



# OCL

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## Report Title:

## Flex OCL Class Diagram Analysis for Term Project

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## 1. Overview

- This document provides comprehensive details regarding the attributes of class diagrams and enumerations in the term project model. For visual representation of the class diagrams.

- please refer to the "Class Diagram Design" folder and navigate to the file located at



"\Class Diagram Design\out\ClassDiagram\ClassDiagram.png"

- For OCL editing, please use the provided project.
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## 2. Constraint Details

### Course Registration System Overview

#### 1. Course Viewing

- **Description:** Students can view the list of courses offered by any department in any semester.

#### 2. Semester Details

- **Description:** Semesters are categorized as Fall, Spring, or Summer for any academic year.

#### 3. Core and Elective Courses

- **Description:** Core courses are mandatory for degree completion, while elective courses offer flexibility in course selection.

#### 4. Course Registration Limits

- **Description:** BS students can register for a maximum of 5 courses per semester, while MS students can register for a maximum of 3 courses, with exceptions for prerequisite courses.

#### 5. Course Withdrawal

- **Description:** Students can withdraw from a course before the announced date.

#### 6. Transcript Representation

- **Description:** Withdrawn courses are marked with a 'W' on the transcript.

## 7. Course Dropping

- **Description:** Students can drop a course within two weeks of registration, and dropped courses do not appear on the transcript.

## 8. CGPA Calculation

- **Description:** CGPA is calculated by aggregating all GPAs of semesters taken so far.

## Repeat Courses

### 9. Course Repeat Requirements

- **Description:** Students must repeat all failed courses.

### 10. Repeat Course Criteria

- **Description:** Students under warning must repeat passed courses with a GPA below the minimum required for their degree.

### 11. Repeat Course Permissions

- **Description:** Students can repeat a course if not passed or to improve their grade.

### 12. Transcript Representation

- **Description:** Repeat courses are indicated on the transcript with a repeat count.

## Warning System

### 13. Warning Status Viewing

- **Description:** Students can view the status of their warnings, if any.

### 14. Warning Issuance

- **Description:** Warnings are issued at the end of every semester if a student's CGPA is below the minimum required for their degree program.

### 15. Registration Restrictions

- **Description:** Students with a warning cannot register for subsequent semesters without approval from relevant faculty.

## **16. Warning Count Updates**

- **Description:** Warning count increases by one if a student's CGPA is below the required minimum after each semester.

## **17. Admission Closure**

- **Description:** If the warning count reaches three, admission to the university is closed unless the CGPA meets the required minimum.

## **18. Automatic Admission Cancellation**

- **Description:** Admission is automatically canceled after the maximum duration allowed to earn a degree.

# **Fee Management**

## **19. Fee Details Viewing**

- **Description:** Students can view fee details.

## **20. Fee Payment Timeline**

- **Description:** Fees are charged on a semester basis and are due two weeks before the start of the semester during course registration.

## **21. Payment Method**

- **Description:** Fees are paid through bank challan available in the Accounts Office/Flex.

## **22. Non-Refundable Fees**

- **Description:** All fees are non-refundable except for security deposits.

# **Loan Assistance**

## **25. Loan Eligibility**

- **Description:** Indigent students can apply for loans.

## **26. Loan Renewal**

- **Description:** This assistance is subject to renewal every semester based on the student's academic performance and financial need.

## **27. Loan Coverage**

- **Description:** The financial assistance is limited to tuition fees only.

## **28. Loan Discontinuation**

- **Description:** The loan is discontinued if the student's CGPA falls below 2.00 for undergraduate degree and 2.5 for graduate degree.

## **29. Loan Repayment Period**

- **Description:** The repayment of the loan starts three months after graduation or getting a job, whichever is earlier.

## **30. Loan Repayment Duration**

- **Description:** The total amount has to be repaid within a period of four years after graduation. Students are required to sign to this effect.

## **31. Loan Application Process**

- **Description:** All those who are admitted and are in real need of financial assistance should apply on the prescribed Financial Aid form. A notice to this effect will be posted on the notice board.

## **Merit Scholarship**

### **32. Scholarship Awards**

- **Description:** Merit scholarship is awarded to the Top Three position holders of each Examination Board.

### **33. Campus Merit Scholarship**

- **Description:** Scholarship is also offered to top three position holders in the NU admission merit list of each campus.

### **34. Scholarship Maintenance Criteria**

- **Description:** Students awarded merit Scholarship, 100% tuition fee for 8 regular semesters must maintain a CGPA of  $\geq 3.00$  in each semester.

## Attendance Management

### 35. Attendance Viewing

- **Description:** A student can view the attendance of any course in which he/she has registered.

### 36. Attendance Criteria for Exam

- **Description:** In order for a student to appear in the Final exam of a course, he/she should have attendance more than 80%.

## Results and Exam Requests

### 37. Marks Viewing

- **Description:** A student can view the marks of each course (detailed view).

### 38. Grade Change Request

- **Description:** A student can apply for Change in Grade Request after the results are announced.

### 39. Exam Retake Request

- **Description:** A student's request to retake any exam is approved by the respective HOD
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## 3. Class Diagram Image



## 2.5. Graduation

- Attribute: `graduationMonth`
- Description: Represents the month in which a student graduates.

## 2.6. Job

- Attribute: `startingDate`
- Description: Represents the starting date of a job.

## 2.7. Student

- Attributes: Various attributes representing student information.
- Properties: Various properties representing relationships with other classes.
- Constraints:
  - **Constraint 37:** Ensures that all courses in a student's transcript have marks recorded.
  - **Constraint 35:** Ensures that all courses in a student's transcript have attendance records.
  - **Constraint 34:** Ensures that a student receiving a scholarship maintains a CGPA above a specified threshold.
  - **Constraint 30:** Defines the repayment period for a loan based on graduation.
  - **Constraint 29:** Defines the start of the loan repayment period based on graduation and job starting date.
  - **Constraint 28:** Discontinues a student's loan if their CGPA falls below a minimum threshold.
  - **Constraint 24:** Allows a student to give an exam if fees are paid or approved as a fee defaulter.
  - **Constraint 1:** Ensures that a student can view all courses offered by the university.
  - **Constraint 4:** Limits the number of registered courses based on the type of degree.
  - **Constraint 8:** Ensures that dropped courses are not included in the transcript.



- **Constraint 11:** Prohibits a student under warning from repeating low-grade courses.
- **Constraint 9:** Calculates the CGPA based on the student's transcript.
- **Constraint 14:** Ensures that warnings have meaningful status.
- **Constraint 15 and 18:** Issues warnings to students with a CGPA below the minimum threshold.
- **Constraint 17:** Updates the warning count based on finished semesters.
- **Constraint 20:** Ensures that fee details are available for all semesters.

## 2.8. DegreeProgram

- Attributes: `name`, `type`, `warningCount`, `minCGPA`, `maxTime`, `onWarning`
- Properties: `coreCourses`, `electiveCourses`
- Description: Represents an academic degree program.
- Constraints:
  - **Constraint 3:** Ensures that all core courses for a degree program are taken by students.

## 2.9. Transcript

- Properties: `semesters`, `displayedCourses`
- Description: Represents a student's academic transcript.
- Constraints:
  - **Constraint 6:** Ensures that withdrawn courses are marked with a grade of 'W'.
  - **Constraint 10:** Tracks the number of attempts for each course.
  - **Constraint 12:** Prohibits repeating a course without passing or indicating a desire to repeat.
  - **Constraint 13:** Indicates repeated courses on the transcript.

## 2.10. Semester

- Attributes: Various attributes representing semester information.
- Properties: `enrolledCourses`, `offeredCourses`, `fee`

- Description: Represents an academic semester.
- Constraints:
  - **Constraint 2:** Ensures that semester names are valid.
  - **Constraint 21:** Defines the due date for semester fees.

## 2.11. Department

- Attributes: `name` , `HOD`
- Properties: `offeredCourses`
- Description: Represents an academic department.
- Operations: Various operations related to departmental functions.

## 2.12. Marks

- Attributes: Various attributes representing marks for different assessments.
- Description: Represents the assessment marks for a course.

## 2.13. Date

- Attributes: `year` , `month` , `day`
- Description: Represents a date.

## 2.14. Course

- Attributes: Various attributes representing course information.
- Properties: `attendance` , `semester` , `studiedBy` , `marks`
- Description: Represents an academic course.
- Constraints:
  - **Constraint 38 and 39:** Define preconditions for requesting grade changes and course retakes.
  - **Constraint 16:** Allows a student to register for a course if certain conditions are met.
  - **Constraint 7:** Defines preconditions for dropping a course.
  - **Constraint 5:** Defines preconditions for withdrawing from a course.

## 2.15. Attendance

- Attributes: `numLectures` , `attendancePercentage`
- Description: Represents attendance details for a course.

## 2.16. University

- Attributes: `name` , `ranking`
- Description: Represents a university.

## 2.17. Campus

- Attributes: `location`
- Properties: `meritList` , `studentList` , `departmentList`
- Description: Represents a university campus.
- Constraints:
  - **Constraint 32 and 33:** Ensures scholarship for top-performing students.
  - **Constraint 18:** Limits student admissions based on warnings.
  - **Constraint 19:** Cancels admissions after the maximum duration.

## 2.18. MeritList

- Property: `positionHolders`
- Description: Represents a merit list of students.

## 2.19. PositionHolder

- Attribute: `paper`
- Description: Represents a position holder in a merit list.

## 2.20. Loan

- Attributes: Various attributes representing loan details.
- Description: Represents a financial loan for students.
- Constraints:
  - **Constraint 25:** Defines a precondition for applying for a loan.
  - **Constraint 26:** Ensures loans are renewed every semester.

- **Constraint 27:** Limits loan assistance to fees.

## 2.21. Scholarship

- **Attributes:** Various attributes representing scholarship details.
- **Description:** Represents a scholarship awarded to students.

## 2.22. Fee

- **Attributes:** Various attributes representing fee details.
- **Description:** Represents a fee charged to students.
- **Constraints:**
  - **Constraint 22:** Ensures a specific payment method for fees.
  - **Constraint 23:** Defines refundability based on fee type.

## 2.23. Enums

- FeeType, Grade, CourseStatus, CourseImportance, Paper, Type
  - **Description:** Enumerations representing various types and statuses used in the model.
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# 3. Enumerations

## 3.1. FeeType

- **Description:** Represents the types of fees charged to students.
- **Values:**
  - **Normal:** Regular academic fees.
  - **Security:** Security or caution money fees.
- **Usage:** This enumeration categorizes fees within the system, distinguishing between regular academic fees and security fees.

## 3.2. Grade

- **Description:** Represents the grades assigned to students for courses.

- **Values:**
  - **A, B, C, D, E, F:** Represent standard letter grades.
  - **W:** Indicates withdrawal from a course.
- **Usage:** Used to assess and record student performance in courses, facilitating academic evaluation and transcript generation.

### 3.3. CourseStatus

- **Description:** Represents the status of a course for a student.
- **Values:**
  - **Passed:** Course completed successfully.
  - **Failed:** Course not completed satisfactorily.
  - **Withdrawn:** Course withdrawn before completion.
  - **Dropped:** Course dropped after registration.
  - **Repeated:** Course repeated due to failure or choice.
- **Usage:** Tracks the progress of students in individual courses, informing academic decisions and transcript generation.

### 3.4. CourseImportance

- **Description:** Indicates the importance or category of a course within a degree program.
- **Values:**
  - **Elective:** Optional courses within a program.
  - **Core:** Mandatory courses integral to a program's curriculum.
- **Usage:** Helps organize and prioritize courses within a degree program, guiding students in fulfilling degree requirements.

### 3.5. Paper

- **Description:** Represents the paper or examination board associated with a position holder in a merit list.
- **Values:**
  - **Board:** Examination conducted by a central board or authority.

- **NU:** Examination conducted by the university.
- **Usage:** Identifies the examination board responsible for assessing and evaluating a student's academic performance.

### 3.6. Type

- **Description:** Indicates the type or level of an academic degree program.
  - **Values:**
    - **MS:** Master's degree program.
    - **BS:** Bachelor's degree program.
  - **Usage:** Distinguishes between different levels of academic programs, aiding in program categorization and student management.
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