



"Investing in Africa's Future"

COLLEGE OF ENGINEERING AND APPLIED SCIENCES (CEAS)

NCIS 403: WEB APPLICATION DEVELOPMENT

END OF SECOND SEMESTER EXAMINATIONS

APRIL/MAY 2025

LECTURER: MR BRAITON U. MUKHALELA

TIME: 3 HOURS

INSTRUCTIONS

This examination is 100% Practical based, no need for any Answer booklet.

Make sure you create a folder on the Desktop named as your Student

Number and the Course code, eg **202021NCIS403**.

Save all your Answers into this folder as instructed on each section.

Answer **ALL** questions using a LAB provided computer.

Part A: Front-End Development (30 Marks)

1. Create a single-page application (SPA) using React or Vue.js that includes:

- A navigation bar with at least two pages (Home and About).
- A dynamic form on the "Home" page that collects user data (e.g., name, email, and message). **(15 Marks)**
- Form validation to ensure all fields are filled correctly. **(5 Marks)**
- Display the submitted data on the "About" page in a structured format.

(10 Marks)

Part B: Back-End Development (25 Marks)

2. Build a RESTful API using Node.js and Express.js to support the SPA. Ensure the following:

- A POST endpoint to accept form submissions and save data to a MongoDB database.

(10 Marks)

- A GET endpoint to retrieve all form submissions. **(5 Marks)**
- Proper error handling and secure data handling practices. **(5 Marks)**
- Use a JSON response format. **(5 Marks)**

Part C: Integration and AI Features (20 Marks)

3. Integrate an AI feature into your application:

- Use OpenAI or Google AI API to create a feature that analyzes the user's message from the form and provides a sentiment analysis or basic summary of the content.

(15 Marks)

- Display the AI's response on the "About" page alongside the form data. **(5 Marks)**

Part D: Progressive and Real-Time Web Features (15 Marks)

4. Convert your application into a Progressive Web Application (PWA):

- Implement service workers for offline capability. **(10 Marks)**
- Ensure your application passes Lighthouse PWA criteria in Chrome DevTools.

(5 Marks)

Part E: Deployment (10 Marks)

5. Deploy your application to a cloud platform of your choice (e.g., Heroku, AWS):

- Provide the live application URL. **(5 Marks)**
- Ensure the application is functional and all features work as intended. **(5 Marks)**

Bonus (Optional)

- Implement WebSocket-based real-time updates to show new form submissions without refreshing the page. **(5 Bonus Marks)**

Submission Checklist

- All project files, including front-end and back-end code.
- MongoDB connection string (ensure no sensitive credentials are included).
- URL for the deployed application.

END OF EXAMINATION