

GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)**Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)**

Semester-IV

Course Title: Introduction to Web Development

(Course Code: 4340704)

Diploma programme in which this course is offered	Semester in which offered
Computer Engineering	4 th Semester

1. RATIONALE

In our day-to-day lives, we use a number of web applications, such as online ticket or hotel booking, e-commerce, social networks, email, etc. All of these web applications are stored on a remote server, delivered over the Internet and accessed through a browser interface.

PHP is an open-source, server-side scripting language designed specifically for web applications. PHP is one of the most popular choices among developers to develop dynamic, interactive, secure and database-driven web applications.

In the growing field of web technologies, it is essential for diploma-passing students to learn the PHP language to help them build web applications. The goal of this course is to develop web development skills in students using the server-side scripting language-PHP. Students will learn the integration of HTML, CSS, PHP and MySQL database to develop web applications. This course will help students who want to develop web-based applications for their final year project.

2. COMPETENCY

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

- **Develop Interactive Web applications using PHP and MySQL.**

3. COURSE OUTCOMES (COs)

The practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

- a) Develop PHP scripts using variables, operators and control structures.
- b) Develop PHP scripts using arrays and functions.
- c) Develop PHP scripts by applying object oriented concepts.
- d) Develop web pages using form controls with validation to collect user inputs in PHP.
- e) Develop and host interactive websites using PHP and MySQL database.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (CI+T/2+P/2)	Examination Scheme				
CI	T	P		Theory Marks		Practical Marks		Total Marks
			CA	ESE	CA	ESE		
3	0	4	5	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: **CI** – Classroom Instructions; **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) that are the subcomponents of the COs. Some of the **PrOs** marked **'**'** are compulsory, as they are crucial for that particular CO. These PrOs need to be attained at least at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'.

Sr. No	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1.	Environment Setup i. Install and configure PHP, Web Server and MySQL database using XAMPP/WAMP/LAMP/MAMP. ii. Create a web page that displays "Hello World."	1	2
2.	Form Introduction i. Create a web page that collects user information using a form and displays it when the user clicks the submit button.	4	2
3.	Variables, Operators and Expressions i. Write a script to implement a simple calculator for mathematical operations. ii. A company has following payment scheme for their staff: a. Net Salary = Gross Salary – Deduction b. Gross Salary = Basic pay + DA + HRA + Medical c. Deduction = Insurance + PF Where, DA (Dearness Allowance) = 50% of Basic pay HRA (House Rent Allowance) = 10% of Basic pay Medical = 4% of Basic pay Insurance = 7% of Gross salary PF (Provident Fund) = 5% of Gross salary	1	2

	Write a script to take the basic salary of an employee as input and calculate the net payment to any employee.																														
4.	<p>Decision making statements</p> <p>i. Write a script that reads the name of the car and displays the name of the company the car belongs to as per the below table:</p> <table border="1"> <thead> <tr> <th>Car</th> <th>Company</th> </tr> </thead> <tbody> <tr> <td>Safari, Nexon, Tigor, Tiago</td> <td>Tata</td> </tr> <tr> <td>XUV700, XUV300, Bolero</td> <td>Mahindra</td> </tr> <tr> <td>i20, Verna, Venue, Creta</td> <td>Hyundai</td> </tr> <tr> <td>Swift, Alto, Baleno, Brezza</td> <td>Suzuki</td> </tr> </tbody> </table> <p>ii. Write a script to read the marks of 4 subjects and display the result as per the below instructions:</p> <table border="1"> <thead> <tr> <th>GTU GRADE</th> <th>Mark-Range</th> </tr> </thead> <tbody> <tr> <td>AA</td> <td>85 - 100</td> </tr> <tr> <td>AB</td> <td>75 - 84</td> </tr> <tr> <td>BB</td> <td>65 - 74</td> </tr> <tr> <td>BC</td> <td>55 - 64</td> </tr> <tr> <td>CC</td> <td>45 - 54</td> </tr> <tr> <td>CD</td> <td>40 - 44</td> </tr> <tr> <td>DD</td> <td>35 - 39</td> </tr> <tr> <td>FF</td> <td>< 35 (FAIL)</td> </tr> </tbody> </table> <p>a. Each of the four subjects is worth 100 marks. b. If a student gets less than 35 marks in any subject, then he/she will be marked as FAIL, otherwise he/she will be marked as PASS.</p> <p>The result contains the grade of each individual subject in tabular format as per the above table.</p> <p>Loops</p> <p>iii. Write a script to display Fibonacci numbers up to a given term. iv. Write a script to display a multiplication table for the given number.</p>	Car	Company	Safari, Nexon, Tigor, Tiago	Tata	XUV700, XUV300, Bolero	Mahindra	i20, Verna, Venue, Creta	Hyundai	Swift, Alto, Baleno, Brezza	Suzuki	GTU GRADE	Mark-Range	AA	85 - 100	AB	75 - 84	BB	65 - 74	BC	55 - 64	CC	45 - 54	CD	40 - 44	DD	35 - 39	FF	< 35 (FAIL)	1	4
Car	Company																														
Safari, Nexon, Tigor, Tiago	Tata																														
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CD	40 - 44																														
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FF	< 35 (FAIL)																														
5.	<p>Arrays</p> <p>i. Write a script to calculate the length of a string and count the number of words in the given string without using string functions. ii. Write a script to sort a given indexed array. iii. Write a script to perform 3 x 3 matrix Multiplication. iv. Write a script to encode a given message into equivalent Morse code.</p>	2	4																												
6.	<p>Functions</p> <p>i. Consider a currency system in which there are notes of 7 denominations, namely Rs. 1, Rs. 2, Rs. 5, Rs. 10, Rs. 20, Rs. 50</p>	2	4																												

	<p>and Rs. 100. Write a function that computes the smallest number of notes that will combine for a given amount of money.</p> <p>ii. Write scripts using string functions:</p> <ol style="list-style-type: none"> to check if the given string is lowercase or not. to reverse the given string. to remove white spaces from the given string. to replace the given word from the given string. <p>iii. Write scripts using math functions:</p> <ol style="list-style-type: none"> to generate a random number between the given range. to display the binary, octal and hexadecimal of a given decimal number. to display the sin, cos and tan of the given angle. <p>iv. Write a script to display the current date and time in different formats.</p>		
7.	<p>OOP Concepts</p> <ol style="list-style-type: none"> Write a script to: <ol style="list-style-type: none"> Define a class with constructor and destructor. Create an object of a class and access its public properties and methods. Write a script that uses the set attribute and get attribute methods to access a class's private attributes of a class. Write a script to demonstrate single inheritance. Write a script to demonstrate multiple inheritance. Write a script to demonstrate multilevel inheritance. Write a script to demonstrate method overriding. Write a script to demonstrate method overloading based on the number of arguments. Write a script to demonstrate a simple interface. Write a script to demonstrate a simple abstract class. Write a script to demonstrate cloning of objects. 	3	8
8.	<p>Forms</p> <ol style="list-style-type: none"> Create a web page using a form to collect employee information. Extend practical - 8(i) to validate user information using regular expressions. Create two distinct web pages to demonstrate information passing between them using URL - Get method. Create two different web pages to demonstrate information passing between web pages using Hidden variables – Post method. 	4	6
9.	<p>Session, Cookies</p> <ol style="list-style-type: none"> Create web pages to demonstrate passing information using Session. Write a script to demonstrate storing and retrieving information from cookies. 	4	4

10.	Database i. Create a web page that reads employee information using a form and stores it in the database. ii. Create a web page for employee log-in. iii. Write a script to upload an image to the server. iv. After an employee logs in, create a Home web page that displays basic employee information. v. Create a web page to delete employee profiles from the database. vi. Create a web page that allows employees to change their password.	5	8
11.	Email, PDF, JSON i. Write a script to generate a salary slip for an employee in PDF format. ii. Write a script to send an email. iii. Write a script to convert an associative array into JSON string format and vice versa.	5	6
12.	Simple Web Application Create a simple web application for Employee Management with 3-4 web pages and host it using cPanel and Filezilla.	5	6
Total Hours			56

Remark: In the above practical list, practical-2 will help students practice using forms for user input. In practicals 3 to 12, students should take user input via forms.

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	Correctness of solution/answer	30
2	Interpret and Solve various algorithms	30
3	Debugging ability	20
4	Program execution/answer to sample questions	20
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS AND SOFTWARE REQUIRED

These major equipment/instruments and Software required to develop PrOs are given below with broad specifications to facilitate procurement of them by the

administrators/management of the institutes. This will ensure conduction of practicals in all institutions across the state in a proper way so that the desired skills are developed in students.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Computer with latest configuration with Windows/Linux/Mac Operating System.	All
2	XAMPP/WAMP/LAMP/MAMP servers.	All
3	Text Editor such as VS Code, Sublime, Atom etc.	All
4	Web Browser such as Chrome, Firefox, Edge, Safari etc.	All
5	Internet Connection.	All
6	Database tool such as MySQL, Maria DB or equivalent.	11, 13
7	Web Domain, Web space and cPanel.	13

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 fulfill the development of this competency.

- a) Follow Coding standards and practices.
- b) Maintain tools and equipment.
- c) Search for project ideas.
- d) Organize project files and resources.
- e) Work as a leader or team member.
- f) Present project work.
- g) Adhere to ethical practices.
- h) Follow safety 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 formulated as given below and only higher level UOs of *Revised Bloom's taxonomy* are mentioned for development of the COs and competency in the students by the teachers. (Higher level UOs automatically include lower level UOs in them).

If required, more such high level UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs)	Topics and Sub-topics
Unit –1: Introduction to PHP	1a. Write simple scripts using variables, constants, and operators. 1b. Write simple scripts using decision making statements to solve the given problem. 1c. Write simple scripts using loop controls to solve the given problem.	1.1 Introduction to Static and Dynamic Websites 1.2 Introduction to PHP and it's History 1.3 Basic PHP syntax and file structure 1.4 Output statements: echo and print 1.5 PHP variables and value types 1.6 PHP Constants and magic constants 1.7 PHP Operators and their precedence: <ul style="list-style-type: none"> i. Arithmetic operators ii. Increment-decrement operators iii. Assignment operators iv. Logical operators v. Bitwise operators vi. Comparison operators 1.8 Decision-making statements: if statement, if-else statement, else-if clause, switch-case statement, the ? operator 1.9 Loops: while loop, for loop, foreach loop, nesting loops 1.10 Break and continue statements
Unit– 2: Arrays and Functions in PHP	2a. Use different types of arrays for a given application. 2b. Create a custom user defined function for a given requirement. 2c. Use PHP in-built functions to perform string operations, simple mathematical operations and to process date and time.	2.1. Introduction to PHP Arrays and types of arrays: Indexed, Associative and Multidimensional arrays 2.2. PHP Strings: single quoted, double quoted, heredoc syntax, nowdoc syntax 2.3. Creating, Manipulating and traversing different types of arrays 2.4. User defined function: creating a function, calling a function and

		<p>returning a value from function</p> <p>2.5. Function with default arguments, passing arguments by value and reference</p> <p>2.6. Variable scope, accessing global variables inside a function</p> <p>2.7. Variable function</p> <p>2.8. Using PHP built-in functions</p> <p>i. String processing functions: chr(), ord(), strlen(), trim(), ltrim(), rtrim(), join(), substr(), str_replace(), str_split(), str_word_count(), strcmp(), strcasecmp(), stripslashes(), strip_tags(), strtolower(), strtoupper(), str_shuffle()</p> <p>ii. Mathematical functions: abs(), ceil(), floor(), round(), rand(), min(), max(), pi(), pow(), sqrt(), exp(), log(), decbin(), decoct(), dechex(), sin(), cos(), tan(), deg2rad(), rad2deg()</p> <p>iii. Date/time function: getdate(), gettimeofday(), time(), date_create(), mktime(), date_format(), date_diff(), checkdate()</p>
<p>Unit– 3: Object Oriented Concepts in PHP</p>	<p>3a. Define class, object, constructor and destructor for a given problem.</p> <p>3b. Implement Inheritance to extend the base class.</p> <p>3c. Use polymorphism to solve the given problem.</p> <p>3d. Clone the given object.</p>	<p>3.1. OOP concepts: Class, Object, Properties, Methods, Encapsulation, Access modifiers</p> <p>3.2. Creating Classes, Objects</p> <p>3.3. Constructors and Destructors</p> <p>3.4. Inheritance</p> <p>3.5. Polymorphism: Overloading, Overriding</p> <p>3.6. Interface</p> <p>3.7. Abstract Class</p> <p>3.8. Final keyword</p> <p>3.9. Cloning Objects</p>

<p>Unit-4: Forms Handling, Session, Cookies</p>	<p>4a. Design a webpage using form controls to collect user input. 4b. Access form data using PHP. 4c. Validate a form using PHP 4d. Implement a simple session using session variables. 4e. Use cookies to store data.</p>	<p>4.1. Form controls: Text Box, Textarea, List Box, Dropdown, Check Box, Radio Box, Buttons, Upload, color, date etc. 4.2. Retrieving form data using GET and POST methods 4.3. Form Validation using PHP 4.4. Working with multiple forms i. A web page having multiple forms ii. A form having multiple submit buttons 4.5. Session: creating a session, storing and accessing session data and destroying session 4.6. Cookies: setting a cookies, accessing cookies data and destroying cookies</p>
<p>Unit-5: Working with Database in PHP</p>	<p>5a. Use the MySQL database to store data in PHP. 5b. Insert, update and delete data from the MySQL database using PHP. 5c. Use the data from the form to insert/update the MySQL database. 5d. Retrieve data from the MySQL database and display it in various formats. 5e. Host a website using cPanel and Filezilla software.</p>	<p>5.1. Introduction to MySQL Database with PHP 5.2. Creating a database using phpMyAdmin & console 5.3. Connecting with MySQL database 5.4. Executing MySQL queries 5.5. Performing database operations i. Create/delete a table ii. Insert data into the table iii. Update data into the table iv. Retrieve data from the table v. Delete data from the table 5.6. Displaying data from the database in different formats, including tables 5.7. Working on mini-project: Developing simple web application and hosting it on web server</p>

Note: The UOs need to be formulated at the 'Application Level' and above of Revised Bloom's Taxonomy' to accelerate the attainment of the COs and the competency.

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	Introduction to PHP	7	2	4	6	12
II	Arrays and Functions in PHP	8	2	4	8	14
III	Object Oriented Concepts in PHP	8	2	4	8	14
IV	Forms, Session, Cookies	8	2	4	8	14
V	Database Operations	11	2	6	8	16
Total		42	10	22	38	70

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

Note: This specification table provides general guidelines to assist students for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions 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 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 small reports (of 1 to 5 pages for each activity). For micro-project, the report should be as per the suggested format, for other activities students and teachers together can decide the format of the report. Students should 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) Prepare a journal of practicals.
- b) Undertake micro/mini-projects in teams.
- c) Develop a simple website using HTML, CSS, PHP and MySQL.
- d) Perform a survey on different web technologies and websites using those technologies.
- e) Students are encouraged to register themselves in various MOOCs such as: Swayam, edX, Coursera, Udemy etc. to further enhance their learning.
- f) Encourage students to participate in different coding competitions like hackathons, online competitions on Codechef etc.
- g) Encourage students to form a coding club at the institute level and can help the slow learners.
- h) Contribute to Open Source Software project.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES

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) Managing Learning Environment
- d) Diagnosing Essential Missed Learning concepts that will help students.
- e) Guide Students to do Personalized learning so that students can understand the course material at his or her pace.
- f) Encourage students to do Group learning by sharing so that teaching can easily be enhanced.
- g) **“CI” in section No. 4** means different types of teaching methods that are to be employed by teachers to develop the outcomes.
- h) 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.
- i) With respect to **section No.10**, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- j) Guide students on how to address issues on environment and sustainability using the knowledge of this course

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 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 a dated work diary consisting of individual contributions in the project work and give a seminar presentation of it before submission. The total work load on each student due to the micro-project should be about **16 (sixteen) student engagement hours** (i.e., about one hour per week) during the course. The students ought to submit micro-project by the end of the semester (so that they 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) Develop a web application to send plain text emails, send HTML messages and send mails with attachments.
- b) Develop a web application to generate Word documents or PDFs automatically from an excel file or a database.
- c) Develop a web based Library Management Application with add books, search books, issue books and return books functionalities.
- d) Develop a Two-Factor Authentication (2FA) system.
- e) Develop a web application for e-commerce.

- f) Develop a web application for Restaurant Management System.
- g) Develop a web application for Hotel Management System
- h) Develop a web application for Movie Review and Suggestions.
- i) Develop a web application for Online Quiz System.
- j) Develop a web application for Student Feedback Management System.
- k) Develop a web application for Employee Pay Management System.
- l) Develop a web based Chatbot system.
- m) Develop a Fitness Club Management System.
- n) Develop a web application for Hospital Management System.
- o) Develop a web application for Online Blood Bank.
- p) Develop an application to scrap website information.

13. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	PHP: The Complete Reference	Steven Holzner	McGraw Hill Education ISBN-13: 978-0070223622
2	Head First PHP & MySQL: A Brain-Friendly Guide	Lynn Beighley, Michael Morrison	O'Reilly ISBN-13: 978-0596006303
3	Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5	Robin Nixon	Shroff Publishers & Distributers Private Limited – Mumbai ISBN-13: 978-9352130153
4	PHP and MySQL Web Development	Laura Thomson, Luke Welling	Pearson Education ISBN-13: 978-9332582736
5	PHP Cookbook	David Sklar, Adam Trachtenberg	O'Reilly ISBN-13: 978-1449363758
6	The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications With PHP and mySQL	Alan Forbes	Createspace Independent Pub ISBN-13 : 978-1522792147

14. SUGGESTED LEARNING WEBSITES

- a) <https://www.php.net/manual/en/langref.php>
- b) <https://www.tutorialspoint.com/php/index.htm>
- c) <https://www.w3schools.com/php/default.asp>
- d) <https://www.codecademy.com/learn/learn-php>
- e) <https://www.geeksforgeeks.org/php-tutorials>
- f) https://www.youtube.com/watch?v=OK_JCrrv-c
- g) <https://phpapprentice.com>

15. PO-COMPETENCY-CO MAPPING

Semester III	Scripting Language - Introduction to Web Development (Course Code: 4340704)									
	POs and PSOs									
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1	PSO 2	PSO 3 (If needed)
Competency	Develop simple applications using Python to solve the given problem.									
CO a) Develop PHP scripts using variables, operators and control structures.	3	2	1	2	-	-	1			
CO b) Develop PHP scripts using arrays and functions.	3	3	1	2	-	-	1			
CO c) Develop PHP scripts by applying object oriented concepts.	2	2	2	2	-	1	1			
CO d) Develop web pages using form controls with validation to collect user inputs in PHP.	2	2	2	2	-	2	2			
CO e) Develop and host interactive websites using PHP and MySQL database.	2	2	2	3	-	3	3			

Legend: '3' for high, '2' for medium, '1' for low or '-' for the relevant correlation of each competency, CO, with PO/ PSO

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

S. No.	Name and Designation	Institute	Contact No.	Email
1	Smt. Manisha Mehta Head of Computer Department	Government Polytechnic - Himatnagar	9879578273	manishamehtain@gmail.com
2	Smt. Jasmine Kargathala Lecturer in Computer Engineering	Government Girls Polytechnic - Ahmedabad	9824799620	jdaftary@gmail.com
3	Shri Kartik Detroja Lecturer in Computer Engineering	Government Polytechnic - Porbandar	9972419091	detroja.kartik@gmail.com