COLLEGE OF INFORMATION TECHNOLOGY AND COMPUTING

Data Science Deparment

SYLLABUS

Course Title: **DS Elective 2** *(Web Development)*
Course Code: **DS 315**
Credits: **3 Units:** **(2 hours Lecture, 3 hours Laboratory)**
Prerequisite(s): DS 223
Co-requisite(s):

Year & Semester: **Third Year, 1st Semester AY 2025-2026**
Class Schedule: **S 1:00 PM - 4:00 PM | W 6:00 PM - 8:00 PM**
BUILDING: 09-204 | Online

Instructor: AMIEL RYAN JAMES NAYVE
Email: ari.nayve@gmail.com
Mobile no.: *available upon request*

Consultation Schedule: (WED) 10:00 AM - 5:00PM
Building/Room: 2F ICT Bldg. 9, Data Science Faculty Room
Office Phone #/Local: 1228

USTP Vision
A nationally - recognized Science and Technology University providing the vital link between education and the economy.

USTP Mission
•Bring the world of work (industry) into the actual higher education and training of students;
•Offer entrepreneurs the opportunity to maximize their business potentials through a gamut of services from product conceptualization to commercialization;
•Contribute significantly to the national development goals of food security and energy sufficiency through Technology solutions

I. Course Description:
This foundational course offers a comprehensive introduction to web development, covering both backend and frontend development. Students will gain hands-on experience with modern web technologies, including Node.js and Express.js for server-side development, React.js for building dynamic user interfaces, and either MongoDB or MySQL for database management. The course is designed to build a solid understanding of how web systems are constructed, emphasizing the roles of servers, client-side interfaces, and databases. Students will learn to integrate frontend and backend components, develop RESTful APIs, and utilize tools like Postman for testing and debugging, and Git for Version Control. By the end of the course, students will be equipped with the skills necessary to build and deploy full-stack web applications, preparing them for integrating trained models or other data-driven components into their projects.

II. Course Outcomes (CO):

	Program Outcomes													
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
CO1: Students will gain hands-on experience in fundamental web development, including building and integrating frontend and backend components using technologies such as Node.js, Express.js, and React.js. They will understand how these components interact to create full-stack web applications.	I	E	E	I	E	D	E	E	E	E	I	I	E	I
CO2: Students will learn to develop and implement RESTful API's, utilize database management systems like MongoDB or MySQL, and integrate these into dynamic web applications. They will acquire practical skills in testing and debugging using tools like Postman.	I	E	E	E	D	D	D	E	E	E	I	E	D	I
CO3: Students will learn to develop and implement RESTful API's, utilize database management systems like MongoDB or MySQL, and integrate these into dynamic web applications. They will acquire practical skills in testing and debugging using tools like Postman.	I	E	E	E	E	D	E	E	E	E	I	E	E	I

Program Outcomes (PO)
Upon completion of the BS Data Science program, graduates are able to:

a.Apply knowledge of computing science, and mathematics, and business management in solving complex data-driven problems;

b.Use current standards and best practices within data-science and specific areas of mathematics (e.g. statistical analysis, optimization, machine learning, network analysis, experiment design, and algorithms, among others.) in solving complex data-driven problems and requirements;

c.Analyze complex data-driven problems by applying analytical and quantitative reasoning, and identify the statistical and computing requirements appropriate to its solution;

d.Extract, process and analyze data sets, including Big Datasets too large for traditional data processing techniques;

e.Design, implement and evaluate different predictive models, techniques, processes, components, or programs to meet desired needs and requirements under various constraints;

III. Course Outline:

Allotted Time	Course Outcomes (CO)	Intended Learning Outcomes (ILOs)	Topic/s	Suggested Readings	Teaching-Learning Activities	Assessment Tasks/Tools	Grading Criteria	Remarks
WEEK 1 **5 hours**			***Course Orientation*** University's VMEGO CITC CMGO Class Policies	USTP Student Handbook				
	CO1	Students will be introduced to Web, and Fundamentals of Web Development	***Introduction to Web Development*** Overview of web development: Frontend vs. Backend. Understanding the web: How the internet works. Introduction to tools and technologies (Node.js, Express.js, React.js, MongoDB/MySQL).	Introduction to Web	Lecture, Discussions, Introduction to Web	Participation, Initial quiz	Class Performance Items/ Lab Exercises 30% | 30%	
WEEK 2 **5 hours**	CO2	Students will learn how to use Git as Version Control System and GitHub for saving their code via cloud	***Introduction to Git and GitHub*** Introduction to Git Version Control Git Commands Saving code into GitHub	Git and GitHub	Lecture, Introduction to Version Control, Hands-on session with Git Version Control and GitHub	Practical exercises, Software setup	Class Performance Items/ Lab Exercises 30% | 30%	
WEEK 3 **5 hours**	CO1	Students will be introduced on Backend Development using Node.JS	***Introduction to Backend Development with Node.js*** Introduction to Node.js Basics of server-side programming Setting up a basic Node.js project	Node.JS Introduction Creating Backend with Node.JS	Lectures, Hands-on session with Backend development	Practical Workshop	Class Performance Items/ Lab Exercises 30% | 30%	

f.Integrate effectively the big data analytics solutions into government sectors such as transportation, public health and safety, environmental issues as well as issues in the corporate and non-profit organizations;

g.Create, select, adapt and apply appropriate techniques, resources, mathematical or statistical models, machine/deep learning and other modern tools to complex data science activities;

h.Utilize data science and its technologies as strategies in marketing/branding of potential entrepreneurial ventures;

i.Function effectively as individual or work collaboratively and respectfully as a member or leader in diverse development teams and in multi-cultural and multi-disciplinary settings;

j.Communicate effectively in both oral and in written form by being able to deliver and comprehend instructions clearly, and present persuasively to diverse audience the data science-related ideas and perspectives;

k.Assess the model used to solve data science tasks and identify its local and global impact on individuals, organizations, and society;

l.Recognize the need to engage in independent learning and be at pace with the latest development in a specialized Data Science field, with emphasis on Massive Data Analytics and Business Intelligence for continual development as a computing professional

m.Participate in generation of new knowledge, or in research and development projects with the end view of contributing to local and national economy; and

n.Preserve and promote "Filipino historical and cultural heritage

WEEK 4 *5 hours*	CO1	Students will understand the basics and fundamentals of javascript programming language.	***Fundamentals of javascript Programming Language*** Introduction to JavaScript: Syntax, variables, data types, and operators. Basic programming concepts: Loops, conditionals, and functions.	Javascript Code Syntax	Lectures, Practical exercises	Practical Workshop	Class Performance Items/ Lab Exercises 30% / 30%	
WEEK 5 *5 hours*	CO1	Students will build a simple backend server using ExpressJS framework.	***Building RESTful APIs with Express.js*** Introduction to Express.js: Web framework for Node.js	Developing RESTful API with ExpressJS	Lecture, Hands-on session	Practical Workshop Portfolio 1	Class Performance Items/ Lab Exercises 30% / 30%	
WEEK 6 *5 hours*	CO1	Students will learn about MongoDB Database and its CRUD operations.	***Introduction to Database (MongoDB)*** Overview of MongoDB Database Installation of MongoDB and MongoDB Compass Database CRUD Operations	MongoDB Introduction	Lectures, Discussions, Practical Exercises	Practical Workshop	Quiz 40%	
WEEK 7 *5 hours*	CO3	Students will develop Backend server using ExpressJS and MongoDB as its database.	***Connecting ExpressJS Server and MongoDB database*** Setting up and connecting to MongoDB or MySQL. Performing basic CRUD operations from Node.js.	Building ExpressJS Server with MongoDB Database	Lectures, Hands-on session	Practical Workshop Portfolio 2	Class Performance Items/ Lab Exercises 30% / 30%	
WEEK 8 *5 hours*	CO3	Students will perform data validation on the server before saving to database.	***Advanced CRUD Operations and Data Validation*** Advanced CRUD operations: Data validation and error handling. Implementing CRUD operations with data validation. Using Mongoose or an ORM to interact with the database.	Data Validation	Lectures, Hands-on session	Practical Workshop Portfolio 3	Class Performance Items/ Lab Exercises 30% / 30%	
MIDTERM WEEK								
WEEK 10 *5 hours*	CO1	Understand the concept of web page structure with HTML	***Introduction to web design: HTML*** Introduction to HTML and HTML Syntax	Introduction to HTML	Hands-on session	Practical Workshop Portfolio 4	Class Performance Items/ Lab Exercises/ Hands-on Exercises 30% / 30% 30%	
Week 11 *5 hours*	CO2	Implement CSS layout and design to a HTML webpage	***Introduction to web design: CSS*** Introduction to CSS, CSS Syntax, and Styling HTML webpage using CSS	Introduction to CSS	Lectures, Discussions	Practical Workshop	Class Performance Items/ Lab Exercises/ Hands-on Exercises 30% / 30% / 30%	
Week 12-13 *10 hours*	CO3,CO2	Understand the concept of an event driven web page with JavaScript. Apply the proper syntax in writing JavaScript code. Implement basic DOM Manipulation with JavaScript	***Introduction to web design: JavaScript*** Introduction to Javascript for DOM Manipulation.	Javascript HTML DOM	Lectures, Practical exercises	Practical Workshop Critical Analysis Task	Class Performance Items/ Lab Exercises/ Hands-on Exercises 30% / 30% 30%	

Week 14-16 **15 hours**	CO2	Students will be able to use API package for communicating both frontend and backend	***Introduction to API for Frontend and Backend Integration*** Introduction of REST API and Axios library for API integration. Understanding async and await in javascript.	Introduction to REST API Introduction to AXIOS	Hands-on session	Practical Workshop	Class Performance Item; Lab Exercises/ Hands-on Exercises 10% : 30%	
Week 17 **5 hours**	ALL Cos	Students will be able to integrate both Frontend and Backend using API.	***Introduction to API for Frontend and Backend Integration*** Introduction to HTTP Request Methods and JSON.	HTTP Request Methods Explained	Lectures, Practical exercises	Practical Workshop	Class Performance Item; Lab Exercises/ Hands-on Exercises 10% : 30%	
WEEK 18	**FINAL EXAM**							

Program Educational Objectives:

Three (3) to Five (5) years after graduation, BSDS graduates are:

PEO1. Proficient in the Data Science field and able to engage constantly in big data analysis and professional advancement by pursuing a higher academic level and/or practicing quality improvement in their career or entrepreneurial endeavor;

PEO2. Highly competent in generating new ideas and innovations in Data Science emphasizing on capturing, storing, retrieving and visualizing massive data; and

PEO3. leading data scientists who can effectively work on data sets to extract knowledge and identify patterns in order to predict trends; and contribute significantly to human development, socio-economic transformation, national initiatives.

IV. Course Requirements:

1. Class attendance and participation policy:
   - Refer to the Student Handbook
2. Course Readings/Materials:
   - https://www.freecodecamp.org/news/git-and-github-for-beginners/
   - https://www.geeksforgeeks.org/javascript-basic-syntax/
   - https://jinalshah999.medium.com/introduction-to-mongodb-and-basic-crud-operations-a406452b83e9
   - https://www.geeksforgeeks.org/rest-api-introduction/
   - https://www.freecodecamp.org/news/http-request-methods-explained/
3. Assignments, Assessment, and Evaluation

Attendance and Participation in Co-Curricular Activities
Students are expected to attend and actively participate in relevant webinars, trainings, and competitions as part of their academic engagement. Participation in such activities will be awarded corresponding points, which shall be determined and arranged by the faculty and reflected in the overall grading system.

Lecture Grade (67%)	
Performance Item/Criteria	**%**
Class Performance Item	10%
Quizzes (All quizzes, prelim and pre-final exams)	40%
Major Exams (i.e. Midterm and Final Exams)	30%
Performance Innovative Task / Project	20%
TOTAL	**100%**
Laboratory Grade (33%)	
Performance Item/Criteria	**%**
Laboratory Exercises Reports	30%
Laboratory Major Exams	40%
Hands on Exercises	30%
TOTAL	**100%**

Term/Periodic Grade = 67% Lecture Grade + 33% Laboratory Grade

FINAL GRADE (FG) = 1/2 Midterm Grade (MTG)+ 1/2 Final Term Grade (FTG)

Prepared by:

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ALBERT CHRISTOPHER P. DANIOT II
Instructor

Noted by:

ALBERT CHRISTOPHER P. DANIOT II
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