Faculty of Engineering and Technology
B P S Mahila Vishwavidyalaya, Khanpur Kalan (Sonepat)
(State University Established Under the Legislative Act No 31/2006)

Scheme of Studies and Examination for Pre-Ph.D. Course Work
in
Fashion Technology (2021-22)

Pre-Ph.D programme course for the award of Ph.D. degree in Fashion Technology, Faculty of Engineering and Technology, B P S Mahila Vishwavidyalaya, Kalan is as follows.

S. No	Code	Course Title	Hrs/Week			Total Credit	Marks		Total Marks	Duration of Exam
			L	T	P		Internal Marks	External Marks		
Theory										
1.	PPL-701	Research Methodology	3	2	-	5	20	80	100	3 Hours
2.	PFL-701/702/703	Departmental Subject (Any one out of given choices)	3	2	-	5	20	80	100	3 Hours
3.	CPE-RPE-022	Research and Publication Ethics *	3	-	-	2	10	40	50	3 Hours
4.	PPP- 721	Independent Study	-	2	6	5	20	80#	100	
5.	PPP- 722	Scientific Communication	-	2	6	5	20	80#	100	
6.	PPP- 723	Computational Software Packages Lab	-	2	2	3	10	40#	50	
Total			9	10	14	25	100	400	500	

Note:

- All Engineering departments will share the teaching as well as examination.
- Students have to choose any one of departmental subject in concern and suitability with guide from following:
  1) PFL-701: Textile and Apparel Testing
  2) PFL-702: Technical Textiles
  3) PFL-703: Advances in Apparel Technology
- Students will be allowed to use scientific calculator only but sharing of the same will not be permitted in the exam. There will be nine questions in theory paper in total from all four units of syllabus. First question is compulsory and set from all four units. Students will have to attempt any five questions in all selecting at least one question from each unit.
- The duration of theory as well as practical exam will be of 3 hrs. The all question will carry equal marks. The pass marks in the paper will be as per university ordinance.
- Theory examination of Research Methodology subject will be conducted at centre level in SES and all research students will have common question papers.
- The grand total of the semester credits and marks are 25 and 500, respectively.

Practical examination of Independent Study, Scientific Communication, Software Package lab will be conducted at the departmental level even for external marks.

* RPE course introduced vide UGC notification D.O.No.F.1-1/2018(Journal/CARE) DEC,2019

In-Charge
Department of Fashion Technology
Bhagat Phool Singh Mahila Vishwavidyalaya
Khanpur Kalan (Sonepat) Haryana-131305

Program Outcomes of Ph.D in Fashion Technology

PO of Ph.D in Fashion Technology

PO1 Trained human resources having expertise in a particular area of Fashion, Textiles and related areas.

PO2 To Acquire the ongoing scientific research in and outside the country.

PO3 To address and overcome the crisis of Fashion and Textile sector.

PO4 To create researcher having the ability to present scientific results and thoughts in front of a educated audience.

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Program Specific Outcomes of Ph.D in Fashion Technology

PSO of Ph.D in Fashion Technology

PSO1 Trained human resources having expertise specialization to overcome the crisis of Fashion Industries and related sectors.

PSO2 To understand and implement scientific and technological research of interdisciplinary areas to address its technological, managerial and other needs to promote up gradation of existing facilities.

PSO3 To find out the broader interdisciplinary utilisation of advanced technologies used in Fashion and related sector.

PSO4 To provide the ability to relate technical advancement solution for sustainable and societal development.

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Khanpur Kalan (Sonepat), Haryana-131305

PPL-701   **Research Methodology**

L T P Credits: **Theory Exam: 80 Marks**

3 2 0 5   **Duration of Exam: 3 hrs**

Internal Assessment Marks: 20 + External Marks of Theory Exam: 80 = Total Marks: 100

Course Objectives:

The course is designed to make the students:

- To understand basic concepts and approaches of research and their significance.
- To identify a research problem and to develop a research proposal.
- To choose and apply an appropriate experimental design to a particular research problem.
- To understand and apply statistical techniques for data analysis.

Unit 1

Objectives of research, Types and significance of research, research and scientific methods, research approaches. Importance of knowing how research is done – Research Process – Criteria of good Research.

Necessity of defining the problem, technique involved in defining the Problem.

Research Design: Need for research design, features of a good design, important concepts relating to research design, different research design.

Significance of report writing, different steps in writing report, layout of the research report, precautions for writing research reports.

Unit 2

Sample Design: Objective and principal of experimental design. Experimental design terminology. Completely randomized design. Complex random sampling design. Blocking design: Latin square design, two and three level of factorial design

Measurement and scaling Techniques: measurement in research, measurement scales and source of errors, tests of second measurement, technique of developing measurement tools, important scaling and scale construction techniques.

Data collection: collection of primary and secondary data through various techniques, selection of appropriate method for data collection, case study method, guideline for developing questionnaire, successful interviewing. Survey V/S experiment.

Unit 3

Processing and analysis of Data, Statistics in Research, measures of central tendency, dispersion, Standard deviation, skewness and kurtosis.

Sampling Fundamentals: Definition, Need, Important sampling distribution, central limit theorem, sampling theories, concept of standard error, estimation, estimation population mean, proportion, sample size and its determination.

Tests of hypothesis and significance: basic concepts, important parametric tests. Hypothesis testing of means, differences between means, comparing two related samples, testing of proportion, difference between proportions, comparing variance to hypothesised population variance, equality of variances of two normal populations. Hypothesis testing of correlation coefficients, limitations of test of hypothesis.

Unit 4

Tests of significance for large and small samples. Problems based on X^2-test for goodness of fit, t test, F-test and analysis of variance (one way and two way classifications). Regression and Correlation: Karl Pearson's coefficient of correlation, Rank correlation coefficient, Regression Lines, Regression equations. Control charts, namely, X,R,C and p charts. Analysis of variance and covariance.

Course Outcomes:
On completion of the course the student should be able to
- Relate different methodologies and techniques used in research work.
- Develop research problem and research proposals.
- Apply statistical techniques and analyse data.
- Write research report and thesis in proper formats

Note: There will be nine questions in theory paper in total from all four units of syllabus. First question is compulsory and set from all four units. Students will have to attempt any five questions in all selecting at least one question from each unit.

Books Recommended:
1. Operations Research Methods and Practices, CK Mustafi
2. Operations Research, Kantiswarup, PK Gupta, Manmohan
3. Business Statistics, Gupta and Gupta
4. Theory and problems of probability and Statistics, MP Spiegel
5.Research Methodology (Methods and Techniques), C.R. Kothari, New Age Publisher.
6. Fundamentals of modern statistical methods, Rand R. Wilcox

PFL-701   **Textile and Apparel Testing**

L T P   Credits: **Theory   Exam: 80   Marks**
3 2 0 5   **Duration of Exam: 3 hrs**
Internal Assessment Marks: 20 + External Marks of Theory Exam: 80 = Total Marks: 100

Objectives: Course
The course is designed to make the students:
  • To understand in depth concepts of fibre, yarn, fabric and apparel testing and instruments.
  • To acquire the knowledge about mechanism of working and designing instruments.
  • To understand sampling techniques and statistical applications in textile testing.
  • To know testing of specially designed functional and breathable textiles.
  • To measurement of low stress mechanical properties and fabric comfort analysis.

Unit – I
Introduction: Aim and scope of testing, Sample and Population, Sampling techniques. Fibre, yarn and fabric testing concepts, instruments and applications.
Fabric comfort properties: water-vapor transmission through fabrics, Wicking properties, Air permeability and wettability.

Unit – II
Overview of low stress mechanical properties, FAST, Kawabata Evaluation System. Analysis of KES, FAST data.
Garment testing concepts, instruments and applications: dimensions, seam strength, seam slippage, adhesion between interlining and fabric, shrinkage, zippers, buttons, snap fasteners and other general garment properties. Needle cutting/yarn severance.

Unit – III
Testing of specially designed fabrics and finishes: Flame resistance, Water repellency, etc. Computer colour matching: concept of colour measurement and applications. Different fastness (light, washing, perspiration, sublimation, chlorine, etc.) properties and their evaluation.

Unit – IV
Testing of Technical Textiles: Testing of filtration characteristics, test for geotextiles, test for protective clothing, test of various form of medical textiles, tests for carpets and nonwoven fabrics.
International quality parameters and various standards such as AATCC, SDC, ASTM, etc. Innovation in textile and garment testing.

Course Outcomes:
After completion of the course, students will be able to:
  • Relate the importance of concepts, techniques and analysis in research areas.
  • Perform proper sampling techniques and procedures for testing and in research.
  • Evaluate the influence of fibre, yarn and fabric properties on apparel quality/functionality.
  • Use analytical skills to assess performance and to develop insight into developing innovative quality product.

Note: There will be nine questions in theory paper in total from all four units of syllabus. First question is compulsory and set from all four units. Students will have to attempt any five questions in all selecting at least one question from each unit.

Books Recommended:

1. Physical Testing of Textiles, Wood head Publishing Ltd, Cambridge, 2002. Saville B P
2. Testing and Quality Management, Ed. V. K. Kothari, IAFL Publications, New Delhi, 1999, V. K. Kothari.
3. Principles of Textile Testing", CBS Publishers and Distributors, New Delhi, 1999, Booth J E.
4. Textile Testing, SSM Institute of Textile Technology, Angappan P & Gopalakrishnan, R,Komarapalayam, 2002.
5. Apparel quality Control, V.K. Mehta
6. Basu A, "Textile Testing", SITRA Coimbatore, 2002.

PFL-702   **Technical Textiles**

L T P   Credits: **Theory Exam: 80 Marks**
3   2   0   5   **Duration of Exam: 3 hrs**
Internal Assessment Marks: 20 + External Marks of Theory Exam: 80 = Total Marks: 100

Course Objectives:
The course is designed to make the students understand about:
- Application and development of textiles in technical areas.
- Advancement in technology and its tremendous impact in various spheres of life including electronics, sports, medical, defence by bringing functionality in apparels.
- Innovations and future prospectus of technical textile industries.

Unit – I
Technical Textiles: Introduction Definition & Scope, Development Processes, Applications, Globalizations, Future prospects of technical textile industry. Various textile materials in technical textile applications.
Filtration textiles and their application. Definition of filtration parameters, filtration requirements. Characteristics properties of fibres and fabrics in selective examples of filtration.

Unit – II
Geotextiles: Mechanics of reinforcement, filtration and drainage of soils by geotextiles. essential properties of geotextiles, different geotextile materials and applications.
Automotive Textiles: Application of textiles in automobiles, requirement and design for different tyres, airbags and belts. Brief description for the manufacture and application of these devices or parts.
Sewing threads, ropes and Cordages: Methods of production and Application, functional requirements, structure and properties.

Unit – III
Medical textiles: Textiles in various medical applications. Absorbency of textile materials and methods of sterilization. Textiles product in sanitation. application oriented design of typical medical textiles (e.g. porous graft or trashed tube). Sun protection factor. Materials used and design procedure for protecting wounds, cardiovascular application, Sutures, etc
Sports and recreation textiles: Functional requirement of different type of product and their construction. Moisture management in textiles and garment.

Unit – IV
Protective Clothing: protective clothing and their applications, functional requirement of textiles in defence including ballistic protection materials and parachute cloth, temperature and flame retardant clothing, chemical protective clothing, water proof breathable fabrics. Protection from electromagnetic radiation and static hazards. Protection against micro-organisms, chemicals and pesticides. Electronic textiles and their applications. Clothing for space suits. Advancement in protective clothing.

Course Outcomes:
After completion of the course, students will be able to:
- Know and evaluate various raw materials and development processes to be used in technical textiles.
- Apply technical knowledge in developing geo/sports/automotive textiles with enhanced functionality.
- Impart functionality by understanding utility of electronic component in medical textile or design of typical medical textiles by grafting or protecting wounds through sutures or other applications.
- Apply technical know-how in protective clothing against chemicals/thermal/radiation.

Note: There will be nine questions in theory paper in total from all four units of syllabus. First question is compulsory and set from all four units. Students will have to attempt any five questions in all selecting at least one question from each unit.

Books Recommended:
1. "Industrial Textile", Ed., J Svedova, Elsevier, New York, 1990.
2. "Wellington Sears Handbook of Industrial Textiles", Ed. Sabit Adanaur, Technimic
Publishing Company, Inc., Pennsylavania, USA, 1995.
3. "Engineering with Geosynthetics", Ed. G V Rao and G V S Raju, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1990.
4. "Handbook of Technical Textiles", Ed. A R Horrocks and S C Anand, Woodhead
Publication Ltd., Cambridge, 2000.
5. 'Sewing Threads' (Textile Progress, Vol. 30, No. 3/4, 2000) J. O. Ukponmwan,
A. Mukhopadhyay and K. N. Chatterjee, Textile Institute, Manchester, UK, ISBN 1 87037238 7.
6. Mukhopadhyay S K and Partridge J F, "Automotive Textiles", Vol. 29, No. ½, TheTextile Institute, 1999.

PFL-703 **Advances in Apparel Technology**
L T P **Credits:**   **Theory Exam: 80 Marks**
3 2 0   5   **Duration of Exam: 3**
Internal Assessment Marks: 20 + External Marks of Theory Exam: 80 = Total Marks: 100

Course Objectives:
The course is designed to make the students understand about:
- Innovation and advancement in stitching technology
- Various kinds of machines and their utility and their developments.
- Automation and applications of programmable machines in garment industries.
- Ergonomic concepts and applications

Unit – I
Innovation in seams, stitches, sewing thread, needles, marker, planning and cutting technology.

Unit – II
Understanding the need and use of various construction types for sewing machinery in regards to quality and performance improvement and ease to operate,
Advancement in sewing Machinery: Directive for operating special purpose sewing machinery. Various bed types of machine and their applications in manufacturing processes: Flat Bed, large area Raised Bed, DNLS m/c, Over Lock m/c, Flat Lock m/c, Multi thread Chain Stitch m/c, Blind stitch machine and their developments.

Unit – III
Various types of feed mechanisms, their suitability for different fabrics and construction of components and their contribution towards quality and productivity. Application of programmable machines in garment industries. Developments and automation in garment manufacturing machines and industries.

Unit – IV
Scientific approach in sewing techniques. Ergonomic concepts and application in the sewing room, Introduction of time targets and quality aspects, Practical approach to achieve targets, Understanding of different shaped sewing lines in actual garments, Material Handling, Postural Techniques, Work Study, Working Time Arrangement, Shift Work, Motion Economy, anthropometric, Basic Sewing Patterns, Convex sewing pattern, Curved sewing pattern, Angular sewing pattern, etc

Course Outcomes:
After completion of the course, students will be able to:
- Gain insight of innovations and advancements in stitching technology
- Develop understanding and functionality of various kinds of machines and their utility.
- Get exposure about automation and applications of programmable machines in garment industries.
- Apply Ergonomic concepts and applications in time studies.

Note: There will be nine questions in theory paper in total from all four units of syllabus. First question is compulsory and set from all four units. Students will have to attempt any five questions in all selecting at least one question from each unit.

Suggested Text Books & References:

1. Knitted Clothing Technology, Bracken burry
2. The Technology of Clothing Manufacture, Harold Carr, Barbara Latham
3. Introduction to Clothing Manufacture, Gerry Cooklin

CPE-RPE-022   **RESEARCH & PUBLICATION ETHICS**

L T P Credits: 2   **Theory Exam: 40 Marks**
3 0 0   **Duration of Exam: 3**

Internal Assessment Marks: 10 + External Marks of Theory Exam: 40 = Total Marks: 50

Course Objectives:

- To study the philosophy of ethics
- To study the scientific conduct of research
- To study the publication ethics
- To know about various journal citation databases
- To know the importance of quality publications

UNIT – I

PHILOSOPHY AND ETHICS   (3 Hrs)

1.   Introduction to philosophy: definition, nature and scope, concept, branches

2.   Ethics: definition, moral philosophy, nature of moral judgments and reactions
SCIENTIFIC CONDUCT (5 Hrs)
1.   Ethics with respect to science and research
2.   Intellectual honesty and research integrity
3.   Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
4.   Redundant publications: duplicate and overlapping publications, salami slicing
5.   Selective reporting and misrepresentation of data

UNIT - II
PUBLICATION ETHICS (7 Hrs)
1.   Publication ethics: definition, introduction and importance
2.   Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
3.   Conflicts of interest
4.   Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
5.   Violation of publication ethics, authorship and contributorship
6.   Identification of publication misconduct, complaints and appeals
7.   Predatory publishers and journals 8.

UNIT - III
DATABASES AND RESEARCH METRICS (7 Hrs)
(A)   Databases (4 Hrs)
1.   Indexing databases
2.   Citation databases: Web of Science, Scopus, etc.
(B)   Research Metrics (3 Hrs)
1.   Impact Factor of journal as per Journal Citation Report, SNIP, SIR, IPP, Cite Score
2.   Metrics: h-index, g index, i10 index, altmetrics

UNIT - IV
 Practice
OPEN ACCESS PUBLISHING (4 Hrs)
1.	Open access publications and initiatives
2.	SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3.	Software tool to identify predatory publications developed by SPPU
4.	Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.
PUBLICATION MISCONDUCT (4 Hrs)
(A)	Group Discussions
1.	Subject specific ethical issues, FFP, authorship
2.	Conflicts of interest
3.	Complaints and appeals: examples and fraud from India and abroad
(B)	Software tools (2 hrs.) :Use of plagiarism software like Tumitin, Urkund and other open source software tools

Course Outcomes:
By completion of course the student is able to
1.	Ethics in conduct of scientific research
2.	Know the scientific misconducts
3.	How to avoid plagiarism and what are the penalties of plagiarism
4.	Know the quality of research publications
5.	Write research and review articles.

References:
1. Bird, A. (2006). Philosophy of Science, Routledge
2. P. Chaddah (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarised.
3. Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance (2019).
4. Beall, J (2012), Predatory publishers are corrupting open access. Nature, 489(7415),179.
5. National Academy of Sciences, National Academy of Engineering and Institute of Medicine (2009). On being a Scientist: A guide to Responsible Conduct in Research, Third Edition, national Academic press.

Note: The examiner has to set a total of nine questions (two from each unit and one compulsory question consisting of short answer from all units. The candidate has to attempt one question each from each unit along the compulsory question.

PPP- 721   **Independent Study**
L T P   Credits
0 2 6   5

Course Objectives:
The course is designed to make the students:
- Independent and enable to pursue research based on professional area of interest.
- Learn and review literature and to explore suitable research methodology
- Gain confidence and experience in appreciating the selection of research problem

Study of research oriented activities involving problem formulation, literature review, plan of the research work related to the Ph.D. topic. The student is required to present the same in department.

Note: Assessment/ evaluation of the candidate will be carried out by internal board of examiner on the basis of literature review, proposal, presentation and viva voce.

Course Outcome:
After completing the course, research scholar should be able to:
- Demonstrate a command on applying research approaches, methodologies and scientific principles in problem formulation.
- Demonstrate an ability to develop research report and communicate effectively through presentations in an area of specific professional or personal interest related to textiles.

PPP- 722   **Scientific Communications**
L T P   Credits:
0 2 6   5

Course Objectives:
The course is designed to make the students:
-   Understand about the use of ICT in scientific research and communication.
-   Learn about using appropriate English grammar research proposals and report writing
-   Write and publish research papers and prepare oral/poster presentations.

Application of computer and information technology in scientific research: operating system, use of software package such as MS Office, Power Point, Excel, SPSS, etc. application of data base of literature via internet.
Introduction of English Grammar: Word Choice, Sentence Structure, paragraph structure and comprehension.
Types of Scientific Communications, Basic concept of paper writing, Importance of publishing research papers, writing review articles, citation index/impact factor

Publishing Research paper:
a) Preliminaries, Format, Choosing Journal
b) Title, Running Title
c) Authors: Single and Multi authorship
d) Writing Abstract
e) Introduction section
f) Materials and Methods Section
g) Result Section
h) Figures: Design Principles, Legends, Table components, Graphs: Types, Style,
Tables v/s Graph
i) Discussion Section: Format, Grammar Style, Content.
j) Acknowledgements
k) References : Different Styles
l) Selecting Keywords
m) Communication with the Editor, Handling Referees' Comments, Galey Proofs

Preparing and Delivering of Oral and Poster Presentations
Avoiding Plagiarism, introduction to intellectual property rights i.e. patent and copy right, etc.
Preparing documents for MoUs, Confidentiality Agreements.
The research student is required to prepare a concept paper/working paper/review paper by reviewing at least 40-60 research papers/reference books/ etc. The student is required to present the same in department/conference/ seminar/ workshop/ journal.

Course Outcome:
After completing the course, research scholar should be able to:
•   Demonstrate a command of applying ICT tools and scientific communication skills by preparing a concept paper/working paper/review paper by reviewing at least 40-60 research papers/reference books/ etc.
•   Demonstrate his research skills and present the same in department/conference/ seminar/ workshop/ journal.
Note: Evaluation/ assessment in terms of submission of scientific communication/ article in journal or to the concern guide.

PPP-723   **Software Packages Lab**

L T P   Credits
0 2 2   3

Course Objectives:
The course is designed to make the students:
- To impart an understanding about the fundamentals, principles and application of CAD.
- To give hands on training to students on Pattern making and Grading software's and their use in Fashion Designing field.
- To learn about print development, logo designing, making fashion illustration and designing with the help of softwares.
- To be familiar with various graphics approaches using design software.

Study and application of tools and software packages related to the topic and discipline of the study and department.
- Mat Lab, Or cad, Lab view, Math cad etc simulation and software packages in Electronic and Communications Engineering.
- Pattern making, grading and marker making, Textile and apparel testing and designing software's in Fashion and Technology.

Course Outcomes:
After completing the course, research scholar should be able to:
- Demonstrate a command of tools and techniques used for pattern making and grading.
- Develop garment designing by using CAD softwares.
- Appreciate and acquire skills of designing software in Fashion.
- To utilize the software in apparel industry.

Note: Evaluation/ assessment of the candidate in terms of practical exam and viva voce by internal board of examiner.