

L-GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)

Semester - II

Course Title: Fabric Science and its Application

(Course Code: 4325104)

Diploma programmes in which this course is offered	Semester in which offered
Computer Aided Costume Design and Dress Making	Second

1. RATIONALE

Rapid changes and progress in textile industry has led to the advancement in the fabrics selected for manufacturing garments. Manufacturing of textile fabrics for apparel, household and industrial use has great business opportunity. This course provides in-depth knowledge of different fabrics available in the market, its mechanical production, the chemistry and physics involved in manufacturing of woven, knitted, non-woven and special textiles.

2. COMPETENCY

The purpose of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Suggest suitable textile fabrics for given application based on its manufacturing processes.**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

- a) Prepare suitable woven and knitted samples for given situation.
- b) Select suitable fabrics for given application.
- c) Suggest suitable type of non-woven fabric for given application.
- d) Determine suitability of special textiles based upon its characteristics.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
3	-	2	4	30*	70	25	25	150

()*: Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit, CA - Continuous Assessment; ESE - End Semester Examination.

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) are the sub-components of the COs. *Some of the PrOs marked '**' (in approx. Hrs column) are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'.*

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Prepare types of basic weave samples with draft and peg plan: Plain weave, Basket weave, Twill weave, Satin weave, Sateen weave.	I	10
2	Prepare types of decorative weave samples with draft and peg plan: Leno weave, Pile weave, Surface figure weave, Double weave.	I	8
3	Prepare 10*10centimeter knitting samples: Knit, Purl, Rib, Moss.	II	10
			28 Hrs.

Note

- More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.
- The following are some **sample** 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course which are embedded in the COs and ultimately the competency.

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Selection of material for creating the sample.	10
2	Selection of suitable method for constructing the sample.	20
3	Follow the instructions for the given practical.	30
4	Quality of the finished sample.	30
5	Submission of the sample as per the given guideline.	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

This major equipment with broad specifications for the PrOs is a guide to procure them by the administrators to usher in uniformity of practical in all institutions across the state.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Wooden sample loom	

7. AFFECTIVE DOMAIN OUTCOMES

The following **sample** Affective Domain Outcomes (ADOs) are embedded in many of the above-mentioned COs and PrOs. More could be added to fulfil the development of this course t competency.

- Work as a leader/a team member.
- Follow safety practices while performing the practical.
- Realize importance of green energy.

The ADOs are best developed through the laboratory/field-based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- i. 'Valuing Level' in 1st year
- ii. 'Organization Level' in 2nd year.
- iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of *Revised Bloom's taxonomy* that are formulated for development of the COs and competency. If required, more such higher level UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit – I Woven fabric formation	1a. Define weaving and related terminologies. 1b. Explain basic loom operations. 1c. Classify various types of weaves and its application. 1d. Draft peg plans of various weaves. 1e. Identify woven fabric defects. 1f. Identify various woven fabrics and its uses.	1.1. Weaving: Definition & terminology related to weaves- warp, weft, floats, blended fabric, union fabric. 1.2. Basic loom and its structure 1.3. Types of weaves: 1.3.1 Basic weaves- Plain weave, Basket weave, Twill weave, Satin weave, Sateen weave 1.3.2 Decorative weave- Dobby weave, Jacquard weave, Leno weave, Surface figure weave, Pile weave, Double weave 1.4 Draft and peg-plan of weaves 1.5 Identification of woven fabric defects- yarn and weave 1.6 Identification of different types of woven fabrics and its application 1.6.1 Brocade 1.6.2 Burlap 1.6.3 Calico 1.6.4 Cambric 1.6.5 Canvas 1.6.6 Cheese cloth 1.6.7 Chiffon 1.6.8 Corduroy 1.6.9 Crepe 1.6.10 Damask 1.6.11 Denim 1.6.12 Dotted swiss 1.6.13 Drill 1.6.14 Gabardine

		<ul style="list-style-type: none"> 1.6.15 Georgette 1.6.16 Ghingham 1.6.17 Lawn 1.6.18 Muslin 1.6.19 Organdy 1.6.20 Organza 1.6.21 Poplin 1.6.22 Satin 1.6.23 Seersucker 1.6.24 Taffeta 1.6.25 Tapestry 1.6.26 Terry cloth 1.6.27 Velvet 1.6.28 Voile
Unit – II Knitting	<ul style="list-style-type: none"> 2a. Define knitting and related terminologies 2b. Explain types of knitting. 2c. Explain the steps of knitting for given Hand knitted samples. 2d. Differentiate weft knitting and warp knitting. 2e. Identify various knitted fabrics and its uses. 	<ul style="list-style-type: none"> 2.1 Knitting: definition and terminology related to Knitting- course, wale 2.2 Types of knitting: Hand knitting, Machine knitting 2.3 Methods of knitting: Weft/filling knitting, warp knitting 2.4 Identification of different types of knitted fabrics and its application: <ul style="list-style-type: none"> 2.4.1 Circular knit 2.4.2 Crochet 2.4.3 Double knit 2.4.4 Flat knit/ Jersey 2.4.5 Cable knit 2.4.6 Full fashioned 2.4.7 Purl fabric 2.4.8 Rib fabric 2.4.9 Bird's Eye Knit 2.4.10 Fleece Knit
Unit– III Non-woven or Felting	<ul style="list-style-type: none"> 3a. Define non-woven and related terminologies. 3b. Distinguish various types of non-woven and its application 3c. Explain special non-woven fabrics. 3d. Identify different non-woven fabrics. 	<ul style="list-style-type: none"> 3.1 Non-woven: definition/ meaning 3.2 Types of non-woven and its application <ul style="list-style-type: none"> 3.2.1 Felts 3.2.2 Bonded 3.2.3 Special non-woven <ul style="list-style-type: none"> 3.2.3.1 Fusible 3.2.3.2 Film fabric 3.2.3.3 Coated fabric 3.2.3.4 Tufted fabric
Unit– IV Special Textiles	<ul style="list-style-type: none"> 4a. Explain decorative fabrics and its use. 4b. Describe manufacturing processes of decorative fabric. 	<ul style="list-style-type: none"> 4.1 Decorative fabrics its process and application <ul style="list-style-type: none"> 4.1.1 Braids 4.1.2 Net

	4c. Explain the use of technical textile. 4d. Identify different technical textiles.	4.1.3 Lace 4.2 Technical textile and application 4.2.1 Geo textile 4.2.2 Agro textile 4.2.3 Medical textile 4.2.4 Industrial textiles 4.2.5 Protective textiles
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9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Woven fabric formation	14	6	8	12	26
II	Knitting	8	3	4	7	14
III	Non -woven or Felting	10	4	5	6	15
IV	Special textiles	10	4	5	6	15
Total		42	17	22	31	70

Legends: R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)

Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions to assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary slightly from above table.

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related **co-curricular** activities which can be undertaken to accelerate the attainment of the various outcomes in this course. Students should conduct following activities in group and prepare reports of about 5 pages for each activity. They also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a) Market Survey of different latest fabrics and prepare a report.
- b) Prepare different charts showing various uses of special textiles.
- c) Give seminar on latest innovations in the field of textiles.
- d) Find out the textile industry nearby your place and visit the industry and prepare report.
- e) Prepare a chart or scrapbook showing photographs of different special textiles and its uses.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- a) Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- b) Guide student(s) in undertaking micro-projects.

- c) **'L' in section No. 4** means different types of teaching methods that are to be employed by teachers to develop the outcomes.
- d) About **20% of the topics/sub-topics** which are relatively simpler or descriptive in nature is to be given to the students for **self-learning**, but to be assessed using different assessment methods.
- e) With respect to **section No.10**, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- f) Guide students on how to address issues on environment and sustainability.
- g) Guide students for using data manuals.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The duration of the microproject should be about **14-16 (fourteen to sixteen) student engagement hours** during the course. The students ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:

- a) **Collection and identification:** Collect woven, knitted and non-woven fabric samples available in the market and create suitable article.
- b) **Woven Sample making:** Create any 3 different variations of weave samples. (Variations of Basket, Plain and Twill weave)
- c) **Knitted Sample Making:** Prepare any 3 fancy samples using knitting technique.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Fabric Science	Arthur Price & Allen C. Cohen	Fairchild publication, New York. ISBN: 1-56367-004-6
2	Textiles: Fiber to Fabric	Bernard P. Corbman	MC Graw Hill, New York ISBN: 0-07-013137-6
3	Texbook of Clothing & Textiles	Dr. Sushma Gupta, Neeru Garg & Renu Saini	Kalyani Publisher, New Delhi ISBN: 81-7663-252-X
4	UGC- NET/SLET (Home Science)	Navneeta Kaur Sokhi	COSMOS book hive, (P) Ltd., Gurgaon-122016

S. No.	Title of Book	Author	Publication with place, year and ISBN
5	Textile Science An explanation of fibre properties	E.P.G Gohl, L. D, Vilensky	CBS; 2 nd edition (1 January 2005) ISBN: 812391038X

14. SOFTWARE/LEARNING WEBSITES

- http://cbseacademic.nic.in/web_material/Curriculum/Vocational/2018/Textile%20DesignT&P_XI_829.pdf
- <https://www.technicaltextile.net/articles/technical-textiles-and-their-applications-3922>
- <https://www.carnegietextile.com/12-applications-of-technical-textiles-12-types-of-technical-textiles/>
- <https://www.onlineclothingstudy.com/2019/01/different-types-of-knitted-fabrics.html>
- <https://www.textileschool.com/251/knitted-fabrics-and-types/>

15. PO-COMPETENCY-CO MAPPING

Semester I	Fabric Science and its Application (Course Code: 4325104)						
	POs						
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation & Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Management	PO 7 Life-long learning
<u>Competency</u>	Suggest suitable textile fabrics for given application based on its manufacturing processes						
<u>Course Outcomes</u>							
CO a) Prepare suitable woven and knitted samples for given situation.	3	2	2	-	2	2	3
CO b) Select suitable fabrics for given application.	3	3	3	-	2	2	3
CO c) Suggest suitable type of non-woven fabric for given application.	3	3	3	2	2	2	3
CO d) Determine suitability of special textiles based upon its characteristics.	3	3	3	2	2	2	3

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE**GTU Resource Persons**

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