EE4216: MODERN WEB APPLICATIONS

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Modern Web Applications

Subject Code
EE - Electrical Engineering
Course Number
4216

Academic Unit
Electrical Engineering (EE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
(EE3206 Java Programming and Applications
or
EE2311 Object-oriented Programming and Design)
and
CS3402 Database Systems

Precursors
CS3103 Operating Systems

Equivalent Courses
Nil

Exclusive Courses
CS4273 Distributed System Technologies and Programming

Part II Course Details

Abstract

Students will gain fundamental knowledge of designing and implementing reactive and responsive web applications. The contents of this course includes HTML5, CSS3, JavaScript, Java Servlet, JSP and SQL. Upon completion, students can design and/or build real-world, industrial strength, web-based applications.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the basic concepts of the client-server model, the communication protocols and the web architectures.		x	x	
2	Implement reactive, responsive and distributed web applications with modern application frameworks.		x	x	
3	Describe the taxonomy of web attacks and be aware of the security measures in development.		x	x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Students will engage with key concepts in the Web Application Design.	1, 2, 3	3 hrs/wk
2	Projects	Students forms a small group or individually carry out a mini-project of medium-scale web applications.	1, 2, 3	N/A
3	Self-study	Students will develop in-depth understanding of the concepts and topics through the reference materials.	1, 2, 3	N/A

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Tests (min.: 2)	1, 2	36		
2	#Assignments (min.: 3)	1, 2, 3	24		

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

Remark: To pass the course, students are required to achieve at least 30% in course work and 30% in the examination. # may include homework, tutorial exercise, project/mini-project, presentation

Assessment Rubrics (AR)

Assessment Task

Examination

Criterion

Achievements in CILOs

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Coursework

Criterion

Achievements in CILOs

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Basic Principles and Programming Languages

Basic concepts of client and server; multi-tier application architecture; internet protocols; ports and addresses; overview of recent developments of web technology and the Internet; AJAX-based rich internet applications; push technologies; real-time web by websocket; CSS3 and HTML5; JavaScript; SQL; Java Servlet and Java Server Page

Design Patterns and Architectural Patterns

Model-View-Controller (MVC); Model-View-ViewModel (MVVM); Promise; Dependency Injection; Inversion of Control (IoC); Representational State Transfer (REST); Responsive Web Design (RWD); Synchronizer Token Pattern

Java Network Programming

Multi-threaded program design; race condition and thread interference; synchronization and deadlock; thread-safe programs; stream socket and datagram socket programming; multicast datagram socket; multi-threaded server model

Data Storage

HTML5 web storage; document stores; key-value stores; relational database; database normalization; database connectivity; database transactions

Web Security

Security principles; same origin policy; denial of service (DoS), HTML injection; cross-site scripting (XSS); cross-site request forgery (CSRF); SQL injection; man-in-the-middle attack; session hijacking; OAuth and JSON Web Token

Selected Topics on Modern Web Frameworks

Reading List

Compulsory Readings

	Title
1	Lecture notes

Additional Readings

	Title
1	Intro to Java Programming, Comprehensive Version (10th Edition) by Y. Daniel Liang, 2014
2	Internet and World Wide Web How to Program. by Paul and Harvey Deitel, 2012
3	The Oracle Java Tutorials https://docs.oracle.com/javase/tutorial/index.html
4	Java SE 8 API Specification https://docs.oracle.com/javase/8/docs/api/
5	Document API https://developer.mozilla.org/en-US/docs/Web/API/Document