# CURRICULUM
# OF
# BS TEXTILES IN
# GARMENT MANUFACTURING
# SCHOOL OF TEXTILE AND DESIGN

Uncertainty assistant married

Year 2020

# UNIVERSITY OF MANAGEMENT AND TECHNOLOGY, LAHORE

# CURRICULUM DIVISION, UMT

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# CONTENTS

# PREFACE

The curriculum is a plan of an educational learning process that students of an academic programme undergo to achieve some specific objectives. It includes scheme of studies, objectives & learning outcomes, course contents, teaching methodologies and assessments or evaluations. Since knowledge in all disciplines and fields is expanding at a fast pace and new disciplines are also emerging, it is imperative that curricula be developed accordingly.

In Pakistan, University Grant Commission (UGC) was designated as the competent authority to develop, review and revise curricula beyond Class-XII vides section 3, Sub-Section 2 (ii), Act of Parliament No. X of 1976 titled "Supervision of Curricula and Textbooks and Maintenance of Standard of Education". With the repeal of UGC Act, the same function was assigned to the Higher Education Commission (HEC) under its Ordinance of 2002, Section 10, Sub-Section 1(v). As University of Management and Technology (UMT) is recognized by the Higher Education Commission (HEC) as a 'W4' category (highest rank) university, therefore in compliance with the above provision, the curriculum of BS Textiles was developed through eminent professors and researchers of relevant textile field from public and private sector textile professionals, R&D organizations, industry and civil society by seeking nominations from their organization.

In order to impart quality education in the Textile profession, UMT has developed the BS Textiles curriculum to meet indigenous needs and international standards. It is hoped that this curriculum document, prepared by the BOS of the UMT serve the purpose of meeting our national, social and economic needs and it would also provide the level of competency specified in Pakistan Qualification Framework to make it compatible with international educational standards.

# 1. MINUTES OF THE 27th ACADEMIC COUNCIL MEETING

The 27th Academic Council (AC) / Board of Studies (BOS) meeting of curriculum development for BS Textiles was held at UMT main campus, Johar Town Lahore dated 21st August 2019. The objective was to finalize the curriculum of BS Textiles program. The following honourable members attended the meeting.

| Sr. No. | Name & Organizational Address | Status |
|---|---|---|
| 1 | Dr. Mumtaz Hassan Malik<br>Dean/Professor,<br>School of Textile & Design,<br>University of Management & Technology,<br>C-II, Johar Town, Lahore | Convener |
| 2 | Dr. Zafar Javed<br>Assistant Professor/ Director FHSS<br>National Textile University,<br>Sheikhupura Road, Faisalabad | Member |
| 3 | Dr. Salman Naeem<br>Assistant Professor<br>National Textile University,<br>Sheikhupura Road, Faisalabad | Member |
| 4 | Dr. Mudassar Abbass<br>Associate Professor<br>School of Textile & Design,<br>University of Management & Technology,<br>C-II, Johar Town, Lahore | Member |
| 5 | Mr. Ahmed Fraz<br>Assistant Professor<br>School of Textile & Design,<br>University of Management & Technology,<br>C-II, Johar Town, Lahore | Member |
| 6 | Mr. Kamar Haider<br>Assistant Professor<br>School of Textile & Design,<br>University of Management & Technology,<br>C-II, Johar Town, Lahore | Member |
| 7 | Miss. Faiza Anwar<br>Assistant Professor<br>School of Textile & Design,<br>University of Management & Technology,<br>C-II, Johar Town, Lahore | Member |
| 8 | Mr. Asim Siddique<br>Deputy Manager<br>School of Textile & Design,<br>University of Management & Technology, | Member |

| | | |
|---|---|---|
| | C-II, Johar Town, Lahore | |
| 9 | Mr. ???????<br>Registrar<br>School of Textile & Design,<br>University of Management & Technology,<br>C-II, Johar Town, Lahore | |

The meeting started with the recitation of verses from the Holly Quran Majeed. Prof. Dr. Mumtaz Hassan Malik/ Dean, STD welcomed the participants/guests and assured best of his support in making the curriculum development. Mr. Ahmed Fraz, HOD School of Textiles and Desgin, briefed the participants about the aims and objectives of the meeting with a particular focus on outcome based education (OBE) of BS Textiles. The objective is to make the curriculum compatible with national or international standards, satisfying indigenous demands as well as ensuring the uniformity of academic standards within the country.

Dr. Mumtaz Hassan Malik, Dean/professor, School of Textile & Design, University of Management and Technology started proceedings of the meeting in accordance with the Agenda. The committee, during the proceedings of the meeting, considered the inputs given by the members of the committee and incorporated their suggestions where necessary in the curriculum.

After thorough discussion of full day, the BOS committee achieved the following objectives:

- Finalized the draft curriculum in the discipline of BS Textiles with the needs of national and international standards.
- Vision, mission and scope of the discipline.
- Developed the course learning outcomes (CLO) with program learning objectives (PLO).
- Incorporated latest reading materials/references against each course.
- Develop contents with uniformity keeping in view the futuristic needs of the society and international scenario.
- Developing the contents without overlapping across other disciplines.
- Finalized the intake criteria for BS Textiles program.
- Dr. Zafar Javed briefed the participants about the OBE, its implementation and incorporation into the curricula with special focus to curriculum of BS Textiles.
- The convener of the UMT thanked the members for the inputs in finalizing the draft curriculum of BS Textiles by keeping in view the national and international requirements that make it more effective, competitive and practical.
- The committee highly appreciated the efforts by Mr. Registrar, Deputy Manager Asim Siddiqui for making proper arrangement to facilitate the members of the committee.
- The meeting ended with the vote of thanks to and from the chair.

# 2. ROADMAP OF BS TEXTILES IN GARMENT MANUFACTURING

**First Semester** `

| Code | Course Title | Theory | Lab | Total |
|---|---|---|---|---|
| ISL-101 | Islamic Studies | 2 | 0 | 2 |
| TL-105 | Introduction to Textile and Clothing industry | 3 | 0 | 3 |
| EN-104 | Functional English | 3 | 0 | 3 |
| CS-100 | Fundamentals of Information Technology | 2 | 1 | 3 |
| MA-100 | Calculus – I | 3 | 0 | 3 |
| NS-124 | Applied Physics | 3 | 1 | 4 |
| | **Total** | **16** | **2** | **18** |

**Second Semester**

| Code | Course Title | Theory | Lab | Total |
|---|---|---|---|---|
| TL-102 | Textile Fibers | 3 | 0 | 3 |
| EN-130 | Communication and Presentation Skills | 3 | 0 | 3 |
| DW-101 | Basic Drawing | 0 | 3 | 3 |
| MA-103 | Calculus -II | 3 | 0 | 3 |
| CH-108 | Applied Chemistry | 3 | 1 | 4 |
| POL-101 | Pakistan Studies | 2 | 0 | 2 |
| | **Total** | **14** | **4** | **18** |

**Third Semester**

| Code | Course Title | Theory | Lab | Total |
|---|---|---|---|---|
| TL-204 | Yarn Manufacturing | 3 | 1 | 4 |
| TL-206 | Fabric Manufacturing | 3 | 1 | 4 |
| TL-209 | Textile Wet Processing | 3 | 1 | 4 |
| EN-225 | Technical Writing | 3 | 0 | 3 |
| SS-201 | Critical Thinking | 3 | 0 | 3 |
| | **Total** | **15** | **3** | **18** |

**Fourth Semester**

| Code | Course Title | Theory | Lab | Total |
|---|---|---|---|---|
| ME-202 | Mechanical Engineering Fundamentals | 3 | 1 | 4 |
| TL-211 | Technical Textiles | 3 | 1 | 4 |
| MG-201 | Team Management | 3 | 0 | 3 |
| TL-212 | Garment Illustration | 0 | 3 | 3 |
| EE-251 | Electrical and Electronic Engineering Fundamentals | 3 | 1 | 4 |
| | **Total** | **12** | **6** | **18** |

**Fifth Semester**

| Code | Course Title | Theory | Lab | Total |
|---|---|---|---|---|
| MG-301 | Organizational Behavior | 3 | 0 | 3 |
| TL-308 | Garment Manufacturing | 3 | 1 | 4 |
| TL-309 | Garment Industry Utilities | 3 | 0 | 3 |
| TL-312 | Digital Communications | 0 | 2 | 2 |
| TL-313 | Anthropometry and Garment Construction | 1 | 2 | 3 |
| | **Total** | **10** | **5** | **15** |

**Sixth Semester**

| Code | Course Title | Theory | Lab | Total |
|---|---|---|---|---|
| TL-314 | Apparel Designing | 1 | 2 | 3 |
| TL-315 | Human Factors & Ergonomics | 3 | | 3 |
| TL-316 | Basics of Industrial Engineering | 3 | 1 | 4 |
| TL-356 | Production Planning and Control | 3 | 0 | 3 |
| TL-318 | Apparel Finishing | 1 | 2 | 3 |
| | **Total** | **11** | **5** | **16** |

**Seventh Semester**

| Code | Course Title | Theory | Lab | Total |
|---|---|---|---|---|
| MG-401 | Supply Chain Logistics | 3 | 0 | 3 |
| MK-402 | Marketing and Merchandising | 3 | 0 | 3 |
| TL-401 | Sustainable Textiles | 3 | 0 | 3 |
| MG-450 | Entrepreneurship | 3 | 0 | 3 |
| TL-491 | Capstone Project-I | 0 | 3 | 3 |
| | **Total** | **10** | **5** | **15** |

**Eighth Semester**

| Code | Course Title | Theory | Lab | Total |
|---|---|---|---|---|
| TL-402 | Apparel Machinery and Equipment | 2 | 1 | 3 |
| TL-411 | Quality Characterization of Apparel | 1 | 2 | 3 |
| QM-460 | Total Quality Management | 3 | 0 | 3 |
| TL-492 | Capstone Project– II | 0 | 3 | 3 |
| | **Total** | **5** | **7** | **12** |

**Total Credit Hours = 130**

# 3. FRAMEWORK OF BS TEXTILES IN GARMENT MANUFACTURING

| | |
|---|---|
| Duration | 4 years |
| Number of semesters | 8 |
| Number of weeks per semester | 16 - 18 (16 for teaching and 2 for examinations) |
| Duration of each class | **1 lecture credit** = 1 hour, **1 lab credit** = 3 hours |
| Total number of credit hours | 130 |
| Number of credit hours per semester | 12-18 |
| Textile and Clothing Courses | 65 - 70 % |
| Other Courses | 30 - 35 % |

| **Non-Engineering Domain** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Knowledge Area** | **Course Name** | **LEC** | **LAB** | **CR** | **Total Courses** | **Total Credits** | **Area wise %** | **Overall %** |
| **Humanities** | Functional English | 3 | 0 | 3 | 5 | 13 | 27.08 | 10 |
| | Communication & Presentation Skills | 3 | 0 | 3 | | | | |
| | Technical Writing | 3 | 0 | 3 | | | | |
| | Islamic Studies | 2 | 0 | 2 | | | | |
| | Pakistan Studies | 2 | 0 | 2 | | | | |
| **Social Sciences** | Critical Thinking | 3 | 0 | 3 | 2 | 6 | 12.5 | 4.61 |
| | Human Factors and Ergonomics | 3 | 0 | 3 | | | | |
| **Management Sciences** | Organizational Behavior | 3 | 0 | 3 | 5 | 15 | 31.25 | 11.53 |
| | Entrepreneurship | 3 | 0 | 3 | | | | |
| | Total Quality Management | 3 | 0 | 3 | | | | |
| | Team Management | 3 | 0 | 3 | | | | |
| | Marketing and Merchandising | 3 | 0 | 3 | | | | |
| **Natural Sciences** | Calculus-I | 3 | 0 | 3 | 4 | 14 | 29.17 | 10.76 |
| | Calculus-II | 3 | 0 | 3 | | | | |
| | Applied Physics | 3 | 1 | 4 | | | | |
| | Applied Chemistry | 3 | 1 | 4 | | | | |
| **Sub Total** | | **46** | **2** | **48** | **16** | **48** | **100** | **36.92** |

| Engineering / Specialization Domain | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Knowledge Area** | **Course Name** | **LEC** | **LAB** | **CR** | **Total Courses** | **Total Credits** | **Area wise %** | **Overall %** |
| **Computing** | Fundamentals of Information Technology | 2 | 1 | 3 | 2 | 5 | 6.10 | 3.84 |
| | Digital Communication | 0 | 2 | 2 | | | | |
| **Engineering Foundation** | Introduction to Textile and Clothing Industry | 3 | 0 | 3 | 10 | 34 | 41.5 | 26.15 |
| | Textile Fibers | 3 | 0 | 3 | | | | |
| | Basic Drawing | 0 | 3 | 3 | | | | |
| | Basics of Industrial Engineering | 3 | 1 | 4 | | | | |
| | Yarn Manufacturing | 3 | 1 | 4 | | | | |
| | Fabric Manufacturing | 3 | 1 | 4 | | | | |
| | Textile Wet Processing | 3 | 1 | 4 | | | | |
| | Garment Illustration | 0 | 3 | 3 | | | | |
| | Quality Characterization of Apparel | 1 | 2 | 3 | | | | |
| | Sustainable Textiles | 3 | 0 | 3 | | | | |
| **Major-based core / Specialization** | Garment Manufacturing | 3 | 1 | 4 | 9 | 29 | 35.36 | 22.30 |
| | Apparel Finishing | 1 | 2 | 3 | | | | |
| | Apparel Designing | 1 | 2 | 3 | | | | |
| | Technical Textiles | 3 | 1 | 4 | | | | |
| | Production Planning and Control | 3 | 0 | 3 | | | | |
| | Supply Chain Logistics | 3 | 0 | 3 | | | | |
| | Garment Industry Utilities | 3 | 0 | 3 | | | | |
| | Apparel Machinery and Equipment | 2 | 1 | 3 | | | | |
| | Anthropometry and Garment Constructions | 1 | 2 | 3 | | | | |
| **Inter-Disciplinary Engineering** | Mechanical Engineering Fundamentals | 3 | 1 | 4 | 2 | 8 | 9.76 | 6.15 |
| | Electrical & Electronic Engineering Fundamentals | 3 | 1 | 4 | | | | |
| **Senior Design Project** | Capstone Project-I | 0 | 3 | 3 | 2 | 6 | 7.32 | 4.62 |
| | Capstone Project-II | 0 | 3 | 3 | | | | |
| | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Total** | **50** | **32** | **82** | **25** | **82** | **100** | **63.08** |
| **Grand Total** | **95** | **36** | **130** | **41** | **130** | **100** | **100** |

## 4. SUMMARY

| Domain | Knowledge Area | Total Courses | Total Credits | % Overall |
|---|---|---|---|---|
| **Non-Engineering / Other Courses** | Humanities | 5 | 13 | **36.92** |
| | Social Sciences | 2 | 6 | |
| | Management Sciences | 5 | 15 | |
| | Natural Sciences | 4 | 14 | |
| | **Sub Total** | **16** | **48** | |
| **Engineering / Specialization** | Computing | 3 | 9 | **63.08** |
| | Foundation | 8 | 30 | |
| | Major-based Core | 10 | 29 | |
| | Inter-Disciplinary Engineering | 2 | 8 | |
| | Capstone Project | 2 | 6 | |
| | **Sub Total** | **25** | **82** | |
| **Total** | | **41** | **130** | **100** |

# BS TEXTILES (BSTEX) IN GARMENT MANUFACTURING

**Semester – I**

1. Introduction to Textile and Clothing Industry

**Semester – II**

1. Textile Fibers
2. Basic Drawing

**Semester – III**

1. Yarn Manufacturing
2. Fabric Manufacturing
3. Textile Wet Processing

**Semester – IV**

1. Mechanical Engineering Fundamentals
2. Technical Textiles
3. Team Management
4. Garment Illustration

**Semester – V**

1. Organizational Behavior
2. Garment and Clothing
3. Garment Industry Utilities
4. Digital Communication
5. Anthropometry and Garment Construction

**Semester – VI**

1. Apparel Designing
2. Human Factors & Ergonomics
3. Basics of Industrial Engineering
4. Production Planning and Control
5. Apparel Finishing

**Semester – VII**

1. Supply Chain Logistics
2. Marketing and Merchandising
3. Sustainable Textiles
4. Entrepreneurship

**Semester – VIII**

1. Apparel Machinery and Equipment
2. Quality Characterization of Apparel
3. Total Quality Management

# 5. COURSE SPECIFICATIONS

## COURSE CONTENTS- HUMANITIES

1. Functional English
2. Communication & Presentation Skills
3. Technical Writing
4. Islamic Studies
5. Pakistan Studies

## COURSE CONTENTS- SOCIAL SCIENCES

1. Critical Thinking
2. Human Factors and Ergonomics

## COURSE CONTENTS- MANAGEMENT SCIENCES

1. Organizational Behavior
2. Entrepreneurship
3. Total Quality Management
4. Team Management
5. Marketing and Merchandising

## COURSE CONTENTS- NATURAL SCIENCES

1. Calculus-I
2. Calculus-II
3. Applied Physics
4. Applied Chemistry

## COURSE CONTENTS- COMPUTING

1. Fundamentals of Information Technology
2. Digital Communication

## COURSE CONTENTS- ENGINEERING FOUNDATION

1. Introduction to Textile and Clothing Industry
2. Textile Fibers
3. Basic Drawing
4. Basics of Industrial Engineering
5. Yarn Manufacturing
6. Fabric Manufacturing
7. Textile Wet Processing

8. Garment Manufacturing
9. Apparel Finishing
10. Apparel Designing
11. Technical Textiles
12. Production Planning and Control
13. Supply Chain Logistics
14. Garment Industry Utilities
15. Apparel Machinery & Equipment
16. Anthropometry and Garment Constructions
17. Garment Illustration
18. Quality Characterization of Apparel
19. Sustainable Textiles

# 6. DETAILS OF COURSES

## 6.1. COURSE CONTENTS- HUMANITIES

1. Functional English
2. Communication & Presentation Skills
3. Technical Writing
4. Islamic Studies
5. Pakistan Studies

**Course Title**

**Functional English**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding of English speech skills<br>- Interact in a variety of settings that range from casual speech of everyday conversation to more academic content | | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| | - Share their experiences, express their opinions and relate the target language to their personal lives | | | |
| 2 | Analytical and problem solving skills<br>- Read and respond to the texts and learn comprehension skills such as, inference, comparing and contrasting, drawing conclusion, self-questioning, problem-solving, relating background knowledge, distinguishing between fact and opinion, finding the main idea, important facts, and supporting details. | | 5 | 3 |
| 3 | Communication, interpersonal skills<br>- Use target structures in writing to express their ideas<br>- Feel confident in using diverse discourse patterns of spoken and written English | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

This is the first course in a series of three required English language courses designed to upgrade English language proficiency of English as a second language learners at undergraduate level. All four language skills (listening, speaking reading and writing,) will be focused. This course has been designed by keeping in mind to make the learners autonomous through learner-centered approach. It will enable the learners to locate, extract and synthesize the required information from texts; as a result, their cognitive and critical thinking skills will be developed. In addition to that, the focus on reading will activate and reinforce their other language skills. They will be engaged in topic relevant discussions with peers and they will reflect on their own learning. It will prepare the learners to understand varied writing styles with attention to grammar, syntax, content and organizational structure. Read and respond to the texts and learn comprehension skills such as, inference, comparing and contrasting, drawing conclusion, self-questioning, problem-solving, relating background knowledge, distinguishing between fact and opinion, finding the main idea, important facts, and supporting details.

**Module-1: Introduction**

- Introduction of the Course
- Diagnostic test
- Narrative paragraph writing
- Grammar (Past Tense)

**Module-2: Descriptive paragraph writing**

- Descriptive paragraph writing
- Grammar (adjectives, adverbs)

**Module-3: Transitional words & phrases**

- Use of discourse markers(transitional words & phrases
- Explanation with reference to the context
- Peer assessments

**Module-4: Symbolism & use of inference**

- Symbolisms
- Use of inference
- Peer assessments

**Module-5: Critical analysis**

- Critical Analysis
- Explanation with reference to the context

**Module-6: Skimming skills**

- Review
- Themes
- Skimming skill

**Module-7: Speculation & deduction**

- Speculation & deduction (reading, speaking, writing activities)

**Module-8: Comparison and contrast writing**

- Comparison and contrast writing
- Peer assessments

**Module-9: Figures of speech**

- Figures of speech
- Explanation with reference to the context
- Grammar (Present Tense)

**Module-10: Cause & effect writing**

- Cause & effect writing
- Portfolio (self-assessment)

**Module-11: Final project presentation**

- Work on final project (peer assessment & feedback)
- Final project presentation

**Teaching methods & Assessments**

Course will be conducted on the lecture based discussion models along with homework assignments and evaluations through quizzes, Midterm and Final Term examinations. To ensure

class participation of the attendees, students will be encouraged to raise more and more questions during and after the lectures

**Bibliography / References**


1. Steinbeck, J. (1992). The pearl. Viking Press.
2. Coelho, P. (1993). The Alchemist. Harper Collins Publishers.
3. Azar, B., & Hagen, S. (2011). Fundamentals of English Grammar (Fourth Edition ed.). New York: Pearson Longman.


## Course Title

## Communication & Presentation Skills

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding of English speech skills<br>- To train the students to speak and write appropriately at the personal and professional front<br>- To help in building up the students' interpersonal and intrapersonal communication skills through different assignments and activities, which include, writing in formal and informal settings | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- the emphasis is on speaking with appropriate body language, logical reasoning to convey messages to an audience<br>- Specifically focused on certain grammatical components along with intensive reading to enhance students' written and spoken discourse in general | | 5 | 3 |
| 3 | Communication, interpersonal skills | | 4 | 4 |

| | | | | |
|---|---|---|---|---|
| | - Explain the concept of good communication, demonstrate communication skills through class discussion and activities while analyzing the text,<br>- Use different expression in their writing and verbal speech,<br>- According to the needs of audience to convey message,<br>- Develop argumentative and persuasive messages according to the purpose and topic, etc. | | | |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

It is an advanced level English module that aims to train the students to speak and write appropriately at the personal and professional front. The course contents are selected after careful speculation to cater the needs of our students in the market. This module will help in building up the students' interpersonal and intrapersonal communication skills through different assignments and activities, which include, writing in formal and informal settings. Basically it aims to enriched students with the important tools of writing and speaking expressions while keenly considering creative faculty. In this module students will use language according to the context with professional undertones. Along with writing there is great emphasis on enhancing speaking skills. All together the emphasis is on speaking with appropriate body language, logical reasoning to convey messages to an audience. Moreover, it has specifically focused on certain grammatical components along with intensive reading to enhance students' written and spoken discourse in general. Participants will be able to explain the concept of good communication, demonstrate communication skills through class discussion and activities while analyzing the text, use different expression in their writing and verbal speech, according to the needs of audience to convey message, develop argumentative and persuasive messages according to the purpose and topic, give an effective presentation with appropriate use of body language, write error free sentences, especially correct use conditional sentences and articles, appear in a formal interview

**Module-1: Introduction to communication**

- Reading
- Writing
- Listening
- Speaking
- Soft Skills
- Overview of Tenses

**Module-2: Reading, listening and writing skills**

- Reading comprehension (discussion)
- Visual documentaries
- Novel

**Module-3: Grammar & writing**

- Tenses usage in novel and role of adjectives
- Character's intro and description
- Descriptive writing in discussion

**Module-4: Reading & speaking**

- Novel (role play activity or discussion)
- Chapter # 5&6
- Presentation on assigned topic to develop an argument
- Reading comprehension
- Tenses (Past tense)

**Module-5: Reading comprehension**

- Reading comprehension (writing/speaking activity)
- Novel chapter 7 and chapter 8

**Module-6: Reading, comprehension and writing skills**

- Novel chapter 9 and chapter 10, visual documentary
- (Discussion/writing)
- Tenses (Future Tense)

**Module-7: Public speaking**

- Novel Chapters 11 & 12
- How to speak effectively, analyzing your audience, using verbal and non-verbal techniques.

**Module-8: Pronunciation/ Stress/ Misused & Mispronounced words (Practice)**

- Sentence error correction
- Informal presentations
- Reading comprehension (Novel based)
- Revision of the Syllabus
- Theme
- Character of novel
- Role of Symbols
- Relating with real life settings
- Character's psyche
- Discussion/ Writing

**Module-9: Reading comprehension (discussion and worksheet)**

- Novel Time Machine

- Chapter 1, 2 & 3

**Module-10: Convincing ideas in the mind**

- Persuasion aspect in the light of Novel
- How Time traveler convince audience about time travelling and its possibility.
- Assigning students various situation to convince audience about the ideas in their mind.
- Role of rationale and concrete evidences.
- Soft Skills (social graces, communication abilities, language skills, personal habits, cognitive or emotional empathy, time management, teamwork and leadership traits)
- Chapter 4 and chapter 5

**Module-11: Presentation**

- Presentation skills
- 3ps of presentation skills
- Reading comprehension (activity) (NOVEL)
- Topics will be assigned
- (discussion)
- Chapter 6, chapter 7, chapter 8, chapter 9

**Module-12: Presentation**

- Revision of Grammar/error analysis exercises from the novel
- (Discussion/Review)
- Sentence error correction practice
- Chapter 10, chapter 11 and chapter 12
- (Survey/ Documentary/ Project)
- Short report (Discussion/writing)
- Reading comprehension
- Visual Comprehension (Documentaries)

**Teaching methods & Assessments**

Course will be conducted on the lecture based discussion models along with homework assignments and evaluations through quizzes, Midterm and Final Term examinations. To ensure class participation of the attendees, students will be encouraged to raise more and more questions during and after the lectures. Assessment will be made on eye contact, body language, poise, enthusiasm, cohesion and coherence, grammar, confidence, elocution, subject knowledge, organization, organization, content, stating facts and vital information. Supporting your stance with strong evidence and logical arguments

**Bibliography / References**

1. Williams, T., Clift, M., Harris, J., Tandy, J., Wayne, D., Sacker, H., & HarperCollins (Firm). (1991). The Glass Menagerie. New York: HarperCollins Publishers.
2. Theobald, T. (2011). Develop your presentation skills. London; Philadelphia: Kogan Page.

3. Azar, B. S., & Hagen, S. A. (2009). Understanding and using English grammar. White Plains, NY: Pearson Longman.

Introduction with Novels

1. The Time Machine by HG Wells.
2. Lord of the Flies by William Golding.
3. Meta Marphosis by Franz Kafka

## Course Title

## Technical Writing

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding of English speech skills<br>- To train the students to write appropriately at the personal and professional front<br>- Develop cognitive and critical thinking by analyzing a variety of texts<br>- Analyze the given reading material in terms of facts and opinions and further utilizing it in written skill | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- Identify and solve their problems through self-assessment techniques and improve their language proficiency<br>- Engage in topic relevant discussions with peers in the context of "The Animal Farm | | 5 | 3 |
| 3 | Communication, interpersonal skills<br>- Explain the concept of communication, demonstrate communication skills through class discussion and activities while analyzing the text,<br>- Writing formal/informal letters and business communication patterns | | 4 | 4 |

| | | | | |
|---|---|---|---|---|
| | - Reflect on their own learning while evaluating their writing skills | | | |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

This course is designed to improve and polish the communication skills through reading and writing, Portfolio maintenance, online and book resources for grammar exercises, are included to emphasize personal, reflective, and analytical writing that forms the basis of academic and professional communication. This course fosters the development of writing faculty in any context. In addition, this course incorporates the proper utilization of critical observation and analytical thinking through Novel & formal/ informal presentations. Through variety of activities including portfolios, writing genres and peer critiques, students are motivated to place a high emphasis on content, purpose, audience and overall coherence patterns.

**Module-1: Introduction**

- Portfolios Introduction
- Grammar
- Present Tenses

**Module-2: Reading and visual comprehension**

- Novel chapter 1
- Grammar
- sentence structure
- Sub-Verb agreement
- Picture Description Writing
- Reading and visual comprehension in the light of the novel

**Module-3: Grammar & review**

- Novel chapter 2 & chapter 3
- (Reading comprehension & Review)
- Grammar
- Past Tenses/irregular verbs

**Module-4: Reading & speaking**

- Novel chapter 4 & chapter 5
- Discussion on the double standards in the light of the novel
- (Implementing it on real life scenarios)
- Verbal activity

**Module-5: Reading comprehension**

- Novel chapter 6 & chapter 7
- Reading Comprehension
- Future Tenses/ Comparison of tenses

- (video clips will be shown)

**Module-6: Reading and discussion**

- Novel chapters 8 & chapter 9
- Impending action and transition in text
- Reading & discussion

**Module-7: Human behaviors**

- Novel chapter 10
- Overview
- Circumstance that stress characters
- Symbols
- Human behaviors and real life inferences

**Module-8: Review writing**

- Letter writing
- Format provided
- Vocabulary provided
- Modal verbs and their usage
- Review Writing (Online Articles)

**Module-9: Technical writing**

- Technical Writing
- Researching
- Essays Academic Writing/ Drafting the Essay
- Researching overview

**Module-10: Writing employment**

- Applying three steps writing process
- Includes: Brief messages/ Writing Employment
- Messages (Official Messages) and interviewing for jobs

**Module-11: Writing resume**

- Building and writing resume/ Analyzing formal report
- Giving positive and negative official messages
- In the light of samples and modern day official communication

**Module-12: Presentation Do's and Don'ts**

- Presentation Do's and Don'ts
- Visual Aspects highlighted

**Teaching methods & Assessments**

Course will be conducted on the lecture based discussion models along with homework assignments and evaluations through quizzes, Midterm and Final Term examinations. To ensure

class participation of the attendees, students will be encouraged to raise more and more questions during and after the lectures. Assessment will be made on eye contact, body language, poise, enthusiasm, cohesion and coherence, grammar, confidence, elocution, subject knowledge, organization, organization, content, stating facts and vital information. Supporting your stance with strong evidence and logical arguments

**Bibliography / References**


1. Bove'e, courtland L., & Thill, J. V. (2019). Business Communication Today (14th ed.). Pearson.
2. Bovee, C. L., & Thill, J. L. (2017). Business Communication Today (13th ed.). Pearson.
3. Campbell, D. N. (2014). Business Academic Skills (5th ed.). Sydney: Pearson.
4. Hewings, M. (2013). Advanced Grammar in Use. Italy: Cambridge University Press.
5. Murphy, R. (2007). Essential grammar in use. Cambridge University Press.
6. Vince, M., & Sunderland, P. (2003). Advanced language practice. Italy: Macmillan Publishers Limited.


## Course Title

## Islamic Studies

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding of personality skills and movements<br>- Provide participant with good knowledge of all issues pertaining to Islamic state-structure<br>- Enabling them to understand the current needs of the society | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- To encourage students to make their own unbiased analysis of that tradition independent of confines and paradigms of existing contemporary discourses on Islam. | | 5 | 3 |
| 3 | Communication, interpersonal skills | | 4 | 4 |

| | | | | |
|---|---|---|---|---|
| | - Knowledge about history, culture and geography of Pakistan.<br>- To briefly discuss some of the issues and challenges confronting Islam in today's world | | | |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

The Course is designed to familiarize students with the Islamic tradition, to encourage them to independently engage that tradition and to ascertain its relevance to the modern individual and society. Students are expected to directly engage the authors of the texts, determine what each author is trying to convey and raise questions on author's arguments. There will be no attempt to impose a single viewpoint or methodology and students are encouraged to bring their perspectives and experiences to bear on the course.

**Module-1: The Hadith of Gibraeel**

- Islam
- Imaan
- Ihsan

**Module-2: Islamic Scholarly Tradition**

- Understanding the multiplicity in legal thought

**Module-3: Interpreting Quran**

- Textual and Thematic Tafsir

**Module-4: Understanding Prophecy**

- The Life of Muhammad ﷺ

**Module-5: Freewill and Predestination**

- The importance of human actions and accountability

**Module-6: Importance of Actions and Intentions**

- Actions and Intentions

**Module-7: Islamic Commercial Law**

- Fiqh Ul Muamalaat

**Module-8: Woman rights**

- Islam, gender and women rights

**Module-9: Islamic Finance and issues**

- Issues of finance

**Teaching methods & Assessments**

Course will be conducted on the lecture based discussion models along with homework assignments and evaluations through quizzes, Midterm and Final Term examinations. To ensure class participation of the attendees, students will be encouraged to raise more and more questions during and after the lectures

**Bibliography / References**


1. Muslim Society by Ernest Gellner, Cambridge University Press, Vol.32, ISSN: 0068-6794, 1995.
2. Globalized Islam by Olivier Roy, Columbia University Press, 2004.
3. Making Islam Democratic by Asef Bayat, Stanford University Press, 2007.
4. Islamic Law: Social and Historical Contexts by Aziz al-Azmeh, Routledge, USA, 2013.


## Course Title

## Pakistan Studies

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding of personality skills and movements<br>- Provide participant with good knowledge of all issues pertaining to nation-building and state-structure,<br>- Enabling them to understand the current needs of the society,<br>- Provide participant with a comprehensive Knowledge of remedial measures for overcoming impediments inherent in socio-political fabric. | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- Deals with the issues confront by Pakistan in the contemporary age more specifically related to the internal law and order situation and with constitutional and political development. | | 5 | 3 |

| | | | | |
|---|---|---|---|---|
| 3 | Communication, interpersonal skills<br>- Knowledge about history, culture and geography of Pakistan. To understand the constitutional problems faced by newly independent state | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

This multidimensional course seeks to encompass wide range of issues pertaining to nation-building and state-structure in Pakistan and provides awareness about the remedial measures for overcoming impediments inherent in socio-political fabric. The half of course outline deals with the Freedom Movement and the remaining deals with the issues confront by Pakistan in the contemporary age more specifically related to the internal law and order situation and with constitutional and political development. To enhance students' knowledge about history, culture and geography of Pakistan. To understand the constitutional problems faced by newly independent state. To learn about socio-political and legal development. To be acquainted with the foreign relations of Pakistan

**Module-1: Introduction to Independence and rise of Muslim nationalism**

- Learn about independence and sacrifices
- War of Independence 1857
- Rise of Muslim Nationalism in Subcontinent(A Constitutional Struggle: Reforms of 1909, 1919, 1935)

**Module-2: Khilafat movement**

- Learn about the worth of sacrifices and movements
- Simla deputation
- Khilafat Movement

**Module-3: Indo-Pak historical 14 Points of Quaid-e-Azam**

- Nehro Report
- 14 Points of Quaid-e-Azam

**Module-4: Indian Act 1935**

- Indian Act of 1935
- Congress Ministries

**Module-5: Pakistan Resolution**

- Pakistan Resolution 1940
- Elections of 1945-46

**Module-6: Redcliff Award**

- 3rd June Plan 1947

- Radcliff Award 1947

**Module-7: Constitution of 1947**

- Interim Constitution of 1947
- Early Problems faced By Pakistan

**Module-8: Interesting facts about Pakistani Prime Ministers and Army chiefs**

- Names, Interesting facts about Pakistani Prime Ministers & Presidents
- Army chiefs and Chief Justices of Supreme Court

**Module-9: Foreign Policy Analysis**

- Foreign Policy analysis (1947-1962)
- Foreign Policy (1962-1979)
- Foreign Policy(1979-99)

**Module-10: War against Terrorism**

- War Against Terrorism(2000-2013)
- Brief Introduction to the Constitutional Amendments
- 18th Amendment: Criticism and Evaluation

**Module-11: National action plans and issues**

- National Action Plan
- Pakistan Protection Ordinance & 21st Amendment
- Issues of New Provinces
- Baluchistan Issue: Causes and Remedies
- CPEC : Importance and Controversies
- Financial Action Task Force

**Teaching methods & Assessments**

Course will be conducted on the lecture based discussion models along with homework assignments and evaluations through quizzes, Midterm and Final Term examinations. To ensure class participation of the attendees, students will be encouraged to raise more and more questions during and after the lectures

**Bibliography / References**


4. Cohen, Stephen, P. The Idea of Pakistan, Lahore. Vanguard, 2005
5. Haqqani, Husain, Pakistan: between Mosque and Military Washington. Carnegie Endowment for International Peace. 2005.
6. Karim, Arshad, Pakistan: From Community to Nation, Karachi,
7. Saad Publications.1978
8. Qureshi, Ishtiaq, The Struggle for Pakistan, Karachi, University of Karachi. 1987.
9. Wasim, Muhammad, State and Society in Pakistan, London, McMillan Publications
10. Ziring, Lawrence, Pakistan in the Twentieth Century: A Political history, Karachi, Oxford University Press. 2000

## 6.2. COURSE CONTENTS- SOCIAL SCIENCES

1. Critical Thinking
2. Human Factors and Ergonomics

### Course Title

### Critical Thinking

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Develop an in-depth understanding of the concept and process of critical thinking.<br>- Ability to take ownership of content through actively thinking it through, value questions more than answers, and seek understanding over memorization. | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- Enable and apply the general principles of logic that make patterns of argument valid or invalid. | | 5 | 3 |
| 3 | Design, synthesis and evaluation skills<br>- Know themselves better, which is the key to Critical Thinking.<br>- Understand the basic tools and rules involved in Critical Thinking.<br>- Identify the many ways in which thinking can go wrong and what to do to avoid them. | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Apply a strategy to analyze and evaluate arguments.<br>- Become independent self-directed thinkers and learners | | 4 | 4 |

| | | | | |
|---|---|---|---|---|

**Course Contents:**

**Aim, scope & Objective:**

Everyone thinks as it is our nature to do so. But much of our thinking is confounded by distortions, biases and prejudices, and is in many instances uninformed and partial. It would not be an exaggeration to say that the quality of our life depends in crucial ways on the quality of our thinking. Disciplined thinking is all about personal empowerment, and it helps us greatly to take charge of our intellects. Excellence in thought, however, requires systematic cultivation. This course provides an introduction to the tools and techniques of logic and critical thinking, and their application in various arenas of life. Through an appreciation of context, identification of pitfalls and application of a strategy, this course hopes to bring to life the process of thinking and argumentation.

**Module-1: Introduction**

- Introduction to critical thinking
- Benefits and barriers to critical thinking

**Module-2: Truth and means**

- What is truth and what does it mean to know

**Module-3: Good opinions and evidences**

- How good is your opinion?
- What is Evidence?

**Module-4: Arguments**

- Recognizing arguments & basic
- Logical concepts: What is and isn't an argument?

**Module-5: Language**

- Finding the Right Words
- The pitfalls
- The basic problem
- Logical fallacies:
- Fallacies of relevance

**Module-6: Inductive reasoning and generalization**

- Fallacies of Insufficient Evidence.
- Inductive Reasoning
- Inductive Generalizations

**Module-7: Induction and causal arguments**

- Induction and analogy
- Induction and causal arguments

**Module-8: Thinking critically**

- Thinking critically about moral issues

**Teaching methods**

**Assessments**

**Bibliography / References**


1. Chaffee, John. THINKING CRITICALY. Tenth . Boston: Wadsworth, 2012.
2. Gregory Bassham, William Irwin, Henry Nardone and James M. Wallace. CRITICAL THINKING A Student's Introduction. fourth . New York: The McGraw-Hill Companies, 2011.
3. Ruggiero, Vincent Ryan. Beyond Feelings: A guide to Critical thinking. Nineth. New York: The McGraw-Hill Companies, 2012.


**Course Title**

**Human Factors and Ergonomics**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Provide participant with good knowledge of all the preparatory processes,<br>- Enabling them to understand the current needs of industry,<br>- Provide participant with a comprehensive Knowledge of different pre-treatments prior to dyeing and printing, which will help out the student to understand whole industry mechanism. | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- Ability to analyze problems faced by industry and their remedies. The detail knowledge of different parameters will help participant to understand why industry need these parameters and industrial need of managing these parameters like singeing, | | 5 | 3 |

| | | | | |
|---|---|---|---|---|
| | desizing, scouring, bleaching, mercerizing and as well as bio technology. | | | |
| 3 | Design, synthesis and evaluation skills<br>- Ability to design layout, industrial operational optimization and skill improvements | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Ability to communicate the methods adopted to solve the problems and to present the final solution | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

It covers a broad spectrum of ergonomics and human factors issues with a focus on the design, operation and management of contemporary manufacturing systems, both in the shop floor and office environments, in the quest for manufacturing agility.

**Module-1: Introduction to Human factors and ergonomics**

- Learn about application of psychological and physiological principles to the (engineering and) design of products, processes, and systems

**Module-2: Inter related disciplines**

- Learn about the influence of field on numerous disciplines, such as psychology, sociology, engineering, biomechanics, industrial design, physiology, anthropometry, interaction design, visual design, user experience, and user interface design

**Module-3: Goals of occupational health, safety and productivity**

- Learn about inter relevance of the mentioned objects

**Module-4: Domains of specialization**

- Learn about three main sub fields: physical, cognitive and organizational ergonomics

**Module-5: History of the field**

- Learn about history of the field its application in ancient societies
- In industrial societies
- In aviation

**Module-6: Information age**

- Learn about human–computer interaction
- Human factors in their product design. Using advanced technologies in human kinetics, body-mapping, movement patterns and heat zones, ,expertise to manufacture purpose-

specific garments, including full body suits, jerseys, shorts, shoes and sometimes undergarments.

**Module-7: Methods used to evaluate human factors and ergonomics**

- Learn about Ethnographic analysis
- Iterative Design(prototyping)
- Task analysis

**Module-8: Methods used to evaluate human factors and ergonomics**

- Methods analysis
- Time studies
- Work sampling
- Predetermined time systems

**Module-9: Complexity of human society**

- Learn about Macro ergonomic analysis of structure (MAS): This method analyzes the structure of work systems according to their compatibility with unique sociotechnical aspects.
- Macro ergonomic analysis and design (MEAD): This method assesses work-system processes by using a ten-step process

**Module-10: Process Safety Management**

- Human Error
- Errors of Intent
- Errors of Action
- Prevention and fixation

**Module-1: Phases of ergonomics**

- Phase I—Concept Selection
- Phase II—Preliminary Engineering
- Phase III—Detailed Engineering

**Teaching methods**

**Assessments**

**Bibliography / References**


11. Handbook of human factors and ergonomics by Gavriel Salvendy, 4th Edition, Wiley
12. Occupational ergonomics: Theory and application by Amit Bhattacharya and James D. McGlothlin 2nd Edition, CRC press
13. Work measurement and ergonomics by Robert Wayne Atkins, Grandpappy Inc

## 6.3. COURSE CONTENTS- MANAGEMENT SCIENCES

1. Organizational Behavior
2. Entrepreneurship
3. Total Quality Management
4. Team Management
5. Marketing and Merchandising

**Course Title**

**Organization Behavior**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to apply knowledge of management, business and industry, especially textile industry to the solution of complex textile business problems in the competitive global business environments. | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- Ability to identify, formulate, research literature and analyze complex textile business management problems reaching substantiated conclusions by using the principles and techniques of management and business strategy. | | 5 | 3 |
| 3 | Design, synthesis and evaluation skills<br>- Ability to communicate effectively on complex textile management activities with the business community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions | | 4 | 3 |

| | | | | |
|---|---|---|---|---|
| 4 | Communication, interpersonal & IT skills<br>- Ability to create, select and apply appropriate techniques, resources, and modern management technique & tools and IT tools, including prediction and modelling, to complex textile management & business problems, with an understanding of the limitations. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To have advance leadership roles in modern organization. Translation of management and organizational behavior theory to practices that result in organizational effectiveness, efficiency, and human resource development.

**Module-1: Introduction?**

- What is organizational behaviour & Why it is important
- Theories of organizational behavior
- Compare and contrast theories of organizational behavior.
- Definition of organizational behavior.
- Identify the theories and principles, examine challenges of organizational behavior.
- Determine when and where the theories and skills are applied

**Module -2: Management Issue**

- Analyze management issues.
- Shaping the employees behavior to get the results you need.
- Explore Management issues such as diversity, attitudes and job satisfaction, personality, and values in organizational behavior.
- Explore the underlining theories behind issues such as emotions and motivation.
- Examine these issues management faces, identify applicable theories and principles, and determine when and where the theories and skills are applied.

**Module -3: Ethical Issues**

- Analyze management issues.
- Shaping the employees behavior to get the results you need.
- Explore Management issues such as diversity, attitudes and job satisfaction, personality, and values in organizational behavior.
- Explore the underlining theories behind issues such as emotions and motivation.
- Examine these issues management faces, identify applicable theories and principles, and determine when and where the theories and skills are applied.

**Module -4: Challenges of Communication**

- Examine challenges of effective organizational communication.
- Communicate through writing, reading, speaking, and listening.
- Presented with the basics of communication, methods and tools used in organizational communication, barriers to communication, implications for managers, and scenarios to identify each

**Module -5: Leadership, Power & Management**

- Examine the differences and similarities between leadership, power, and management.
- Examine the components and theories behind leadership, power, and politics.
- Analyze real situations where leadership, power, and politics are illustrated positively and negatively.
- Take these scenarios and distinguish the differences and similarities between leadership, power, and management

**Module -6: Impact of Structure & Design**

- Assess the impact that a company's structure and design can have on its organizational behavior.
- Sets the framework for what work gets done, who does it, where it gets done, and the tools needed to get it done.
- Analyze the foundations and designs of organizational structures and assess the impact it may have on organizational behaviors

**Module -7: Impact of Culture**

- Assess the impact of culture on organizational behavior.
- Strong organizational culture provides stability for an organization.
- Define culture, compare different organizational cultures.
- Examine characteristics of cultures, explore global implications, and examine creating and sustaining a positive culture.
- Assessing the impact of culture on organizational behavior

**Teaching Methods**

**Assessments**

**Bibliography / References**


1) Organization Theory by Mary Jo Hatch
2) Organization, Class and Control by Stewart Clegg and David Dunkerle. Well, this one is a classic. Published in 1980
3) Case studies

**Course Title**

**Entrepreneurship**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to apply knowledge of management, business and industry, especially textile industry to the solution of complex textile business problems in the competitive global business environments. | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- Ability to identify, formulate, research literature and analyze complex textile business management problems reaching substantiated conclusions by using the principles and techniques of management and business strategy. | | 5 | 3 |
| 3 | Design, synthesis and evaluation skills<br>- Ability to communicate effectively on complex textile management activities with the business community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Ability to create, select and apply appropriate techniques, resources, and modern management technique & tools and IT tools, including prediction and | | 4 | 4 |

| | | | | |
|---|---|---|---|---|
| | modelling, to complex textile management & business problems, with an understanding of the limitations. | | | |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

This course provides a broad overview of the principles, theories, and practice of entrepreneurship, together with an understanding of the key tasks, skills, and attitudes required. To learn the opportunities offer real feasibility, sustainability and growth potential.

**Module-1: Introduction?**

- The Concept of Entrepreneurship
- The Economist view of Entrepreneurship
- The Sociologist view of Entrepreneurship
- Behavioral Approach
- Entrepreneurship and Management

**Module -2: The Practice of Entrepreneurship**

- The Process of Entrepreneurship and garment industry
- Entrepreneurial Management
- The Entrepreneurial Business
- Entrepreneurship in Service Institutions
- The New Venture

**Module -3: Entrepreneurship & Innovation**

- The Innovation Concepts
- Importance of Innovation for entrepreneurship
- Sources of innovative opportunities
- The Innovation Process
- Risks involved in innovation

**Module -4: Developing Entrepreneurship**

- Entrepreneurial profile
- Trait approach to understanding entrepreneurship
- Factors influencing entrepreneurship
- The Environment
- Socio cultural factors
- Support Systems

**Module -5: Entrepreneurship Organization**

- Team work
- Networking organization
- Motivation and compensation
- Value system

**Module -6: Entrepreneurship & SMES**

- Defining SMEs, Scope of SMEs related to garment
- Managers of SME
- Financial and marketing problems of SMEs

**Module -7: Entrepreneurial Marketing**

- Framework for developing entrepreneurial marketing
- Devising entrepreneurial marketing plan + Business Plan
- Framework for developing entrepreneurial marketing
- Devising entrepreneurial marketing plan

**Module -8: Entrepreneurship & Economic Development**

- Role of entrepreneur in the economic development generation of services, Employment creation and training
- Ideas, knowledge and skill development
- The Japanese experience

**Teaching Methods**

**Assessments**

**Bibliography / References**


- Small Business and Entrepreneurship, Paul Burns and Jim Dew Hurst
- Entrepreneurship for Economic Growth P.N. Singh:
- Innovation and Entrepreneurship: Peter F. Drucker
- Entrepreneurial Success John B. Miner:
- Case studies


**Course Title**

**Total Quality Management**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to apply knowledge of management, business and industry, especially textile industry to the solution of complex textile business problems in the competitive global business environments. | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- Ability to identify, formulate, research literature and analyze complex textile business management problems reaching substantiated conclusions by using the principles and techniques of management and business strategy. | | 5 | 3 |
| 3 | Design, synthesis and evaluation skills<br>- Ability to communicate effectively on complex textile quality management activities with the business community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Ability to create, select and apply appropriate techniques, resources, and modern quality management technique & IT tools | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To study about basic testing of raw material, semi-product and final product of textile, especially textiles & clothing products testing. Another aim is to learn methods to control quality of production of textile materials in various stages of manufacturing

**Module-1: Introduction?**

- Introduction to Quality & TQM
- Definitions, History and Importance of Quality, Quality Gurus, Quality & Competitive advantage.
- Defining Quality, Evolution of Quality Concepts
- Contributions of Gurus of the field

**Module -2: Leadership**

- Leadership and management concepts
- Elaborate implementation
- Module -3: Strategic Quality Planning
- Explain role of leaders
- Explain Deming philosophy and industrial response

**Module -4: Quality Management Framework**

- Malcolm Baldrige Award
- Deming Prize
- ISO Series; ISO 9000, 14000 (environment)
- 26000 (social responsibility)

**Module -5: Customer Satisfaction & Employment**

- Who is customer? Customer perception of Quality and Feedback.
- Using customer Complaints to enhance quality.
- Quality through Motivation.
- Motivation Theories. Benefit of employee involvement.
- Role of Teams in TQM, Quality Circles

**Module -6: Continuous Process Improvement**

- The Juran Trilogy. Improvement Strategies. Types of Problem.
- The PDCA Cycle. Problem Solving Method.
- Kaizen, Process Re-engineering
- Poka Yoke (mistake proofing)

**Module -7: Supplier Partnership & Performance**

- Partnering. Sourcing, Supplier Selection.
- Principles of Customer-Supplier Relationship. Supplier Rating and relationship development.
- Performance Measures. Strategies
- Quality Control Tools: Check Sheets, Pareto Diagrams, Process Flow diagrams, Scatter Diagrams, Cause & Effect Diagrams, Histograms

**Module -8: Control Charts**

- Control charts: X Bar Charts, R charts

- Attribute control charts

**Module -9: Advance Quality Control Tools**

- Affinity Diagram & Interrelationship Diagram
- Matrix Diagram & Prioritization Matrix
- PDPC & Activity Network Diagram

**Module -10: Quality Function Development**

- Benefits, House of Quality, Building HOQ
- Experimental Design: Single factor, two factor designs, Orthogonal Design, Full Factorials
- Total Productive Maintenance (TPM)

**Teaching Methods**

**Assessment**

**Bibliography**


1. Fundamentals of Total Quality Management by Jens J.Dahlgaard, Kai Kristensen, and Gopal K.Kanji. Taylor and Francis
2. Total Quality Management by NVR Naidu, KM Babu, and G Rajendra. New Age International Publishers
3. Mechanics of Materials by Ferdinand Pierre Beer, 2008


**Course Title**

**Team Management**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to apply knowledge of management, business and industry, especially textile industry to the solution of complex textile business problems in the competitive global business environments. | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Ability to identify, formulate, research literature and analyze complex textile | | 4 | 3 |

| | | | | |
|---|---|---|---|---|
| | business management problems reaching substantiated conclusions by using the principles and techniques of management and business strategy. | | | |
| 3 | Communication, interpersonal & IT skills<br>- Ability to communicate effectively on complex textile management activities with the business community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions<br>- Ability to create, select and apply appropriate techniques, resources, and modern management technique & tools and IT tools, including prediction and modelling, to complex textile management & business problems, with an understanding of the limitations. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Analytical skills for the process of business management. Includes evaluation of management systems and business strategy in textile & amp; clothing manufacturing, sales, merchandise planning, developing the presentation of textiles & apparel lines, and finalizing textiles & apparel lines through merchandising and budget review.

**Module -1: Introduction**

- Human Resource Management
- Process & Organization Management
- Project Management Team Concept

**Module -2: HR Management Process**

- Acquire Project Team
- Develop HR Plan
- Develop Project Team
- Manage Project Team

**Module -3: Develop HR Plan**

- Identifying and documenting project roles, responsibilities, and required skills.
- Reporting relationships, and creating a staffing management plan.
- Determine and identify human resources with the necessary skills required for project success.
- Enterprise environmental factors.
- Organizational process assets.
- Organization charts & position description.
- Organizational theory.
- Roles and Responsibilities (Role, Authority, Responsibility, and competency).
- Project Organization Charts.

**Module -4: Acquire Project Team**

- Process of confirming human resource availability and obtaining the team.
- Negotiation and influence Skills
- Virtual Team & Resource calendars.
- Management plan updates Inputs Tools & Techniques
- Organization standard policies, processes, and procedure

**Module -5: Develop Project Team**

- Improve the competencies, team interaction, and the overall team environment to enhance project performance.
- Acquire skills to identify, build, maintain, motivate, lead, and inspire project team to achieve high team performance and meet the project's objectives.
- Improve knowledge and skills.
- Improve feeling of trust and agreement among team members.

**Module -6: Develop Staff Assignment**

- Project staff assignments.
- Project management plan.
- Resource calendars.
- Interpersonal skills.
- Training & Team building activities.
- Recognition and rewards.
- Team performance assessment.

**Module -7: Staff Assignments Documents**

- Identify the people who are on the team.

- Project management plan identifies training strategies.
- Plans for developing the project team.
- Resource calendars identify times when the project team members can participate.
- Interpersonal skills & Training.

**Module -8: Team Performance Assessment**

- Team performance assessment criteria.
- The evaluation of team effectiveness.
- Improvement in skills, Improvements in competencies.
- Reduced staff turnover rate
- Increased team cohesiveness.
- Enterprise environmental factors updates.

**Teaching Methods**

**Assessments**

**Bibliography/ References**


- The 17 Indisputable Laws of Teamwork: Embrace Them and Empower Your Team by John Maxwell
- A Team of Leaders: Empowering Every Member to Take Ownership, Demonstrate Initiative, and Deliver Results by Paul Gustavson and Stewart Liff
- The Team Building Activity Book by Venture Team Building


**Course Title**

**Marketing and Merchandising**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to apply knowledge of management, business and industry, especially textile industry to the solution of complex textile | | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| | business problems in the competitive global business environments. | | | |
| 2 | Design, synthesis and evaluation skills<br>- Ability to identify, formulate, research literature and analyze complex textile business management problems reaching substantiated conclusions by using the principles and techniques of management and business strategy | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to communicate effectively on complex textile management activities with the business community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions<br>- Ability to create, select and apply appropriate techniques, resources, and modern management technique & tools and IT tools, including prediction and modelling, to complex textile management & business problems, with an understanding of the limitations. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Includes evaluation of merchandise in textiles & clothing sales, merchandise planning, developing the presentation of textiles & apparel lines, and finalizing textiles & apparel lines through merchandising and budget review.

**Module -1: Introduction to Marketing & Merchandizing**

- Textile Industry Overview & Facts
- Importance of the merchandising in the Textile Industry
- Overview of Marketing & merchandising activities
- Overview of retail management

**Module -2: Modern Merchandizing**

- Historical perspective
- Structural changes in the apparel industry
- Private label and private brand apparel
- Today's merchandiser
- Responsibilities of the merchandiser
- Traits of a merchandiser
- Module -3: World Clothing Market
- How to target the markets?
- Market segmentation
- Alternate marketing
- Market research

**Module -4: Planning & Control**

- The importance of planning & control in global environment.
- Changing consumer demands
- Planning and control tools
- Understanding of the marketing & merchandising calendar etc.
- Interfacing with other departments

**Module -5: Line Development: Principles, Process, Technology**

Response time & Design environment

Element of line development & Line plan

Styling direction and style development

Line development and computer technology

**Module -6: Clothing & Price Strategies**

- Examine the pricing formula
- Strategies used to determine wholesale selling prices of garment styles
- Analyze the costing principle and the its
- Explore costing strategies and their effects on product mixes.

**Module -7: Clothing Supply Chain Management**

- Supply chain management in apparel industry
- Effect of demand-activated manufacturing architecture on the apparel industry.
- The role of control, communication. And collaborating in supply chain management

**Module -8: Sourcing Process**

- Domestic sourcing process

- Factors that are evaluated in making domestic sourcing decisions.
- International sourcing process
- Factors that are evaluated in making international sourcing decisions.
- Problems associated with managing the sourcing function

**Module -9: Sourcing Strategies**

- Global sourcing for apparel
- Role of merchandiser in the development of sourcing strategies.
- Analyze internal manufacturing, domestic sourcing and offshore sourcing options

**Module -10: Clothing Quality Management**

- Understand the role of quality in apparel products.
- Identify consumers' quality expectations.
- Identify the apparel company's role in meeting the needs of its targeted consumer

**Teaching Methods**

**Assessments**

**Bibliography/ References**


1. Fundamentals of Marketing Tenth Edition by William J. Stanton, Michael J. Etzel & Bruce J. Walker
2. Apparel Merchandising: The Line Starts Here by Jeremy A. Rosenau and David L. Wilson, Fairchild Publications, 2010
3. Principles of Marketing 14th Edition (A South Asian Perspective) by Kotler, Armstrong, Agnihotri and Haque
4. Papers and case studies


## COURSE CONTENTS-NATURAL SCIENCES

## COURSE TITLE:

## Calculus I

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- To understand the concepts of calculus-I | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Techniques of handling functions i.e. calculating the limits and continuity functions | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- To develop mathematical models of engineering | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Understand the basic limit and continuity of a function and apply it upon various polynomial, root, trigonometric, logarithmic and exponential functions. Grasp the concept of derivative of a function and applying different techniques to differentiate and optimize various functions. Handle indefinite integral of a given function and to be able to apply it for finding the areas between the curves and finding the volumes.

**Module-1: Trigonometric functions**

- Inequalities, lines, circles, and parabolas
- Functions and graphs , trigonometric functions, calculating limits using the limit laws

**Module -2: Limits, continuity and tangents**

- One-sided limits and limits at infinity , vertical asymptotes, continuity
- Equation of tangent, the derivative as a function, differentiation rules

**Module -3: Derivatives of trigonometric functions**

- Derivative as a rate of change, derivatives of trigonometric functions, the chain rule and parametric equations
- Implicit Differentiation, Extreme Values of Functions

**Module -4: Theorem of Calculus**

- The Mean Value Theorem, Monotonic Functions and The First Derivative Test , Indeterminate Forms and L'Hôpital's Rule
- The Fundamental Theorem of Calculus, Indefinite Integrals and the Substitution Rule

**Module -5: Integration Formulas**

- Basic Integration Formulas, Integration by Parts
- Integration of Rational Functions by Partial Fractions Trigonometric Integrals

**Module -6: Logarithms and exponential function**

- Trigonometric Substitutions, Improper Integrals
- Natural Logarithms, The Exponential Function
- $a^x$ and $\log_a x$ , Hyperbolic Functions

**Teaching Methods**

**Assessments**

**Bibliography / References**


1. Swokowski, Olinick and Pence, Calculus and Analytical Geometry, 6th edition, 1994, Brooks/Cole Publishers
2. Howard Anton, Calculus, 7th edition, 2002, John Wiley and Sons (WIE)
3. William E. Boyce Richard C. Diprima, Calculus, John Wiley and Sons, ISBN: 0471093335.
4. Erwin Kreyzing, Advanced Engineering Mathematics, 7th edition, 1993, John Wiley and Sons


## COURSE TITLE:

## CALCULUS II

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- To understand the advance concepts of calculus-II | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Techniques of handling functions i.e. calculating the limits and continuity functions | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- To develop mathematical models of engineering | | 4 | 4 |

| | | | | |
|---|---|---|---|---|

**Course Contents:**

**Aim, scope & Objective:**

To prepare the students to understand comparatively for the advanced concepts than the concepts they learnt in Calculus-I Course. To make the participants learn the techniques of handling multivariable functions i.e. calculating the limits and continuity of multivariable functions, partial differentiation, multiple integrals, etc. To enhance the vision of participants in developing mathematical models of engineering.

**Module-1: Limit & Continuity**

- Functions of several variables, limit & continuity
- Partial derivatives
- The chain rule

**Module -2: Derivatives and tangent planes**

- Directional Derivatives
- Gradient vectors
- Tangent Planes

**Module -3: Differentials and regions**

- Linearization & Differentials
- Extreme values & Saddle points
- Absolute Extrema over closed and bounded regions
- Double integrals over rectangular regions

**Module -4: Integrals and regions**

- Double integrals over non rectangular regions
- Area integrals and Volumes
- Double integrals in Polar coordinates
- Triple integrals in Rectangular coordinates
- Triple integrals in Cylindrical & spherical coordinates
- Line integral
- Surface integral
- Green's theorem

**Module -5: Theorem and Functions**

- Stoke's Theorem
- Fourier Series
- Perodic Functions
- Functions of any period P-2L
- Even & odd functions

- Half Range expansions

**Module -6: Transform**

- Fourier Transform
- Laplace Transform
- *Z-Transform*

**Teaching Methods**

**Assessments**

**Bibliography / References**


1. Thomas' Calculus, 11th Edition
2. Calculus with Analytical Geometry, E.W. Swokowski, Latest edition.
3. Transforms and Applications Handbook, A.D. Poularikas (3ed, CRC, 2010)
4. Howard Anton, Calculus, 10th edition, John Wiley and Sons (WIE).
5. Erwin Kreyzing, Advanced Engineering Mathematics, 7th edition, 1993, John Wiley and Sons.
6. Swokowski, Olinick and Pence, Calculus and Analytical Geometry, 6th edition, 1994, Brooks/Cole Publishers
7. Howard Anton, Calculus, 7th edition, 2002, John Wiley and Sons (WIE)
8. William E. Boyce Richard C. Diprima, Calculus, John Wiley and Sons, ISBN: 0471093335.
9. Erwin Kreyzing, Advanced Engineering Mathematics, 7th edition, 1993, John Wiley and Sons


## COURSE TITLE:
## APPLIED PHYSICS

Credit Hour Details:

Theory: 02 Practical: 1 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- To understand the concepts of vectors and scalars | | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| | - Electric field and distribution of charges | | | |
| 2 | Design, synthesis and evaluation skills<br>- Techniques of managing current and resistances in alternating circuits | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- To develop electrical models of engineering | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Vectors and Scalars, Components of vectors, Multiplying vectors, Scalar product, Vector product, Coulomb's law, electric field due to a single charge and distribution of charges, electric flux and Gauss's law, electric potential due to a single charge and distribution of charges, capacitance and dielectrics, current and resistances, direct current circuits, Kirchhoff's rules, RC circuits, magnetic field and forces, Biot-Savart law, Ampere's law, Faraday's law of induction, inductance, alternating current circuits, RL circuits, LC circuits and RLC circuits, Maxwell's equations. The learning in this course is strengthened by related Lab work.

**Module-1: Vectors and Scalars**

- Vectors and Scalars, Addition of vectors,
- Addition of vectors, Unit Vectors, The laws of physics

**Module -2: Electric charge and Coulomb's Law**

- Multiplying vectors
- Electric charge and Coulomb's Law

**Module -3: Electric field and particle motion**

- Electric field of point charge and continuous charge
- Motion of a charged particle in uniform electric field

**Module -4: Gauss Law**

- Electric flux and Gauss' Law
- Application of Gauss' Law
- Potential difference and electric potential
- Electric potential energy due to point charges

**Module -5: Capacitors and capacitance**

- Electric potential of continuous charge distributions
- Capacitance

- Combination of capacitors
- Capacitors with dielectrics
- Electric current and resistance
- Dependence of resistance upon temperature and electrical power
- Electromotive force and combination of resistors
- Calculating the current in a multi-loop circuit

**Module -6: Magnetic field**

- RC circuits
- The magnetic force and motion of charged particle in uniform magnetic field
- The magnetic force on a current carrying conductor
- The Biot-Savart Law and Ampere's Law
- The magnetic field of a solenoid
- Magnetism in Matter
- Faraday's Law of induction and Motional emf

**Module -7: Transform**

- Lenz's Law and Induced emf and electric fields
- Generators, motors and Eddy Currents
- Self-Inductance and RL circuits
- Energy in a magnetic field
- Oscillations in an LC circuits
- RLC series circuit

**Teaching Methods**

**Assessments**

**Bibliography / References**


1. Physics for Scientist and Engineers, John W. Jewett, Jr., Raymond A. Serway, 7th Edition, Thomson Brooks/Cole, US, 2008. Second Indian Reprint 2011
2. Fundamentals of Physics, Halliday/Resnick/Walker, Sixth edition 2006


**Course Title**

**Applied Chemistry**

## 6.4. COURSE CONTENTS- COMPUTING

**Course Title**

**Fundamentals of Information Technology**

Credit Hour Details:

Theory: 0 Practical: 02 Total: 02

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Basic terminologies of computer and computer related products and understand the basics of computer hardware such as CPU, RAM, hard disk, etc.<br>- To work within MS Windows, manage files and folders in a proper manner<br>- Create/edit business documents applying various format options to make them more professional | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- To perform simple and complex business calculations on the spreadsheet and also able to use various format options and presentation options such as numerical or graphical<br>- Make changes and modifications quickly and easily.<br>- Experiment with different patterns, textures and color ways. | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- To create a basic presentation by using various objects such as text, image, chart, movie, sound, etc. with various designing techniques and animations to make it more attractive and professional. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Know about the basics of computer's hardware, software and basic operations. Learn the basics of operating system to perform daily routines tasks with computer. Learn different techniques to format business documents such as letter, memo, business report, etc. in a professional way. Use of various functionalities of basic spreadsheet including setup and analyze itemized list of numbers such as the various types of budgets or financial statements. Perform and manipulate the calculations to achieve meaningful information numerical as well as graphical format, able to perform what-if analysis if needed. Develop an effective and professional presentation by learning different techniques of formatting and animation. Able to perform to transfer data from one application to other to develop an integrated application by using various contents available in different applications or files. Merge data in single file from various files or merge the contents from database to document or mail content.

**Module-1: Understanding computer basics**

- Computer Basics such as hardware, software, it's working, etc.
- Documents in MS Word, Document Types, Create Single Page Document, Using Mail Merge, Create Contact List, Using Paragraph setting, Page Margin

**Module -2: Introduction to word page document**

- Multi-page documents, understanding to apply heading levels, Table of Content, Insert Picture, Tables, etc. Creating Table of Figures/Tables, Header & Footer, Cover Page, Page Numbering
- Use of Outline View, Applying Heading Levels beyond Three, Format Document, Font, Color, Size, List, Bullets, etc., Page Break

**Module -3: Creating presentations and formatting**

- Use of column in creating Magazine, Column Break, Section Break, Page Size, Use Text Box and WordArt for Highlights
- Creating Presentation in MS PowerPoint, Use of objects, such as Image, Table, Screenshots, SmartArt, etc. Slide Transition, Object Animation in slide.

**Module -4: basic computation in MS Excel**

- Basic Concepts of MS Excel, Rows and Columns, handling workbooks, Formatting Cell, Cell Addressing, Cell Naming
- Basic computation in MS Excel, Use of Built-in Functions such as SUM, Count, MIN, MAX, Average.
- Use of IF function, understanding the logical expression and operators,
- Conditional formatting

**Module -5: Data grouping and use of short keys for functions**

- Fetch data from a dataset by using VLookUp function, Data Sorting, Understanding the Financial functions such as PMT, CUMIPMT, CUMPRINC, NPER, etc.

- Use of Grouping and Subtotal, Subtotal function, Conditional functions CountIF, SumIF, etc.
- Learn to use Date Time functions such as Date, Day, Month, Year, etc

**Module -6: Data analysis and description through different charts**

- Chart, Chart Types, PIE Chart, Line Chart, Bar Chart, Chart Settings, Chart Parameters, Modify data range
- Pivot Table, Pivot Chart
- What-If Analysis, Scenario Manager, Goal Seek
- Integration of MS Excel with MS Word, Paste Special
- Macros in MS Office, Understanding and creating Macros, Use of Macros in MS Word, Use of Macros in MS Excel, Introduction to VBA, Editing Macro in VBA Editor

**Teaching Methods**

**Assessments**

**Bibliography / References**


1. Microsoft Office Professional 2013 Step by Step (Step By Step (Microsoft)) By Beth Melton, Mark Dodge, Echo Swinford, Andrew Couch., 2013
2. Discovering Computers Complete: Your Interactive Guide to the Digitl World, 2014 Edition by Shelly Cashman, Misty E. Vermaat.
3. Office 2013 All-In-One for Dummies by Peter Weverka published by Wiley 2013.


**Course Title**

**Digital Communication**

Credit Hour Details:

Theory: 0 Practical: 02 Total: 02

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Communicate their concepts better both verbally and digitally.<br>- Use graphic design elements for visual story/concept building | | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| | - See the products in 3D by rotating the design and viewing it from all angles | | | |
| 3 | Design, synthesis and evaluation skills<br>- Make changes and modifications quickly and easily.<br>- Experiment with different patterns, textures and color ways.<br>- Develop basic or standardized designs to improve the quality of the design. | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Share their design concept in 3D<br>- For better communication of conceptual design participants can rotate the design and viewing it from all angles.<br>- Use simulations to test the design | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Graphic design elements for visual story/concept building, visualization of 3D products by rotating the design and viewing it from all angles, make changes and modifications quickly and easily, experiment with different patterns, textures and color ways, develop basic or standardized designs to improve the quality of the design, use simulations to test the design.

**Module-1: Understanding digital communication**

- Digital communication with respect to rapid changing world technologies.
- Introduction to digital graphics
- Explore Leading professional graphic design software in the market.

**Module -2: Introduction to Computer Aided Design (CAD)**

- Understand the use of Computer-aided design (CAD) in Textile and Clothing
- Appreciate that computer systems are used to assist in the creation, modification, analysis, or optimization of a design

**Module -3: Introduction to Computer Aided Design (CAD)**

- Appreciate and understand that CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation
- Learn how to create a database for manufacturing
- Garment CAD
- Technical data sheet
- 3D creation

- Style design

**Module -4: Garment CAD**

- Use pattern library
- Modify patterns
- Design patterns
- Create new pattern
- Understand CAD for grading Clotting patterns
- Explore the purpose of grading clothing patterns
- Apply computerized grading
- Understand computerized marker making system
- Design more efficient product range to reduce labor and material costs
- Introduction to nest
- Understand plot functions
- Check plotting automatically
- Appreciate and understand CAD in spreading
- Appreciate and understand CAD in cutting

**Module -5: 3D creation and Style Design**

- Understanding 3D environment
- Create 3D pattern, with three dimensional map designing.
- Create 3D design with printing color separation
- Presenting designs in 3D
- Create woven and knitted fabric design in 3D
- Conceptualize 3D draped design
- At the end of this week, the students will be able to:
- Create and present the realistic 3D drape design using virtual models
- Display concept by posing models in 3D at various angels.
- Conceptualize creative ideas in 3D.
- Present, showcase on virtual 3D garments.
- Virtual Fashion show

**Module -6: Digital Visualization and Presentation**

- Make professional and stylish presentation of the creative design work to a Client

**Teaching Methods**

**Assessments**

**Bibliography / References**

4. Fashion communication in the digital age by Nadzeya Kalbaska, Teresa Sadaba, Francesca C and Lorenzo C, Springer.
5. Garment s of paradise by Susan Elizabeth Ryan, The MIT press, London
6. Smart clothing by Gilsoo Cho, CRC press, London

## 6.5. COURSE CONTENTS- ENGINEERING FOUNDATION

### 6.5.1. COURSE CONTENTS- FOUNDATION BASED CORE

**Course Title**

**Introduction to Textile and Clothing Industry**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Understanding textiles, types of textile processes, textile materials | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- Ability to critically analyze the textile industry | | 5 | 3 |
| 3 | Design, synthesis and evaluation skills<br>- Understand the manufacturing processes | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Ability to communicate the methods adopted to solve the problems and to present the solution | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To get familiar with the textiles, textile history and market of Pakistan. To get acquainted with different textile sectors especially Textile and Clothing industry.

**Module-1: What are textiles?**

- Define and describe some terms related with the basic textile products.

**Module-2: Textile Fibers?**

- Classify natural and man-made fibers.
- Describe general properties of textile fibers.
- Differentiate between natural and man-made fiber properties.

- Identify fibers using various identification methods.
- Give global production data of textile fibers.

**Module-3: Textile Manufacturing: Spinning**

- Demonstrate the process flow of short staple and long staple spinning
- Briefly describe each process of staple spinning
- Explain the physical and mechanical properties of staple spun yarns.

**Module-4: Textile Manufacturing: Weaving**

- Demonstrate the process flow of weaving
- Briefly describe each process of weaving
- Explain the physical and mechanical properties of woven fabrics

**Module-5: Textile Manufacturing: Knitting**

- Differentiate between weft knitting and warp knitting
- Briefly describe all knitting techniques
- Explain the physical and mechanical properties of knitted structures

**Module-6: Textile Manufacturing: Colouration and Finishing**

- Explain pretreatments, dyeing, printing and finishing processes
- Briefly describe the process variables of colouration methods
- Explain mechanical and chemical finishing techniques
- Describe parameters pertaining to product's quality

**Module-7: Textile Made-ups**

- Explain the process flow of home textiles and Textile and Clothing industry
- Describe the systems and machines used for making the clothing
- Identify the product faults and provide their remedy

**Teaching Methods:**

**Assessment:**

**Biblography/References:**


1) Introduction to Textile Technology by T. Ishida, 1991.
2) Textile Science by E. P. G. Gohl and L. D. Vilensky, 1987.
3) Textiles: Fiber to Fabric by Corbman B. P., 1985.
4) J. J. Pizzuto's Fabric Science by Allen C Cohen, Ingrid Johnson., 2010.
5) Textiles: Properties and Behavior in Clothing Use by Miller E. B T, 1984.

**Course Title**

**Textile Fibers**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- All fiber types | | 3 | 2 |
| 3 | Design, synthesis and evaluation skills<br>- Ability to evaluate the different fibers by tests | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Ability to communicate the types of fibers present for fabric formation. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To provide a brief knowledge of different textile fibers responsible for the formation of fabric and garments.

**Module-1: Textile Fibers: Classification and Properties**

- Define and describe textile fibers
- Classify natural and man-made fibers
- Differentiate between regenerated and synthetic fibers.
- Explain primary and secondary properties of textile fibers..

**Module-2: Vegetable Fibers: Cotton**

- Describe cotton growing, picking, and ginning methods
- Explain fiber structural properties
- Give details of fiber physical and chemical properties
- Explicate application prospects of cotton
- Elaborate production processes
- Explain fiber structural, physical and chemical properties
- Give information on applications areas of linen

- Elaborate production processes
- Explain fiber structural, physical and chemical properties
- Give information on applications areas of linen

**Module-3: Animal Fibers: Wool**

- Elaborate production, shearing and washing of wool fiber
- Explain structural properties of wool
- Elaborate physical and chemical properties of wool
- Explain end-use prospects.

**Module-4: Animal Fiber: Silk**

- Explain structural properties of silk
- Elaborate physical and chemical properties of fiber
- Explain end-use prospects

**Module-5: Regenerated Fibers**

- Elaborate production processes
- Explain fiber structural, physical and chemical properties
- Give information on applications areas
- Elaborate production processes
- Explain fiber structural, physical and chemical properties
- Give information on applications areas

**Module-6: Synthetic Fibers**

- Elaborate production processes
- Explain fiber structural, physical and chemical properties
- Give information on applications areas
- Elaborate production processes
- Explain fiber structural, physical and chemical properties
- Give information on applications areas

**Module-7: Composite Fibers**

- Elaborate production processes of composite fibres
- Explain fiber structural, physical and chemical properties
- Give information on applications areas

**Teaching Methods:**

**Assessment:**

**Biblography/References:**


1) Textiles fiber to fabric by Bernard P. Corbman
2) J. Gordon. Cook "Textile Fibres" (1993)
3) W. Kline "Introduction to textile Technology"
4) Industrial Fibre A Raven
5) Preparation of textile Fibre By W.S Murphy.


Other Required Reading:


1) Principles of Textile Testing By J.E. Booth.
2) Articles: Textile Fibers Catalogues


**Course Title**

**Basic Drawing**

Credit Hour Details:

Theory: 0 Practical: 03 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Drawing is the essential part of learning any technical skills and it develop basic knowledge to construct any idea related to design on paper. | | 3 | 2 |
| 3 | Design, synthesis and evaluation skills<br>- It enable students to draw, imagine and communicate what they see, feel and think through the use of pencil, color, texture, form, pattern and different materials and processes. | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Basic drawing increases the critical awareness of the roles and purposes of design in different times and cultures. | | 4 | 4 |

| | | | | |
|---|---|---|---|---|
| | - It helps to understand scale, proportions, form and dimension in later semesters of a Textile and Clothing. | | | |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To develop basic knowledge to construct any idea related to design and communicate through the use of pencil, color, texture, form, pattern and different materials and processes.

**Module-1: Introduction to dot, line and their characteristics**

- Understanding mediums
- Drawing different types of lines
- Visualizing line through pasting
- Observing and drawing line
- Role of medium in drawing
- Study of line intensity

**Module-2: Basic geometric shapes and forms**

- Definition of basic geometric shapes
- Freehand drawing of angles
- Drawing shapes and continuous lines
- Making 3d form from 2d shape
- Drawing different sizes of cubes , pyramids, with exact angle free hand
- Understanding 3d form
- Making 3d form from 2d shape
- Drawing different sizes of cylinders with exact angle free hand
- Understanding 3d form

**Module-3: Perspective drawing**

- Introduction to one point Perspective
- Study of Depth and distance in drawing
- Study of vanishing point
- Introduction to one point Perspective
- Study of Depth and distance in drawing
- Role of vanishing point, horizon line and orthogonal lines

**Module-4: Negative and positive spaces in drawing**

- Negative &positive space in drawing
- Exploring mediums in drawing

- Role of composition

**Module-5: Shading and contrast**

- Lighting effect(white light) on different objects
- Understanding variation of tones on white objects and how they can be achieved on paper

**Module-6: Appearance of color in different light**

- Study of colors
- Basic color theory
- Use of unconventional tools
- Theory of Alfred Hickethier
- Understanding poster color and its application

**Teaching Methods:**

**Assessment:**

**Biblography/References:**


1) Keys to drawing by Bert Dodson, 5th Edition, North Light Books.
2) Drawing on the right side of the brain by Betty Edwards, 6th Edition, Tarcher Perigee
3) Drawing for the absolute beginner by Mark Willenbrink, Mary Willenbrink, 4th Edition, F+W Media.


**Course Title**

**Basic of Industrial Engineering**

Credit Hour Details:

Theory: 03 Practical: 01 Total: 04

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to identify, formulate, research literature and analyze complex textile engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. | | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| 3 | Design, synthesis and evaluation skills<br>- Ability to design solutions for complex textile engineering problems and design systems, products, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.<br>- Ability to conduct investigations of complex textile engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.<br>- Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex textile engineering problems, with an understanding of the limitations. | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Ability to communicate effectively on complex textile engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

The calculation of performance, capacity studies, time and motion studies in the managing and handling of different operations.

**Module-1: Introduction**

Define ‘industrial engineering

Explain role of IE in manufacturing industry

Explain the history of IE

Explain the importance of IE

Basic terminologies of IE

**Module-2: Work & Method Study**

- Define Work Study
- Describe importance of Work Study
- Explain work study as direct means of raising productivity
- Define method study
- Understand factors involved in method study
- Recording techniques of method study
- Evaluate any ongoing task w.r.t. method study

**Module-3: Work Measurement & Time Study**

- Define work measurement
- Explain advantages and purpose of work measurement
- Understand techniques of work measurements
- Define time study
- Identify basic time study equipment
- Explain steps in making time study
- Record all information related to the operation under consideration
- Prescribe and standardization of measured operation time

**Module-4: Motion Economy & PDTMS**

- Define Motion Study
- Explain motion economy in apparel unit
- Describe PDTMS for work measurements
- Describe importance of PDTMS
- Explain the advantages of PDTMS
- Recording techniques of PDTMS

**Module-5: Learning Curves**

- Define Learning curves
- Be acquainted with History of learning curves
- Different approaches of calculating time
- Producing learning curves and setting standards
- Calculate and determine time required to do a job, learning rates of an Organization, process or individual using learning curves.

**Module-6: Layout & Material Handling**

- Define Layout Planning
- Layout Types and Flexibility at work
- Designing process and Product Layouts
- Define material handling
- Explain comprehensively the following principles of material handling selecting material handling methods progressive bundle system unit production system modular production system

**Module-7: Operation Breakdown**

- Define the term Operation Breakdown
- Important considerations for making operation breakdown bulletin and machine selection
- Techniques and tools used for operation breakdown
- Exercise of making operation breakdown of different Top garment products:
    - T-Shirt
    - Polo-Shirt
    - Dress-Shirt

**Module-8: Operation Breakdown Auxiliary**

- Exercise of making operation breakdown of different Made-ups products:
    - Overall
    - Box Pleated Curtin
- Exercise of making operation breakdown of different Bottom garment products:
    - Slacks
    - Boxer Short
    - Trousers

**Module-9: Calculations of Industrial Engineering in Garment Industry**

- Thread consumption calculation
- Capacity Calculation
- Production Target Calculation
- Productivity Calculation
- Performance Calculation

**Teaching Methods**

**Assessments**

**Bibliography / References**

1. Sewn Product Analysis by Ruth. E. Glock 2007.

2. Introduction to Clothing Production Management, 2001, by A.J.Chutter.

**The Binran, Juki Corporation, 2006**

1. Production Control Tools for Garment Industry, Sewing research institute Juki.2004.
2. Operation Management Strategy and Analysis, Lee J.
3. Krajewski & Larry P. Ritzman, Addison-wesly publishing company. 2005.

**Course Title**

**Yarn Manufacturing**

Credit Hour Details:

Theory: 03 Practical: 01 Total: 04

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Departments of spinning mills | | 3 | 2 |
| 3 | Design, synthesis and evaluation skills<br>- Ability to tell about the major processes and machines involved in yarn formation | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Ability to communicate the process and machines for yarn formation | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To provide a brief knowledge of yarn manufacturing and process involved in yarn formation.

**Module-1: Spinning Process**

- Flow charts of spinning processes for filament and staple-spun yarns carded and combed yarns, jute, flax and spun silk yarn.
- Input and output of each department.
- Intermittent spinning and continuous spinning

**Module-2: Mixing & Blending**

- Report different mixing techniques.
- Learn about effect of mixing on fiber characteristics.
- Know about mixing machines
- Explain actions of machines

**Module-3: Blow Room**

- Objectives of blow room.
- Working principles in blow room.
- Study of bale breaker, porcupine opener, various beaters, cage condenser, scutcher and removal of wastes

**Module-4: Carding**

- Objectives of carding
- Carding actions
- Working of card
- Role of different parts and their speeds

**Module-5: Drawing**

- Objects of drawing frame
- Working of drawing frame
- Concept of drafting
- Drafting and doubling
- Breaker, inter and finisher drawing frame

**Module-6: Combing & Roving frame**

- Objectives of combing
- Noil %age
- Combing preparatory processes
- Working of comber
- Objectives of roving frame
- Working of roving frame

**Module -7: Spinning**

- Objectives of ring spinning
- Principle and mechanism of twist insertion

**Module -8: Auto Cone Winding & yarn packing**

- Winding objectives and process
- Splicing
- Yarn clearing mechanism
- Yarn humidification
- Packing materials and types
- Explain auto-cone Diagram

**Module -9 New Spinning Systems**

- Open-End Rotor spinning
- Air-jet spinning
- Working of ring frame
- Friction spinning
- Wrap spinning
- Compact spinning

**Module -10: Woolen Industry**

- Wool and its classification
- Woolen and worsted yarn
- Flow charts for woolen and worsted spinning processes
- Wool classification and sorting
- Impurities in wool
- Raw material for woolen industry
- Wool scouring, carbonizing, drying and blending
- Woolen carding and woolen spinning

**Module -11: Worsted Industry**

- Worsted carding, backwashing and gilling
- Combing, drawing and spinning

**Practicum:**

- Study of Methods of Mixing in Blow Room
- To study the different types of beaters being used in blow room
- Study of working principle of a bale breaker.
- Study of feeding system of carding machine.
- Study of working of revolving flat card.
- Study of working of carding Machine
- Study of working of drawing frame
- Study of working of roving frame.
- Study of working of ring frame.

- Study of working of cone winding machine.

**Teaching Methods:**

**Assessment:**

**Biblography/References:**


1) Fundamentals of Spun Yarn Technology by C. A. Lawrence, 2003.
2) The Rieter Manual of Spinning by W. Klein, 2008
3) Manual of Cotton Spinning by Gilbert R.Merrill
4) Spun Yarn Technology by Eric Oxtoby.
5) The Woolen & Worsted Industry by Brearley and Iredale, 1977.


Other Required Reading:

1) Articles: Textile Yarn Catalogues

**Course Title**

**Fabric Manufacturing**

Credit Hour Details:

Theory: 03 Practical: 01 Total: 04

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Weaving, knitting, non-conventional woven products, Braiding and Non-woven | | 3 | 2 |
| 3 | Design, synthesis and evaluation skills<br>- Ability to tell about the major processes and machines involved in Fabric formation. | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Ability to communicate the process and techniques for fabric | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To provide a brief knowledge for Fabric Manufacturing and process involved in cloth formation.

**Module -1: Introduction to Fabric manufacturing**

- The history and scope of weaving.
- The Flow chart of Weaving. Types of fabric forming methods (weaving, knitting, braiding and non-woven)
- The Current status of fabric manufacturing
- The General applications of woven fabric

**Module -2: Winding Process**

- The objectives of winding
- The different types of packages w.r.t angle of wind, core, etc.
- The different package angles
- Differentiate between different winding type's w.r.t. drive, traverse, and package.
- Distinguish between different zones of winding machine
- The basics of any winding machine

**Module -3: Warping Process**

- Define the Objectives of Warping,
- Types of warping
- Identify different parts of warping machine
- Discuss creel and their types
- Understand the working of a creel

**Module -4: Warping & Sizing**

- The working of High speed warping machine
- Understand the working of sectional warping
- Understand the working of Ball warping and draw set warping
- Importance and advancements in warping
- Discuss the objectives of sizing
- Explain different types of size ingredients used for sizing

**Module -5: Weave design & drawing in**

- The working of High speed warping machine
- Understand the working of sectional warping
- Understand the working of Ball warping and draw set warping
- Importance and advancements in warping
- Discuss the objectives of sizing

- Explain different types of size ingredients used for sizing

**Module -6: Looming**

- Identify different parts of a loom
- Identify the primary & secondary motions of a loom
- Explain shedding and different types of shedding systems (tappet, dobby, jacquard)
- Different weft insertion systems: shuttle, shuttle less (air-jet, water-jet, rapier, projectile)

**Module -7: Fabric Inspection**

- Explain the quality inspection of fabric
- Explain quality parameters of fabric
- Explain 4 point system
- Explain 10 point system

**Module -8: Introduction to Knitting**

- Define basic concepts of knitting
- Learn about flow chart of warp & weft knitting structures
- Define loop and its parts
- Learn about the applications of knitting
- Learn about the status of knitting industry (local & international)

**Module -9: Weft Knitting (Circular)**

- Learn the functioning of circular weft knitting machines
- Learn about the machine knitting elements
- Define knitting machine creel and its parts
- Define latch needle and sinker parts
- Learn about the types of needles
- Learn about the types of knitting cam
- Define cylinder and gauge
- Types of stitches
- Basic Structure of single and double jersey
- Socks Knitting machine and socks parts
- The Glove knitting machine and gloves parts
- Fabric parameters (loop length + GSM)

**Module -10: Warp knitting**

- Define warp knitting
- Define underlap, overlap, swinging and shogging motion
- Define warp knitting machines types
- Explain warp knitting machine parts
- Learn about front guide and back guide bar working

- Analyze different types of warp knitted structures
- Learn loop formation mechanism in tricot and Rachel machine
- Learn about spacer fabric
- Learn about the applications of woven, weft and warp knitting

**Module -11: Braiding**

- The Introduction to braid technology and its application
- Maypole braiding machine, Flat and circular braiding machines
- The horizontal and vertical braiding machines, Take-up mechanism
- The machine components, Bobbins, Yarn carriers, the braiders deck
- The Braided structures, Flat and Circular braid structures, Over-braid (braiding over a core/mandrel)

**Module -12: Non-woven**

- The Introduction to nonwovens and its range of applications
- Classification of nonwoven: web formation and consolidation, Classification of consolidation processes
- The Needle punching, Spun laced woven, Adhesive bonding, Thermal bonding, Stitch bonding, End uses

**Practicum:**

**Teaching Methods:**

**Assessments**

**Bibliography/ References**


2) Weaving Conversion of Yarn to Fabric by P.R. Lord & M.H. Mohd
3) Principles of Weaving by R.Marks & A.T.C. Robinson
4) Knitting Technology by D.J.Spencer
5) Woven Cloth Construction by A.T.C Robinson & R.Marks
6) Knitting Handbook: An Instructional Guide to Knitting by Viv Foster, 2004
7) Principles of Weaving by R. Marks & A.T.C. Robinson
8) Braiding and braiding machine by W. A. Douglass
9) Specialist yarn and fabric structures Edited by R. H. Gong


Other Required Reading:


1) Introduction to Textiles by Eurotex
2) Articles: Textile Fabric Catalouges

**Course Title**

**Textile Wet Processing**

Credit Hour Details:

Theory: 03 Practical: 01 Total: 04

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Provide participant with good knowledge of all the preparatory processes,<br>- Enabling them to understand the current needs of industry,<br>- Provide participant with a comprehensive Knowledge of different pre-treatments, dyeing and printing processes will help out the student to understand whole industry mechanism. | | 3 | 2 |
| 2 | Analytical and problem solving skills<br>- Ability to analyze problems faced by industry and their remedies. The detail knowledge of different parameters will help participant to understand why industry need these parameters and industrial need of managing these parameters like singeing, de-sizing, scouring, bleaching, mercerizing, dyeing/printing and finishes. | | 5 | 3 |
| 3 | Design, synthesis and evaluation skills<br>- Ability to evaluate different textile processing stages. | | 4 | 3 |
| 4 | Communication, interpersonal & IT skills<br>- Ability to communicate the methods adopted to solve the problems and to present the final solution. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Chemical processing provides founding comprehension of textile processes, material used, governing principles and scientific understanding chemical preparation of textiles, textile dyeing, textile printing and textile finishing on different fibers like cotton, wool, polyester etc.

**Module -1: Introduction to textile chemical processing**

- Explain the objectives of the course
- Define the wet processes
- Make a flow chart of material flow within a wet processing mill
- Define the major processes involved in wet processing

**Module -2: Singeing & Sharing Fundamentals**

- Define singeing and shearing process.
- Discuss objectives of Singeing and Shearing.
- Explain Singeing and shearing machine and its description.
- Explain the gas singeing parameters and different gas singeing positions.

**Module -3: De-sizing & Scouring Fundamentals**

- Chemical composition of Size and Cotton
- Explain the desizing techniques and methods used.
- Brief enzymatic desizing.
- Explain the effect of pH, temperature and electrolytes on enzymatic desizing
- Explain the acid desizing.
- Explain the associated problems with acid desizing process.
- Explain the evaluation of desizing process.
- Demonstrate knowledge of scouring chemicals and auxiliaries.
- Explain saponification, Emulsification and Detergency process.
- Explain the dispersion and suspension. Explain the evaluation of scouring process.
- Explain solvent scouring.

**Module -3: Bleaching & Mercerizing Fundamentals**

- Explain the bleaching objectives.
- Explain the continuous bleaching.
- Explain continuous bleaching machine parts.
- Explain peroxide bleaching mechanism.
- Explain the risks involved with peroxide bleaching.
- Explain the effect of pH, time and temperature on peroxide bleaching.
- Explain the function of stabilizers in peroxide bleaching.
- Explain sodium chlorite bleaching.
- Explain the evaluation of bleached fabric.
- Explain the mercerizing process.
- Explain the effect of mercerization on cotton fiber.
- Explain the evaluation of mercerizing process by barium activity number.

- Explain the chain and chainless mercerizing machines.
- Explain the importance of neutralization after mercerizing.
- Explain the evaluation of mercerized fabric.

**Module -4: Dyeing Fundamentals**

- Introduction to dyes
- Explain different types of dyes and their classification based on application and dye structure.
- Explain a brief chemistry (molecular configuration) of Direct Dyes.
- Explain theory of direct dyeing.
- Explain the effect of electrolyte and Temperature on direct dyeing.
- Explain basic theory and methods of wash fastness improvement of direct dyes.
- Explain the mechanism of reactive dyes.
- Explain the effect of electrolyte and alkali in reactive dyeing.
- Explain the effect of acids on reactive dyes.
- Explain the effect of chlorine on reactive dye.

**Module -5: Cellulosic Dyeing**

- Explain a brief chemistry (molecular configuration) of sulphur dyes.
- Explain theory of sulphur dyeing.
- List down the color range available in sulphur dyes.
- Explain the limitation associated with sulphur dyeing.
- Explain bronzing effect of sulphur dyeing and method for minimizing the bronzing effect.
- Explain the effect of ultraviolet light on sulphur dyed fabric.
- Explain a brief chemistry (molecular configuration) of vat dyes.
- Explain the high light fastness properties of vat dyes.
- Explain the effect of pre mature oxidation during vat dyeing.

**Module -6: Disperse Dyeing**

- Explain a brief chemistry (molecular configuration) of disperse dyes
- Define & explain theory of disperse dyeing
- Explain dyeing and fixation mechanism of disperse dyeing for polyester fibers
- Explain the effect of pH, and temperature on disperse dyeing of polyester
- Give requirement of a carrier in carrier method of disperse dyeing
- Explain the role & brief chemistry of a carrier used to obtain deep dyeing of polyester
- List down limitations associated with carriers & carrier method of dyeing polyester fibers
- Explain HT-method of polyester dyeing
- List down advantages of HT-method of polyester dyeing
- Compare HT-method with carrier method for dyeing of polyester

- Explain general color fastness properties of disperse dyes

**Module -7: Wool, Silk & Acrylic Dyeing**

- Explain a brief chemistry (molecular configuration) of acid dyes
- Define & explain theory of acid dyeing
- Explain dyeing and fixation mechanism of acid dyeing
- Explain effect of pH and temperature on acid dyeing of wool
- Give requirement of a retarder for level acid dyeing
- Explain role & brief chemistry of a retarder used to obtain level dyeing
- Explain general color fastness properties of acid dyes
- Explain a brief chemistry (molecular configuration) of basic dyes
- Define & explain theory of basic dyeing
- Explain dyeing and fixation mechanism of basic dyeing for acrylic fibers
- Explain effect of pH and temperature on basic dyeing of Acrylic fibers
- Give requirement of a retarder for a level basic dyeing
- Explain role & brief chemistry of a retarder used to obtain level dyeing
- Explain general color fastness properties of basic dyes.

**Module -8: Color Science Fundamentals**

- Introduction to color specification
- Introduction to color measurement
- Introduction to quality control of colour

**Module -9: Printing Fundamentals**

- Explain the function/importance of design studio.
- Different styles of printing, block printing, screen printing, rotary screen printing, resist printing, discharge printing
- Explain the function of each of the auxiliary used during pigment printing
- Give a brief introduction & history of pigment printing
- Explain properties of pigments
- Differentiate between dyes & pigment
- Define & explain Binder.
- Explain mechanism of pigment printing.
- Explain general advantages of Pigment printing
- List down limitations associated with pigment printing
- Explain reactive printing of cotton fibers
- Give dye selection criteria for reactive printing
- Give mechanism of fixation of reactive dyes applied/ printed on Cotton
- Give print paste formulation for reactive printing
- Give print paste formulation for pigment printing
- Compare reactive printing with pigment printing

**Module -10: Finishing Fundamentals**

- Define & explain textile finishing.
- Classify the chemical, mechanical and combined chemical and mechanical finishing.
- Name the types of mechanical and chemical finishes commonly used.

**Mechanical Finishing Fundamentals**

- Define & explain calendaring
- Explain different types of Bowls used in calendaring
- Define & explain s sanforizing

**Teaching Methods**

**Assessments**

**Bibliography / References**


1) Cellulosic Dyeing by John Shore, Society of Dyers and Colorists, 1995
2) Dyeing of Textile Materials by Jose Cegarra, Textilia, 1992
3) Textile Printing by W.C. Miles, Society of Dyers & Colorists, 2003
4) Textile Finishing by Derek Heywood, Society of Dyers & Colorists, 2003

## 6.5.2. COURSE CONTENTS- MAJOR BASED CORE

1. Garment Manufacturing
2. Apparel Finishing
3. Apparel Designing
4. Technical Textiles
5. Production Planning and Control
6. Supply Chain Logistics
7. Garment Industry Utilities
8. Apparel Machinery and Equipment
9. Anthropometry and Garment Constructions

**Course Title**

**Garment Manufacturing**

Credit Hour Details:

Theory: 03 Practical: 01 Total: 04

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Departments of garments mills. | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Ability to tell about the major processes and machines involved in different techniques. | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to communicate the process and machines for garment mills. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Introduction to clothing, clothing measurements, clothing sizes, pattern makings, sampling, cutting, induction, Stitching machines, stitching, trimming, finishing, packing.

**Module -1: Apparel industry**

- Explain the flow chart of apparel industry.
- Discuss different departments for garments manufacturing.
- Learn about global market and trade.

**Module -2: Product development**

- Report different phases for product development
- Learn about theme boards, design pattern
- Know about Design elements
- Learn about design development processes
- Explain Design principle
- Know about sample Textile and Clothing

**Module -3: Marker making**

- Explain what is marker
- Learn about marker efficiency
- Know about marker making types

**Module -4: Spreading**

- Learn about spreading techniques
- Learn about spreading types
- Explain processes involved in spreading

**Module -5: Seams & Stitching**

- Know about seams and their types
- Learn about how seams are produced
- Know about seams usage
- Learn about stitching ways
- Express stitch classes
- Learn about stitching uses

**Module -6: Cutting**

- Explain cutting machines
- Explain cutting department responsibilities

**Module -7: Needles**

- Explain needles types
- Learn about needle parts
- Explain interaction of different needles with different fabrics

**Module -8: Sewing machines**

- Know about fundamentals of sewing machine.
- Know about sewing machine parts
- Learn about SPI effect on stitching
- Know about different types of stitching machines
- Explain button attaching and hemming machines

- Learn about overlock machine.

**Module -9: Garment Finishing**

- Know about finishing quality.
- Explain inspection of finished goods.
- Learn about finishing techniques

**Module -10: Garment Packing**

- Know about packing technique
- Explain lay cards and cartons
- Know about packing bags

**Practicum:**

- Study of Parts of a sewing machine and their functions
- To study the treadle control and precise stops at maximum velocity.
- Straight stitches at maximum velocity.
- Stitching practice by changing direction with needle down.
- Stitching practice on zig zag lines.
- Stitching Practice on irregular curve lines.
- To stitch Mobile Cover.
- Stitch Flap pocket.
- Stitch Collar.
- To Stitch the Cuff.
- Stitch Sample garment (student choice).

Teaching Methods

Assessments

Bibliography / References


1) Introduction to Clothing Manufacture by Gerry Cooklin 2nd edition 2006.
2) Clothing: Fashion, Fabrics & Construction,by Jeanette Weber 2006.
3) Textile and Clothing Technology 1st edition, 2015.


**Course Title**

**Apparel Finishing**

Credit Hour Details:

Theory: 01 Practical: 02 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills | | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| | - Ability to apply knowledge of mathematics, natural sciences, engineering fundamentals and textile engineering specialization to the solution of complex textile engineering problems | | | |
| 2 | Design, synthesis and evaluation skills<br>- Ability to design solutions for complex textile engineering problems and design systems, products, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.<br>- Ability to conduct investigations of complex textile engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions. | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex textile engineering problems, with an understanding of the limitations. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To introduce the analytical skills for the process of merchandising and sources. Includes evaluation of merchandise in clothing sales, merchandise planning, developing the presentation of apparel lines, and finalizing apparel lines through merchandising and budget review.

**Module -1: Initial quality checks**

- Seam Accuracy
- Stich parameters
- Precision of operations

**Module -2: Washing**

- Types of Mechanical washes
    - Rinse wash

    - Water jet fading
    - Stone wash
    - Whiskering
    - Microsanding including sandblasting
    - Mechanical abrasion
    - Laser treatment
- Types of Chemical washing
    - Acid wash, ice or snow wash
    - Hydrogen peroxide wash or Bleach washing
    - Enzyme wash
    - Ozone fading
    - Spray techniques
    - Overdyeing and tinting
    - De-sizing
    - Fading of denim

**Module -3: Thread clipping & Ironing**

- Use of Thread Trimming Machine in Textile and Clothing
- What is pressing
- Removal of unwanted creases and crinkles and Shaping
- To apply creases where necessary
- Under pressing
- Final pressing

**Module -4: Quality Inspection (inside) process wise**

- To maximize the production of goods within the specified tolerances correctly the first time.
- To achieve a satisfactory design of the fabric or garment in relation to the level of choice in design, styles, colours, suitability of components and fitness of product for the market.

**Module -5: Quality Inspection Process**

- Fabric Roll sampling for inspection
- Trims and Accessories inspection
- Cutting panel inspection
- Sewing Quality Audit
- Finishing Quality Audit
- Finishing inline inspection
- Pre-final Inspection
- Final inspection

**Module -6: Accessories Attach**

- Response time
- Design environment
- Element of line development

- Research w.r.t market and fashion
- Line plan
- Styling direction and style development
- Understanding of product development w.r.t fabric selection, silhouettes, line sheets, prototyping, pre-costing, specifications, final costing

**Module -7: Folding and shade sorting**

- Pressing or Folding
- Finishing and Detailing
- The Principles of Pressing
- What id shade sorting
- Shade Numbering
- Shade sorting

**Module -8: Quality audit & Packing list**

- Objectives of Garments Buyer Technical Audit
- Types of Technical Audit (TA)
- Technical Audit Categories/Sections for Apparel
- Technical Audit Criteria for Garments
- Audit CAP and Follow up Improvement in Garments
- Follow up Improvement of Audit
- Importance of Garments Packing List
- Format of Packing List in Apparel Industry

**Module -9: Assorting**

- What is Assortment Planning for the Garment Industry
- Picking Apparel Products to Meet Demand
- Using Assortment Planning to Drive the Supply Chain
- Accurate Assortment Planning and Profitability

**Module -10: Carton Pack & Final inspection**

- Types of packaging:
    - Based on garment packaging:
    - Based on packaging design:
    - Shipment Packaging
    - Benefits of packaging
- Garments packaging materials
- Functions of packing
- Quality inspection
- Activities to be performed during inspection

**Module -11: Document Record Keeping**

- Document Management for the Apparel Manufacturing Industry
- Document control
- Document coding

- Control of Obsolete Documents

**Teaching Methods**

**Assesments**

**Bibliography / References**


1) Apparel Merchandising: The Line Starts Here by Jeremy A. Rosenau and David L. Wilson, Fairchild Publications, 2010
2) Carr Harold & Lantham Barbara: The Technology of Clothing Manufacture (Second Edition)


**Course Title**

**Apparel Designing**

Credit Hour Details:

Theory: 01 Practical: 02 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Finishes<br>- Fashion details.<br>- Basic pattern making<br>- Show basic knowledge of working processes of couture on industrial level. | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Identify design elements in any garment. | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Communicate in fashion industry by using vocabulary of fashion details | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

The ability to draw technical drawings of fashion details, apply knowledge of technical drawing in the design development process, basic methods of drafting patterns, marking of grain line, types of button holes, press button with extensions and finishing of garment.

**Module -1: Variation and types of finishing's**

- Identification of grain line, hem finishes, embroidered buttons and decomposition of buttonhole with edge to edge closures

**Module -2: Introduction to design elements**

- Vocabulary, variations and technical drawings of fashion features such as types of necklines, collars, sleeves, trousers and jackets

**Module -3: Designer research**

- Names of designers and their certain style of work and make a catalogue

**Module -3: Study of finishes & components**

- Finishes and components: Opening/closures e.g. pockets, zips, placket, snap-button/Velcro, toggles/pullers.

**Module -4: Basic skirt drafting and its blocks**

- Draft basic skirt through mathematical calculations along with blocks

**Module -5: Basic sleeve drafting**

- Draft basic sleeve through mathematical calculations along with blocks

**Module -6: Basic bodice block drafting**

- Manipulate in the basic bodice

**Module -7: Basic bodice manipulation**

- Manipulate in the basic bodice
- Draft the basic bodice and blocks.

**Teaching Methods**

**Assessments**

**Bibliogrpahy / References**

1) Alderich, Winifred, metric pattern cutting. (4th edition). 2004, john Wiley & sons.

**Course Title**

**Technical Textiles**

Credit Hour Details:

Theory: 01 Practical: 03 Total: 04

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Manufacturing, types and applications of technical textiles | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Non-woven production processes | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to communicate the types and different properties of technical textiles | | 4 | 4 |

**Course Contents:**

**Aim, scope & Objective:**

To provide a brief knowledge of the production of technical textiles and their applications.

**Module -1: Introduction to non-woven fabric, fiber & polymer selection**

- Understand what are non-woven textiles
- Explain the difference between woven, knitted and non-woven fabrics
- Understand the fiber and polymer types used for non-woven production

**Module -2: Web formation process**

- Explain web formation process
- Explain different parameters governing the process

**Module -3: Web handling & transport processes**

- Explain web handling methods
- Explain web transport methods
- Explain various web bonding techniques

**Module -4: Finishing and functionalization of nonwoven fabrics**

- Explain different finishing products used for non-woven
- Explain non-woven finishing methods

**Module -5: Manufacture-structure-property relations of selected nonwoven materials**

- Explain different properties related to the structure of non-woven
- Explain production methods

**Module -6: Study of nonwoven manufacturing routes for different product types**

- Explain different product characteristics
- Understand various manufacturing processes used for non-woven

**Module -7: Characterization and testing**

- Explain different product properties

- Explain various testing methods

**Module -8: Principles of design for performance**

- Explain different Principles of design for performance

**Module -9: Introduction to technical textiles**

- Explain what technical textiles are
- Explain different agrotech products
- Explain different buildtech products
- Explain production methods

**Module -10: Geotech & Medtech**

- Explain different geotech products
- Explain different medtech products
- Explain production methods
- Explain various application areas of grotech and medtech products

**Module -11: Mobiltech Oekotech**

- Explain different mobiltech products
- Explain different Oekotech products
- Explain production methods
- Explain various application areas of mobiltech and oekotech products

**Module -11: Packtech**

- Protech
- Explain different packtech products
- Explain different protech products
- Explain production methods
- Explain various application areas of packtech and protech products

**Module -12: Sporttech**

- Explain different sportech products
- Explain different types of ropes and their properties
- Explain cleaning textiles and advertising textiles
- Explain production methods

**Module -13: Coated & laminated fabrics**

- Explain different types of coated and laminated fabrics
- Explain different characteristics and applications of coated and laminated fabrics
- Explain different types of coating and laminating

**Teaching Methods**

**Assessments**

**Bibliography / References**

1) Handbook of Technical Textiles by A.R. Horrocks and S.C. Anand, 2000
2) Nonwoven Textiles, by Radko Krcma

Other Required Reading:

1) Encyclopedia of Textiles, Fibers and Non-Woven Fabrics by Martin Grayson, 1984

**Course Title**

**Production Planning and Control**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to apply knowledge of finance, marketing and supply chain and strategic management.<br>- Ability to identify, formulate, research literature and analyze | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Ability to design line planning, pre-production and critical path ways<br>- Ability to investigate throughput time, tips and tricks on PPC | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex textile engineering problems, with an understanding of the limitations. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Translating a sales forecast into a viable production plan to coordinate, execute and control the activities of an operation to ensure that the organizations goals are met in a cost effective manner.

**Module -1: Function of PPC**

- Basic structure of the subject and function of PPC

**Module -2: Characteristics of Intermittent Production System**

- Characteristics of Intermittent production system

**Module -3: Characteristics of Continuous Production System**

- Characteristics of Continuous Production System

**Module -4: Factors effecting the choice of manufacturing system**

- Factors effecting the choice of manufacturing system

**Module -5: Project preplanning and planning**

- Project preplanning and planning

**Module -6: Types of planning**

- Types of planning

**Module -7: Labor planning & Thread Consumption**

- Projected and real financial calculation
- Labor planning
- Thread consumption

**Module -8: Fabric Consumption & Trim Calculation**

- Fabric consumption
- Trims calculation

**Module -9: Planning and execution**

- Planning and execution

**Module -10: Types of control**

- Types of control
- Quality control

**Module -11: ABC Analysis**

- ABC analysis

**Teaching Methods**

**Assessments**

**Bibliography / References**

1) Production planning & control in apparel manufacturing by Prasanta Sarkar

2) Fundamentals of production planning and control by Stephen N. Chapman, Pearson
3) Production control by F. G. MOORE
4) Research papers (to be provided by the resource person)

**Course Title**

**Supply Chain Logistic**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to apply knowledge of management, business and industry, especially textile industry to the solution of complex textile business problems in the competitive global business environments | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Ability to identify, formulate, research literature and analyse complex textile business management problems reaching substantiated conclusions by using the principles and techniques of management and business strategy | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to communicate effectively on complex textile management activities with the business community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions<br>- Ability to create, select and apply appropriate techniques, resources, and | | 4 | 4 |

| | | | | |
|---|---|---|---|---|
| | modern management technique & tools and IT tools, including prediction and modelling, to complex textile management & business problems, with an understanding of the limitations. | | | |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To focus multiple processes of supply chain and the ways to measure the performance of these processes, namely, purchase, transportation, warehousing, inventory management etc. The course also focuses on discussing various models proposed for measuring supply chain performance in an effective way

**Module -1: Introduction to Supply Chain**

- Basics of supply chain management.
- Significance of performance in the today's manufacturing and service organizations
- Basics of supply chain performance

**Module -2: Efficient & Responsive SCM**

- Design distribution networks according to different responses required by the customers
- To understand the solution of bull whip effect created in the industries
- Elaborate customer orders

**Module -3: Inventory Control Management**

- Significance of supply chain inventory management.
- Product availability & Appraisal of Inventories
- Multi-Echelon Inventories & Virtual Inventories
- Push Inventory Control & Significance of supply chain inventory
- Single Order Quantity, Advanced Pull Inventory Control, Risk pooling

**Module -4: Planning in Supply Chain Management**

- Role of aggregate planning in supply chains
- Aggregate planning & Network Optimization Models
- Significance of aggregate planning in the SCM
- Information sharing, connectivity through IT, ERP, E-commerce.
- Relationship management, Transactional relationships & Coordination in supply chains.
- Significance of information flows and its impacts on supply chain performance

**Module -5: Logistics**

- Transport fundamentals
- VMI & Cross docking

- Importance of other business entities in supply chain

**Module -6: Performance measures**

- Benchmarking the supply chains
- SCOR model and aligning incentives
- Importance of measuring the performance of supply chains on continuous basis
- Benefits, Pitfalls & Limitations
- Trends and future of supply chain management
- Assessment of supply chains
- Application of supply chain as a whole

**Teaching Methods**

**Assessments**

**Bibliography / References**


1) Supply chain management: from vision to implementation by Stanley E. Fawcett, Lisa M. Ellram & Jeffrey A. Ogden (1st Ed.), Prentice Hall
2) Business Logistics & Supply chain management by Ronald H. Ballou, (5th Ed.) Prentice Hall
3) Supply Chain Management by Sunil Chopra 5th Ed. Prentice Hall
4) Principles of supply chain management, A Balanced approach by Joel D. Wisner, G.Keong Leong, Keah-Choon Tan, Thomson-Southwestern publishers.


**Other Required Reading:**

1) Research papers
2) Case studies

**Course Title**

**Garment Industry Utilities**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Different auxiliary systems used in textiles manufacture like humidifiers, chillers, compressors, steam and water energy | | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| | conservation systems, lighting systems, fire-fighting systems | | | |
| 2 | Design, synthesis and evaluation skills<br>- Ability to take timely decisions in various situations in textile mills for proper material processing and emergency | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to communicate the situation regarding information and terminology to seniors and concerned staff | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To provide a brief knowledge of different utilities used in different fields of garments manufacturing industry.

**Module -1: Introduction Textile Mills Humidification**

- The fundamentals of Textile Mills Humidification
- The layout of a typical mills humidification system
- The importance of Textile Mills Humidification towards workers' safety and proper material processing
- Instruments used to evaluate air relative humidity
- Requirement of different industries of different humidification levels
- Problems associated with mills air humidification

**Module -2: Mills Air-conditioning (Chilling and filtration)**

- Importance of chilling for textiles processing
- Types of air-conditioners
- Air circulation and ventilation for air conditioning
- Explain air filtration

**Module -3: Compressor**

- Working of compressors
- Types of compressors
- Maintenance issues of compressors

**Module -4: Industrial Illumination**

- Industrial lighting system

- Requirements of lighting levels for different materials and processes
- Lighting calculations for textile industry
- Installation and maintenance of lighting equipment

**Module -5: Fire Fighting**

- Importance of fire-fighting in textile industry
- Types of fire-fighting equipment used in textile industry
- Installation of fire-fighting equipment
- Safety and cares related to fire-fighting equipment
- Maintenance of fire-fighting equipment

**Module -6: Steam Generation**

- Types of boilers used for steam generation
- Boiler safety and maintenance
- Load estimation
- Impact of fuel in boiler performance
- Boiler efficiency

**Module -7: Steam Transportation**

- Uses of steam in different departments of textile mills
- Types are cares of steam transportation system
- Energy losses related to steam and remedies

**Module -8: Electrical Generation**

- Types of electricity generation systems used in textile industry
- Different fuels used for electricity generation and their economic impact

**Module -9: Electrical Transmission**

- Calculation and balancing of electricity load
- Types of electricity transmission wires and their properties
- Energy losses in electricity transmission
- Cares and safety of electricity equipment

**Module -10: Water & Energy Conservation**

- Different solid and liquid wastes produced in textile industry
- Waste management systems used in textile industry
- Environmental aspects of waste management

**Teaching Methods**

**Assessments**

**Bibliography / References**

1) Principles of Textile Testing by J. E. Booth

Other Required Reading:

2) Principles of Textile Testing by J.E. Booth.
3) Humidification and Ventilation Management in Textile Industry by B. Purushothama, 2009

**Course Title**

**Apparel Machinery & Equipment**

Credit Hour Details:

Theory: 02 Practical: 01 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to apply knowledge of mathematics, natural sciences, engineering fundamentals and textile engineering specialization to the solution of complex textile engineering problems.<br>- Ability to identify, formulate, research literature and analyze complex textile engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Ability to design solutions for complex textile engineering problems and design systems, products, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.<br>- Ability to conduct investigations of complex textile engineering problems using research- | | 4 | 3 |

| | | | | |
|---|---|---|---|---|
| | based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions | | | |
| 3 | Communication, interpersonal & IT skills<br>- Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex textile engineering problems, with an understanding of the limitations.<br>- Ability to communicate effectively on complex textile engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Basic working mechanisms of the machinery and the effective use of machines in production process.

**Module -1: Mechanical Terminology, Gears & Bearings**

Define 'kinematics, mechanisms, machines, motion, links, joints, kinematics' chains, crank, rocker, coupler and ground '

Explain the types of motion, links, joints, kinematics' chains

**Module -2: Belts, Pulleys & Couplings, Categories of Apparel Machinery**

- Explain belts, pulleys, and couplings.
- Explain their general use in the textile industry
- Explain the specific use of belts, pulleys and couplings in the apparel industry
- Explain bearings and major types of bearings
- Explain the bearing friction for high efficiency and low wear and tear
- Explain the principle of operation of sliding bearings, rolling element bearings, jewel bearings, fluid bearings, magnetic bearings, and flexure bearings

**Module -3: Garment Preparatory machines**

Analyze the working of Spreaders and its production, Error, faults remedies and modern softwares.

Analyze the working of Cutters and its production, Error, faults remedies and modern softwares.

Distinguish between different embroidery machines according to their mechanism and color capacities

**Module -4: Sewing Machines**

- Classifications of Industrial Sewing Machines
- With different automation, trouble shooting and different drives mechanism

**Module -5: Elements of Sewing Machines**

- Needle Bar & its types
- Functions of Needle Bar
- Mechanism of needle bar
- Analyze the necessity of Hook
- Functions of Hook
- Mechanism of Hook
- Understand the importance of Thread Take Up lever
- Functions of Thread Take Up lever
- Mechanism of Thread Take Up lever
- Analyze the performance of different Presser Foot
- Functions of Presser Foot according to their shapes
- Mechanism of Presser Foot
- At the end of this week, the students will be able to:
- Feed Dog
- Functions of Feed Dog
- Mechanism of Feed Dog
- At the end of this week, the students will be able to:
- Thread Tensioner
- Functions of Thread Tensioner
- Mechanism of Thread Tensioner

**Module -6: Auxiliary Mechanisms for Industrial Sewing Machines**

- Overview of a High Speed Sewing Machine with Ancillary Controls
- Ancillary Equipment for High Speed Sewing Machines
- Thread Cutter
- Thread Wiper
- Automated Presser Foot
- Needle Positioning Device
- Stitch Compression
- Bar Tacking

- Edge Detection Devices
- Edge Trimmer
- Automatic Fabric Feeding & Guiding

**Module -7: Automation in Sewing Machines**

- Automatic Sewing Machines with Cam Control
- Buttonhole Sewing Machine
- Button Sewing Machine
- Bar tacking Machine; Loop Sewing Machines
- Automated Sewing Equipment
- Profile Sewing Systems
- Pocket Flap Marker
- CNC Sewing Machines
- Collar Assembly
- Robots
- Sewing a Back Seam
- Problems in the Automation of Sewing Process

**Module -8: Finishing & Packing Machinery**

- Pressing Equipments
- Mechanical Presses
- Iron Press
- Buck Press
- Moulding Press
- Steam Dolly
- Tunnel Finisher
- Pressing Accessories
- Stain Removing Machine
- Needle Detector
- Shrink Wrap Machine
- Strapping Machine
- Pallet Making Machine

**Module -9: Finishing & Packing Machinery-II**

- Miscellaneous Machine Types
- Fabric Inspection Machine
- Snap Fastening Machine
- Thread Trimmer Machine
- Thread Suction Machine
- Thread Winding Machine
- Quilting Machine

- Denim Finishing
- Swatch Cutting Machines
- Light Box
- Washing Machines
- Drying Machines
- Brushing Machines
- Sand Blasting Machines
- Spray Cabinets

**Module -10: Maintenance of Garment Machinery**

- Define maintenance
- Necessity of Maintenance
- Types of maintenance
- Reactive Maintenance
- Advantages & Disadvantages
- Preventive Maintenance
- Advantages & Disadvantages
- Predictive Maintenance
- Advantages & Disadvantages
- Reliability Centered Maintenance (RCM)
- Advantages & Disadvantages
- How to Initiate RCM

**Teaching Methods**

**Assesments**

**Bibliography/ Referecnes**


1) Machine Elements in Mechanical Design by Mott Robert L
2) Apparel Manufacturing – Sewn Product Analysis by Glock Ruth E, (Third Edition)
3) Introduction to Clothing Manufacture by Cooklin Gerry
4) The Technology of Clothing Manufacture by Carr Harold & Lantham Barbara, (Second Edition)
5) Juki Corporation: Basic Knowledge of Sewing


**Course Title**

**Anthropometry and Garment Construction**

Credit Hour Details:

Theory: 01 Practical: 02 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ability to apply knowledge of mathematics, natural sciences, engineering fundamentals and textile engineering specialization to the solution of complex textile engineering problems. | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Ability to design solutions for complex textile engineering problems and design systems, products, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.<br>- Ability to conduct investigations of complex textile engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions. | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex textile engineering problems, with an understanding of the limitations.<br>- Ability to communicate effectively on complex textile engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | | 4 | 4 |

| | | | | |
|---|---|---|---|---|
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Approaches to production pattern making, and manipulate patterns to accommodate various body sizes, shapes and also the course design with the emphasis on innovation, skills, creativity, ideas, methodologies, principle and provides an opportunity to build on garment design skills, including a work placement and projects set with the industry.

**Module -1: Defining Anthropometry**

- Define Anthropometry.
- History of Anthropometry
- New trends in Anthropometry

**Module -2: Human Figure**

- Human Anatomy
- Figure Types
- Ideal Standard Figure
- Landmark terms

**Module -3: Sizing System**

- History of sizing systems.
- Creating Sizing system.
- Size intervals
- Division into eight method
- Golden Mean method

**Module -4: Imaginary Lines in fabric**

- Define the Grain.
- Understand Lengthwise grain, Crosswise Grain, Bias, True Bias and Selvedge

**Module -5: 2DBody Structure**

Basic body structure

**Module -6: Pattern Design**

- Pattern design in terms of anthropometric systems
- Pattern evaluation

**Module -7: Aesthetic and technical requirement**

- The importance and aesthetic garment requirements
- The importance and technical garment requirements

**Module -8: Body modeling methods**

- Body landmarks

**Module -9: 3D apparel design systems**

- 3D apparel design system for pattern generation and garment fit

**Module -10: Patterns & Fabric Behaviors & Facing & Interlinings**

- Knits Stretch & shrinkage Factors
- Adapting pattern to knits
- Dart-less Knit Foundations
- Type of facings/Interlinings
- Cutout necklines & armholes

**Module -11: Sleeves**

- Different types of sleeves & cuffs.

**Module -12: Plackets & Pockets**

- Types of plackets & Pockets

**Module -12: Skirts**

- Basics of Skirt patterns
- Different skirt lengths
- Different skirt silhouettes

**Module -13: Draping**

- Difference b/w Draping & Drafting
- Sketch reading
- Elements identification
- Formation of Basic Bodies Pattern by draping
- Formation of basic Skirts pattern by draping
- Formation of Trouser pattern by draping

**Teaching Methods**

**Assessments**

**Bibliography / References**


1) Patternmaking for Fashion Design (Fourth Edition), Helen Joseph – Armstrong, 2010 Prentice Hall,
2) Apparel Manufacturing: (Sewn Product Analysis), Ruth E. Glock, Grace I. Kunz, 2005, Prentice Hall,
3) Dress Pattern Designing (Fifth Edition), Natalie Bray, 2008 Blackwell Science,


**Course Title**

**Garment Illustrations**

Credit Hour Details:

Theory: 0 Practical: 03 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Gain knowledge of world's different illustrators who are working in this field and will get to know about their different ways and methods of illustrations. | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Sketch techniques of making an exaggerated croqui.<br>- Compose research boards by researching different themes.<br>- Render fabrics and materials using different mediums. | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools and to communicate effectively | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To demonstrate the sketch techniques of making an exaggerated croqui, practice 9-Heads technique, draw different features and expressions of face, study different source of light on body through different sheets and mediums, compose research boards by researching different themes, render fabrics and materials using different mediums..

**Module -1: Study of different Illustrators**

- Research on different illustrators, their names, history, and style. All information will be compiled in booklet

**Module -2: Practice of figure making in geometrical shapes**

- 9-heads figure drawing from basic shapes to full body posture

**Module -3: Fast drawings in given time slot**

- To draw fashion figures in given time slots of 60-30-10-5 minutes

**Module -4:** Replication of Illustrations

- Illustrations of different illustrators then will exchange their research with classmates and then replicate it. This practice will make their creative mind strong and skill full.

**Module -5: Study of Movement and posture**

- Draw different posture and movements of croquis.

**Module -6: Face features drawing**

- Draw and practice face features from large scale to smallest size scale and practice until they get perfect

**Module -7: Study of Source of light**

- To render body by source of light study. Student will use different body postures and color medium to practice source of study.

**Module -8: Research Boards**

- Render body by source of light study. Student will use different body postures and color medium to practice source of study.

**Module -9: Final Projects**

**learn to work on big scale canvas and will be able to draw an illustration on it of chosen artist's technique by exploring different mediums and present it to the jury**

**Teaching Methods**

**Assessments**

**Bibliography / References**


1) Hagen, Kateryn. Fashion Illustration for designers (2nd edition) Printice Hall (2004).
2) Vogue magazine, collezioni magazine


**Course Title**

**Quality Characterization of Apparel**

Credit Hour Details:

Theory: 01 Practical: 02 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Textile Testing, Quality Management Procedures<br>- Ability to Analyze Textile Raw-material, semi-product and final Product | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills<br>- Ability to understand and analyze the problems related to quality management of textiles during production<br>- Ability to evaluate the fabric Construction for re-production and analysis for further Process<br>- Ability to analyze different types of textiles<br>- Ability to devise methodology to reproduce textile products of desired quality | | 4 | 3 |
| 3 | Communication, interpersonal & IT skills<br>- Ability to communicate the methods adopted to solve the problems and to present the final solution | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

To study about basic testing of raw material, semi-product and final product of textile, especially fabric testing. Another aim is to learn methods to control quality of production of textile materials in various stages of manufacturing.

**Module -1: Raw-material Structure**

- Learn about basic raw-material specification/parameters
- learn about analysis of these specifications
- Learn their impacts on next process

**Module -2: Yarn Structure**

- Learn about basic yarn specification/parameters
- Standard Test Methods for Sewing Threads
- Learn their impacts on next process

**Module -3: Fabric Structure**

- Learn about basic Fabric specification/parameters
- learn about analysis of these specifications
- Learn their impacts on next process

**Module -4: Garment Structure**

- Learn about basic garment specification/parameters
- Standard Specification for Zipper Dimensions
- Standard Practice for Selection of Zippers for Care-Labeled Apparel and Household Furnishings

**Module -5: Raw-material Faults**

- Learn about raw-material faults
- Learn about analysis of these faults
- Learn their impacts on final utilization/uses

**Module -6: Yarn Faults**

- Learn about yarn faults
- Learn about analysis of these faults
- Learn their impacts on final utilization/uses

**Module -7: Fabric Faults**

- Learn about fabric faults
- Learn about analysis of these faults
- Learn their impacts on final utilization/uses

**Module -8: Garment Faults**

- Learn about garment faults
- Learn about analysis of these faults
- Learn their impacts on final utilization/uses

**Module -9: Operational Faults**

- Learn about operational faults
- Learn about analysis of these faults
- Learn their impacts on next and final utilization/uses

**Module -10: Mechanical Faults**

- Learn about basic mechanical faults
- Learn about analysis of these faults
- Learn about their impacts on next and final utilization/uses

**Module -11: Customized Inspection**

- Learn about customer's needs and requirements
- Learn about to match testing methods with customer's needs

**Module -12: American and Japanese System**

- Learn about difference between these two systems
- Learn about their impacts on end products

**Module -13: Packing Faults**

- Learn about basic packing defects
- Learn about analysis of these faults
- Learn about their impacts on products

**Module -14: Faults produced during product process iteration**

- Learn about faults produced during sewing process
- Explain prevention of sewing faults

**Teaching Methods**

**Assessments**

**Bibliography / References**


1) Mechanics of Materials by Ferdinand Pierre Beer, 2008
2) Structure & Mechanics of Woven Fabrics by Jinlian Hu, Woodhead Publishing in Textiles, 2004


Course Title

**Sustainable Textiles**

Credit Hour Details:

Theory: 03 Practical: 0 Total: 03

Pre-requisites:

Course Learning Outcomes:

| CLO No | CLO Description | Domain | Taxonomy level | Linking to PLOs |
|---|---|---|---|---|
| 1 | Knowledge, understanding and application skills<br>- Ways of improving sustainability at various points in the supply chain<br>- Consumer perceptions of recycled textiles, eco-labelling, organic textiles and the use of recycled materials in textile products | | 3 | 2 |
| 2 | Design, synthesis and evaluation skills | | 4 | 3 |

| | | | | |
|---|---|---|---|---|
| | - Ability to understand and analyze the problems related to textiles during production<br>- Ways of achieving more sustainable materials and technologies as well as textiles recycling<br>- Ability to analyze different types of textiles<br>- Ability to devise methodology to reproduce textile products of desired quality | | | |
| 3 | Communication, interpersonal & IT skills<br>- Examines how sustainability can be integrated into textile design, production and processes<br>- Ability to communicate the methods adopted to solve the problems and to present the final solution | | 4 | 4 |
| | | | | |

**Course Contents:**

**Aim, scope & Objective:**

Environmental issues are playing an increasingly important role in the textile industry, both from the point of view of government regulation and consumer expectations. Sustainable textiles reviews ways of achieving more sustainable materials and technologies as well as improving recycling in the industry. Thus there is a need to study sustainable living ideology in the modern 21st century. Many people in the world are pushing for more sustainable textiles or ethically produced fabrics as the impacts of human production and waste are becoming inescapably apparent. Moreover to encourage habits that will not have negative long-term impacts on the environment, including the preservation of resources. To creating a balance of social equity of fairness. To avoid practices that are inherently exploitative or which are only beneficial to some communities at the detriment to others. Creating products that can realistically be incorporated into existing markets.

**Module -1: Introduction**

- Sustainability through the supply chain

**Module -2: Achieving sustainable textiles**

- A designer's perspective; sustainable cotton production and processing; sustainable wool production and processing; sustainable synthetic fibers.

**Module -3: Application of biotechnology**

- Application of biotechnology in the processing of textile fabrics

**Module -4: Enzyme biotechnology**

- The case of poly(hydroxyalkanoates) (PHA) and other fibers
- Enzyme biotechnology for sustainable textiles

**Module -5: Key sustainability issues**

- Key sustainability issues in textile dyeing
- Environmentally-friendly plasma technologies for textiles
- Understanding and improving textile recycling: A systems perspective

**Module -6: Applications and case studies**

- Consumer perceptions of recycled textile fibers
- Eco-labelling for textiles and apparel

**Module -7: Organic cotton**

- Production practices and post-harvest considerations
- The role of nanotechnology in sustainable textiles
- The use of recovered plastic bags in nonwoven fabrics

**Module -8: Environmentally-friendly flame-retardant textiles**

- Environmentally-friendly flame-retardant textiles
- Systems change for sustainability in textiles

**Teaching Methods**

**Assessments**

**Bibliography / References**


1. Sustainable Textiles by Richard Blackburn, Woodhead Publishing, 2009
2. Sustainable Technologies for Fashion and Textiles by Rajkishore Nayak, Woodhead Publishing, 2020.
3. Roadmap to Sustainable Textiles and Clothing by Subramanian Senthilkannan Muthu, Springer, 2014.
4. Textiles and Clothing Sustainability by Subramanian Senthilkannan Muthu, Springer, 2017
5. Sustainable Innovations in Apparel Production by Subramanian Senthilkannan Muthu, Springer, 2018.