GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

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

Course Title: Fabric Structure-I
(Course Code: 4332904)

Diploma programme in which this course is offered	Semester in which offered
Textile Manufacturing Technology	Third

1. RATIONALE

Knowledge of woven structure is prime requirement for production of fabric. Fabric structure plays vital role in fabric properties like strength, feel, drape and appearance etc. It is necessary to develop design on point paper with all necessary details like weave, draft, peg-plan and denting required for actual fabric production on machine.

2. COMPETENCY

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

- **Develop basic fabric structures, derivatives and "special structures" with design, draft, peg-plan, denting plan and prepare sample for the same on handloom.**

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) Use methods to represent the weave on point paper.
b) Develop basic fabric structure with design, draft and peg-plan.
c) Develop derivatives of basic fabric structure with design, draft and peg-plan.
d) Develop special fabric structures with design, draft and peg-plan.
e) Calculate fabric particulars.

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 the 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 thesub-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'*.

Sr.No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Prepare graphical representation of the weave.	1	2
2	Prepare structural design for plain weave on point paper.	1	2
3	Draw structural design of twill weave on point paper.	1	2
4	Draw structural design of satin/sateen weave on point paper	1	2
5	Prepare fabric sample of plain weave on sample loom.	2	2
6	Prepare fabric sample of twill weave on a sample loom.	2	2
7	Prepare fabric sample of satin/sateen weave on a sample loom.	2	2
8	Analyzefabric sample of plain/twill/satin/sateen (design, draft, peg plan)	2	2
9	Draw designs on a point paper - plain derivatives.	3	2
10	Draw designs on a point paper - twill derivatives.	3	2
11	Prepare sample of plain/twill derivative on sample loom.	3	2
12	Develop design on a point paper - crepe, diamond, diaper and cork-screw.	4	4
13	Develop design on point paper - honeycomb, huckaback and mock-leno.	4	4
14	Draw design and cross section of warp and weft distorted effect.	4	2
15	Draw design of extra warp and weft figuring.	4	2
17	Identify and calculate various particulars from the samples like weave, draft, peg plan, approximate count of threads, threads density, heald& reed calculation, weight of warp and weft.	5	2
	Minimum 14 Practical Exercises		**28 Hrs.**

Note

i. *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**.***

ii. *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	Identify components.	10
2	Prepare experimental setup.	20
3	Operate the equipment setup or circuit.	20

4	Follow safe practices.	10
5	Record observations correctly.	20
6	Interpret the result and conclude.	20
Total		**100**

6. MAJOR EQUIPMENT/ INSTRUMENTSREQUIRED

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

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Point paper	All practical
2	Pick glass	All practical
3	Hand loom	5,6,7,11

7. AFFECTIVE DOMAIN OUTCOMES

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

a) Work as a leader/a team member.
b) Follow ethical practices.
c) Follow safety precautions.
d) Practiceenvironmentally friendly methods and processes.

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 level)	Topics and Sub-topics
Unit – I Representation of	1a. Explain different methods to represent interlacement of warp & weft.	1.1. Develop draft, Design, and Peg-plan on point paper 1.2. Selection of weave according to

Weave on Graph Paper with fabric particular and trade name	1b. Discuss draft, Design, and Peg-plan 1c. List various types of fabric trade name and their particulars	end use of the fabric. 1.3. Features and quality particulars of special structures like - Calico, Rubia, Voiles, Denim, Jean, Poplin, long cloth, Georgette etc.
Unit – II Construction of Basic fabric weave and features	2a. Represent Plain / Twill /Satin/Sateen weave on point paper. 2b. Identify the basic characteristics and end use of the Plain / Twill / Sateen /Satin weaves 2c. List methods of ornamentation of plain weave 2d. Develop regular and irregular satin and sateen. 2e. Differentiate between satin and sateen designs. 2f. Discuss Influence of twist on fabric properties	2.1 Construction of basic weaves and its features. a) Plain Weave. b) Twill Weave. c) Sateen. 2.2 Ornamentation of Plain Weave. 2.3 Influence of yarn twist direction,on twill lineappearance.
Unit – III Modification of Plain, Twill & Sateen Weave	3a. Develop regular and irregular warp / weft rib weaves. 3b. Develop basket / matt weave (Regular, Irregular and fancy) 3c. Develop pointed twill, Herring bone twill, broken twill, zig-zag, curved and waved twill, and transpose twill by changing draft & peg-plan from given twill weave. 3d. List four methods to produce crepe weave. 3e. Develop crepe weaves based on each method. 3f. Develop Cork-screw weave Develop Diamond & Diaper Design.	3.1 Derivatives of Plain Weave. a) Rib Weave b) Matt Weave 3.2 Derivatives of Twill Weave. a) Pointed Twills b) Broken Twills c) Transposed Twills d) Rearranged Twills e) Herringbone Twills 3.3 Crepe Weave.(all four methods of construction) 3.4 Cork-screw Weave.(Warp and Weft) 3.5 Diamond & Diaper Design. 3.6 Loom equipment required for above Weaves.
Unit – IV Special Fabric Structures	4a. Develop specific weaves like, honeycomb, huckaback, mock leno weaves. 4b. Draw and differentiate ordinary and brighten honey	4.1 Toweling weaves a. OrdinaryHoneycomb b. Brighton honeycomb c. Huckaback d. Mock-Leno

	comb. 4c. Develop honey comb weave on straight draft and pointed draft. 4d. Develop brighten honeycomb weave on point paper. 4e. Develop different huckaback weaves including special weave like "Devon". 4f. Develop all types of mock lenoweave with denting order 4g. Develop Warp and Weft distortedEffect 4h. Develop a motifusing extra warp and weft 4i. State the methods to select the motif and ratio of ground and figuring threads	4.2 Loom equipment required for above Weaves. 4.3 Distorted Weave. a) Warp distorted effect. b) Weft distorted effect 4.4 Extra Warp & Extra Weft Figuring with Loom equipment
Unit – V Yarn and Fabric Calculation	5a. Calculate average count 5b. Calculate resultant count. 5c. Discuss heald and reed count. 5d. Calculating weight of warp and weft.	5.1 Yarn & Fabric calculation. 5.2 Average count. 5.3 Resultant count. 5.4 Heald & Reed count. 5.5 Weight of Warp & Weft.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTIONPAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Representation of Weave on Graph Paper with fabric particular and trade name	4	2	2	2	6
II	Construction of Basic fabric weave and features	8	0	4	10	14
III	Modification of plain, twill & sateen / satin weave	12	0	10	10	20
IV	Special Fabric Structures	12	0	10	10	20
V	Yarn and Fabric Calculation	6	0	2	8	10
	Total	**42**	**2**	**26**	**42**	**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 assess the attainment of theUOs. 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 studentrelated***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in groups and prepare small reports of above 5 page for each activity,also collect/record physical evidences such as photographs/videos of the activities for their (student's) portfolio which will be useful for their placement interviews:

a) Collect samples of various basic weave fabrics and label them with its design, draft and peg plan
b) Collect samples of various derivatives of basic weave fabric and label them with its design, draft and peg plan.
c) Present a seminar on any relevant topic of fabric structure.
d) Explore library/internet for search for specification of different popular fabric(with its trade name) in market
e) Prepare showcase portfolios of various fabric with their trade names

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-projectis 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-projects are 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 micro-project should be about **1416*(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 should relate highly with competency of the course and the COs.Similar micro-projects could be added by the concerned course teacher:

a) **Plain, Twill and Satin/Sateen weave:** Collection of various samples of Plain, Twill and Satin/Sateen weave and analyse it.

b) **Modification of plain weave:** Collection of various samples of modified plain weave and analyse it.

c) **Modification of twill weave:** Collection of various samples of modified twill weave and analyse it.

d) **Towelling weave:** Collection of various samples of towelling weave and analyse it.

e) **Special structure:** Collection of various samples of Specialweave and analyse it.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Elementary Textile Design and Colour	William Wattson	Forgotten Books, United states 2018, ISBN-13- 978-1528462143, ISBN-10 - 1528462149
2	Advance Textile Design	William Wattson	Kessinger Publishing, LLCUnited states 2010, ISBN-13- 978-1166485962, ISBN-10 - 116648596X
3	Watson's Textile Design and Colour	Z. Grosiky	Woodhead Publishing Limited, England, 1975, ISBN-13: 978-185573-995-6, ISBN-10: 978185573995
4	Watson's Advance Textile Design	Z. Grosiky	Woodhead Publishing, UK 1977, ISBN-13 : 978-1855739963, ISBN-10 : 9781855739963
5	Grammar of Textile Design	Nisbet	Forgotten Books, United states 2018, ISBN-13- 978-1330304280,, ISBN-10 - 97813303042
6	Fabric Structure and Design	N. Gokarneshan	New Age International Private Limited New Delhi, India 2008, ISBN-13 : 978-8122424706, ISBN-10 : 8122424708

7	Weaving calculation	R. Sengupta	Imprint 1979, ISBN-13: 978-0906216613,ISBN-10: 0906216613

14. SOFTWARE/LEARNING WEBSITES

a. http://www.textileassociationindia.org/
b. http://www.fiber2fashion.org/
c. http://www.nift.ac.in/
d. www.itamma.org/
e. www.en.wikipedia.org/wiki/Textile_design
f. http://www.designdiary.nic.in/
g. http://textilelearner.blogspot.in
h. https://textilestudycenter.com/
i. http://www.textileschool.com/
j. https://textilestudycenter.com/textile-books-free-donwload/

15. PO-COMPETENCY-CO MAPPING

Semester II	**Textile Fibre Technology (Course Code: 4332904)**						
	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**
Competency	Develop basic fabric structures, derivatives and "special structures" with design, draft, peg-plan, denting plan and prepare sample for the same on handloom.						
Course OutcomesCO a)Use methods to represent the weave on point paper	3		3				
CO b). Develop basic fabric structure with Design, Draft and Peg-plan	2		2			1	
CO c). Develop derivatives fabric structure with Design,		1	3		1	1	2

Draft and Peg-plan							
CO d)Develop special fabric structures with Design, Draft and Peg-plan		1	3				2
CO e)Calculate fabric particulars.				3			

Legend: '**3'** for high, '**2**' for medium, **'1'** for low or **'-'**for the relevant correlation of eachCOwith PO.

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

Sr. No.	Name and Designation	Institute	Contact No.	Email
1	Zala Samrat Madansinh Lecturer	R. C. Technical Institute, Ahmedabad	079-27664785	samrat.zala@gmail.com
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