



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari College of Computer Application
Semester-7 (BCA)

Subject: Advanced Mobile Application Features & Integration – BCAMA10404

Type of course: Major Core

Prerequisite: Basic knowledge of Mobile Application Development and Flutter Development.

Rationale:

Modern mobile applications are no longer standalone systems but integrate with cloud platforms, APIs, real-time systems, and intelligent services, requiring developers to build scalable, secure, and high-performance apps with features like authentication, payment gateways, real-time communication, and cloud-based architectures; this course covers advanced topics such as API integration, cloud services, real-time data handling, push notifications, performance optimization, and application security, enabling students to develop production-ready mobile applications aligned with industry standards.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	SEE		CCE		
			Theory		Practical	MSE	LWA	ALA	
3	0	2	4	75	25	30	20	50	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory

1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical

SEE 100 Marks will be converted in to 50 Marks

CCE 100 Marks will be converted in to 50 Marks

It is compulsory to pass in each individual component.



Course Content:

Sr. No	Course content	Hrs	% Weightage
1	Advanced Networking & API Integration : RESTful APIs, JSON, XML, HTTP Methods: GET, POST, PUT, DELETE, API Integration (HTTP / Retrofit), Error Handling & API Debugging, GraphQL Basics, Third-party APIs (Maps, Weather, Payment APIs)	10	20%
2	Cloud Integration & Backend Services : Introduction to Backend-as-a-Service (BaaS), Firebase Advanced Features, Authentication (Email, Google, OAuth), Firestore / Realtime Database, Cloud Functions, Introduction to Supabase / AWS Amplify Cloud Storage (File Upload/Download)	10	20%
3	Real-Time Features & Notifications : Push Notifications (Firebase Cloud Messaging), Local Notifications, Real-Time Data Handling, WebSockets Introduction, Background Services	8	20%
4	Performance Optimization & Testing : Performance Profiling Tools, Memory Management Techniques, App Optimization Strategies, Debugging Techniques, Unit Testing & Widget Testing, Introduction to CI/CD for Mobile Apps	8	20%
5	Security, Payments & Advanced Integration's: Mobile Application Security Fundamentals, Data Encryption & Secure Storage, Authentication & Authorization Best Practices, Payment Gateway Integration (Razorpay/Stripe), Maps & Location Services, Introduction to AI/ML Integration (Chatbots, APIs)	9	20%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	API Integration Project : Develop a fully functional application that integrates at least two public APIs (e.g., weather, maps, news, payment, or social media APIs). The project should demonstrate the ability to fetch, process, and display real-time data from external services. Students must handle API requests, manage responses (JSON/XML), implement error handling, and ensure smooth UI updates and upload all files in one PDF on GMIU portal.	10



2	<p>Cloud-Based Application : Design and develop a cloud-enabled application using Firebase or similar platforms. The application must include user authentication (login/signup) and real-time database or Firestore integration. Students should demonstrate data storage, retrieval, and synchronization across devices. Security rules, scalability considerations, and deployment on cloud infrastructure must be explained in the report. Upload final report on GMIU web portal.</p>	10
3	<p>App Performance Audit : Analyze an existing mobile or web application to evaluate its performance, responsiveness, and efficiency. Students should use profiling tools (such as Android Profiler, Flutter DevTools, or browser developer tools) to identify bottlenecks related to memory usage, CPU consumption, network latency, and UI rendering. Based on findings, propose and implement optimization techniques and present a comparative performance report. Upload final report on GMIU web portal.</p>	10
4	<p>UI/UX Prototype for Chat Application : Design an interactive UI/UX prototype of a chat application using tools like Figma, Adobe XD. The prototype should include screens such as login, contact list, chat interface, notifications, and settings. The final prototype must be submitted on the GMIU portal.</p>	10
5	<p>Real-Time Chat Application(mini-project) : Develop a real-time chat application implementing instant messaging functionality using technologies such as Firebase Realtime Database, Firestore, or WebSockets. The application should support features like user authentication, sending/receiving messages instantly, timestamps, and basic UI for conversation display. All the files along with Screen Shots of the Application must be submitted on the GMIU portal.</p>	10
Total		50

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	20%	15%	15%	15%	15%

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.



Course Outcome:

After learning the course the students should be able to:	
CO1	Understand advanced mobile application architecture and integrations.
CO2	Integrate REST APIs and third-party services.
CO3	Develop cloud-enabled applications using Firebase and backend services.
CO4	Implement real-time features like chat and push notifications.
CO5	Build secure, optimized, and production-ready mobile applications.

List of Practical

Sr. No	Descriptions	Unit No	Hrs
1	Implement REST API integration to fetch and display dynamic data from external services using HTTP methods like GET and POST.	1	4
2	Parse JSON data and display it in structured UI components such as ListView or GridView with proper formatting.	1	4
3	Implement user authentication using Firebase with email/password and Google Sign-In methods.	1	4
4	Perform Create, Read, Update, and Delete operations using Firebase Firestore database.	1	4
5	Integrate push notifications using Firebase Cloud Messaging to send and receive real-time alerts.	1	2
6	Develop functionality to capture images using device camera and store them locally or in cloud storage.	2	2
7	Implement secure payment processing using gateways like Razorpay or Stripe within the application.	3	2
8	Integrate Google Maps API to display maps, markers, and location-based services in the application.	3	2
9	Upload and manage files such as images or documents using cloud storage services like Firebase Storage.	4	4
10	Analyze application performance and apply optimization techniques to improve speed, memory usage, and responsiveness.	4	2



Total	30
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Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc. From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory.

The internal evaluation will be done on the basis of Active Learning Assignment.

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

- [1] Building Mobile Magic: Integrating Flutter with Firebase – Kameron Hussain, Frahaan Hussain, 2024
- [2] LEARN FIREBASE – Build Web and Mobile Applications – Diego Rodrigues, 2025 Edition
- [3] RESTful Web APIs – Leonard Richardson, Mike Amundsen, Sam Ruby, 2013
- [4] Creating Mobile Applications using Flutter and Firebase – Shivank Awasthi, Utkarsh Bhardwaj, 2021
- [5] Firebase Essentials – Android Edition – Neil Smyth, 2017

