### REQUIREMENTS ENGINEERING

### Requirements Elicitation

### Requirements Specification

### Requirements Validation

**3.1 REQUIREMENTS ELICITATION - DISCOVERY:**

3.1.1 DISCOVERING STAKEHOLDERS:

First, the team recognised the primary stakeholders of the system who are all the faculties and students. Then the other stakeholders including the head of the department, Department of Mathematics.

3.1.2 DISCOVERING INTERVIEW QUESTIONS:

Second, gathered questions to ask the stakeholders. The fixed questions for the faculties include what is the additional feature you expect from the system? Would you like to give any other suggestions you would like to give to the core functionalities we provided? What is the procedure you have followed to date in the manual attendance process? What are all the things the manual attendance would include? Etc… The fixed questions for the students included What is the problem you face in the attendance system in your class? What feature do you expect from the application?

3.1.3 DISCOVERING REQUIREMENTS THROUGH INTERVIEW:

Then, the team first approached each faculty of the Department of Mathematics they could meet to take on the interview. The interview initially began as a closed-interview with fixed questions so that the ideas and suggestions for the primary functionality could be received followed by an open interview since they might have ideas out of the box we have. Also, the open interview is led to find the existing attendance system and its process. It also revealed the whole of the attendance sheet they maintain to date. The team noted down the response and the requirements they suggested.

Then, the team approached the students of the Department of Mathematics in person to take on the interview. The interview began with the questions the team had and then asked their general suggestions and views on the system.

3.1.4 DISCOVERING REQUIREMENTS THROUGH SURVEY:

The team also conducted a survey through Google form with students of other departments of the college to expand their views and ideas on the attendance system. This revealed the attendance system that has been followed in other departments of the college and received a reason for the suggestions and led to new features of the system. Then the survey report was recorded.

3.1.5 DISCOVERY OF REQUIREMENTS THROUGH EXISTING APPLICATIONS:

Since there already exists a web-based application of this system, the team also approached the developer of the web version of this system. Then gathered the information they could from the developer and got some suggestions on the tech stack.

There exists a number of similar systems in action, the team has also led some research on the websites about the existing systems and gathered some ideas on the requirements they hold and also new requirements.

3.1.6 CONCLUSION:

Finally, the team recorded all the responses from the stakeholders. These suggestions and ideas are analysed and documented. Then the list is classified into functional requirements and non-functional requirements as listed below. Then Prioritized the functional requirements as the order of the list. These requirements were developed into system requiremnents.

### 3.2 USER REQUIREMENTS DEFINITION:

1) Login: As a user, I want to log in to benefit from the use of the application.

2) Logout: As a user, I want to log out to exit the use of the application.

3) Registration: The user should Sign up to benefit from the use of the application.

4) Forgot password: As an authorized user, I want a feature to change the existing password if required.

5) List classes: Our project application can generate a page that gives information about the classes a faculty is teaching to bring the pages related to that class.

6) Take attendance: This feature provides the main requirements of the user to take and display attendance of each course.

7) Overall attendance(student): The attendance manager shall generate a view attendance page displaying the attendance percentage for the student secured in each subject.

8) Overall attendance(Faculty): As an authorized faculty, I want to view and edit the cumulative attendance of every student in their respective course.

9) Attendance list(Faculty): As a logged-in faculty after opting for a class, I want to view every student's attendance data for that opted class along with an edit option of the particular dates provided if not asked for attendance of a particular student and, if so attendance of the particular student shall be provided with the modifying option.

10) Take form: The attendance Manager shall generate the absence intimation form through which students intimate about their absence with reason before the absence date to the faculty.

11) View forms: The View Forms Page displays the absent intimation forms for faculty sent by the Students.

12) Reschedule class: As a logged-in faculty, I shall be able to reschedule the class if I need.

13) Attendance list(student): As an authorized student, I want to view the attendance list displaying the attendance status of each date and if required, on the given range of dates.

14) Settings(Faculty): The Faculty Settings shall provide options for managing attendance-related preferences, including the ability to set a freeze period for attendance, receive notifications, select a theme for the app interface, should be able to change their password.

15) Settings(student): The Student Settings shall provide options for switching notifications when their attendance falls between 65 to 75 per cent, and select a theme for the app interface.

**NEGOTIATED REQUIREMENTS:**

16) Manage faculties: The system should allow the admin to efficiently manage faculty profiles and provide access to a faculty list.

17) Manage courses: As a logged-in admin, I want the system should allow me to efficiently manage courses and provide access to a course list.

18) Manage students: Administrators should be able to register new students by entering their personal information, contact details, and enrolment data.

19) View attendance: First, the admin is provided with information on the different courses, each with a different semester that the department provides and each class shows the current percentage of attendance of the students.

**3.3 SYSTEM REQUIREMENTS SPECIFICATION:**

1) FUNCTIONAL REQUIREMENTS

1.1) SHARED

1.1.1) LOGIN

1.1.1.1) It is mandatory to Sign up first before you log in.

1.1.1.2) Login contains the User ID and password.

1.1.1.3) If the user is faculty, then the User ID should contain 6 digits.

1.1.1.4) If the user is a student, then the User ID should contain 10 digits with the first 4 digits of the year of joining, the next 3 digits of the program code and the last 4 digits of your Roll number.

1.1.1.5) Password should contain at least 8 characters but at most 14.

1.1.1.6) Password should contain at least one uppercase letter, Lowercase letter, Number and a Special character.

1.1.1.7) Passwords are encrypted by default, you can see when needed by using the near icon.

1.1.1.8) when you click the Login button, if all the above condition is satisfied, then your login is successful.

1.1.1.9) If not, then it will pop an error message showing the “Invalid User ID or Password”.

1.1.2) LOGOUT

1.1.2.1) Once a user asks for log out, a confirmation box appears to ensure that the user needs to log out of the application intentionally.

1.1.2.2) Once logged out, the application is in general and anyone can log in again to benefit from the use of the application with the authorized user ID and its appropriate password.

1.1.3) REGISTRATION

1.1.3.1) When a user needs to use the application, signing up for the application is mandatory.

1.1.3.2) Sign-up contains User ID, Email, Password.

1.1.3.3) If the user is faculty, then the User ID should contain 6 digits.

1.1.3.4) If the user is a student, then the User ID should contain 10 digits with the first 4 digits of the year of joining, the next 3 digits of the program code and the last 4 digits of your Roll number.

1.1.3.5) The user should provide a valid Email ID.

1.1.3.6) The Email ID is verified by sending the notification, that is, OTP to check whether the User’s valid ID or not.

1.1.3.7) Password should contain at least 8 characters but 14 or more is better.

1.1.3.8) Password should contain at least one Uppercase letter, Lowercase letter, Number and Special character.

1.1.3.9) Passwords are encrypted by default, you can see when needed by using the gear icon.

1.1.3.10) When you click the Sign-up button, if all the above condition is satisfied, then your account is created.

1.1.3.11) If not, then it will pop an error message showing the “Invalid register”.

1.1.4) FORGOT PASSWORD

1.1.4.1) First input the new password.

1.1.4.2) Password should contain at least 8 characters but at most 14.

1.1.4.3) Password should contain at least one uppercase letter, one lowercase letter, a number and a special character but not whitespaces.

1.1.4.4) Passwords are encrypted by default, you can see when needed by using the near icon.

1.1.4.5) You have to re-enter the password to ensure that the user sets the password consciously.

1.1.4.6) To verify the user modifies his own password, the system will send an

OTP to verify that the user has authentication and then modify the password.

1.1.4.7) The new password is also updated in the Database.

1.2) FACULTY: -

1.2.1) LIST CLASSES

1.2.1.1) At the inception of every semester, once the faculty has designated the classes he or she should be instructed in, the list of the classes will be revamped on the screen.

1.2.1.2) The data the system shall exhibit may include the course and the branch, the course name with the appropriate course code.

1.2.2) TAKE ATTENDANCE

1.2.2.1) The faculty should mention the date and hour of the class.

1.2.2.2) This page provides a summary of student’s names with their respective register number.

1.2.2.3) The default toggle button will be present; faculty can update if absent.

1.2.2.4) After taking the attendance, the faculty should submit, it so that it will be stored permanently.

1.2.2.5) Once the absence intimation form is provided, that particular student is marked absent for the mentioned dates automatically.

1.2.2.6) On the last working day of every semester, the attendance will be frozen automatically.  Then, no updating can be done by faculty.

1.2.2.7) On the last working day, the summary of the attendance will be generated and the system generate a report

1.2.3) VIEW FORMS

1.2.3.1) The View Forms Page shows the roll number, name and date of absent intimation forms sent by the students.

1.2.3.2) The fonts of the read forms are light-coloured, while the unread forms are dark-coloured.

1.2.3.3) While the user clicks on the roll number, they are taken to another page where the reason for the student's absence is shown.

1.2.4) OVERALL ATTENDANCE

1.2.4.1) This page shows the student’s name with their respective roll number.

1.2.4.2) The faculty can view the total number of hours that the particular student is present in the course.

1.2.4.3) The faculty has the ability to modify if the minimum criteria of the crisis go down.

1.2.4.4) The page will be updated as soon as the faculty modifies and submits attendance.

1.2.5) ATTENDANCE LIST:

1.2.5.1) The system shall provide two calendars to select a range of dates which are mandatory fields to be filled by the faculty.

1.2.5.2) A register number or the name of the student whose attendance data should be displayed may be provided by the faculty to make searching for a particular student's attendance data easy.

1.2.5.3) The system shall provide the attendance data in a table with absence indicated in red colour and an edit option in the last if the faculty needs to modify the attendance data of any student.

1.2.5.4) Once the faculty edited the attendance data of a student(s), the system shall automatically update the modification in the database and reflect the change wherever needs to be.

1.2.5.5) Once the modification is successful, a snack bar indicating that the modification is successful can appear and return to the Attendance List page with the modified attendance data of the same student.

1.2.6) SETTINGS

1.2.6.1) The system shall provide a user-friendly interface for faculty members to set a freeze period for attendance submission.

1.2.6.2) The system shall prevent changes to attendance records, and absence intimation form submissions during the specified freeze period.

1.2.6.3) The system shall integrate a notification mechanism to inform faculty members about submitted absence intimation forms.

1.2.6.4) Notifications about absence intimation forms shall be generated with the date when the student submits the form.

1.2.6.5) The system shall offer a selection of predefined themes for faculty members to choose from.

1.2.6.6) The system shall provide a secure password change process for faculty members.

1.2.6.7) Faculty members shall need to provide appropriate verification to change their passwords.

1.3) STUDENT: -

1.3.1) OVERALL ATTENDANCE

1.3.1.1) The system compiles the attendance data for each student and each course and calculates their respective attendance percentages.

1.3.1.2) The system shall automatically generate the attendance percentage for each student whenever there is an update.

1.3.1.3) Page includes the subject code, subject title and the attendance percentage for that course.

1.3.1.4) By the attendance criteria:

1.3.1.4.1) An attendance percentage of 75% or higher will be represented as green.

1.3.1.4.2) Attendance falling within the range of 65% to 75% will be depicted in orange, indicating the requirement for a medical certificate or the on-duty form must be submitted to permit them to take the end-semester examination.

1.3.1.4.3) Attendance percentage below 65% will trigger a change to the colour red, indicating that the student will not be eligible to write the end-semester examination.

1.3.1.5) Student will get an attendance alert mail if their attendance for any subject falls between 65% and 75%.

1.3.1.6) Students can only view their attendance percentage. They don't have permission to edit.

1.3.2) TAKE FORM

1.3.2.1) Absence intimation form shall be forwarded automatically to the faculties to whom the student wants to intimate.

1.3.2.2) Students should choose the appropriate course code so that the system will send it to the faculty who is the instructor of the particular course.

1.3.2.3) The page includes the reason for absence, date of absence, and number of hours of absence.

1.3.2.4) Students should receive a confirmation or acknowledgement once their absence notification is successfully submitted and confirmed by the faculty.

1.3.2.5) Students should be able to view a history of their previously submitted absence intimations.

1.3.2.6) If the percentage of attendance of a particular course of the student is below 75% the absence intimation form submitted by the student becomes invalid.

1.3.3) SETTINGS

1.3.3.1) The system shall generate notifications for students when their attendance falls between 65% to 75%.

1.3.3.2) The system shall prevent students from submitting absence intimation forms during the attendance freeze period.

1.3.3.3) The system shall provide appropriate notifications to students about the freeze period.

1.3.3.4) The system shall offer predefined themes for students to choose from for the app interface.

1.3.3.5) The system shall implement a secure process for students to change their passwords.

1.3.3.6) The system shall implement a secure process for students to change their passwords.

1.3.4) ATTENDANCE LIST:

1.3.4.1) The system shall provide two calendars to select a range of dates which are mandatory fields to be filled

1.3.4.2) The subject code or the name of the subject may be provided by the student to make searching for the attendance data easy.

1.3.4.3) The system shall provide the attendance data in a table with absence indicated in red colour.

1.3.4.4) Once the faculty edited the attendance data of a student(s), the system shall automatically update the modification in the database and reflect the change wherever needs to be.

1.3.5) RESCHEDULE CLASS

1.3.5.1) The system shall provide a list of classes of the current date, each class associated with a rescheduled option.

1.3.5.2) The system may also provide a reschedule option globally with a calendar option to provide a date as input on which the faculty needs to reschedule the class.

1.3.5.3) When the faculty provides a particular date in the global option, the system shall display the list of classes on that particular date with a rescheduling option.

1.3.5.4) When the faculty opts for rescheduling a particular class, the system may pop up a dialogue box to provide inputs.

1.3.5.5) The inputs of the rescheduling may include the date and hour to which the class is rescheduled.

1.3.5.6) The system shall check with timetable and details of other rescheduled classes and reschedule the class if the faculty is free during the hour or inform the faculty that the hour is blocked for other classes.

1.3.5.7) Once the faculty rescheduled a class, the system shall send a notification to all the students who enrolled on that course through email.

1.3.5.8) The system shall also store the rescheduled class in the database and shall display it along with the regular class on that particular date.

1.3.5.9) The system shall give an option to return to display the list of classes on the current date.

1.4) ADMIN: -

1.4.1) MANAGE FACULTIES

1.4.1.1) The system shall display a list of registered faculty members for admin access.

1.4.1.2) Faculty profiles shall consist of name, contact information, department, and research areas.

1.4.1.3) The system shall provide a user interface that allows the admin to add, edit, and remove faculty profiles.

1.4.2) MANAGE COURSE

1.4.1.1) The system shall display a list of courses with the details associated with it.

1.4.1.2) The course list shall consist of course name, course code, semester which enjoys that course and their total credits.

1.4.1.3) The system shall provide a user interface that allows the admin to add, edit, and remove the courses.

1.4.2) MANAGE STUDENTS

1.4.2.1) Administrators should be able to easily enrol new students into the system by entering their personal information, contact details, and enrollment dates.

1.4.2.2) Administrators should be able to manage course enrolments, including selecting courses, dropping courses, and viewing course schedules.

1.4.2.3) Administrators should be able to record and monitor student attendance for classes, meetings, and events.

1.4.2.4) Administrators should have the ability to view, edit, and update student records, including demographics, academic progress, attendance, and disciplinary history.

1.4.2.5) Administrators should be able to manage courses, including adding, modifying, and deleting courses, and assigning instructors.

1.4.2.6) Administrators should have the ability to send announcements, notifications, and important updates to students, instructors, and staff.

1.4.3) VIEW ATTENDANCE

1.4.3.1) The admin can view the general attendance of students.

1.4.3.2) The page displays a range of student attendance percentages from lower to higher else by register number or by the chronological order of the student's name by sort option.

1.4.3.3) The attendance of the students is updated automatically once the teacher submits the attendance of the particular hour.

1.4.3.4) By the attendance criteria:

1.4.3.4.1) An attendance percentage of 75% or higher will be represented as green.

1.4.3.4.2) Attendance falling within the range of 65% to 75% will be depicted in orange, indicating the requirement for a medical certificate or the on-duty form must be submitted to permit them to take the end-semester examination.

1.4.3.4.3) Attendance percentage below 65% will trigger a change to the colour red, indicating that the student will not be eligible to write the end-semester examination.

**3.4 USER TO SYSTEM REQUIREMENTS:**

1) TAKE FORM:

User requirements:

The Attendance Management System shall generate the absence intimation form through which students intimate their absence with reason before the absence date to the faculty.

System requirements:

1.1) Absence intimation form shall be forwarded automatically to the faculties to whom the student wants to intimate.

1.2) Students should choose the appropriate course code so that the system will send it to the faculty who is the instructor of the particular course.

1.3) The page includes the reason for absence, date of absence, and number of hours of absence.

1.4) Students should receive a confirmation or acknowledgement once their absence notification is successfully submitted and confirmed by the faculty.

1.5) Students should be able to view a history of their previously submitted absence intimations.

1.6) If the percentage of attendance of a particular course of the student is below 75% the absence intimation form submitted by the student becomes invalid.

2) ATTENDANCE LIST:

User requirements:

As a logged-in faculty after being assigned as an instructor of a course, I want to view every student's attendance data along with an edit option of the particular dates provided if not asked for attendance of a particular student and, if so attendance of the particular student shall be provided with the modifying option.

System requirements:

2.1) The system shall provide two calendars to select a range of dates which are mandatory fields to be filled by the faculty.

2.2) A register number or the name of the student whose attendance data should be displayed may be provided by the faculty to make searching for a particular student's attendance data easy.

2.3) The system shall provide the attendance data in a table with absence indicated in red colour and an edit option in the last if the faculty needs to modify the attendance data of any student.

2.4) Once the faculty edited the attendance data of a student(s), the system shall automatically update the modification in the database and reflect the change wherever needs to be.

2.5) Once the modification is successful, a snack bar indicating that the modification is successful can appear and return to the Attendance List page with the modified attendance data of the same student.

**3.5 REQUIREMENT VALIDATION:**

3.5.1 RESCHEDULE OF CLASSES:

On submitting of system requirements specification document, a faculty, one of our primary stakeholders asked to get input on classes they take on the current date from the timetable generation team. So that the list of classes displayed to take attendance would be based on the day. Also, have a reschedule option in each class, if he wants to reschedule classes.

So the functionality of list classes would be based on the timetable of the day with a rescheduling option.

3.5.1.1 User Requirement:

As a logged-in faculty, I shall able to reschedule classes on the date I provide or the current date by default if I need to.

3.5.1.2 System Requirement:

1) The system shall provide a list of classes of the current date, each class associated with a rescheduled option.

2) The system may also provide a reschedule option globally with a calendar option to provide a date as input on which the faculty needs to reschedule the class.

3) When the faculty provides a particular date in the global option, the system shall display the list of classes on that particular date with a rescheduling option.

4) When the faculty opts for rescheduling a particular class, the system may pop up a dialogue box to provide inputs.

5) The inputs of the rescheduling may include the date and hour to which the class is rescheduled.

6) The system shall check with timetable and details of other rescheduled classes and reschedule the class if the faculty is free during the hour or inform the faculty that the hour is blocked for other classes.

7) Once the faculty rescheduled a class, the system shall send a notification to all the students who enrolled on that course through email.

8) The system shall also store the rescheduled class in the database and shall display it along with the regular class on that particular date.

9) The system shall give an option to return to display the list of classes on the current date.

3.5.2 TOGGLE SWITCH TO MARK ATTENDANCE:

Initially, we had planned to place the check box to mark the attendance by the faculty in the take attendance functionality. Since it was not appropriate and not better to at look, our neighbour teams suggested us change it to a toggle switch. So we have changed that check box to a toggle switch since it could be easier for the faculty to mark present or absent in an efficient manner and could facilitate more functions.

3.5.2.1 User requirement:

As a logged-in faculty and an instructor of a course, I shall able to mark the attendance to every class by using the toggle switch.

3.5.2.2 System requirement:

1) By default, the toggle switch should be in on mode for all the students, which indicates they are present.

2) The faculty should be able to toggle it to off mode for the absent students, which indicates they are absent.

3) When a student intimates his absence and if it is accepted by the faculty, then the toggle switch should automatically change to off mode for that particular student in that particular class.