Phase 5 — Apex Programming (Developer)

Project: Admission–Academic Journey CRM

1. Classes & Objects

Apex classes define the blueprint for objects in the Admission–Academic Journey CRM project. In this project:
- AdmissionTriggerHandler class handles automation logic for multiple objects.
- Objects used include Student__c, Application__c, Prospective_Student__c, Academic_Record__c, Course__c, Department__c, and Counseling_Note__c.

2. Apex Triggers (before/after insert/update/delete)

Triggers automate operations based on record changes. Examples:
- ApplicationTrigger → After insert/update, creates Student records when applications are accepted.
- StudentTrigger → Before insert, prevents duplicate students.
- ProspectiveStudentTrigger → After update, converts Prospects to Applications.
- AcademicRecordTrigger → After insert/update, updates Status field based on grades.
Trigger events include before insert, after insert, before update, after update.

3. Trigger Design Pattern

Triggers call a handler class instead of having logic directly in the trigger.
- Example: AdmissionTriggerHandler class is called from ApplicationTrigger, StudentTrigger, ProspectiveStudentTrigger, and AcademicRecordTrigger.
- Ensures reusability, bulkification, and maintainability.

4. SOQL & SOSL

SOQL: Used to query Salesforce records.
Example: SELECT Id, Name, Status__c FROM Application__c WHERE Status__c = 'New'
SOSL: Used for text search across multiple objects.
Example: FIND 'Math' IN ALL FIELDS RETURNING Student__c(Id, Name), Application__c(Id, Status__c), Academic_Record__c(Id, Status__c)

5. Collections: List, Set, Map

- List: Stores multiple Application records.
- Set: Stores unique record Ids to prevent duplicates.
- Map: Maps student Ids to student records for quick lookup.

6. Control Statements

Standard IF-ELSE, FOR loops, and WHILE loops are used to control logic flow.
Example: Loop through Academic Records to update student status based on grades.

7. Batch Apex

Handles large data volumes asynchronously.
Example: Batch process to update all Academic Records and recalculate GPA for students.

8. Queueable Apex

Used for complex asynchronous jobs.
Example: Queueable job to send notification emails when a student graduates.

9. Scheduled Apex

Executes Apex classes at scheduled intervals.
Example: Weekly job to send reminders to counselors for pending student follow-ups.

10. Future Methods

Used to run long-running processes asynchronously.
Example: @future method to sync student information with external systems after record creation.

11. Exception Handling

Apex try-catch blocks are used to handle runtime errors.
Example: Catch DML exceptions when inserting/updating Student or Application records.

12. Test Classes

Every Apex class/trigger must have test coverage.
Example: AdmissionTriggerHandlerTest to insert mock Applications, Students, and Academic Records and verify correct automation execution.

13. Asynchronous Processing

Combines Batch Apex, Queueable Apex, Future Methods, and Scheduled Apex.
Ensures large volume operations like GPA calculation, email notifications, and academic report generation do not block user operations.