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|  | <b>Daffodil International University</b><br><b>Department of Computer Science and Engineering</b><br><b>Theory Course Outline</b> |                      |  |
| <b>Course Code:</b>   | CSE413  |                      |   |
| <b>Course Title:</b>  | Mobile Application Design   |                      |   |
| <b>Program:</b>   | B.Sc. in CSE  |                      |   |
| <b>Faculty:</b>   | Faculty of Science and Information Technology (FSIT)  |                      |   |
| <b>Semester:</b>  | Spring 2025   | <b>Year:</b>         | 2025  |
| <b>Credit:</b>  | 1   | <b>Contact Hour:</b> | 1.5 Hrs/Week  |
| <b>Course Level:</b>  | L4-T1   | <b>Prerequisite:</b> | CSE325, CSE333  |
| <b>Course Category:</b>   | Core Engineering  |                      |   |

### Course Content (From Syllabus):

Introduction to Mobile Application Development: Overview of mobile platforms (Android, iOS); Evolution and trends in mobile applications; Mobile ecosystems and OS architectures; Development environments (Android Studio), SDK tools and their roles. User-Centered Design: UX/UI design principles, accessibility and usability standards, Material Design, and HIG. Prototyping and Wireframing: Tools like Figma, Adobe XD, creating and testing prototypes. Application Design: Lifecycle, intuitive navigation (tabs, drawers), and interactive components (forms, buttons, gestures). Data Handling and Networking: Local/cloud storage, RESTful APIs, secure data transfer. Advanced Features: Motion design, Flutter, React Native, AR/VR. Testing and Deployment: Debugging, app submission, and maintenance tools.

### Course Description/Rationale:

The **Mobile Application Design (CSE413)** course provides a comprehensive introduction to designing and developing user-friendly mobile applications for Android and iOS platforms. It covers mobile architecture, development environments, and the complete app lifecycle, including deployment and maintenance. Key topics include UX/UI design principles, prototyping, navigation design, data handling, API integration, and cross-platform development with Flutter and React Native. Students will also explore emerging trends like AR/VR and foldable devices. Emphasizing theory and hands-on practice, this course prepares students to create scalable, efficient, and secure mobile applications that meet industry standards.

### Course Objective:

- Understand the architecture of mobile platforms and development environments.
- Learn the principles of designing user-friendly and accessible mobile applications.
- Understand mobile application lifecycle management, including deployment and maintenance.
- Evaluate emerging trends and ethical considerations in mobile application design.

### Course Learning Outcome (CO): (by the end of the course, students will be able to:)

|            |  |
|------------|--|
| <b>CO1</b> | <b>Explain</b> the design principles and architecture of mobile applications       |
| <b>CO2</b> | <b>Identify</b> the key components and development tools for mobile platforms      |
| <b>CO3</b> | <b>Analyze</b> mobile application performance and propose optimization strategies. |

|            |  |
|------------|--|
| <b>CO4</b> | <b>Apply</b> the concepts of mobile application development and <b>Develop</b> mobile applications using modern frameworks to solve a real-life problem. |
|------------|--|

### Contents of the Course:

| Week         | Course Content (as summary)                               | Hrs         | COs           |
|--------------|---|-------------|---------------|
| 1            | Introduction to Mobile Application Design and Development | 1.5         | CO1           |
| 2            | Mobile Ecosystems and Development Environments            | 1.5         | CO1, CO2      |
| 3            | User-Centered Design Principles                           | 1.5         | CO1, CO3      |
| 4            | Prototyping and Wireframing                               | 1.5         | CO1, CO2, CO4 |
| 5            | Application Lifecycle and Navigation Design               | 1.5         | CO1, CO2      |
| 6            | Data Handling and Interaction Design                      | 1.5         | CO2, CO3      |
| 7            | Networking and APIs in Mobile Applications                | 1.5         | CO2, CO3      |
| 8            | Advanced Visual and Motion Design                         | 1.5         | CO3, CO4      |
| 9            | Cross-Platform Development                                | 1.5         | CO2, CO3, CO4 |
| 10           | Emerging Trends in Mobile Application Design              | 1.5         | CO1, CO3      |
| 11           | Testing, Deployment, and Maintenance                      | 1.5         | CO3, CO4      |
| <b>Total</b> |   | <b>16.5</b> |               |

### Mapping of Course Learning Outcomes to Program Learning Outcomes:

| CO's/PO's  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | ✓   |     |     |     |     |     |     |     |     |      |      |      |
| <b>CO2</b> |     | ✓   |     |     |     |     |     |     |     |      |      |      |
| <b>CO3</b> |     |     | ✓   |     |     |     |     |     |     |      |      |      |
| <b>CO4</b> |     |     |     |     | ✓   |     |     |     |     |      |      |      |

### Teaching Learning Activity:

| TLA         | Activity  |
|-------------|---|
| <b>TLA1</b> | Introduce the importance of mobile application design and development. Explore real-world case studies highlighting successful mobile app designs and their impact. |
| <b>TLA2</b> | Discuss mobile platforms (Android, iOS) and their ecosystems. Set up development  |

|             |   |
|-------------|---|
|             | environments (Android Studio, Xcode) and explore the roles of SDKs in app design and development.   |
| <b>TLA3</b> | Explain user-centered design principles, focusing on accessibility, usability, and interface guidelines (Material Design and Human Interface Guidelines). Use hands-on prototyping tools. |
| <b>TLA4</b> | Through lab activities, analyze mobile app performance and optimization strategies. Examine emerging trends and evaluate their implications for mobile application design.                |

### Mapping Course Outcome (COs) with the Teaching Learning and Assessment Strategy

| COs        | POs | Teaching Learning Activity | Assessment Strategy     | Learning Domain | Knowledge Profile (WK) | Complex Engineering Problem (EP) | Complex Engineering Activity (EA) |
|------------|-----|----------------------------|-------------------------|-----------------|------------------------|----------------------------------|-----------------------------------|
| <b>CO1</b> | PO1 | TLA1                       | Quiz Assignment         | C1              | K1-K4                  | EP1, EP2                         |                                   |
| <b>CO2</b> | PO2 | TLA2                       | Midterm Quiz            | C2              | K1-K4                  | EP1, EP3                         |                                   |
| <b>CO3</b> | PO3 | TLA3                       | Midterm Final Quiz      | C4              | K5                     | EP1, EP3                         |                                   |
| <b>CO4</b> | PO5 | TLA4                       | Final Quiz Presentation | C3              | K3                     | EP1, EP6                         |                                   |

#### Bloom's Taxonomy Cognitive Domain

C1: Remembering  
C2: Understand  
C3: Apply  
C4: Analyze

#### Knowledge Profile

K1: Natural Science  
K2: Mathematics  
K3: Engineering Fundamentals  
K4: Specialist Knowledge  
K5: Engineering Design  
K6: Technology

#### EP Attributes

EP1: Depth of knowledge required.  
EP2: Range of conflicting requirements  
EP3: Depth of analysis required.  
EP6: Extent of stakeholder involvement

#### EA Attributes

### Justification of CO-PO Mapping:

- **CO1 to PO1:** CO1 involves understanding and explaining the design principles and architecture of mobile applications, which aligns with PO1 by applying foundational engineering knowledge to address mobile application design challenges.
- **CO2 to PO2:** CO2 requires students to identify and evaluate suitable development tools for solving platform-specific challenges, fulfilling PO2 by analyzing and drawing conclusions based on engineering principles.
- **CO3 to PO3:** CO3 requires students to propose performance optimization strategies, fulfilling PO3 by

designing solutions to enhance mobile application efficiency.

- **CO4 to PO5:** CO4 focuses on applying mobile app development concepts and using modern frameworks to develop mobile applications for real-life problems. This corresponds with PO5, where students use modern engineering tools and techniques (like frameworks and platforms) to solve engineering problems, particularly in the context of mobile app development.

#### **Justification of Knowledge Profile (KP) Mapping:**

- **CO1 to K1-K4:** CO1 requires understanding mobile application design principles, involving K1 (Natural Science), K2 (Mathematics), K3 (Engineering Fundamentals), and K4 (Specialist Knowledge).
- **CO2 to K1-K4:** CO2 focuses on SDKs and mobile components, requiring K1 (Natural Science), K2 (Mathematics), K3 (Engineering Fundamentals), and K4 (Specialist Knowledge).
- **CO3 to K5:** CO3 involves analyzing app performance, and aligning with K5 (Engineering Design) to propose optimization strategies.
- **CO4 to K6:** CO4 emphasizes applying modern frameworks to solve real-life problems, correlating with K6 (Technology) for using tools to develop mobile apps.

#### **Justification of Complex Engineering Problem (CEP) Attributes Mapping:**

- **CO1 to EP1, EP2:** CO1 covers fundamental mobile application design principles, requiring basic problem analysis (EP1) and addressing conflicting design requirements (EP2) in app architecture.
- **CO2 to EP1, EP3:** CO2 involves identifying key mobile development components and tools, requiring in-depth analysis (EP3) of SDKs, components, and their interactions.
- **CO3 to EP1, EP3:** CO3 requires performance analysis of mobile apps, involving deep analysis (EP3) of performance bottlenecks and technical challenges (EP1).
- **CO4 to EP1, EP6:** CO4 focuses on applying mobile development concepts to real-life problems, involving complex problem-solving (EP1) and stakeholder involvement (EP6) in app design and development.

### Course Delivery Plan/Lesson Delivery Plan:

| Week/Lesson<br>(Hour)                    | Discussion Topic and Book Reference  | Student Activities<br>During Online<br>and Onsite<br>[course teacher<br>will decide based<br>on the type of the<br>contents] | Mapping<br>with CO<br>and PO | Assessment<br>Plan              |
|--|--|--|------------------------------|---------------------------------|
| <b>Week-1</b><br>Lesson 1<br>[1.5 Hours] | <b>Introduction to Mobile Application Design and Development</b><br>- Overview of mobile platforms (Android, iOS)<br>- Evolution and trends in mobile applications<br>- Understanding the roles of design and development in mobile app creation<br><i>Reference: "Professional Mobile Application Development" by Jeff McWherter</i>        | Brainstorming sessions,<br>Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion                | CO1                          | Class Test, Assignment, Midterm |
| <b>Week-2</b><br>Lesson 2<br>[1.5 Hours] | <b>Mobile Ecosystems and Development Environments</b><br>- Overview of mobile OS architectures<br>- Introduction to SDKs (Android SDK, iOS SDK)<br>- Setting up development environments (Android Studio, Xcode)<br>- Role of SDK tools in supporting app design and development<br><i>Reference: Official Android/iOS SDK documentation</i> | Brainstorming sessions,<br>Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion                | CO1, CO2                     | Class Test, Assignment, Midterm |
| <b>Week-3</b><br>Lesson 3<br>[1.5 Hours] | <b>User-Centered Design Principles</b><br>- Key principles of UX/UI design<br>- Accessibility and usability standards<br>- Introduction to Material Design and Human Interface Guidelines (HIG)<br><i>Reference: Google Material Design and Apple HIG</i>  | Brainstorming sessions,<br>Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion                | CO1, CO3                     | Class Test, Assignment, Midterm |
| <b>Week-4</b><br>Lesson 4<br>[1.5 Hours] | <b>Prototyping and Wireframing</b><br>- Tools for prototyping (Figma, Adobe XD)<br>- Creating wireframes and interactive prototypes<br>- Testing design concepts before development<br><i>Reference: Tutorials on prototyping tools</i>  | Brainstorming sessions,<br>Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion                | CO1, CO2, CO4                | Class Test, Assignment, Midterm |
| <b>Week-5</b><br>Lesson 5<br>[1.5 Hours] | <b>Application Lifecycle and Navigation Design</b><br>- Understanding activity lifecycles in mobile apps<br>- Designing intuitive navigation (tabs,  | Brainstorming sessions,<br>Classroom discussion, Voice over PPT, Lecture   | CO1, CO2                     | Class Test, Assignment, Midterm |

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|  | drawers, bottom navigation)<br>- Case studies of effective navigation systems<br><i>Reference: Android and iOS navigation design documentation</i>   | video, Lecture note, Open discussion   |               |   |
| <b>Week-6</b><br>Lesson 6<br>[1.5 Hours]   | <b>Data Handling and Interaction Design</b><br>- Introduction to local and cloud storage (SharedPreferences, SQLite, Firebase)<br>- Designing interactive UI components (forms, buttons, gestures)<br>- Ensuring smooth user interactions with animations and transitions<br><i>Reference: Android/iOS developer guides on data handling</i> | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | CO2, CO3      | Class Test, Assignment, Midterm             |
| <b>Week-7</b>                              | <b>Midterm Examination</b><br><b>Syllabus: Week 1 – Week 6</b>   |  |               |   |
| <b>Week-8</b><br>Lesson 7<br>[1.5 Hours]   | <b>Networking and APIs in Mobile Applications</b><br>- Introduction to RESTful APIs and JSON<br>- Real-time communication (Firebase Realtime Database)<br>- Design considerations for secure mobile data transfer<br><i>Reference: Networking chapters in the course textbook</i>  | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | CO2, CO3      | Class Test, Assignment, Presentation, Final |
| <b>Week-9</b><br>Lesson 8<br>[1.5 Hours]   | <b>Advanced Visual and Motion Design</b><br>- Advanced UI elements (custom themes, animations)<br>- Microinteractions for better user engagement<br>- Tools for creating motion graphics and transitions<br><i>Reference: Design blogs and case studies</i>  | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | CO3, CO4      | Class Test, Assignment, Presentation, Final |
| <b>Week-10</b><br>Lesson 9<br>[1.5 Hours]  | <b>Cross-Platform Development</b><br>- Introduction to Flutter and React Native<br>- Advantages and challenges of cross-platform development<br>- Comparing cross-platform and native app development<br>- Best practices for designing cross-platform apps<br><i>Reference: Official documentation from Flutter and React Native</i>        | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | CO2, CO3, CO4 | Class Test, Assignment, Presentation, Final |
| <b>Week-11</b><br>Lesson 10<br>[1.5 Hours] | <b>Emerging Trends in Mobile Application Design</b><br>- Introduction to emerging technologies: AR (Augmented Reality), VR (Virtual Reality), and foldable devices<br>- Voice User Interfaces (VUI) and conversational design<br>- Design challenges and solutions for integrating emerging technologies                                     | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | CO1, CO3      | Class Test, Assignment, Presentation, Final |

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|--|---|---|----------|---|
|  | <ul style="list-style-type: none"> <li>- Case studies of apps using AR/VR and voice UI</li> </ul> <i>Reference: Industry articles and platform-specific documentation</i>   |   |          |   |
| <b>Week-12</b><br>Lesson 11<br>[1.5 Hours] | <b>Testing, Deployment, and Maintenance</b> <ul style="list-style-type: none"> <li>- Types of testing: unit, UI, and performance</li> <li>- Debugging strategies and tools (Logcat, Xcode debugger)</li> <li>- App submission process (Google Play Store, Apple App Store)</li> <li>- Monitoring and analytics tools</li> </ul> <i>Reference: App Store submission guidelines</i> | Brainstorming sessions,<br>Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | CO3, CO4 | Class Test, Assignment, Presentation, Final |
| <b>Week-13</b>                             | <b>Final Examination</b><br><b>Syllabus: Week 8 – Week 12</b>   |   |          |   |

#### Assessment Pattern:

| Assessment Task     | CO's |     |     |     | Mark<br>(Total = 100) |
|---------------------|------|-----|-----|-----|-----------------------|
|                     | CO1  | CO2 | CO3 | CO4 |                       |
| Attendance          | --   | --  | --  | --  | 7                     |
| Class Test          | --   | --  | --  | --  | 15                    |
| Assignment          | --   | --  | --  | --  | 5                     |
| Presentation        | --   | --  | --  | --  | 8                     |
| Midterm Examination | 5    | 5   | 5   | 10  | 25                    |
| Final Examination   | 5    | 10  | 10  | 15  | 40                    |
| Total Marks         | 10   | 15  | 15  | 25  | 100                   |

#### CIE - Breakup [60 marks]

| Bloom's Criteria  | Attendance<br>(07) | Class Test<br>(15) | Assignment<br>(05) | Presentation<br>(08) | Midterm<br>(25) |
|-------------------|--------------------|--------------------|--------------------|----------------------|-----------------|
| <b>Remember</b>   |                    | 02                 |                    |                      | 2.5             |
| <b>Understand</b> |                    | 05                 | 02                 | 02                   | 7.5             |
| <b>Apply</b>      |                    | 05                 |                    | 03                   | 12.5            |
| <b>Analyze</b>    |                    | 03                 | 03                 | 03                   | 2.5             |
| <b>Evaluate</b>   |                    |                    |                    |                      |                 |
| <b>Create</b>     |                    |                    |                    |                      |                 |

**SEE - Semester End Examination [40 Marks]**

| <b>Bloom's Criteria</b> | <b>Score for the Test</b> |
|-------------------------|---------------------------|
| <b>Remember</b>         | 5                         |
| <b>Understand</b>       | 10                        |
| <b>Apply</b>            | 20                        |
| <b>Analyze</b>          | 5                         |
| <b>Evaluate</b>         |                           |
| <b>Create</b>           |                           |

**Learning Materials:****Textbook/Recommended Readings:**

1. Professional Mobile Application Development by Jeff McWherter and Scott Gowell

**Reference Books/Supplementary Readings:**

1. Google Material Design Guidelines
2. Apple Human Interface Guidelines
3. OWASP Mobile Security Guidelines
4. Research articles and platform documentation