

# MAHARISHI UNIVERSITY OF MANAGEMENT



## **Mobile Device Programming**

*Enjoy greater efficiency and accomplish more*

CS 473

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Professor

Dr. Renuka Mohanraj

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**March 2020**

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*Maharishi's Eighth Year of Invincibility*

*Global Raam Raj*

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# CS 473: Mobile Device Programming

*Enjoy greater efficiency and accomplish more*

*Dr. Renuka Mohanraj*

## SYLLABUS

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

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### COURSE OBJECTIVES, ACTIVITIES, AND ASSESSMENTS

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#### 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.
- Build your own Android Apps.
- Learn to work with SQLite database and Room Database
- 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
<b>Android Basics:</b> <b>Discuss</b> Android architecture, project structure and Activity life cycle. <b>Discriminate</b> between the elements of an Android manifest. <b>Develop</b> user input and output interfaces using widgets and structured layouts in XML and Kotlin.(3,5)	<b>By constructing</b> Android apps that properly demonstrate the activity lifecycle and layouts.  <b>By constructing</b> Android apps that properly integrate XML for user interfaces.	Results from Quizzes, and the Midterm examination.
<b>Working with Multiple Activities</b> <b>Design</b> Android apps using Intents and Fragments. <b>Build</b> apps using WebView and HTML. (3,5)	<b>By constructing</b> Android apps that properly integrate Intents, fragments and WebView.	Results from Quizzes, and the Midterm examination.
<b>Media Handling</b> <b>Create</b> multimedia apps using audio and video. <b>Devise</b> ways to incorporate the camera and its data into Android. (3,5)	<b>By constructing</b> Android apps that properly integrate the use of Media Player, VideoView, Camera, Audio recording and Video recording.	Results from Quizzes, and the final examination.
<b>Data Handling</b> <b>Demonstrate</b> the various ways of storing data using Shared Preferences, Internal, External Storage and SQLite database. (3,5)	<b>By constructing</b> Android apps that properly transfer data from Android apps to various data sources.	Results from Quizzes, and the Final examination.
<b>Project</b> <b>Develop and present</b> a Mobile app that integrates the knowledge gained from this course. (3,4,5)	<b>By creating</b> (as a team) app using Android.	The presentation complements the project documentation and the app demo
<b>Science of Consciousness</b> <b>Explain</b> the connection between the Science of Consciousness and Android Programming. (2)	<b>By writing</b> 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

## **Course Outline**

### **Week – 1**

#### **Lesson – 1 – Introduction to Android**

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

#### **Lesson – 2 – Kotlin 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 Layouts, Activity and Event Handling**

- 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
  - Explicit Event - Send a message from one activity to another activity.
  - 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 Basic & Advanced UI Components – 2 days**

- Input Controls
- Auto Complete View
- Toast
- Spinner
- List View
- Grid View
- Dialogs – Alert, DatePicker and TimePicker
- Android Menus, Action Bar
- RecyclerView and Card view
- Hands on Examples

## **Week - 2**

## **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
- Design support Library – Material Design
  - FloatingActionButton
  - SnackBar
  - Tabs
  - NavigationDrawer

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

- WebView
  - Introduction
  - WebView Operations
  - Methods in WebViewClient class
  - How create your own HTML Page
- SharedPreferences
  - Introduction
  - Applications of Shared Preferences
  - Steps for creating Shared Preferences
  - Retrieve, Update and Delete preferences
- JSON, Retrofit
- Hands on Example

## **Week – 3**

### **Lesson – 9 - Multimedia in Android**

- Android Runtime Permissions
- Video View & Media Player
- Audio Recording
- Video Recording
- Camera & Gallery
- Hands on Example

### **Lesson – 10 - SQLite Database**

- Introducing SQLite
- SQLite Open Helper
- SQLite CRUD operations
- SQLite browser
- 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

### **Week – 4 Project**

#### **Online Reading Resource**

<https://developer.android.com>

#### **Textbooks**

The *recommended* textbook for the course is

1. Kotlin/Android Studio 3.0 Development Essentials (Android 8 Edition) - Neil Smyth / Payload Media





## Course Schedule

MAHARISHI UNIVERSITY OF MANAGEMENT  
**CS473 – Mobile Device Programming**  
*Discovering the Structuring Principles of Creation*



### *Course Overview Chart*

WEEK		MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
WEEK ONE	AM	The Course Overview Chart & Syllabus  Lesson 1 Introduction to Android	Lesson 3 Creating <del>First App</del>	Lesson 4 Layouts, Activity and Event Handling	Lesson 5 Intents	Lesson 6 Basic & Advanced UI Components	Lesson 6 Continued Quiz 1
	PM	Lesson 2 Kotlin Programming Fundamentals	Lab Time	Lab Time	Lab Time	Lab Time	Rest
WEEK TWO	AM	Lesson 7 Menus, Fragments, Tab layout with Swipe views, and Material Design	Lesson 7 Continued	Lesson 8 Shared Preferences, WebView and HTML, JSON	Lesson 8 Continued	Review for Midterm	Midterm Examination
	PM	Lab Time	Lab Time	Lab Time	Lab Time	Study for Midterm	Rest
WEEK THREE	AM	Lesson 9 Multimedia	Lesson 10 SQLite Database	Lesson 11 Sensors Lesson 12 Localization	Lesson 13 Publish App on Google Play Store	Review for Final	Final Examination
	PM	Lab Time & Project work	Lab Time & Project work	Lab Time & Project work	Lab Time & Project work		
WEEK FOUR	AM	Project Work	Project Work	Project Work	Project Presentation	-----	-----
	PM	Project Work	Project Work	Project Work	-----	-----	-----

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### OFFICE HOURS, CONTACT INFORMATION AND BIOGRAPHICAL SKETCH

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### RECOMMENDED DAILY SCHEDULE

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Class is in session from 10 AM to 12:15 every weekday morning, with the final 15 minutes devoted to a group meditation, and from 1:15 to 3:15 every afternoon, with the final 20 minutes for group meditation. On Saturday, we meet only in the morning and follow the usual weekday format during the morning.

Course Resources : [www.online.cs.mum.edu](http://www.online.cs.mum.edu)

## **Reading and Lab Assignments**

The purpose of all labs, projects, and homework is to provide an opportunity for learning with a minimum pressure for graded outcomes. For learning, you should attempt the assigned project individually. Discussions among fellow students are very beneficial to the learning process to clarify your understanding and to remove any roadblocks that may slow down progress.

Every day you have homework to apply the knowledge you gained on that day. Homework will be submitted by the next day 10 pm.

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

## **Homework Submission**

We 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. Because the free GitHub account does not allow you to create private repositories once you get a grade for an assignment you can delete the repository for that assignment, otherwise if you want to keep the repository it is ok. Just realize that the whole world can see it and eventually someone will come across it. Homework will be assigned individually and one or two homework will be group, I will let you know the group assignment.

## **Project**

You will be asked during the middle of second week of class to come up with an idea for an Android app. Projects will be assigned as group of two or three members. You have the freedom to choose the topics in the given area. Decide what kind of app you will create, if you are ok with the idea inform to the Faculty.

Each day you should incorporate the concepts you learn on that day into your app. If you wish to change the idea for your app, ask the faculty for approval before changing to a different app.

During this course you will give a presentation that demonstrates the final version of your app. Presentations will occur the last day of the fourth week. Giving presentations will hone your skills for doing interviews and showing your work. You will have some reviews in the third week to check your progress.

You should develop a Mobile Application in the following areas

1. Marketing/ Promoting MUM Compro department worldwide
2. Develop some useful app to the benefit of
  - a. Compro Current & Alumni Student
  - b. Compro Faculty
  - c. Compro Department
3. Useful app to the benefit of Society

Second week Monday: Need to provide a title in the mentioned area

Third Week Thursday: Review 1

Fourth Week Thursday: Final Presentation

Project Duration: Third week all afternoon session

Fourth week Monday, Tuesday and Wednesday.

### **Evaluation Criteria**

- Professional etiquette:2% [ Includes Dress code, class participation, group meditation [Dalby & classroom], interaction, punctuality etc.,]
- Assignments 13%
- Exams[Midterm & Final] : 50%
  - Mid Term Exam includes Lesson 1 – 7
  - Final Exam includes – Lesson 8 – 12
- Final Project: 35%

Attendance at all class sessions including labs is required. Unexcused absences or tardiness will reduce a student's final grade. If you are sick and must miss a class send email to [rmohanraj@mum.edu](mailto:rmohanraj@mum.edu) before class.

## Professional Etiquette

You are expected to dress and behave as you would in the context of a real IT job in the US. With Compro students, there are rarely any issues about professional etiquette, but you should be aware that you can lose up to 3 points (out of 100 total for the course) for failure to observe acceptable codes of dress and behavior. Be alert to the following:

1. Dress appropriately
2. Attend class in the expected way
3. Don't be late to class
4. Don't leave class before it is time to leave
5. Don't skip class
6. Respectful attitude toward the professor. (Arguing about grades is a dangerous path to walk.)
7. Group Meditation at Class and Dalby Hall.

## Academic Honesty

Students are expected to submit only their own work (except for labs or other activities designated as group activities). During exams, they must not look at other students' work, discuss exam contents with other students at any time (including bathroom breaks), or attempt to access outside resources (such as internet or email). The academic dishonesty

**Academic Dishonesty:** Graduate 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 or not having notes, etc.,).

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

80 - 82	B-	proficiency in course competencies 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