HEALTHCARE SYSTEM PROJECT

✦Team Requirements

The Project aims to allow each team to design and develop a unique healthcare solution that enhances efficiency, accuracy, and overall patient and provider experience. Teams may choose any healthcare-related system idea such as hospital management, telemedicine platforms, pharmacy systems, laboratory systems, rehabilitation centers, or wearable health monitoring dashboards, etc... The project should encompass various aspects of healthcare operations, including patient management, appointment scheduling, billing, and reporting while assisting clinical staff in analyzing radiology scans with interactive visualization and intelligent diagnostic support.

Each team must ensure their chosen system idea is unique and not duplicated by other teams.

1. System Requirements:

The system should encompass the following functionalities:

a) **User Authentication and Authorization:**
- Secure login for administrators, clinical staff, and patients.
- Role-based access control (Admin, Clinical Staff, Patient).

b) **Patient Portal:**
- Patient registration and profile management.
- Appointment scheduling and management.
- Medical history and record access.
- Prescription and treatment plan management.
- Billing and payment processing.

c) **Appointment Management:**
- Schedule and manage appointments efficiently.

d) **Billing and Invoicing:**
- Generate accurate bills for services provided.

e) **Reporting and Analytics:**
- Generate reports for system performance, patient statistics, and financial insights.
- Provide data visualization for easy interpretation.

f) **CDSS Integration for Radiology Scans:**
- CDSS Module: Integrate a module that processes DICOM images from radiology scans, providing analysis or insights based on clinical guidelines or machine learning models.

- User Interface: Develop a web-based interface as part of the system's website, allowing seamless integration with patient profiles and ease of access for clinicians.

g) DICOM Viewer:

- Viewer Functionality: Implement an interactive DICOM viewer with basic tools like zoom, pan, rotate, and contrast adjustment for clinical staff and patient use.
- Multiplanar Reconstruction (MPR): Enables users to view images in multiple planes (axial, sagittal, coronal) for improved spatial orientation.
- Volume Rendering: Provides 3D representations of anatomical structures for detailed analysis.
- Image Adjustment and Enhancement: Windowing, leveling, sharpening, smoothing, and noise reduction filters for optimal image quality.

h) 💡 Bonus:

- ICD-10 Integration: Include ICD-10 codes in billing and reporting to standardize diagnoses and support accurate medical documentation.
- DICOM Viewer: Include tools for annotations, measurements, and note-saving, with options to integrate annotated images into patient records.
- Comparison Mode: Support side-by-side viewing of different DICOM images for historical or multi-modality comparisons, such as CT vs. MRI.

2. Technology Stack:

a) **Programming Languages**: Specify preferred languages (e.g., JavaScript, Python, etc.).

b) **Frameworks and Libraries:** Choose suitable frameworks for frontend and backend development (e.g., React, Node.js, Django, etc.). For DICOM and CDSS integration, utilize medical image processing libraries such as PyDICOM, SimpleITK, or deep learning frameworks like TensorFlow or PyTorch, for effective DICOM image handling and analysis.

c) **Database:** Select an appropriate database management system (e.g., PostgreSQL, MongoDB, etc.) and design the database schema.

3. Documentation:

Ensure comprehensive documentation for code, database schema, system architecture, and user guides for administrators, clinical staff, and patients.

4. Project Management and Collaboration:

Define tools and methodologies for project management, version control, and team collaboration (e.g., Git, Agile, etc.).

5. Project Timeline:

NOTE: Each team leader must submit Phase 0 for **approval** by sending an email to Dr. Eman Ayman (eman.ayman@eng1.cu.edu.eg) and Eng. Yara Elshamy (yara.elshamy@eng.cu.edu.eg).

Phases	Deliverables	Deadline
Phase 0	• Chosen healthcare system • Used Tools & language (All of them: frontend, backend, and so on). • Team members, Positions and your System Name. • Preparing repository • Code Style for each team.	**Week 7** **November 7, 2025**
Phase 1	• Task division • System Design • ER Diagram, and features choosing and assigning should be delivered in this phase.	**Week 10**
Phase 2	• 50% of the project should be finished • Progress report for each member and a combined progress report for the whole team.	**Week 12**
Phase 3 - Final Phase	• 100% of the project should be finished. • All the other deliverables should be ready. • Deliver a presentation with a working prototype of your project.	**Week 14**