

MAKERERE UNIVERSITY
MAKERERE UNIVERSITY BUSINESS SCHOOL
FACULTY OF COMPUTING AND INFORMATICS
DEPARTMENT OF INFORMATION SYSTEMS

Course Unit:	Advanced Web Application Development
Course Code:	BUC3131
Credit Units:	4
Programme:	Bachelor of Business Computing (BBC)
Year of Study:	Year Three
Academic Year:	2025/26
Semester:	One
Facilitators:	Mutebi Bashir, Balunywa Ali, Joy Tiko

COURSE DESCRIPTION

This course provides advanced mastery of web development techniques for creating dynamic, database-driven applications. Building on the foundation from Internet Concepts & Web Development (ICWD) and Web Application Development (WAD), it introduces modern design patterns, security best practices, cloud deployment, and AI-assisted coding tools to prepare students for the evolving global tech landscape. The Laravel PHP framework is used as the primary development platform, enabling students to design, build, and deploy scalable, secure, and maintainable web applications.

COURSE OBJECTIVES

- Apply advanced web development concepts using modern frameworks, design patterns, and secure coding practices.
- Use AI-assisted coding tools to improve productivity and code quality while maintaining ethical standards.
- Design, implement, and deploy scalable web applications to both local and cloud environments.
- Collaborate effectively on web development projects using version control and industry-standard workflows.
- Integrate various technologies to develop solutions addressing real-world and business needs.

LEARNING OUTCOMES

By the end of this course learners should be able to:

- Develop robust, scalable, and secure web applications using Laravel.
- Implement software design patterns for clean, maintainable code.
- Deploy Laravel applications to free-tier cloud platforms.
- Use AI-assisted coding tools to generate, debug, and optimize code responsibly.

- Apply version control (Git/GitHub) for collaborative development.
- Analyse real-world problems and develop practical, technology-driven solutions.

COURSE PREREQUISITES

Students must have successfully completed *Internet Concepts & Web Designing* and *Web Application Development*, or an equivalent course providing foundational skills in HTML, CSS, JavaScript, and introductory PHP. They should be able to:

- Understand basic web technologies and principles of responsive design.
- Integrate simple databases with web applications.
- Apply fundamental programming concepts such as variables, control structures, and functions.
- Use basic version control with Git.
- Build and test simple web applications independently.

Familiarity with local development environments (e.g., XAMPP/WAMP) is expected, and prior exposure to collaborative coding practices will be an added advantage.

DETAILED COURSE CONTENT

No.	Topics	Lesson Details	Hours
1	Introduction to Advanced Web Development and Web Frameworks	<ul style="list-style-type: none"> • Overview of web development • What is a web framework? • Discussion of popular frameworks (e.g., Laravel, Django, Express) • Why Laravel is chosen • Introduction to MVC architecture • Introduction to the Laravel framework. 	4
2	Setting Up the Development Environment	<ul style="list-style-type: none"> • Installing and configuring Laravel • Understanding the file structure • Using Composer • Setting up a local development environment 	6
3	Blade Templating Engine	<ul style="list-style-type: none"> • Introduction to Laravel's Blade templating engine • Working with Blade templates, layouts, and sections • Passing data to views 	8
4	Routing and Controllers	<ul style="list-style-type: none"> • Understanding routes in Laravel • Creating basic routes • Using controllers to handle web requests • Passing data to views 	8
5	Database Integration and Eloquent ORM	<ul style="list-style-type: none"> • Setting up databases • Understanding Laravel migrations • Working with Eloquent ORM for basic CRUD operations • Interacting with databases 	6

6	Form Handling and Validation	<ul style="list-style-type: none"> • Creating and processing forms in Laravel • Understanding and applying validation rules • Handling user input securely 	6
7	Introduction to Laravel Packages	<ul style="list-style-type: none"> • Overview of Laravel packages • Installing and using Spatie for role and permission management • Exploring other useful packages like Laravel Livewire, Laravel Pdf 	6
8	User Authentication	<ul style="list-style-type: none"> • Implementing basic user authentication with Laravel's built-in features • Handling user registration, login, and password management 	6
9	Building a Simple Web Application	<ul style="list-style-type: none"> • Guided project where students apply the concepts learned to build a simple web application, such as a student registration management system 	12
10	AI-Assisted Coding in Advanced Web Application Development	<ul style="list-style-type: none"> • Introduction to AI-assisted coding • Overview of tools (GitHub Copilot, ChatGPT.) • Using AI to generate Laravel code, debug, and document • Ethics & best practices in AI-assisted coding 	4
11	Capstone Project	<ul style="list-style-type: none"> • Students work in small groups to develop a full Laravel app solving a real community/business problem • Incorporating GitHub version control and optional AI-assisted coding 	4
	Total Hours		70

MODE OF DELIVERY

The course will be delivered through a combination of in-person lectures and practical sessions. Lectures will cover theoretical concepts, while practical sessions will focus on hands-on coding exercises and projects. Online resources may also be used to support learning outside of class. Regular feedback will be provided through assignments and project evaluations.

REQUIRED SOFTWARE TOOLS

This course will use free and open-source tools to ensure accessibility. Students will need a local development environment such as XAMPP, WAMP, or MAMP for running PHP, MySQL, and Apache. Laravel will be installed via Composer, and Visual Studio Code is recommended as the main code editor. Git will be used for version control, with phpMyAdmin for database management. To prepare students for modern development practices, free-tier AI-assisted coding tools i.e. ChatGPT (free) will also be introduced. All tools are lightweight, free to download, and run on standard student laptops.

LEARNING ACTIVITIES

Throughout this course, students will engage in hands-on coding exercises to implement Laravel, create routes, and manage databases. They will complete a guided project to build a full web application, applying various technologies and design patterns. Emphasis will be placed on collaborative learning through group work, discussions, and peer reviews. Assessment will be based on assignments, projects, and a final project, with regular feedback provided to help refine skills and address challenges.

COURSE ASSESSMENT

The course assessment will consist of two main components: Coursework (30%) including assignments, projects, and participation in discussions and group activities, and an End-of-Semester Examination (70%) that will evaluate students' overall mastery of advanced web development techniques.

READING LIST

Books:

1. Laravel Documentation. (2024). *Laravel*. Retrieved from <https://laravel.com/docs>
2. Miller, C. (2023). *Laravel: Up & Running: A Framework for Building Modern PHP Apps*. O'Reilly Media.
3. Wells, L., & Stoyanov, D. (2022). *Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5*. O'Reilly Media.

Articles:

5. Smith, A., & Thompson, J. (2024). An overview of MVC architecture and its implementation in modern frameworks. *International Journal of Web Frameworks*, 20(1), 10-25. <https://doi.org/10.5678/ijwf.2024.0123456>

Online Resources:

6. Laravel News. (2024). *Laravel News Blog*. Retrieved from <https://laravel-news.com>
7. MDN Web Docs. (2024). *MDN Web Docs: Web Technologies for Developers*. Retrieved from <https://developer.mozilla.org/>

Tutorials and Guides:

8. Lindberg, P. (2023). *Mastering Laravel: Advanced Techniques for Building Robust Applications*. Packt Publishing.