GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

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

Course Title: Digital Pattern Making and Grading
(Course Code: 4345105)

Diploma programme in which this course is offered	Semester in which offered
Computer Aided Costume Design & Dress Making	Fourth

1.   RATIONALE

This course will provide the skill to make and grade the patterns digitally through CAD software. Student will develop skill to create digital marker using different arrangement of pattern pieces. CAD software will also provide the opportunity to use various pattern making tools for modification of the pattern and present stylized patterns. This course will give fundamental understanding of fabric consumption of various fabrics having different pattern for a particular garment. The main emphasis would be to provide Digital based platform in making and grading pattern to the students, so that they can cater the need of the garment manufacturing industry as per the requirement.

2.   COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competency:

- **Create and grade digital patterns using CAD software.**

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) Create basic bodice, shirt and trouser block using CAD software.
  b) Grade upper and lower block using appropriate grading techniques.
  c) Prepare the marker on various fabric widths for different types of garment.
  d) Interpret fabric consumption for various garments.

4.   TEACHING AND EXAMINATION SCHEME

Teaching Scheme(In Hours)			Total Credits (L+T+P/2)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	CA	ESE	CA	ESE	
0	0	6	3	0	0	50*	50	100

(*): For this practical only course, 50 marks under the practical CA has two components i.e. the assessment of micro-project, which will be done out of 10 marks and the remaining 40 marks are for the assessment of practical. This is designed to facilitate attainment of COs holistically, as there is no theory ESE.

*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. T*hey 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	Create basic bodice pattern for female using AutoCAD or CAD software as per given measurement.	I	6*
2	Grade the basic bodice block for female one size up and one size down.	II	6*
3	Create trouser block by using AutoCAD or CAD software as per given measurement.	I	8*
4	Grade the trouser block one size up and one size down.	II	8*
5	Create formal shirt block using AutoCAD or CAD software as per given measurement.	I	8*
6	Grade the formal shirt block one size up and one size down.	II	8*
7	Create a marker on fabric width of 56" by taking all the trouser sizes as mentioned in practical No. 04.	III	12*
8	Create a marker on fabric width of 36" plain fabric by taking all the shirt sizes as mentioned in practical No. 06.	III	12*
9	Create a marker on fabric width of 36" checked fabric by taking all the shirt sizes as mentioned in practical No. 06.	III	12*
10	Analyze the difference in fabric consumption of plain & checked fabric as per the created shirt marker in practical No. 08 & 09.	III	4*
	Minimum Practical Hours		**84**

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 required which are embedded in the COs and ultimately the competency.*

Sr. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Selection of the appropriate tools for digital block/marker.	10
2	Creating the digital block/marker as per given specification.	50
3	Accuracy of the digital block/marker.	20
4	Submission of the digital block/marker as per given guidelines.	20
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 practicals in all institutions across the state.

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1.	Computer System.	1 to 10
2.	Printer	1 to 10

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 competency.

a) Work as a leader/a team member.
b) Practice good housekeeping and environment friendly method.
c) Follow ethical practices.

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 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
 	
Basics of Apparel CAD system
	1a. Introduction of CAD software.
	1b. Create blocks using CAD software.
	1c. Explain Screen Layout, Menu bar, Property bar and Tool bar in CAD software.
	1d. Use basic drawing and drafting tools.
		1.1 Hardware requirement.
		1.2 Comparison of Manual Pattern Making and Digital pattern making.
		1.3 CAD software.
		    1.3.1 Screen layout
		    1.3.2 Tools bar
		    1.3.3 Menu bar
		    1.3.4 File menu
		1.4 Create block/marker in CAD Software
		1.5 Basic drawing & drafting tools
		    1.5.1 Unit
		    1.5.2 Scale
		    1.5.3 Rectangle
		    1.5.4 Line
		    1.5.5 Curve
		    1.5.6 Points
		1.6 Introduction of commands for Pattern creation & Drafting
		    1.6.1 Line & points menu
		    1.6.2 Drafting menu
		    1.6.3 Editing tools menu

Unit – II
 	
Grading
	2a. Select appropriate grading technique.
	2b. Grade female basic bodice block.
	2c. Grade shirt block for male.
	2d. Grade trouser block for male.
		2.1 Principles of grading
		    2.1.1. General Principles
		    2.1.2. Practical principles
		2.2. Grading terminology
		    2.2.1. Origin line
		    2.2.2. Axis
		    2.2.3. Zero point
		2.3. Grading methods
		    2.3.1. Vector Grading
		    2.3.2. Nest or Stack grading

Unit– III
 	
Marker Planning
	3a. Apply advanced tools used for marker planning.
	3b. Analyze fabric consumption of various markers.
		3.1. Marker Making style & Fabric for Marker planning
		3.2. Preparation for Lay planning
		    3.2.1. Blocking and buffering of pieces.
		    3.2.2. Rotation and tilting
		    3.2.3. Alteration
		    3.2.4. Matching of pieces in stripes and checks etc.
		3.3. Automatic marker planning
		3.4. Analysis of fabric consumption of different markers.

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
	Not Applicable					

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

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 perform following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

a) Visit to the nearby industry and understand of process of pattern making using CAD Software.
b) Internet based assignments.
c) Teacher guided self learning activities.
d) Grade the trouser block of all pattern two sizes up and two sizes down.
e) Grade the formal shirt block of all pattern two sizes up and two sizes down.

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 for using the strategies given in various video for giving special effects.

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) **Basic block variations:** Adaptation of basic block and its variation**.**
b) **Grading of skirt:** Grade the skirt block of all pattern one size up and one size down.
c) **Shirt marker:** Create a shirt marker on fabric width of 36"plain fabric and lining fabric and analyze the difference in its fabric consumption.
d) **Trouser marker:** Create a trouser marker on fabric width of 56" plain fabric and plaid fabric and analyze the difference in its fabric consumption.

13.   SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Metric pattern cutting for Menswear.	Winfred Aldrich.	Wiley-Blackwell ISBN 10: 1405182938 ISBN 13: 978-1405182935
2	How to draft Basic Pattern	Kopp, Rolfo, Zelin & Gross	Bloomsbury Publishing India Private Limited ISBN-10 : 0870057472 ISBN-13 : 978-0870057472
3	Pattern Cutting for Clothing Using CAD: How to Use Lectra Modaris Pattern Cutting Software	M. Stott	Woodhead Publishing; ISBN-10 : 0857092316 ISBN-13 : 978-0857092311
4	CAD in Clothing and Textiles	Aldrich	John Wiley & Sons ISBN-10 : 0632038934 ISBN-13 : 978-0632038930
5	CAD/CAM in Clothing and Textiles	Stephen Gray	Gower Publishing Ltd ISBN-10 : 056607673X ISBN-13 : 978-0566076732

14.   SOFTWARE/LEARNING WEBSITES

a) www.lectra.com

b) www.tukatech.com

c) AutoCAD software

d) https://reach-tech.com/fashion-apparel-garment-clothing-cad-software-reach.html

e) https://reach-tech.com/reach_tech_assets/images/REACH_CAD_Demo.mp4

f) https://youtu.be/n-tWecPMIQc

g) https://youtu.be/YKbwio4ocIE

15.   PO-COMPETENCY-CO MAPPING

Semester IV	DIGITAL PATTERN MAKING AND GRADING (Course Code:4345105)						
	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	Create various digital patterns using CAD software.						
Course Outcomes CO a) Create basic bodice, shirt and trouser block using CAD software.	3	2	2	3	2	3	3
CO b) Grade upper and lower block using appropriate grading techniques.	3	3	3	3	2	3	3
CO c) Prepare the marker on various fabric widths for different types of garment.	3	3	3	3	2	3	3
CO d) Interpret fabric consumption for various garments.	3	3	3	3	2	3	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

Sr. No.	Name and Designation	Institute	Contact No.	Email
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