MAHARISHI INTERNATIONAL UNIVERSITY

Mobile Device Programming
Enjoy greater efficiency and accomplish more

CS 473

Professor

Dr. Bright Gee Varghese

October 2023 Block
(Oct-16-2023 to Jan-27-2024)

CS 473: Mobile Device Programming

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SYLLABUS

"The human brain physiology is the hardware of that cosmic computer, which can create anything through proper programming." -- Maharishi Mahesh Yogi

COURSE OBJECTIVES, ACTIVITIES, AND ASSESSMENTS

Main Objectives

The goal of this course is to teach you how to use Kotlin to develop and control Android applications. Upon completion of this course, you will achieve

- Plan the setup of a computer for Android programming.
- Understand Kotlin Programming Fundamentals.
- Understand how Android applications work, their lifecycle, manifest, intents and using external resources.
- Develop user input and output interfaces using widgets, structured layouts, Listeners, Views, Menus and Dialogs.
- Making use of Android Material design.
- Adapt Android library classes for data storage and retrieval using shared preferences, files and data bases.
- Generate Multimedia applications with the help of Audio, Video and Camera.
- Develop methods to save state information between app runtimes.
- Create adaptable UIs using fragments.
- Understand how to work with Android built-in Sensors.
- Learn to work with Android JetPack architectural components.
- Build your own Android Apps.
- Continued development of higher states of consciousness through regular practice of the Transcendental Meditation technique and a balanced daily routine.

This is what you'll learn to do	This is how you'll learn it	This is what will show you've learned it
Android Basics: **Discuss** Android architecture, project structure, and Activity life cycle. **Discriminate** between the elements of an Android manifest. **Develop** user input and output interfaces using widgets and structured layouts in XML and Kotlin. (3,5)	**By constructing** Android apps that properly demonstrate the activity lifecycle and layouts. **By constructing** Android apps that properly integrate XML for user interfaces.	Results from Quizzes, and the Midterm examination.
Working with Multiple Activities **Design** Android apps using Intents and Fragments. **Build** apps using WebView and HTML. (3,5)	**By constructing** Android apps that properly integrate Intents, fragments and WebView.	Results from Quizzes, and the Midterm examination.
Media Handling **Create** multimedia apps using audio and video. **Devise** ways to incorporate the camera and its data into Android. (3,5)	**By constructing** Android apps that properly integrate the use of Media Player, VideoView, Camera, Audio recording and Video recording.	Results from Quizzes, and the final examination.
Data Handling **Demonstrate** the various ways of storing data using Shared Preferences, Internal, External Storage, and Room database. (3,5)	**By constructing** Android apps that properly transfer data from Android apps to various data sources.	Results from Quizzes, and the Final examination.
Project **Develop and present** a Mobile app that integrates the knowledge gained from this course. (3,4,5)	**By creating** (as a team) app using Android.	The presentation complements the project documentation and the app demo
Science of Consciousness **Explain** the connection between the Science of Consciousness and Android Programming. (2)	**By writing** appealing points (with a drawing) that have a Science of Consciousness connection.	A short Essay Exam Questions

*The numbers in parentheses refer to the MUM Essential Learning Outcomes that are best supported by this course objective; they appear in **boldface** in the list below. (Highlight in bold those that best apply to your course objectives, activities, and assessments)

1. Holistic development of consciousness and health
2. **Consciousness-based understanding (Knowledge)**
3. **Creative and critical thinking**
4. **Communication**
5. **Scientific and quantitative reasoning**
6. Collaboration and leadership
7. Sustainable local and global citizenship

<u>Outline of Course contents</u>

Lesson – 1 – Introduction to Android

- What is Android?
- Android Architecture
- Android Features
- Android History and Releases
- Android Components

Lesson – 2 – Kotlin Programming Fundamentals

- What is Kotlin?
- Kotlin Features
- main function
- Mutable and Immutable
- Kotlin Strings
- Looping
- Null safety
- Class and Objects
- Inheritance, Interface and Data Class

Lesson – 3 – Creating First App

- Introduction to Android Studio
- Creation of HelloWorld app
- Android Project Structure and Folders
- AVD Manager
- Styles and Themes
- Event Handling
- Hands on Example – Birthday Wish App

Lesson – 4 Views, Layouts and Activity life cycle

- Views, view groups, and view hierarchy
- Layouts in XML and Kotlin code
- Resources
- Activity Life Cycle
- Save State Information call backs
- Hands on Examples – Basic UI, Simple Calculator, Working with ScrollView, Lifecycle Activity and Save state

Lesson – 5 Intents
- Activity
- Implicit Intents
- Explicit Intents
- Hands on Example o
  - o Explicit Event - Send a message from one activity to another activity.
  - o Implicit Event – Sending message through E-Mail, Dial up screen and WhatsApp
- Run apps on real device
- Intent Filters
- Getting result from the activity

Lesson – 6 User Input Controls – 2 days
- Input Controls
- Auto Complete View
- Toast
- Spinner
- List View
- Grid View
- Dialogs – Alert, DatePicker and TimePicker
- Android Menus, Action Bar
- Recycler View and Card view
- Hands on Examples

Lesson-7- Menus, Fragments and Tab layout with Swipe views, and Material Design – 2 Days
- Menus
- Tab Layouts and Swipe Views
- Fragments
- TabLayout with SwipeViews

- Hands on Example
- View Binding
- Design support Library – Material Design

    o FloatingActionButton

    o SnackBar

    o Tabs

    o NavigationDrawer

Lesson-8 WebView, Shared Preferences and JSON– 2 Days

- WebView
    o Introduction

    o WebView Operations

    o Methods in WebViewClient class

    o How to create your own HTML Page
- SharedPreferences

    o   Introduction o Applications of Shared Preferences

    o   Steps for creating Shared Preferences

    o   Retrieve, Update and Delete preferences
- JSON, Retrofit
- Kotlin Coroutines
- Hands on Example

Lesson – 9 - Multimedia in Android
- Android Runtime Permissions
- Video View & Media Player
- Audio Recording
- Video Recording
- Camera & Gallery
- Hands on Example

Lesson – 10 – Android JetPack
- Introduction to JetPack Architectural Components
- ViewModel
- LiveData
- Navigation Component
- Room Database
- Hands on Example

Lesson – 11 – Sensors

- Sensors Overview
- Sensor Manager
- Types of sensors
- Sensor Event
- Hands on example

Lesson – 12 – Localization

- Supporting different languages
- Localization Checklist
- Localizing with Resources

Lesson – 13- Publish App on Google Play Store

- Build signed .apk
- Build unsigned .apk
- Play store publish process
- Play store .apk updating process

Online Reading Resource

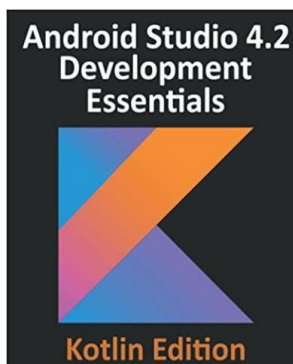**https://developer.android.com**

Reference Textbooks

The *recommended* textbook for the course is

Title: Android Studio 4.2 Development Essentials - Kotlin Edition
ISBN-13**:** 978-1951442309 Edition:2021
Publisher: Packt Publishing
Author: Neil Smyth

Course Schedule

WEEK	Lessons	Assignments
WEEK 1	The Course Overview Chart & Syllabus Lesson 1 Introduction to Android Lesson 2 Kotlin Programming Fundamentals	Assignment 1 for Lesson-2
WEEK 2	Lesson 3 Creating First App Lesson 4 Views, Layouts, and Activity life cycle	Assignment 2 for Lesson-3 Assignment 3 for Lesson-4
WEEK 3	Lesson 4 Views, Layouts and Activity life cycle Lesson 5 Intents	Assignment 3 for Lesson-4 **(50% of completion is enough for Assignment 4)** Assignment 4 for Lesson-5
WEEK 4	Lesson 6 User Input Controls	Assignment 5 for Lesson-6
WEEK 5	Lesson 7 Menus, Fragments, Tab layout with Swipe views, and Material Design	Assignment-6 CV Builder App
WEEK 6	Lesson 8 WebView, Shared Preferences and JSON	Assignment -6 CV Builder App
WEEK 7	Lesson 8 WebView, Shared Preferences and JSON Midterm Preparation	Assignment -6 CV Builder App
WEEK 8	**Midterm**	
WEEK 9	Lesson 9 Multimedia	Completion of Assignment-6 CV Builder App

WEEK 10	Lesson 10 Android JetPack	Assignment-7-Quiz App
WEEK 11	Lesson 10 Android JetPack	Assignment-7-Quiz App
WEEK 12	Lesson 11 Sensors	Assignment-7-Quiz App
WEEK 13	Lesson 12 Localization Lesson 13 Publish App on Google Play Store	Assignment-7-Quiz App
WEEK 14	Completion of Assignment-7-Quiz App Final Exam Preparation	
WEEK 15	**Final Exam**	

OFFICE HOURS, CONTACT INFORMATION AND BIOGRAPHICAL SKETCH

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Reading and Lab Assignments

The purpose of all labs assignments is to provide an opportunity for learning with a minimum pressure for graded outcomes.

Every week you have homework to apply the knowledge you gained on that topic. Assignments will be posted on Sakai, and you are required to check Sakai course page regularly to know about the homework due dates. You need to upload the solutions for all the

homework on or before the due date. If you are going to be late, you need to take prior approval for submitting the homework.

All required reading is located online on the Sakai site **www.online.cs.miu.edu**. You are also encouraged to read additional information beyond that designated in class from the http://developer.android.com website.

Assignment Submission

You will be using GitHub.com to upload your assignments for this class. GitHub is also awesome for showing off your own coding projects and skills.

Proper Scheduling &Time Management

- You received and are familiar with the general structure and process of DE course**.**

- Follow the schedule with proper time management helps you avoid overlapping lessons and overdue assignments.

- Watch the Videos of that respective week and complete the assignments which help you to perform better in the exam.

- Spend about 10 hours each week. Minimum 1 hour each day during the week to view the recorded lectures and reading. Weekend work on your homework.

- Important to maintain good health with regular TM practice, workouts, and taking enough sleep.

- Regularly check your @miu.edu email for any announcements and instructions that come from my side and the DE office.

Academic Honesty

Students are expected to submit only their own work. During exams, they must not access outside resources (such as internet, email, course resources). The academic dishonesty policy stated on the Compro website is reproduced here:

> **Academic Dishonesty:** Students caught cheating will receive a grade of NC. A second case of cheating results in suspension from the university. Cheating includes copying from someone else as well as letting someone else copy your materials, or not following the policies during the test (e.g., not using a cell phone at any time; not having notes, etc).

Evaluation Criteria

- Assignments: 10%

- Midterm: 45 % [Includes Lesson 1 – 7]

- Final: 45% [Includes – Lesson 8 – 12]

We will use the following grading scale:

Range	Letter Grade	Meaning of Grades
93 - 100	A	Excellent, exceptional
90 - 92	A-	Excellent
87 - 89	B+	Very good comprehension of course concepts and proficiency in course competencies
83 - 86	B	Good comprehension of course concepts and proficiency in course competencies
80 - 82	B-	Basic comprehension of course concepts and proficiency in course competencies
77 - 79	C+	Fair — meets minimal expectations for passing
73 - 76	C	Fair
70 - 72	C-	Fair
0 - 69	NC	No credit — did not attain course objectives at a minimal level

Course Evaluation/Feedback

You are required to complete a student course evaluation for this course after the midterm exam (on Sakai) and again after the final exam (on SmartEvals).