UNIVERSITY RANKING MODEL

TEAM MEMBERS

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I. INTRODUCTION

A university is a medium where a student can learn and develop new skills. Designing a course material that is beneficial to students and relevant to the industry trend is the need of the hour. Additionally, the professor teaching the course material, the students' academic progress, the students background are all factors that can help to determine the performance of a student and the university. Our system tracks the performance of a student right from enrollment to the point where a student completes a period of 5 of years by working in the industry.

II. PROBLEM

-To use software engineering techniques to improve the quality of education anywhere and hold people accountable for improving the quality of life through education, learning to learn, and feedback.
-To study ways to create a performance measurement solution to enable universities to measure the quality of the education they deliver to their students over a 5-year period
-To track the jobs and promotions graduates get over time and assign rankings accordingly.
-To track the connection of courses and their relevance to graduates' growth.
-To design a dashboard that enables college and university administrators to compare the performance of their academic units
-To define a ranking system for students to decide where they want to go for their studies.

III. SOLUTION

Our solution is a culmination of feedback received from students, employers, students' academic performance and student's feedback based on work experience. This feedback will help us identify the relevance of the courses in the current times, the performance of the professors, and the success of a particular department in the university thus determining the success of a university over a period of time.

Students are often at wits end while selecting a particular university after high school. Our proposed solution would help a student make an informed decision about which major to choose from the university based on the performance of the department. Additionally, it will make a university understand its current shortcomings and help to rectify the same. Thus, enabling to build a sustainable community that is favorable to both a student and the university.

The mock UI will be a prototype for data entry and retrieval of students, faculties, courses, university departments and employers' data. The dashboard UI will represent the expected trend of these components over a 5-year period.

IV.   ASSUMPTIONS

The feedback provided by students and employers will be unbiased. An approach of mapping the words 'good', 'excellent', 'average' and 'poor' to a quantitative number will determine the success of a course and a professor. Additionally, the mapping of a student's academic growth and students' professional growth to a quantitative number will also determine the success of a department which connects to the college and finally measures the performance of the university as a whole.
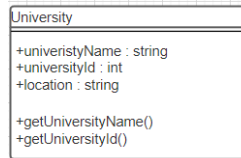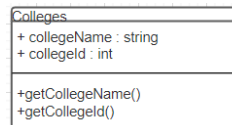
V.   CLASS DIAGRAM
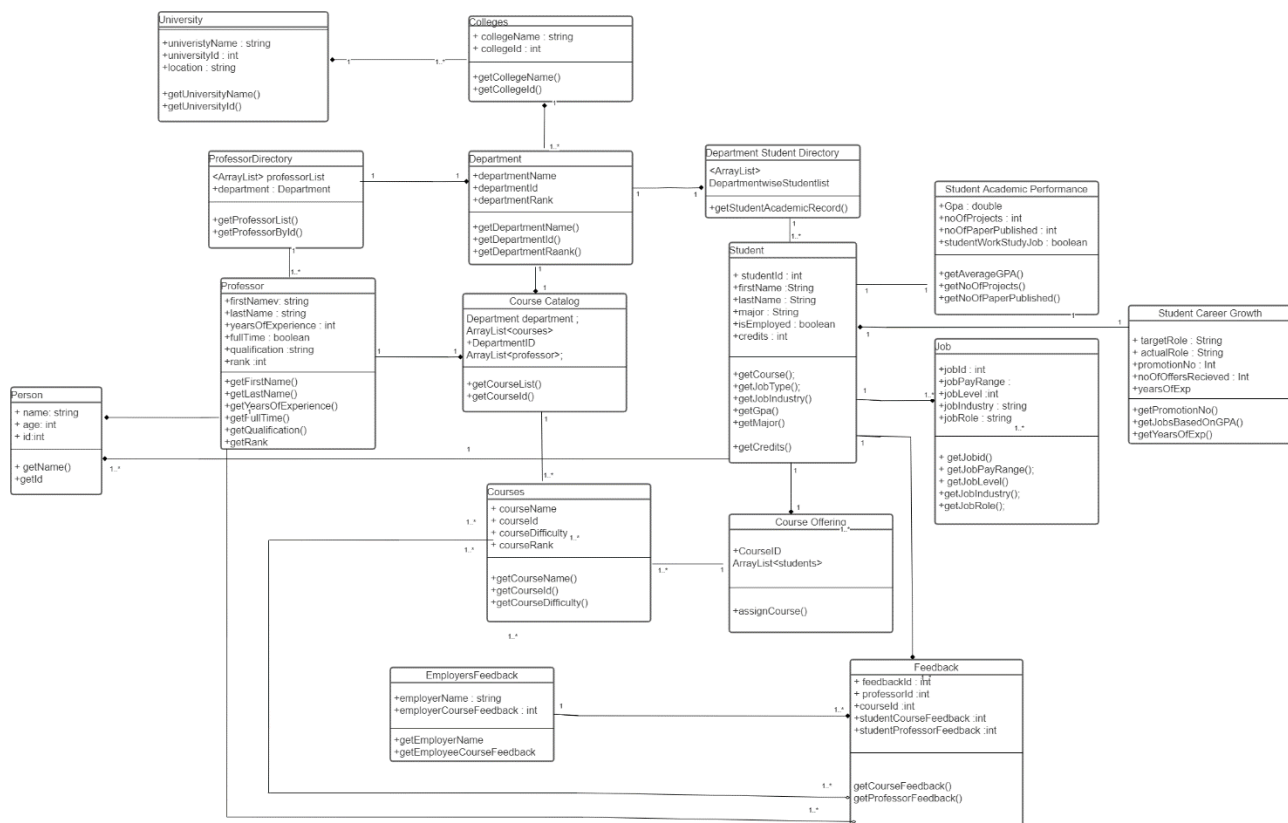
1.1 Class diagram of University Model

VI. MODEL COMPONENTS

- **University:** It gives the details of the university such as the name, university id, location.
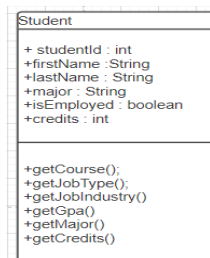
```
University
+univeristyName : string
+universityId : int
+location : string

+getUniversityName()
+getUniversityId()
```

- **Colleges:** It denotes the list of colleges available in a particular university

```
Colleges
+ collegeName : string
+ collegeId : int

+getCollegeName()
+getCollegeId()
```
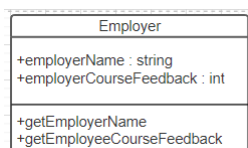
- **Person:** It is a parent class for a student and professor at the university. It holds all the core information that makes a student or professor unique.

```
Person
+ name: string
+ age: int
+ id:int

+ getName()
+getId
```
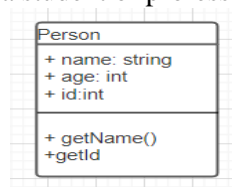
- **Student:** It includes all the information pertaining to a particular student such as the students major, department, employment details and the credits the student has taken

```
Student
+ studentId : int
+firstName :String
+lastName : String
+major : String
+isEmployed : boolean
+credits : int

+getCourse();
+getJobType();
+getJobIndustry()
+getGpa()
+getMajor()
+getCredits()
```

- **Employer:** It tracks the Employer feedback for the course whenever a student is done with the Co-op or internship with the Organization based on the performance or quality of work

```
Employer
+employerName : string
+employerCourseFeedback : int

+getEmployerName
+getEmployeeCourseFeedback
```

- **Professor:** It contains the details of the professor such as his personal details, years of experience, his qualification and the rank given to him by students over a period of years.

Professor
+firstNamev: string
+lastName : string
+yearsOfExperience : int
+fullTime : boolean
+qualification :string
+rank :int

+getFirstName()
+getLastName()
+getYearsOfExperience()
+getFullTime()
+getQualification()
+getRank

- **Course:** It describes the course attributes such as name, course id, course difficulty and course rank

Courses
+ courseName
+ courseId
+ courseDifficulty
+ courseRank

+getCourseName()
+getCourseId()
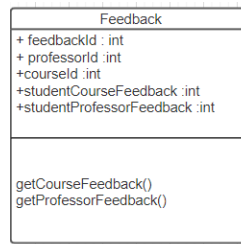+getCourseDifficulty()

- **Course Catalogue:** The Course catalogue maps which course belong to which Departments in the form of an array list of courses

Course Catalog

Department department ;
ArrayList<courses>
+DepartmentID

+getCourseList()
+getCourseId()

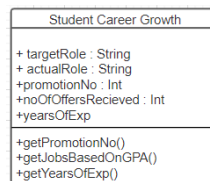- **Job:** It describes the job attributes of a student or alumni such as the jobId, the pay-range, job level, industry and job role.

Job
+jobId : int
+jobPayRange :
+jobLevel :int
+jobIndustry : string
+jobRole : string

+ getJobid()
+ getJobPayRange();
+ getJobLevel()
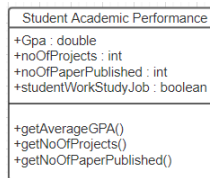+getJobIndustry();
+getJobRole();

- **Feedback:** It denotes the feedback given by the student, alumni, and employer for the courses and for the professors

```
                    Feedback
        + feedbackId : int
        + professorId :int
        +courseId :int
        +studentCourseFeedback :int
        +studentProfessorFeedback :int


        getCourseFeedback()
        getProfessorFeedback()
```
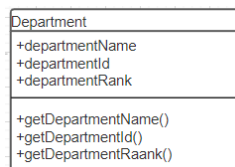
- **Student Performance:** It tell us about the performance of the student after graduation, checking if he reached his target role, his promotion details, the no of offers received and years of experience prior to graduate studies

```
                Student Career Growth

        + targetRole : String
        + actualRole : String
        +promotionNo : Int
        +noOfOffersRecieved : Int
        +yearsOfExp

        +getPromotionNo()
        +getJobsBasedOnGPA()
        +getYearsOfExp()
```

- **Student Academic Growth** : It tells us about the academic performance of a student like the GPA, no of projects, no of papers published and if the student has a work study job on campus

```
            Student Academic Performance

        +Gpa : double
        +noOfProjects : int
        +noOfPaperPublished : int
        +studentWorkStudyJob : boolean


        +getAverageGPA()
        +getNoOfProjects()
        +getNoOfPaperPublished()
```

- **Department :** It describes the different departments of a particular college and their rank based on feedback

```
        Department

        +departmentName
        +departmentId
        +departmentRank

        +getDepartmentName()
        +getDepartmentId()
        +getDepartmentRaank()
```

- **Department Student Category**: It gives the list of students based on the department

```
            Department Student Directory

        <ArrayList>DepartmentWiseStudent


        +getStudentAcademicRecord()
```
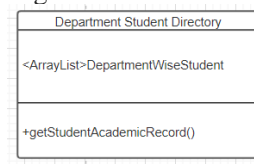
- **Course Offering**: It describes the different course that are offered to a student of a particular department.

```
                Course Offering


        +CourseID
        ArrayList<students>


        +assignCourse()
```
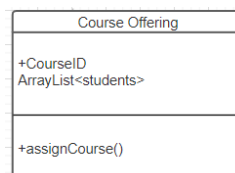
VII.   SEQUENCE DIAGRAM
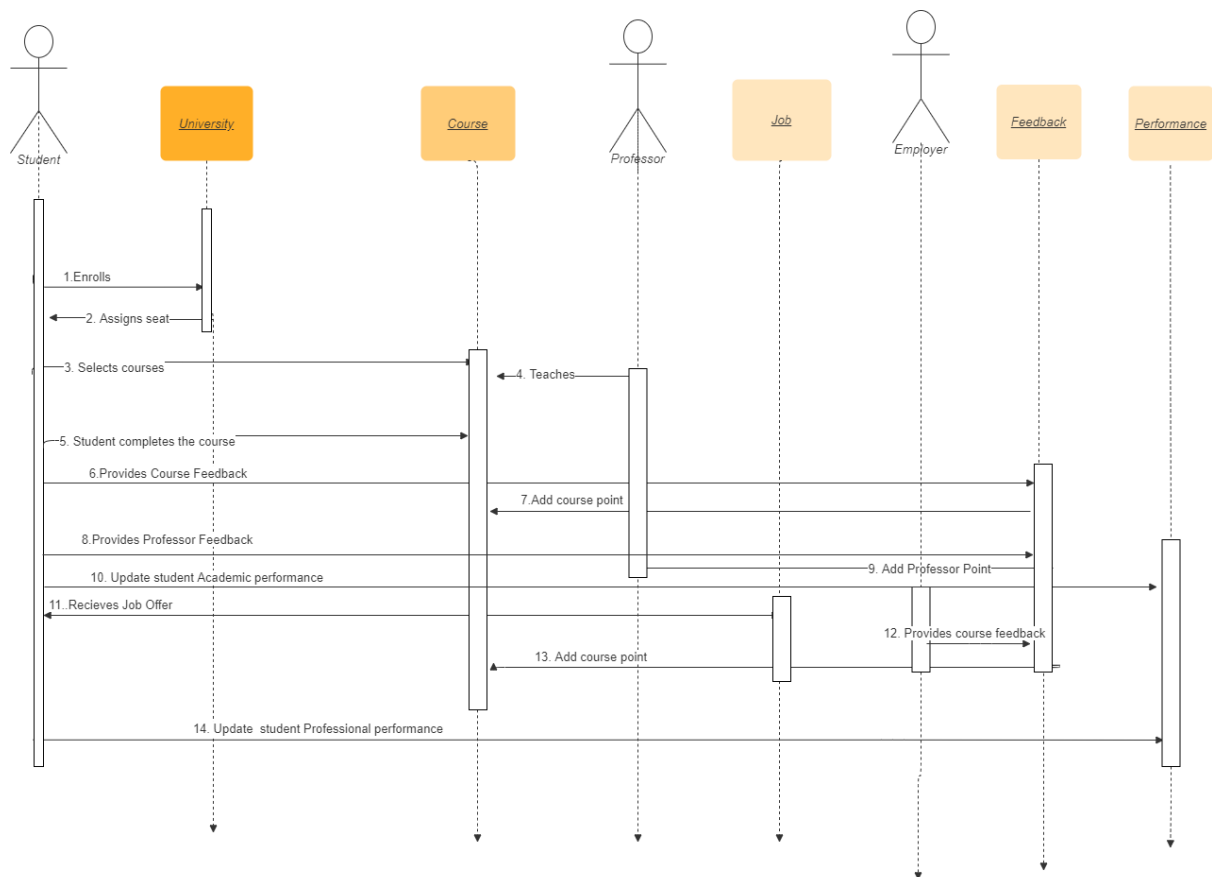
1.2 Sequence Diagram for Feedback Mechanism and Student Academic and
Professional Growth Tracking Mechanism

VIII.   PERFORMANCE CALCULATION

University performance: The university performance is for students to rank the university
which is equivalent to the Department Performance. The performance is calculated based on
certain using two methods i.e., the **Feedback Mechanism** & **Tracking Mechanism.**

Department Net Score	Rating
0-10	Bad
10-20	Poor
20-30	Average
30-40	Good
40+	Excellent

1.   Feedback Mechanism: -

Rating Criteria: The rates will be provided by the following:-

Student → Professor (Student will rate a professor at the end of the semester)

Student → Course (Student will rate a course at the end of the semester & co-op)

Employer → Course (Employer will rate a course based on students' co-op)

Course → Department (Course points collected for each course & professor will flow to each department and determine the performance of the department)

Department →College (Course points collected for each department will flow to each college and determine the performance of the department)

College →University (Course points collected for each college will flow to the University and determine the performance of the University on the whole. This will also enable to students to make an informed decision to choose a university based on the college performance)

Rate Name	Point
Excellent	4
Good	3
Average	2
Poor	1

2.Tracking Mechanism

Student Academic Growth Tracking Factors :-

1. **Student GPA**

GPA	Point
2.5-3.0	1
3.0-3.4	2
3.5-3.7	3
3.7+	4

2. **Student Research Paper published**

No of Papers	Point
1	1
2+	2

3. **Student has done co-op**

Value	Point
Yes	3
No	0

4. **Student received on Campus Job (Related to major)**

Value	Point
Yes	3
No	0

5. Student Academic Projects

No of Projects	Point
1	1
2+	2

Student Professional Growth Tracking Factors :-

1. Student Job Pay Range

Pay	Point
50k – 60k	10
60k – 80k	20
80k – 90k	30
90k +	50

2. Student Promotions

No of Papers	Point
1	10
2+	30

3. Student has received a employment

Value	Point
Yes	30
No	0

4. Student received job related to major

Value	Point
Yes	30
No	0

5. Student Academic Projects

No of Projects	Point
1	10
2+	20

Example:
Student – John Smith
Department – Information Systems
Taught by Faculty – A,B,C,D (All belong to Multidisciplinary department)
College – College of Engineering

Academic Growth – Calculated based on academic growth factors

FACTOR	VALUE	POINT
GPA	3.78	4
NO OF PAPER	2	2
CO-OP	YES	3
WORK STUDY	YES	3
PROJECT	5	2
Total		14

Profession Growth – Calculated based on Professional growth factors

FACTOR	VALUE	POINT
JOB	100K	50
NO OF PAPERS	3	30
EMPLOYED	YES	30
JOB RELEVANT	YES	30
NO OF PROJECTS	5	20
TOTAL		160

Student Points – 160 + 14 = 174
Feedback given by Employer : - 'Excellent' → 4
Student Feedback for Courses: 8 Course from Information Systems → 4*4(Excellent) + 3*4(Good) = 28
Student Professor feedback = (ABCD) =(4+4+4+3+3+3+4+4)=29
Student Course Feedback = (C1 +C2 +C3+C4+C5+C6+C7) =(4+4+4+4+4+3+3+3) = 29

Final Department Net Score = 264/5 = 52.8
This department score moves upward toward the college that the department belongs to and thus we can understand the performance of each respective department and a college on the whole eventually.

UI Prototype:

This is how the system will look when the admin first launches the University Performance Dashboard System.
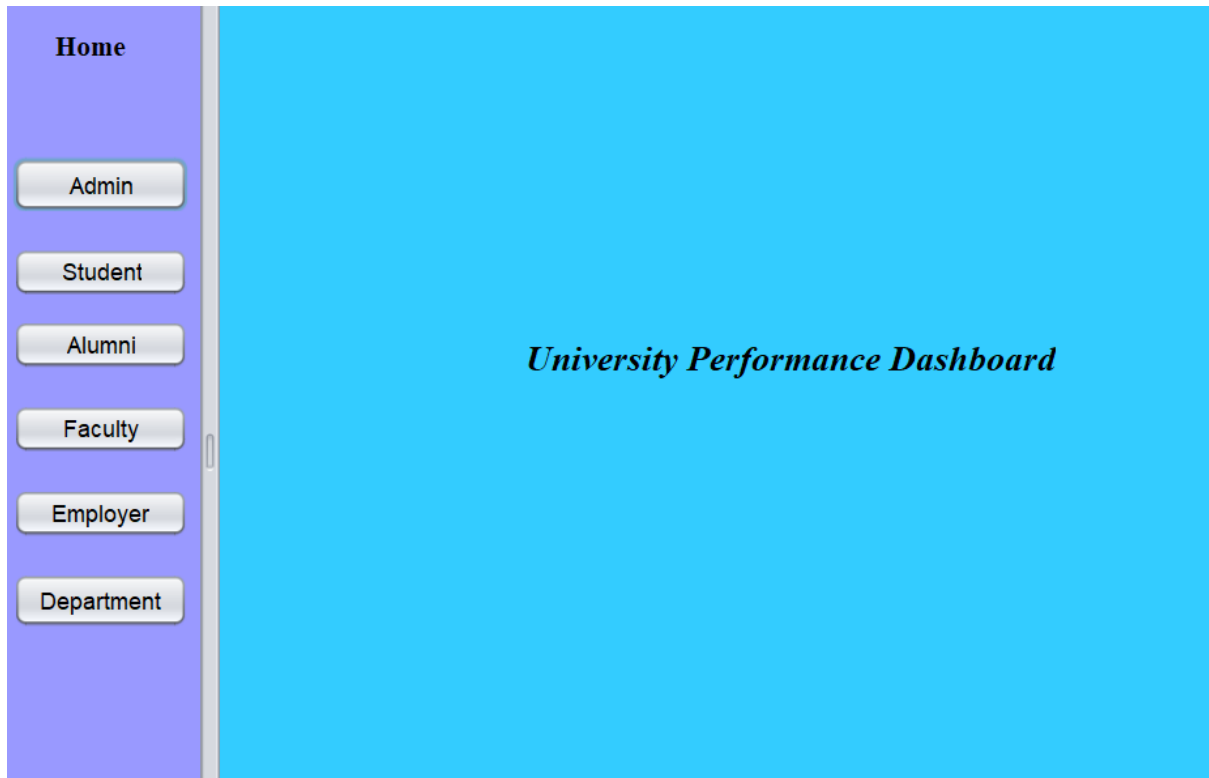
The UI can be accessed only by the admin who is responsible for handling the system right entering the student and faculty feedback to generating the university performance metrics.
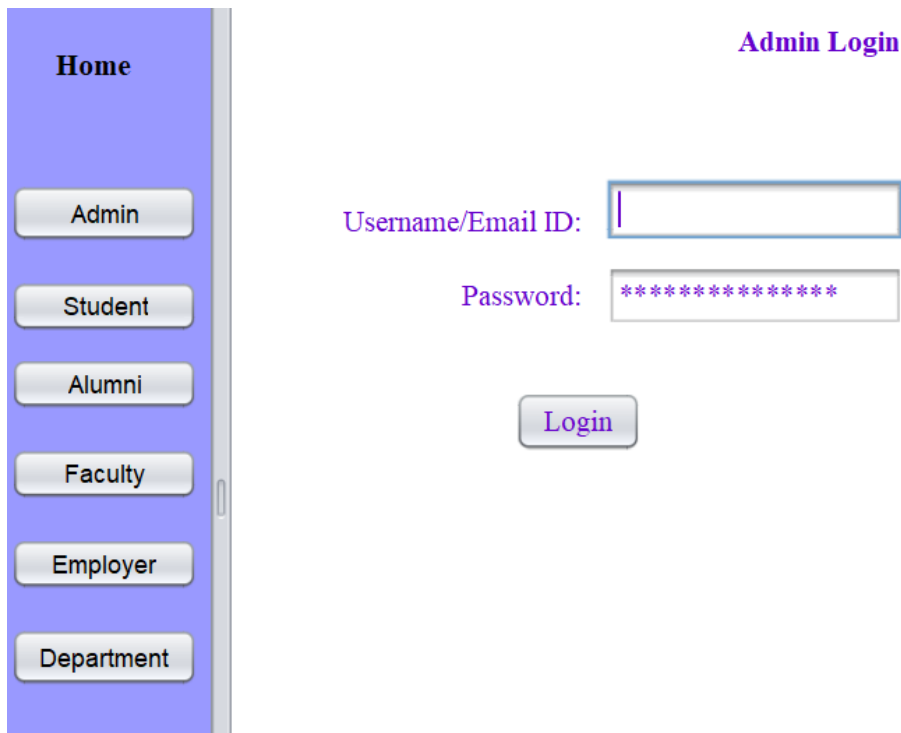
The student portal will record the general academic details of the student and the relevant course feedback based on the Performance metrics calculation rules.

Home

Admin

Student

Alumni

Faculty

Employer

Department

Student Portal

Student ID: [ ]   Course 1: [ ]

Student Name: [ ]   Course 2: [ ]

Student Major: [ ]   Course 3: [ ]

Student GPA: [ ]   Co-ops received: [1 ▼]

Student Feedback

Course 1: [Excellent ▼]   Professor 1: [Excellent ▼]

Course 2: [Excellent ▼]   Professor 2: [Excellent ▼]

Course 3: [Excellent ▼]   Professor 3: [Excellent ▼]

[Submit]

The alumni portal tracks the information about the career growth of the alumni students and accordingly, the course rank gets updated based on the career track performance.

Home	**Alumni Portal**
Admin	Student ID: [ ] Company: [ ]
Student	Student Name: [ ] Designation: [ ]
Alumni	Student Major: [ ] Career Path: [Data Science ▼]
Faculty	Student GPA: [ ] No. of Promotions: [1 ▼]
Employer	Offered CTC: [ ]
Department	Submit
	Search Alumni Name: [ ] Search

Alumni Name	Alumni Major	Organization	Designation

The faculty portal is for keeping a track of the faculty performance, it automatically populates the faculty rank after the student enters the faculty feedback details.

Home	**Faculty Dashboard**
Admin	Faculty ID: [ ] Faculty Rank Course 1: [ ]
Student	Faculty Name: [ ] Faculty Rank Course 2: [ ]
Alumni	Course Taken 1: [ ]
Faculty	Course Taken 2: [ ]
Employer	Save
Department	Search Faculty Name: [ ] Search

Faculty Name	Years of Experience	Qualification	Rank based on feedback

The Employer portal is to track the feedback provided by the employer, if the course skillset was relevant for the job role assigned to the student and skill recommendations to the coursework for future roles and responsibilities.

| Home |
| Admin |
| Student |
| Alumni |
| Faculty |
| Employer |
| Department |

Employer Feedback

Employer Name: [   ]   Organization: [   ]

Student ID: [   ]   Student Name: [   ]

Student Assigned Role : [   ]

Job Type: ○ Co-op   ○ Summer Internship   ○ Full Time

Employee Course Feedback: [Excellent ▼]

Skills Recommended: [   ]

[Submit]

The Department portal tracks the performance of the Departments based on the student's career and academic growth, faculty and course feedback. The Department rank is a derived attribute which gets populated automatically when the course rank for that department gets updated. It also keeps a track of the total jobs which were secured in each department. The Generate Performance Metrics PDF button generate a PDF which is a dashboard highlight the key performance metrics.

| Home |
| Admin |
| Student |
| Alumni |
| Faculty |
| Employer |
| Department |

Department Portal

Department Name: [   ]   Major Name: [   ]

Course Name: [   ]   Course Rank: [   ]

[Submit]

Based on the performance of students/alumni and overall course feedback, below are the departments ranks

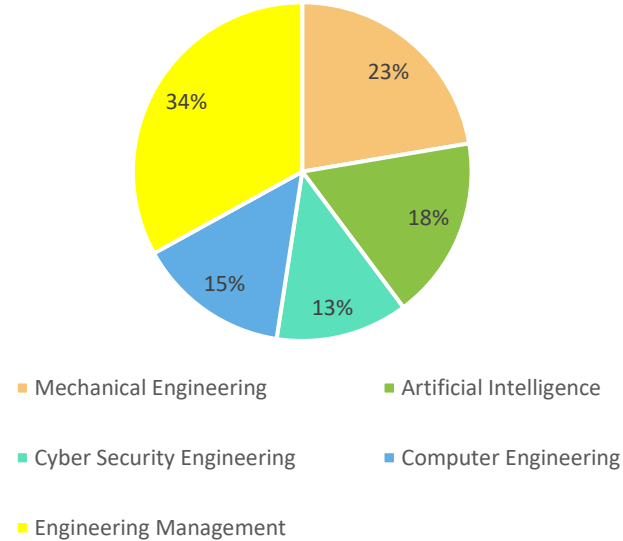| Department ID	Department Name	Highest GPA	Total jobs	Overall Dept Rank

[Generate Performance Metrics PDF]

University Performance Metrics 2020-21

Highest Pay Range of Full Time Jobs

100-120k USD
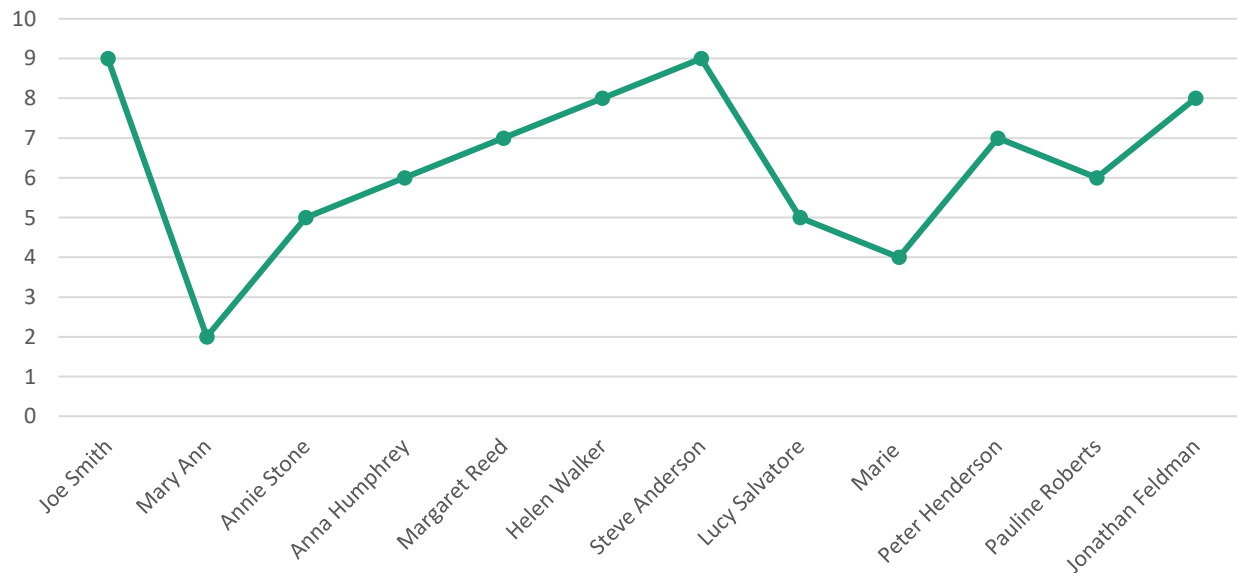
Top 5 Majors with highest number of jobs

- Mechanical Engineering — 23%
- Artificial Intelligence — 18%
- Cyber Security Engineering — 13%
- Computer Engineering — 15%
- Engineering Management — 34%

Highest average Pay scale as per Major

- Software Engineering
- Engineering Management
- Research and Business Analytics
- Cyber Security Engineering
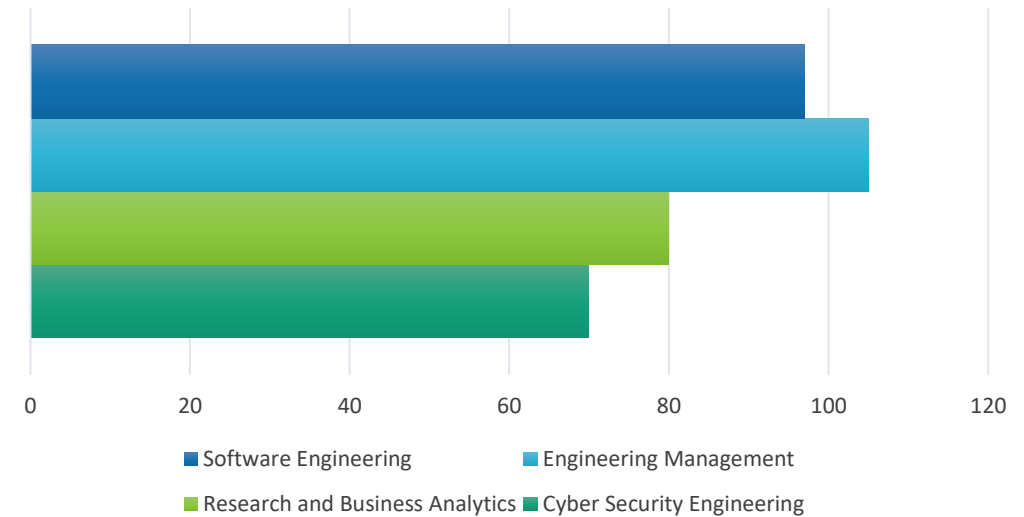
Rank of Faculty based on Student Feedback

Joe Smith, Mary Ann, Annie Stone, Anna Humphrey, Margaret Reed, Helen Walker, Steve Anderson, Lucy Salvatore, Marie, Peter Henderson, Pauline Roberts, Jonathan Feldman

Rank of Courses as per Student feedback

Big Data Analytics, Web Design UX/UI, Database Management, Network Security, Cloud Computing