its reuse	**9 Hours**
WIPES AND SPECIALIZED APPAREL Technology, end-use sector and nonwoven wipes market by region and country. Spotlight on new products and cutting-edge technology, and trends and marketing opportunities within the nonwoven wipes industry. Protective clothing (PPE) applications of nonwovens. Hazard types and levels and the level of protection needed. Balancing protective barrier properties with the desire for comfort. For more traditional apparel, the ability of the nonwoven to drape and conform to the body has been a challenge for designers. The issue of disposability or durability.	**9 Hours**
FLAME RETARDANT AND INTERIOR APPLICATIONS Review of the types of flame retardants, the way they work, advantages and drawbacks. Use of these systems for nonwoven applications. Approaches to flame retard nonwovens - surface treatment, high performance fibers and FR fibers. Applications of FR nonwovens for filtration, as fire-blockers for seats and upholstery and as protective garments. Overview of the interior textiles industry and applications of nonwovens within it. Nonwovens for bedding, upholstery and furnishing fabrics, wallcoverings and floor coverings. Product examples, production methods, materials, product requirements and fabric properties.	**9 Hours**
NONWOVENS IN FILTERS AND AUTOMOBILE INTERIORS Standards for the development of filters and filter media for different applications. Structural design of the filters and their manufacturing technologies. Environmental regulations for filters. Overview of the market for automotive textiles. Key issues for safety, economics, aesthetics, acoustics, and ecology involved in the design and production of automotive nonwoven materials. Requirements and constraints for auto nonwoven producers. Typical nonwoven applications in auto interiors and the primary specifications. New challenges and opportunities for automotive nonwovens.	**9 Hours**

Theory Hours:	Tutorial Hours:	Practical Hours:	Project Hours:	Total Hours:
45	-	-	-	45

Learning Resources

Textbooks:

1.Chapman RA Ed "Applications of Nonwovens in Technical Textiles", Woodhead Publishing ltd, 2010.

References:

1. Albrecht W Ed., Wiley "Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics", Testing Processes, , 2002.

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.R.Saminathan/Textile	
Recommended by BoS on	14.08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

24TXE005	SMART TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Comprehend smart textiles and polymers.
2	Investigate conductive and medical smart textiles.
3	Assess and advancing innovations in smart textile systems.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the classification and design considerations for smart textiles to evaluate their functionalities and applications in various contexts.	An
CO 2	Evaluate the properties and applications of smart polymers, including shape memory and stimuli-responsive polymers, to recommend suitable uses in textile innovations.	E
CO 3	Analyze the formation and applications of conductive textiles, including sensors and conductive coatings, to assess their integration and performance in textile systems.	An
CO 4	Evaluate the effectiveness of medical smart textiles in health monitoring and tissue engineering to justify their use in advanced medical applications.	E
CO 5	Create a comprehensive evaluation protocol for smart textiles, including durability, sensor performance, and optical responses, to ensure their reliability and functionality.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	3	2	3	3		2
2	2	3	2	3		3
3	3	2	3	2	3	
4	2	3		3	2	3
5	3	3		2	3	

Course Content	
SMART TEXTILE CLASSIFICATION AND FUNCTION Definition, Classification of smart textiles, functions of smart textiles, Design consideration for smart clothing, wearable motherboard manufacture, Multifunctional, and multi-intelligent materials. Applications. Regulations and policy for smart materials	**9 Hours**
SMART POLYMERS Shape memory polymers, Phase Change Materials, Thermo regulating polymers, Stimuli-responsive smart textiles - pH Sensitive polymers, Photo, and enzyme responsive polymers, smart polymer gels – synthesis, properties and applications. 3D-printed smart textiles	**9 Hours**
CONDUCTIVE TEXTILES Conductive polymers, formation of conductive yarns, embedded textiles with electrical and electronics. Types of sensors – CNT - sensors, Thread like self- charging supercapacitors, actuators, Solar textiles, conductive coatings, and laminates. Applications. Photonic textiles – Fiber Bragg Gratings- integration of optical fibers in textiles	**9 Hours**
MEDICAL SMART TEXTILES Wearable health assistance, Textiles for monitoring applications, Wearable feedback system, Smart polymers for tissue engineering, smart nanocarriers for drug delivery, light emitting fabrics for photodynamic therapy	**9 Hours**
EVALUATION OF SMART TEXTILES Durability tests, sensors' performance and reusability, Embedded software evaluation, Current based measurements, Thermal transition, morphology, crystallinity, and deformation studies for smart polymers. Optical response under various deformation.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1. Aguilar, M. R., & San Román, J. (Eds.). "Smart polymers and their applications." Woodhead publishing. 2019
References:
1. Miao, M. (Ed.). "Carbon Nanotube Fibres and Yarns: Production, Properties and Applications in Smart Textiles." Woodhead Publishing. 2019 2. Schneegass, S., & Amft, O. (Eds.). "Smart Textiles. Human–Computer Interaction Series" doi:10.1007/978-3-319-50124-6, 2017 3. Mattila, H. (Ed.). (2006). Intelligent textiles and clothing. Woodhead Publishing. 4. van Langenhove, L. (Ed.). "Advances in smart medical textiles: treatments and health monitoring". 2015

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Mrs.R.Sukanyadevi/Textile
Recommended by BoS on	14.08.2024		
Academic Council Approval	No.27	**Date**	24.08.2024

24TXE006	AUTOMOBILE TEXTILE	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand automotive textiles and design requirements.
2	Explore smart textiles in automotive applications.
3	Enhance transportation textile innovations and safety functions.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the requirements and design demands for automotive textiles to evaluate their application and future trends in automotive interiors.	An
CO 2	Evaluate the use of smart textiles, such as heating fabrics and shape memory alloys, in automotive interiors to recommend improvements and future applications.	E
CO 3	Analyze the materials and technologies used in transportation textiles, including tire cords and acoustic textiles, to assess their effectiveness and future applications in the industry.	An
CO 4	Create 2D and 3D textile structures for load-bearing applications in automobiles to design innovative composite structural components for future automotive needs.	C
CO 5	Evaluate recent developments in fiber/textile reinforcements for tires and advances in tire design to predict their impact on future automotive safety applications.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	1	1	2			2
2	2		2		2	
3	2	2		2	2	2
4		2		2		
5			1	2	1	1

Course Content	
AUTOMOTIVE TEXTILES Requirements for automotive textiles, design demands, woven & knitted, non-woven fabrics used in automotive interiors, Recycling of automotive textiles –Future trends	**9 Hours**
SMART TEXTILES IN AUTOMOTIVE INTERIORS Car seats- Types of materials used as cushions. Technology for replacing polyurethane foams in car seats. Smart textiles: definition, textile sensors, textile actuators- heating fabrics for car interior, Shape memory alloys for car seats.	**9 Hours**
TRANSPORTATION TEXTILES Materials used in automobiles – tire cord, filter, air bag- future applications, belt, seat cover, acoustic textiles for noise insulation; Design and development of textile reinforced composites in automobile industry.	**9 Hours**
AUTOMOTIVE TEXTILE STRUCTURES & COMPOSITES 2D and 3D textile structures for load bearing applications in automobiles, future trends in applications of textile structures in automobiles, composite structural components.	**9 Hours**
SAFETY APPLICATIONS & FUTURE TRENDS Recent developments in fibre/textile reinforcements used in tyre, fibre-rubber adhesion in tyre resent advances in tyre design.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources

Textbooks:

1. R.Shishoo, Textile advances in the automotive industry, Woodhead Publishing Limited, Cambridge, England- 2008.
2. Walter Fung and Mike Hard Castle, Textiles in Automotive Engineering, Woodhead Publication, USA, 2001.

References:

1. A.R. Horrocks & S.C. Anand (Edrs.), “Handbook of Technical Textiles”, The Textile Institute, Manchester, U.K., Woodhead Publishing Ltd., Cambridge, England, 2000.
2. S.K. Mukhopadhyay and J.F. Partridge, “Automotive Textiles”, Text. Prog, Vol. 29, No.1/2, 1998.
3. S. Adanur “Wellington Sears Handbook of Industrial Textiles”, Technomic Publishing Co. Inc., Lancaster, Pennsylvania, 1995.

Online Educational Resources:--

Assessment (Theory course)

CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.M.Saravanan/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE007	MILITARY TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7.8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand military textile requirements and design.
2	Explore high-performance fabrics for military applications
3	Evaluate military textile performance and comfort.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the ergonomic requirements and design processes for military textiles to evaluate material selection and protection systems.	An
CO 2	Evaluate camouflage design considerations, including color and pattern, to recommend effective use of chromic materials and conductive polymers.	E
CO 3	Analyze the fiber properties and standards required for high-performance ballistic and NBC warfare clothing to assess their effectiveness in various threats.	An
CO 4	Create materials and clothing designs that ensure comfort and thermoregulation for extreme weather conditions to address physiological responses and provide appropriate protective gear.	C
CO 5	Evaluate the performance of military textiles through mechanical and ballistic testing, as well as chemical and biological resistance, to assess their suitability for military applications.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	3				2
2	2		3		2	
3		2		3		2
4			3	2		2
5				3	2	

Course Content	
REQUIREMENTS OF MILITARY TEXTILES Ergonomics of protective clothing, - fit, heat strain, physiological and psychological load in protective textiles. Engineering design of military uniforms – Design process, material selection suitable for NBC threats, adapting intelligent individual protection systems.	**9 Hours**
CAMOUFLAGE FABRICS Human Perception, Colour and pattern, Camouflage design considerations. Chromic materials, Synthesis of new and conductive polymers, surface attachment of chromophores	**9 Hours**
HIGH PERFORMANCE BALLISTIC AND NBC WARFARE CLOTHING Requirements of fibre property to withstand ballistic force. High performance fibres – Ballistic, high temperature. HMPE fibre, PBO fibre. Standards for NBC threat protective clothing, self- decontaminating materials.	**9 Hours**
WEATHER CLOTHING Comfort and thermoregulation for hot and cold weather climatic conditions. Materials used for extreme weather conditions. Physiological responses to cold weather, Footwear, gloves, head gears and tents for extreme climatic conditions. Estimation of thermal insulation for cold weather climates. Smart textiles for comfort and thermoregulation.	**9 Hours**
EVALUATION OF MILITARY TEXTILES Mechanical Testing, ballistic testing, Comfort properties, Thermal insulation using thermal manikins, Chemical and biological resistance measurement, UV and flame protection testing.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources

Textbooks:

1. Wilusz, E. (Ed.). (2008). Military textiles. Elsevier

References:

1.Jayaraman, S., Grancaric, A. M., & Kiekens, P. (Eds.). (2006). Intelligent textiles for personal protection and safety (Vol. 3). IOS press.

2, Sparks, E. (Ed.). (2012). Advances in military textiles and personal equipment. Elsevier.

Online Educational Resources:--

Assessment (Theory course)

CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Mrs.R.Sukanyadevi/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE008	HOME TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-----	Data Book / Code book (If any)	----

Course Objectives:	
The purpose of taking this course is to:	
1	Understand textile furnishings and floor coverings.
2	Explore kitchen textiles and bed linens.
3	Evaluate home textile finishes and testing standards.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze different types of textile furnishings and floor coverings to recommend suitable materials and finishing methods for home decoration and maintenance.	An
CO 2	Evaluate various kitchen and dining textiles for their functionality and care requirements to select and manage appropriate materials for different kitchen uses.	E
CO 3	Analyze bed linens and bath linens to determine their types, uses, and care procedures, and recommend best practices for their maintenance.	An
CO 4	Create innovative finishes for home textiles such as temperature-regulated beddings and antimicrobial finishes to enhance functionality and comfort.	C
CO 5	Evaluate testing methods for home textiles, including flammability regulations and eco-friendly standards, to ensure compliance and safety in textile products.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	1	1		
2	2	2		1	1	
3	2	1	1	1		
4	2		2		2	
5	1					2

Course Content	
TEXTILE FURNISHINGS& FLOOR COVERINGS Different types of furnishings materials, Woven and non-woven, factors affecting selection of home furnishings. texture in home furnishing. Home decoration: Draperies, choice of fabrics, calculating the amount of material needed. Different types of doors and windows, applications. Curtains, need, types of curtains. method of finishing draperies, tucks or pleats. uses of drapery rods, hooks, tape rings and pins. FLOOR COVERINGS: Hard floor and wall coverings, resilient floor coverings, soft floor coverings, rugs, cushion and pads, recent development, care and maintenance. Living room furnishing: Sofa covers, wall hangers, cushion, cushion covers, upholsteries, bolster and bolster covers.	**9 Hours**
KITCHEN TEXTILES AND BED LINENS Types of kitchen linens, dish cloth, hand towels, Floor and wall cleaning materials, wipes and mobs. Dining: Placemats, tablecloth, hand towels. selection, use and care of kitchen and dining textiles	**9 Hours**
BED LINENS Different types of bed linen, bed sheets, blankets, blanket covers, comforts, comfort covers, bed spreads, mattress and mattress covers, pads, pillows and pillow covers, uses and care. Bath linen: Towels, types, selection, use and care, mats and rugs – types, uses. BATH LINEN: Towels – types, selection use and care, Mats and Rugs – types and its uses	**9 Hours**
FINISHES UDED FOR HOME TEXTILES Thermal draperies. Protection against unpleasant odour, Temperature-regulated beddings, antimicrobial finish, Moisture management finish. Mite free mattresses, Nanotechnology- based home textile enhancements	**9 Hours**
TESTING OF HOME TEXTILES Flammability regulations for different home textiles: Resilient cellular material, non-man-made filling materials, Cigarette resistance, Smouldering screening test. Flammability of blankets, Ignitability of upholstered seating, Flammability standards for curtains ,Test methods for towels . Rug. pot holders and woven mitts, Different eco-friendly standards in home textiles	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1.Dr. V. Ramesh Babu, S. Sundaresan “Home Furnishing” Woodhead Publishing India Ltd., 2) ISBN: 9789385059285,2017 2.Subrata Das, “Performance of Home Textiles” ”, The Textile Institute, Woodhead Publishing Ltd., Cambridge, 2010
References:
1.Wendy Baker, “Curtain and Fabric selector”, Collins and Brown, London, 2000. 2.Elsasser, Virginia Hencken, “Know Your Home Furnishings”, Fairchild Books & Visuals, 2003. 3.Goswami, K K, “Advances in Carpet Manufacture” Woodhead Publishing, Woodhead Publishing Ltd., Cambridge, 2011.

Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.S.Sundaresan/Textile	
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE009	NANO TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the basics of nanotechnology and nanotextiles.
2	Explore nano fibres and electrospinning techniques
3	Evaluate nanocomposites, nano coatings, and surface modifications.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the differences between nanotechnology and conventional technology to explain their applications and risks in nanotextiles.	An
CO 2	Apply electrospinning techniques and mathematical modeling to design and produce nano fibres and yarns for specific textile applications.	Ap
CO 3	Evaluate the synthesis methods and applications of various nanocomposites to determine their structural and property benefits for different textile uses.	E
CO 4	Create nano coatings for textiles that provide self-cleaning, water-repellent, and other functional properties by applying different nanoparticles.	C
CO 5	Analyze the mechanical, chemical, and biological properties of nanotextiles using advanced testing methods to assess their durability and performance.	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2		2		
2	2	1	2		3	
3	2	2	1	3		
4			3		2	
5	2			2		1

Course Content	
BASICS OF NANO TECHNOLOGY Nanotechnology vs conventional technology, Definition, Classification, Biomimetics in nanotextiles, Nano synthesis – Top-down and bottom-up approach Nano risks and Nano hazards, Policy and regulation, Nano label. Applications of nanotextiles. Nanostructures as catalysts.	**9 Hours**
NANO FIBRES Electrospinning - Types of electrospinning, Mathematical Modelling for the electrospinning process. Polymers used, and parameters influencing electrospinning, Continuous yarn from electrospinning - Wet spinning, Template synthesis, Phase separation, Interfacial polymerization. Synthesis of Carbon Nanotube (CNT) fibres and yarns. Woven nano fabrics for vascular grafts.	**9 Hours**
NANO COMPOSITES Polymer matrix nanocomposites, Carbon and graphene nanocomposites. Ceramic Matrix nanocomposites, Metal matrix nanocomposites– synthesis, types and applications. Structural and property analysis of different nanocomposites.	**9 Hours**
NANO COATINGS AND SURFACE MODIFICATIONS Synthesis of nanoparticles – AgNP, ZnNP, TiO2NP, Activated Carbon Application of nanoparticles on textiles, Mechanism of application of nanoparticles on the textiles. Self-cleaning, water-repellent, flame retardant, antibacterial, anti-frictional property of nanocoated textiles.	**9 Hours**
EVALUATION OF NANOTEXTILES Morphology study and fibre diameter analysis using Image J -X-Ray diffraction, Optical Spectroscopy, Porosity and pore size distribution. Surface area analysis (BET), Zeta potential, Mechanical and Chemical Properties. Durability, Biological analysis of nanotextiles.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources

Textbooks:

1. Mishra, R., & Militky, J. "Nanotechnology in textiles: theory and application." Woodhead Publishing. 2018
2.Goyal, R. K. "Nanomaterials and nanocomposites: synthesis, properties, characterization techniques, and applications". CRC Press. 2017

References:

1.Miller, J. C., Serrato, R., Represas-Cardenas, J. M., & Kundahl, G. (2004). The handbook of nanotechnology: Business, policy, and intellectual property law. John Wiley & Sons.
2. Bandyopadhyay, A. K. "Nano materials", New Age International,2008.

Online Educational Resources:--

Assessment (Theory course)

CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Mrs.R.Sukanyadevi/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE010	AUXETIC TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand auxetic structures and materials.
2	Explore auxetic polymers, fibers, and yarns.
3	Understand the applications of auxetic fabrics and composites.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the definition and theoretical models of Poisson's ratio and auxetic structures to describe their deformation mechanisms and mechanical properties.	An
CO 2	Evaluate the properties and manufacturing methods of auxetic polymers, including foams and nano polymers, to determine their mechanical performance and behavior.	E
CO 3	Create designs for auxetic fibres, yarns, and woven fabrics by analyzing their geometrical structures and manufacturing methods to optimize their auxetic behavior and mechanical properties.	C
CO 4	Analyze the auxetic behavior and properties of knitted, braided, and nonwoven fabrics by evaluating their geometrical structures and fabrication methods.	An
CO 5	Evaluate the mechanical properties and applications of auxetic composites, including fiber-reinforced and 3D textile composites, to recommend their use in various fields such as clothing and automotive.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2		2		
2			2		2	
3			3		2	
4		2		2		
5		2				2

Course Content

INTRODUCTION TO AUXETIC STRUCTURES Definition of Poisson's ratio and its bounds from the point of view of classical elasticity theory. Enhancements of the mechanical and physical properties of materials due to auxetic or negative Poisson's ratio behaviour. The classifications of auxetic materials and auxetic textiles. Auxetic structures - reentrant structures, rotating rigid structures, chiral structures, folded structures and other types of auxetic structures, with a description of their deformation mechanisms. Theoretical models for describing the auxetic behaviour and mechanical properties.	**9 Hours**
AUXETIC POLYMERS Polymers with negative Poisson's ratio. The auxetic foams made from conventional foams through different manufacturing methods and their mechanical properties due to changes in Poisson's ratio from positive to negative. Introduction to other types of auxetic polymers including auxetic microporous polymers, natural auxetic polymers and auxetic nano polymers.	**9 Hours**
AUXETIC FIBRES, YARNS AND WOVEN FABRICS Different types of auxetic fibres and yarns including auxetic polypropylene fibre, auxetic polyester fibre, auxetic polyamide fibre, helical auxetic yarn and helical auxetic plied yarn are systematically presented. The geometrical structures, manufacturing methods, auxetic behaviour and mechanical properties of these auxetic materials. Uni-stretch auxetic woven fabrics and bi-stretch woven fabrics structures. The structural design, manufacturing processes and auxetic behaviour of these auxetic fabrics.	**9 Hours**
KNITTED, BRAIDED AND NONWOVEN AUXETICS Auxetic fabrics developed using weft- and warp-knitted structures. The geometrical structures, manufacturing processes, auxetic behaviour and mechanical properties of typical auxetic knitted fabrics. Two kinds of fabrication methods of the auxetic	**9 Hours**

nonwoven fabrics and their auxetic performance and related properties. Auxetic fabrics developed by using conventional and modified circular braiding methods and their geometrical structures, manufacturing processes and auxetic behaviour.	
AUXETIC COMPOSITES and APPLICATIONS OF AUXETICS Fibre-reinforced composites with negative Poisson's ratio. The advantages of using auxetic fibres and yarns as composite reinforcements are first introduced. Auxetic laminates and 3D auxetic textile composites and their mechanical properties, auxetic performance, geometrical and finite element analyses.The potential applications of auxetic textiles are summarised. Applications in clothing, medical, healthcare, protection, packaging, automotive and filtration.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1. Hong Hu, Minglonghai Zhang and Yanping Liu "Auxetic Textiles" The Textile Institute, 2019
References:
1. Hu H, Zulifqar A. "Auxetic textile materials-a review". J Textile Eng Fashion Technol. 2017;1(1):1-15. DOI: 10.15406/jteft.2017.01.00002 2. Auxetic Textiles December 2013Acta Chimica Slovenica 60(4):715-723
Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.S.Sundaresan/Textile	
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE011	ADVANCES IN TEXTILE BIOPROCESSING	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand core concepts and applications of biotechnology in textiles
2	Explore bioprocessing and genetic manipulation for bio-modified fibres
3	Analyze enzymatic and bio-based innovations in textile processing

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the principles and historical development of biotechnology in textiles, including the role of enzymes, bio dyes, and green catalysts in textile processing.	An
CO 2	Evaluate the bioprocessing techniques for different fibres and the effects of genetic manipulation on bio-based fibres like cotton, silk, and spider silk.	E
CO 3	Apply enzyme-based methods for various textile processes such as desizing, bio-polishing, and bio washing, to enhance processing efficiency and textile quality.	Ap
CO 4	Create smart textiles incorporating enzymes by designing systems for controlled release and enzyme immobilization for functional textiles and packaging materials.	C
CO 5	Evaluate bio effluent treatment methods, including the use of genetically modified microorganisms and biofilms, to assess their effectiveness in textile effluent management.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	3	3				2
2	3	2		2	2	
3	2		2		2	
4			3			2
5		3		3		3

Course Content

BASICS OF BIOTECHNOLOGY IN TEXTILES Definition, origin and historical development, concepts of biotechnology in general and that of White Biotechnology in particular. Definition of molecular biotechnology and its emergence. The basic biological and chemical processes of cells, tissues, and organisms and their significance in biotechnology research and product development. Different types of enzymes, their mechanism of action as biocatalysts and in fermentation. Textile processing with green catalysts. Bio dyes. Bio surfactants.	**9 Hours**
BIO-MODIFIED FIBRE Bioprocessing of Bast fibre, wool, silk. Synthesis of bio-copying of nature – Structurally coloured fibres and lotus effect for self-cleaning textile surfaces. Genetic Manipulation for Bio-based Fibres – Cotton, Silk, spider silk, Bio-steal and Chitin fibre	**9 Hours**
ENZYMES IN CHEMICAL PROCESSING Cotton – Desizing; Scouring; Bleaching; Finishing – Bio-polishing; Bio washing. Wool – Bio-clipping of Wool; Carbonisation of wool; Reduction of wool fibre stiffness and prickle; De-scaling; Anti-shrink. Silk – Degumming; Bio-finishing. Jute and other Bast Fibres – Jute Retting; Degumming of bast fibrous plants; Enzymatic Treatment of bast fibres; Bio-preparation of Linen Fabric. Polyester- Bio catalytic modification of polyester.	**9 Hours**

SMART TEXTILES AND BIOMATERIALS CONTAINING ENZYMES Smart materials containing enzymes - Wound dressings, Functional Textiles, and packaging materials. Enzyme immobilization on fabrics and strategies. Smart materials responding to enzymes as triggers - Controlled-release systems and mechanisms, Covalent attachment of enzyme substrates.	**9 Hours**
BIO EFFLUENT TREATMENT Physio-chemical characterization of Textile effluent. Dye removal by immobilized fungi; Biodegradation of dyes. Application of genetically modified microorganism and their enzymes – Biofilms, Microbial fuel cells.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1.Mohammad Shahid, Ravindra Adivarekar. “Advances in Functional Finishing of Textiles”. Springer. 2020. 2.Vincent Nierstrasz, Artur Cavaco-Paulo. Advances in Textile Biotechnology. Woodhead Publishing. 2010.
References:
1. Ram Lakhan Singh, Pradeep Kumar Singh, Rajat Pratap Singh. “Recent Advances in Decolorization and Degradation of Dyes in Textile Effluent by Biological Approaches”. CRC Press. 2020 2. Georg M. Guebitz, Artur Cavaco-Paulo, Ryszard Kozlowski “Biotechnology in Textile Processing”, Haworth Press, 2006 3. Artur Cavaco-Paulo, Georg M. Gübitz, “Textile Processing with Enzymes” CRC, 2003 4. Helmut Uhlig, Elfriede M. Linsmaier-Bednar “Industrial Enzymes and Their Applications,” Wiley-IEEE, 1998.
Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.S.Ariharasudhan/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE012	SMART TEXTILES FOR WOUND CARE	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand advanced textile-based solutions for wound care and drug delivery.
2	Analyze composite dressings and textile-based scaffolds for tissue engineering.
3	Explore novel innovations in chronic wound and burn management.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the types and applications of drug delivery dressings to determine their suitability for various wound types and future trends in wound care.	An
CO 2	Apply the principles and characteristics of smart textiles to design and evaluate textiles that control exudate from wounds and respond to bacteria.	Ap
CO 3	Evaluate the structure, materials, and trends in composite dressings to recommend effective solutions for wound care, including embroidery technology.	E
CO 4	Create textile-based scaffolds for tissue engineering by applying principles of scaffold design, material selection, and textile architecture to improve cell behavior and scaffold applications.	C
CO 5	Analyze novel textiles and current practices for managing burns and chronic wounds to propose innovative solutions and future trends in wound management.	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	3		2		
2	2		3			
3		2				1
4			2		2	
5				2		1

Course Content	
DRUG DELIVERY DRESSINGS Introduction- Wounds: definition and types -Wounds which require drug delivery- Delivering drugs to wounds-Types of dressings for drug delivery- Applications of drug delivery dressings- Future trends.	**9 Hours**
SMART' TEXTILES FOR WOUND CARE Basic principles and types of smart textiles-Characteristics of smart textiles Textiles in control of exudate from wounds-Examples of 'smart' textiles for wound care-Response of dressings to bacteria-Future trends.	**9 Hours**
COMPOSITE DRESSINGS FOR WOUND CARE Definition of composite dressings-Structure of composite dressings-Materials and textile structures used in composite-Dressings- Types of composite dressings-Trends in composite dressings: embroidery technology	**9 Hours**
TEXTILE-BASED SCAFFOLDS FOR TISSUE ENGINEERING Introduction: principles of tissue engineering-Properties required for fi brous scaffolds-Materials used for scaffolds- Relationship between textile architecture and cell behavior-Textiles used for tissue scaffolds and scaffold fabrication-Applications of textile scaffolds in tissue engineering Future trends	**9 Hours**
NOVEL TEXTILES IN MANAGING BURNS AND OTHER CHRONIC WOUNDS Introduction: current practice in the management of deep skin wounds or ulcers- Normal treatment options for deep skin wounds or ulcers -Novel wound dressings for managing deep skin wounds or ulcers -Future trends	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources

Textbooks:

1) Rajendran.S, "Advanced Textiles for Wound Care", Wood Head publishing in Textiles: Number 85, 2009.
2) Shalaby W. Shalaby and Karen J.L. Burg, "Absorbable/Biodegradable Polymers", CRC Press, 2004.

References:

1. Anand (S C) Ed.; Kennedy (J F) Ed.; Miraftab (M) Ed.; Rajendran (S) Ed., "Medical Textiles and Biomaterials for Healthcare", Woodhead Publishing Limited, 2006.
2. Samuel C. O. Ugbolue, "Polyolefin fibres for Induatrial and medical applications",Woodhead Publishing Limited, 2009.
3. Bartel.V.T, "Handbook of medical textiles", Wood Head publishing, 2011.
4. Van Langenhove, "Smart textiles for medicine and health care – materials, systems andapplications", Wood Head publishing, 2007.
5. Ray smith, "Biodegradable polymers for industrial application", CRC press, 2005.
6. Buddy D.Ratner and Allan S. Hoffman, "Biomaterials science – An introduction to materialsin medicine", Academic press, 1996.

7. Pourdegtimi..B, “Vascular grafts: Textile structures and their performance”, Textileprogress, vol. 15, No. 3, the Textile Institute, 1986.
8. Cusick. GE and Teresa Hopkins, “Absorbent incontinence products”, the Textile Institute,1990.
9. Kothari.V.K., “Progress in textiles: Technology developments and applications”, volume 3,IAFL Publications, 2008.

Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by		
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.P.Sivakumar,Textile
Recommended by BoS on	14/08/2024	
Academic Council Approval	No.27	**Date** 24/08/2024

24TXE013	TEXTILE PREFORMS AND PREPREGS	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the fundamentals and applications of textile preforms.
2	Analyze advanced techniques in preform and prepreg production.
3	Evaluate testing and quality considerations for preforms and prepregs.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the classification and characterization of textile preforms to assess their properties and applications in composite preparation.	An
CO 2	Apply fabrication techniques of woven preforms, including 2D, 3D, and multi-axial structures, to develop near net shaped and profile fabrics.	Ap
CO 3	Evaluate various braiding methods and stitching techniques for preforms, including robotic approaches, to determine their impact on component quality and production efficiency.	E
CO 4	Create prepregs by applying different processing methods such as solution route and film transfer route, and develop automated layup processes for diverse prepreg materials.	C
CO 5	Analyze physical and chemical testing methods for prepregs to address challenges in storage and safety, and predict their applications in various composite materials.	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	3		2		
2	2		3		3	2
3	2	3		2		2
4	2		3	2	3	
5	2			2		2

Course Content	
PREFORMS Property requirements for fibre, fabric and matrix, Importance of preforms in composite preparation. Classification of preforms: 1D, 2D-nonaxial, Mono-axial, multi-axial multi-ply non-crimp fabrics, 3D fabrics. Knitted Preforms - Weft knitted preforms with inlay, Warp Knitted multi-axial fabrics, 3D raschel warp knitted fabrics. Characterization of textile Preforms, Application of preforms.	**9 Hours**
WOVEN PREFORMS Fabrication of 2D, 3D and multi-axial preforms, 3D forms - Orthogonal, warp interlock, angle interlock structures, Multilayer woven structures, 3D hollow woven preforms, 3D shell woven preforms, 3D woven preforms from specially made devices, near net shaped preforms. Profile fabrics - T profile, π profile	**9 Hours**
BRAIDED PREFORMS 2D braiding, two-step 3D braiding, four-step 3D braiding, Multilayer interlock braiding. Stitched performs - Traditional stitching, Technical Embroidery, Z- Pinning. Nonwoven preforms, Robotic approach in preform production. Preform considerations - Sealing, Tooling, and Component Quality. Modelling of internal geometry of textile performs**.**	**9 Hours**
PREPREGS Property requirements, Compaction, Prepreg processing - Solution route, Film transfer route. Prepregs material form - UD Tape, Slit Tape, Woven forms. Automated layup process, Prepreg sandwich construction, Formation of tow pregs, Thermoplastic hybrid yarns for prepreg production.	**9 Hours**
PREPREGS TESTING Physical/Chemical tests on prepregs, Challenges in prepreg storage and safety, Theoretical calculations for fibre volume fractions in prepreg composite. Applications of prepregs.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources

Textbooks:

1. Long A C, “Design and Manufacture of Textile Composites”, Woodhead Publishing Ltd., London, 2005.

References:

1. Tsu Wei Chou and Frank K Ko, “Textile Structural Composites”, Elsevier Science Ltd., USA, 1989.
2. Alagirusamy R,Fangueiro R, Ogale V and Padaki N,“Hybrid Yarns and Textile Preforming for Thermoplastic Composites” Textile Progress, 38(4), 2006.
3. Hull D and Clyne T W,“An Introduction to Composite Materials”, Cambridge University Press, 1996.
4. Liyong Tong, Adrian P Mouritz and Michael K Bannister, “3D Fibre Reinforced Polymer Composites”, Elsevier Science Ltd., India, 2002.
5. Autar K Kaw, “Mechanics of Composite Materials”, CRC Press LLC, New York, 1997.

Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. 3.Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.P.Chandrasekaran/Textile	
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE014	LAMINAR COMPOSITES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand stress–strain relationships and material behavior.
2	Analyze lamina and laminate behavior.
3	Apply failure theories and testing methods for lamina and laminates.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the stress-strain relationships and material behavior of laminar composites to evaluate their response under different loading conditions.	An
CO 2	Apply lamina analysis techniques to predict mechanical, thermal, and hygral properties of lamina for accurate material characterization.	Ap
CO 3	Evaluate mechanical test methods for lamina, including strain gauge applications and experimental determinations, to assess their impact on composite performance.	E
CO 4	Create and apply lamina failure theories, such as maximum stress and strain theories, to design examples and predict failure behavior in composite laminates.	C
CO 5	Analyze laminate properties and failure using classical lamination theory, including thermal and hygral effects, to assess laminate strength and performance.	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2					
2	2				2	
3		2		2		
4			2		3	
5		2				2

Course Content	
STRESS–STRAIN AND MATERIAL BEHAVIOR Introduction-Strain–displacement relation- Stress and stress transformations- Stress–strain relationships- Thermal and hygral effects- Complete anisotropic response.	**9 Hours**
LAMINA ANALYSIS Introduction- Mechanical response of lamina- Thermal and hygral behavior of lamina- Prediction of lamina properties (micromechanics).	**9 Hours**
MECHANICAL TEST METHODS FOR LAMINA Strain gages applied to composites-- Experimental determination of mechanical properties- Physical properties- Material properties of selected composites- Testing lamina constituents.	**9 Hours**
LAMINA FAILURE THEORIES Introduction- Maximum stress theory- Maximum strain theory- The significance of shear stress- Interactive failure theories- Buckling- Design examples incorporating failure analysis.	**9 Hours**
LAMINATE ANALYSIS Classical lamination theory- Thermal and hygral effects- Laminate codes- Laminate analysis- Laminate failure analysis- In-plane laminate strength analysis- Analysis of hybrid laminates- short fiber composites.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources

Textbooks:

1.George H. Staab, Laminar Composites, Elsevier Science Ltd., USA, 2015

2. Long A C, “Design and Manufacture of Textile Composites”, Woodhead Publishing Ltd., London, 2005.

References:

1.Autar K Kaw, “Mechanics of Composite Materials”, CRC Press LLC, New York, 1997.

2.Jang-Kyo Kim and Yiu-Wing Mai, “Engineered Interfaces in Fiber Reinforced Composites”, Elsevier India, 1998.

Online Educational Resources:--

Assessment (Theory course)

CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.P.Chandrasekaran/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE015	3-D TEXTILE REINFORCEMENTS IN COMPOSITE MATERIALS	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the fundamentals of 3-D textile reinforcements.
2	Analyze applications and performance of 3-D textile composites.
3	Apply macro-mechanical analysis and forming techniques to 3-D composites.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the classification and structural geometry of 3-D textile preforms to tailor fiber architecture for improved composite strength and toughness.	An
CO 2	Evaluate the mechanical performance of 3-D reinforced composites in the transportation industry, including aerospace and automotive applications.	E
CO 3	Apply macro-mechanical analysis methods to determine the stiffness and strength properties of 3-D textile reinforced composites and design energy absorption structures.	Ap
CO 4	Analyze the tensile behavior and 3-D elastic properties of knitted fabric composites to assess their performance in various applications.	An
CO 5	Create and optimize continuous fiber reinforced polymer (CFRP) products through simulation and finite element analysis to enhance the forming process and product efficiency.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	2	2	2	2
2	2	3	2	2		2
3	2	2	2		2	2
4	2	2	2	2		2
5	2		2	2	2	1

Course Content	
3-D TEXTILE REINFORCEMENTS IN COMPOSITE MATERIALS Introduction-Classification of textile preforms-Structural geometry of 3-D Textiles-Tailoring fiber architecture for strong and tough composites- Modeling of 3-D textile composites.- application of the FGM.	**9 Hours**
3-D TEXTILE REINFORCED COMPOSITES FOR THE TRANSPORTATION INDUSTRY The mechanical performance of conventional and 3-D reinforced composites-Manufacturing textile structural composites-3-D composites in aerospace structures - Textile structural composites in automotive structure.	**9 Hours**
MACRO MECHANICAL ANALYSIS OF 3-D TEXTILE REINFORCED COMPOSITES Determination of the stiffness and strength properties of 3-D textile reinforced composite materials-Application of macro mechanical analysis to the design of a warp knitted fabric sandwich structure for energy absorption applications- Application of macro mechanical analysis to the design of an energy absorber type 3P bending.	**9 Hours**
3D KNITTED FABRIC COMPOSITES Introduction-Description of knitted fabric-Tensile behavior of knitted fabric composites - Analysis of 3-D elastic properties- Analysis of tensile strength properties.	**9 Hours**
3-D FORMING OF CONTINUOUS FIBRE REINFORCEMENTS FOR COMPOSITES Introduction- Forming of continuous fibre reinforced polymers- Simulation of the forming process- Finite element simulation - Optimization of CFRTP products.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1. Antonio Miravete, "3-D textile reinforcements in composite materials", Woodhead Publishing Ltd., London, 2000.
References:
1.Long A C, "Design and Manufacture of Textile Composites", Woodhead Publishing Ltd., London, 2005. 2. Liyong Tong, Adrian P Mouritz and Michael K Bannister, "3D Fibre Reinforced Polymer Composites", Elsevier Science Ltd., India, 2002. 3. Tsu Wei Chou and Frank K Ko, "Textile Structural Composites", Elsevier Science Ltd., USA, 1989.
Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.P.Chandrasekaran/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE016	SUSTAINABLE TECHNICAL TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Explore approaches to sustainability in textile design and recycling.
2	Analyze sustainable fibers and biodegradable materials.
3	Develop eco-friendly functional textile solutions.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the strategies and processes involved in textile recycling and apply this knowledge to design more sustainable textile systems.	An
CO 2	Evaluate the properties and applications of various sustainable fibers, including natural and synthetic options, for their effectiveness in technical textiles.	E
CO 3	Apply techniques for creating biodegradable composites from biowaste and assess their performance in practical applications such as automotive and industrial uses.	Ap
CO 4	Analyze the effectiveness of eco-friendly nonwoven materials, including flushable and PLA fiber-based products, and evaluate their degradability and practical applications.	An
CO 5	Create sustainable functional textiles by developing and testing herbal plant-based textiles for antimicrobial properties and evaluating their impact on human health and the environment.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	3	3	3		3
2	2	3	3	3	3	
3	2		3	2		2
4	2	2	3	3	3	2
5	2		2			2

Course Content	
APPROACHES TO SUSTAINABILITY Key issues affecting textile design, Strategies for technical textile design, Strategies for textile designers: recycling and reuse – beginning to close the loop, The designer empowered.-Reduce disposal to landfills by raising consciousness concerning ecological issues, channels for disposal, and environmentally conscious business ethics. Steps for more sustainable use and disposal of post- consumer technical textiles. Textile recycling: a system perspective, Introduction to Systems theory, Understanding the textile recycling process, The sorting process, The pyramid model, Textile recycling constituents	**9 Hours**
SUSTAINABLE FIBRES Characteristics and applications of Bast (hemp, kenaf, jute, flax, abaca), alginate, synthetic silks, poly(lactic acid), poly(hydroxy alkynoates) and poly(caprolactone) fibres for use in technical textiles. End-of-life fibre degradation by microbes - Background and terminology, Incubation conditions used for studying biodegradation of fibers and films, Sources of microorganisms and enzymes for laboratory incubations, Analytical methods used to assess biodegradation of fibers and films, Examples of types of bonds that are susceptible to enzymatic attack, Future trends	**9 Hours**
BIOWASTE-BASED AND BIODEGRADABLE COMPOSITES Natural geotextiles – manufacture and evaluation. Biodegradable resins, soy- based green composites-Lignocellulosic biomass-reinforced composites employed in various automobile and industrial applications. Role of alkali treatment and chemical modifications in improving the interfacial bonding between the filler and the matrix. Identify the abundantly available biomass to be used as reinforcement for certain application in industrial as well as household composites.	**9 Hours**
ECOFRIENDLY NONWOVENS Flushable nonwovens. PLA fibre-based materials. Assessing the degradability of these products. Use of recovered polyethylene plastic bags as a binder material in nonwoven fabrics. Web forming and bonding methods involving shredded plastic bags: Applications as sound-proofing and thermal insulation materials and the evaluations thereof.	**9 Hours**
MODULE Name: SUSTAINABLE FUNCTIONALIZATION Ecotoxicological issues of flame retardants and the risk of flame-retardant textiles to human health. Drivers for minimizing environmental as well as human health implications. Strategies for the development of sustainable environmentally friendly flame retardants. Identifying governmental and non- governmental organisations that are directly associated with sustainability, renewability and recyclability of flame-retardant chemicals. Utilization of herbal plant-based textiles for anti-microbial functionality. Biological characterization of natural dyed textiles. Isolation of biological potent functional molecules from herbal based plant source.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1. Blackburn Ed “Biodegradable and Sustainable Fibres,” Wood Head Pub, 2006.
References:
1.Blackburn Ed “Sustainable Textiles : Life Cycle and Environmental Impact,”. Wood head Pub 2009. 2.Maity Ed “Functional and Technical Textiles” Textile Institute, 2023.
Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004	Dr.R.Saminathan/Textile	
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE017	FILTRATION TEXTILES	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	--

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the role of textiles in filtration systems.
2	Analyze filtration textile properties and mechanisms.
3	Apply filtration textiles in industrial and consumer applications.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the role of textiles in different filtration processes and apply this understanding to identify suitable materials for specific filtration needs.	An
CO 2	Evaluate the principles and characteristics of filtration textiles, including fabric design and nonwoven filter types, to determine their suitability for various applications.	E
CO 3	Analyze the mechanisms and properties of different filtration textiles, including woven, nonwoven, and composite filters, to optimize their performance in specific contexts.	An
CO 4	Apply the theory of dust collection and solid-liquid separation to assess the effectiveness of filter textiles in industrial and chemical filtration applications.	Ap
CO 5	Create comprehensive testing protocols for various filter types, including air and water filtration systems, to evaluate their performance based on multiple criteria.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques. .	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	3	2	1	2
2		2	2			1
3			3	2		
4				2		
5	2				2	

Course Content	
TEXTILES IN FILTRATION Introduction, general filtration and filtration by osmosis, Textiles in dry filtrations; Textiles in liquid filtrations; filtration for medical purposes.	**9 Hours**
PRINCIPLES AND CHARACTERISTICS OF FILTRATION TEXTILES Theory and Principles: Filtration and Separation, Contaminants, Surface and Depth Filtration. Fabric design and selection considerations, characteristics of nonwoven filters – air laid, dry laid, wet laid, melt-spun, flash-spun, nanofiber spun webs.	**9 Hours**
TYPES AND MECHANISM IN FILTRATION TEXTILES Woven, Nonwoven and Composite filters, various types of filters, Liquid filtration, Particle capture mechanisms, variables of particle capture mechanism, various properties of filter fabric, Filtration efficiency, Particle collection efficiency, Penetration efficiency, Permeability, Filter life, Air filtration.	**9 Hours**
FILTER TEXTILES AND ITS APPLICATIONS Definition of filtration parameters, theory of dust collection and solid liquid separation, filtration requirements, concept of pore size and particle size, role of fiber, fabric construction and finishing treatments, Industrial filtration in textile, chemical, food and metallurgical applications.	**9 Hours**
VARIOUS FILTERS AND THEIR TESTING Industrial Air Filtration, Air Conditioning Systems, Respirators and Facemasks, Vacuum cleaners, Air purifier. Thickness, Air Permeability, Density and Bulk, Solidity and Porosity, Pore Size and Pore Structure, Strength Properties, Water repellence and Water/Moisture Resistance, Filter Media Filtration Testing.	**9 Hours**

Theory 45 Hours:	**Tutorial - Hours:**	**Practical - Hours:**	**Project - Hours:**	**Total 45 Hours:**

Learning Resources
Textbooks:
1.A R Horrocks & S C Anand, “Handbook of Technical Textiles: Technical Textile Processes”, Woodhead Publishing, 2015
References:
1.R Paul, “High Performance Technical Textiles. John Wiley & Sons, Incorporated”, 2019. 2.Prof. Apurba Das, “Testing of Functional and Technical textiles”, NPTEL course. 3.Sabit Adanaur, “Wellington Sears Handbook of Industrial Textiles”, Technimic Publishing Company, Inc., Pennsylavania, USA, 1995.
Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.M.Saravanan/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE018	GEO TEXTILE	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the fundamentals of geotextiles and their environmental context.
2	Analyze the functions and manufacturing of geotextiles.
3	Evaluate the properties and performance of geotextiles.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the definition, materials, and basic design principles of geotextiles and apply this knowledge to identify appropriate geotextile types for various applications.	An
CO 2	Evaluate the primary functions of geotextiles, including separation, filtration, and reinforcement, to recommend their use in specific infrastructure projects.	E
CO 3	Analyze the properties and manufacturing processes of geotextiles made from natural fibers and apply this analysis to assess their suitability for different environmental conditions.	An
CO 4	Evaluate the properties and applications of synthetic fiber-based geotextiles and determine their performance based on current testing standards.	E
CO 5	Create comprehensive evaluation criteria for geotextiles, including morphology, mechanical properties, and filtration efficiency, to assess their overall performance.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	2			2
2	1	2	1		2	1
3	2	2		1		1
4	1	1		1		1
5	2	2	1		2	1

Course Content	
BASICS OF GEO TEXTILES Definition, materials for geo textiles, Basics of soil environmental considerations, geotextile design and application.	**9 Hours**
PRIMARY FUNCTIONS OF GEOTEXTILES Geotextiles used in separation, filtration, drainage. Geotextiles as reinforcements in roads and railroads, walls and slopes	**9 Hours**
MANUFACTURING OF GEO TEXTILES FROM NATURAL FIBRES Natural fibres used for manufacturing of geotextiles, properties of natural fibres, manufacturing process, application of natural fibre based geotextiles, Latest developments in natural geotextiles	**9 Hours**
MANUFACTURING OF GEO TEXTILES FROM SYNTHETIC FIBRES Fibres used in geosynthetics, properties of geosynthetics, applications, testing standards of geosynthetics.	**9 Hours**
EVALUATION OF GEOTEXTILES Morphology and thermal characterization, Mechanical properties, pore size and distribution, permeability and transmissivity, durability. Filtration efficiency.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1. Koerner, R. Geotextiles: from design to applications. Woodhead Publishing. 2016
References:
1.Leao, A. L., Cherian, B. M., De Souza, S. F., Kozłowski, R. M., Thomas, S., & Kottaisamy,M.” Natural fibres for geotextiles”. Woodhead Publishing. 2012
Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. .Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Mrs.R.Sukanyadevi/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE019	AGRO TEXTILE	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the fundamentals and applications of technical textiles.
2	Explore fibers, manufacturing technologies, and their properties.
3	Evaluate agro textiles through testing and standards.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the history and classification of agro textiles and apply this knowledge to identify various uses in agricultural and industrial applications.	An
CO 2	Evaluate the properties of different natural, synthetic, and high-performance fibers used in agro textiles to select suitable materials for specific agro-textile applications.	E
CO 3	Analyze the classification of agro textiles based on their areas of application and apply this analysis to design appropriate solutions for crop production, horticulture, and animal husbandry.	An
CO 4	Evaluate various fabric manufacturing technologies, including weaving, knitting, and non-woven techniques, and determine their impact on agro textile performance.	E
CO 5	Create a comprehensive testing and evaluation plan for agro textiles, incorporating standard test methods and performance specifications to ensure quality and compliance.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2	2	2	2		2
2	2	2	1	2		2
3	2	3	2	2		2
4	2		2	2		2
5	2		1	2	2	2

Course Content	
BASICS OF TECHNICAL TEXTILES Introduction to Technical Textiles, Technical Textiles or Industrial Textiles, Classification of Technical Textiles, Agro Textiles, History of Agro Textiles, Uses of Agro Textiles	**9 Hours**
FIBRES AND PROPERTIES USED Natural fibres: Cotton, Jute, Wool, Coir, Sisal, Flax and Hemp; Synthetic fibres: Polyethylene, Polypropylene, Nylon, Polyester and Polyolefin; High performance fibres: Aramid, Glass and Carbon; General properties and Specific properties of Agro textile products.	**9 Hours**
CLASSIFICATION BASED ON AREAS OF APPLICATION Agro Textiles For Crop Production: Sunscreen Net, Bird Protection Nets, Plant Net, Ground Cover, Windshield, Root Ball Net, Insect Meshes, Mulch Mat, Monofil Nets, Cold & Frost Control Fabrics, Nets for Covering Pallets and Packing Materials for Agricultural Products; Agro Textiles for Horticulture, Floriculture and Forestry, Agro Textile for Animal Husbandry and Aquaculture, Agro Textiles for Agro-Engineering-Related Applications: Greenhouse, Agro Bags, Soil Covers, Grass Reinforcement, Packaging Material, Vermi composting Beds and Backyard Fruit Netting.	**9 Hours**
CLASSIFICATION BASED ON FABRIC MANUFACTURING TECHNOLOGIES Weaving Technology: Types of Looms, Use of Woven Fabrics in Agro Textiles: Polypropylene Woven Shade Cloth Fabrics and Polyolefin Woven Shade Cloth Fabrics; Knitting Technology: Weft and Warp Knitting, Knitting Technologies in Manufacture of Technical Textiles and Knitted Fabrics with Orientated Behaviours; Non-Woven: Properties of Non-woven and Techniques Used for Non-woven Production.	**9 Hours**
TESTING AND EVALUATION Importance of Testing, Objective of Testing and Analysis: Research and Development, Quality Control, Comparative Testing, Analyzing Product Failure and Government Regulations; Standard Test Methods and Performance specifications, Standard Test Methods: Bureau of Indian Standards – India, British Standards – Britain, American Society for Testing of Materials – The United States and Deutsches Institute fur Normung – Germany Standards Institute; International Standards for Agro Textiles and National Standards for Agro Textiles.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: -**	**Practical Hours: -**	**Project Hours: -**	**Total Hours: 45**

Learning Resources
Textbooks:
1.S. Grace Annapoorani, Agro Textiles and Its Applications, Woodhead Publishing India in Textiles, 2020.
References:
1. Handbook for Agrotextiles, A report published by Ministry of Textiles, Government of India, 2013
Online Educational Resources:--

Assessment (Theory course)
CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.M.Saravanan/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024

24TXE020	TEXTILES IN CIVIL CONSTRUCTION AND TRANSPORTATION	L	T	P	J	C
		3	0	0	0	3
PE		SDG	6,7,8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the role of geotextiles in civil engineering.
2	Explore the applications of textiles in architecture and transportation.
3	Evaluate the performance and durability of technical textiles.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze the types, functions, and material specifications of geotextiles, and evaluate their application in civil engineering projects such as filters and reinforcement.	An
CO 2	Evaluate the properties and applications of architecture textiles, including coated textiles and inflatable structures, and recommend suitable materials for specific architectural needs.	E
CO 3	Apply knowledge of textile materials in transportation to design and develop textiles for automotive and aeronautical uses, such as tire cords and air bags.	Ap
CO 4	Create solutions for textile evaluation in civil construction and transportation by analysing performance and durability criteria to recommend improvements.	C
CO 5	Examine the multifaceted uses of geosynthetics in civil engineering and assess their effectiveness in various functions like separation and drainage.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)					
	1	2	3	4	5	6
	Conduct independent research.	Produce and present a report.	Demonstrate advanced mastery	Show proficiency in textile techniques.	Uphold ethical responsibilities	Lead and communicate in teams
1	2			2		2
2	2		2	2	2	
3	2	2		2		3
4	2		2	2	2	
5	2	2		2		3

Course Content	
GEO TEXTILES Geo textile – definition, types, functions; types of fibers and fabrics used in geo textiles; applications of natural fibers in geo-textiles; joining of geo- textiles; multi-functional uses of geo synthetics in civil engineering; usage of geo-synthetic in civil engineering applications as filters, reinforcement, separation and drainage medium; material specifications and design criteria of geo-synthetics for specific applications.	**15 Hours**
ARCHITECTURE TEXTILES Fiber and fabric property requirements for architecture textiles; Coated textiles; Tents, Awnings and Canopies; Inflatable structures – high pressure and low pressure inflatable structures; Textile for roofing applications; Acoustic and heat insulation textiles; Floor and wall covering, scaffolding nets.	**15 Hours**
TRANSPORTATION TEXTILES Quality and design of textile materials used in automobiles – tire cord, filter, air bag, belt, seat cover, noise insulation; Design and development of textile reinforced composites in automobile and aeronautic industry.	**9 Hours**
EVALUATION Evaluation of textile material used in civil construction and transportation industry in terms of performance, construction survivability and durability.	**6 Hours**

Theory 45 Hours:	**Tutorial - Hours:**	**Practical - Hours:**	**Project - Hours:**	**Total 45 Hours:**

Learning Resources

Textbooks:

1. Horrocks A.R. and Anand S.C., "Handbook of Technical Textiles", The Textile Institute, Manchester, 2000, ISBN: 1855733854.
2. R. W. Sarsby, "Geo Synthetics in Civil Engineering", Woodhead Publishing, ISBN-13: 978-1-85573-607-8

References:

1. Mukhopadhyay S.K. and Partridge J.F., "Automotive Textiles", Textile Progress, Vol.29,No1/2, 1999, ISBN:1870372212.
2. Adanur S., "Wellington sears handbook of Industrial textiles", Technomic publishing co inc.,1995, ISBN : 1–56676–340–1.
3. Eugeniooñate and Bern kröplin "Textile Composites and Inflatable Structures", Springer Dordrecht, Berlin, Heidelberg, New York, ISBN-10 1-4020-3316-8

Online Educational Resources:--

Assessment (Theory course)

CAT, Activity and Learning Task(s) Open-ended questions , MCQ, End Semester Examination (ESE)

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Mr. S. Vaidheeswaran, Junior Works Manager, OCF, Ministry of Defence, Avadi, Chennai. Mr. Kannan A J. Director, Tortuous Reach, Textiles and Nonwovens, Coimbatore.	Dr. M. Murugesan, Professor, Department of Textile Technology, ACT Campus, Anna University, Chennai-600 025. Dr. N. K. Palaniswamy, Associate Professor, Textile Technology, National Institute of Technology (NIT),Jalandhar, Punjab 144008. Dr.M. Senthil Kumar, Associate Professor, Textile Technology, PSG College of Technology, Coimbatore-641004		Dr.M.Saravanan/Textile
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.27	**Date**	24/08/2024