Software Requirements Specification

for

<OCES>

Version 1.0 approved

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<UAGC 499 Capstone Class>

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Revision History

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| --- | --- | --- | --- |
| **Name** | **Date** | **Reason For Changes** | **Version** |
| John Turner | 4/12/24 | Initial Version | 1.0 |
|  |  |  |  |

# Introduction

## Purpose

This document specifies the software requirements for the Online Course Enrollment System (OCES), Version 1.0. This SRS details the functionalities and features of the system, focusing on the core functionalities for user registration, course listing, enrollment management, and waitlisting. Future versions of the system may address additional functionalities beyond the scope of this document.

## Document Conventions

This document adheres to the following conventions:

Bold text indicates key terms and functionalities.

Italic text emphasizes specific user actions or system responses.

Requirements are denoted with the prefix "REQ-" followed by a unique identifier (e.g., REQ-101).

## Intended Audience and Reading Suggestions

This SRS is intended for the following audiences:

Software Developers: This section provides detailed functional and non-functional requirements for the development of the OCES.

Project Managers: This section outlines the functionalities and features of the system to aid in project planning, resource allocation, and risk management.

Testers: This section provides a foundation for developing test cases to ensure the OCES meets the specified requirements.

It is recommended to begin by reading this introduction and then proceed to the following sections:

Part 2: Overall Description - Provides a high-level overview of the system architecture and components.

Part 3: External Interface Requirements - Details things like user interface, software, and hardware.

Part 4: System Features – Information on the features of the system.

## Product Scope

The Online Course Enrollment System (OCES) is a web-based application designed to streamline the student enrollment process for online courses offered by the institution. The system will facilitate the following functionalities:

User registration and profile management.

Online course listing with semester-specific offerings.

Course enrollment with capacity management and waitlisting.

User self-service for enrollment cancellation and waitlist management.

The OCES aims to improve the efficiency and user experience of the online course enrollment process for both students and administrators.

## References

None

# Overall Description

## Product Perspective

The Online Course Enrollment System (OCES) is a new, self-contained web application. It is not part of a larger product family and is not intended as a replacement for any existing systems. The OCES operates independently but may integrate with existing student information systems in the future (see Section 2.7 Assumptions and Dependencies).

## Product Functions

The OCES provides the following core functionalities:

* User Management:
  + User registration with account creation and profile management (REQ-101, REQ-102).
  + User login and authentication (REQ-103).
* Course Management:
  + Display of online courses offered by semester (REQ-201).
  + Management of course capacity limits (REQ-202).
* Enrollment Management:
  + User enrollment in available courses (REQ-301).
  + Waitlisting for full courses (REQ-302).
  + User self-service for enrollment cancellation (REQ-303).
  + Automatic notification of waitlisted users when a spot becomes available (REQ-304).

## User Classes and Characteristics

**Students**: The primary user class for the OCES. Students will utilize the system to register, manage profiles, browse course offerings, enroll in courses, manage waitlists, and cancel enrollments. Students are expected to have varying levels of technical expertise but will possess basic internet navigation skills.

**Administrators**: A secondary user class with limited access for system maintenance tasks. Administrators may include IT personnel responsible for user account management and system configuration. Technical expertise is required for this user class.

## Operating Environment

The OCES is a web-based application designed to be accessible through a variety of modern web browsers. The system will be tested and supported on the following popular browsers and versions at the time of release:

* Google Chrome (latest stable version)
* Mozilla Firefox (latest stable version)
* Microsoft Edge (latest stable version)
* Apple Safari (latest stable version)

## Design and Implementation Constraints

* The OCES will be developed using a combination of HTML, CSS, JavaScript, and SQL (MySQL).
* The system will utilize a relational database management system (RDBMS) to store user information, course data, and enrollment records. The specific RDBMS will be chosen during the development phase based on performance and security considerations.
* The OCES will adhere to secure coding practices to prevent vulnerabilities and data breaches.
* The user interface will be designed following WCAG accessibility guidelines to ensure usability for individuals with disabilities.

## User Documentation

The OCES will be delivered with the following user documentation:

User Manual: A comprehensive user manual will be provided in a downloadable PDF format, outlining the registration process, course browsing, enrollment procedures, and waitlist management functionalities.

Online Help: Context-sensitive online help will be integrated within the OCES user interface to provide specific guidance and instructions for each system function.

## Assumptions and Dependencies

* The OCES assumes a reliable internet connection for users to access the application.
* The successful operation of the OCES depends on the availability and continued functionality of the chosen RDBMS.
* Future integration with existing student information systems may require additional development efforts depending on the specific data exchange requirements.

# External Interface Requirements

## User Interfaces

* General Design Principles:
  + The OCES user interface will follow a modern, user-friendly design that is intuitive and easy to navigate.
  + Consistent layout and terminology will be used throughout the application.
  + Color schemes and fonts will adhere to WCAG accessibility guidelines to ensure usability for individuals with disabilities.
  + Standard buttons and functionalities will be utilized (e.g., "Home," "Search," "Help").
  + Context-sensitive online help will be readily accessible within the interface.
  + Error messages will be clear, concise, and provide actionable guidance for the user.
* Screen Layouts:
  + The OCES will employ a responsive design that adapts to different screen sizes and resolutions.
  + A consistent layout will be maintained across devices, with a clear distinction between the main content area, navigation menu, and status bar.
* Supported Screen Resolutions:
  + The OCES will be designed and tested for optimal functionality on a range of screen resolutions commonly used by modern devices, including:
  + 1366x768
  + 1920x1080
  + 3840x2160 (4K)
* Standards Compliance:
  + The OCES user interface will strive to adhere to Section 508 compliance guidelines for accessibility.

## Hardware Interfaces

The OCES is a web-based application and does not directly interact with any external hardware components.

## Software Interfaces

* Database Interface:
  + The OCES will utilize a relational database management system (RDBMS) to store user information, course data, and enrollment records. The specific RDBMS will be chosen during the development phase based on performance and security considerations.
  + The application will interact with the database using industry-standard SQL queries to retrieve, update, and manipulate data.
* Web Server Interface:
  + The OCES will be deployed on a web server to facilitate user access through web browsers. The specific web server software will be determined during the development phase.
  + The application will interact with the web server using standard HTTP requests and responses to manage user sessions, process user actions, and generate dynamic web pages.

## Communications Interfaces

The OCES is an internal system and does not currently require any external communication functionalities such as email, network protocols, or data transfer with external systems. However, future versions may integrate with existing student information systems, and any communication protocols will be addressed at that time.

# System Use Cases

* UC1: Student Register (Online Course Enrollment System)
* UC2: Student Login (Online Course Enrollment System)
* UC3: Student Browse Courses (Online Course Enrollment System)
* UC4: Student Enroll in Course (Online Course Enrollment System)
* UC5: Student Waitlist for Course (Online Course Enrollment System)
* UC6: Student Cancel Enrollment (Online Course Enrollment System)
* UC7: Administrator Manage Users (Online Course Enrollment System)]
* Detailed Use Case Descriptions:

**1.1 UC1: Student Register (Online Course Enrollment System)**

* Objective: A new student registers for an account in the OCES to access course offerings and enrollment functionalities.
* Priority: High
* Source: John Smith (Student)
* Actors: Student

Flow of Events:

Basic Flow:

1. Student navigates to the OCES registration page.
2. Student enters required registration information (name, email address, password, etc.).
3. System validates the entered information.
4. Upon successful validation, the system creates a new user account for the student.
5. The system sends a confirmation email to the student's registered email address.
6. The system redirects the student to the login page.

Alternative Flow 1: Invalid Registration Information

1. If the entered information is invalid (e.g., missing fields, weak password), the system displays appropriate error messages.
2. The student can correct the errors and resubmit the registration form.

* Preconditions: None
* Postconditions: A new student account is created, and a confirmation email is sent.
* Notes/Issues: None

**1.2 UC2: Student Login (Online Course Enrollment System)**

* Objective: A registered student logs in to the OCES to access course listings and enrollment functionalities.
* Priority: High
* Source: John Smith (Student)
* Actors: Student

Flow of Events:

Basic Flow:

1. Student navigates to the OCES login page.
2. Student enters their registered username or email address and password.
3. The system authenticates the login credentials.
4. Upon successful authentication, the system redirects the student to the course browsing or student dashboard.

Alternative Flow 1: Invalid Login Credentials

1. If the username or password is incorrect, the system displays an error message.
2. The student can retry entering the correct credentials.

Alternative Flow 2: Account Locked

1. If the student exceeds the maximum number of login attempts, the system locks the account.
2. The student is directed to instructions for unlocking the account (e.g., security questions, password reset).

* Preconditions: The student has a valid OCES account.
* Postconditions: The student is logged in and granted access to the system functionalities.
* Notes/Issues: Consider security measures such as password complexity requirements and account lockout after a certain number of failed login attempts.

1.3 UC3: Student Browse Courses (Online Course Enrollment System)

* Objective: A logged-in student browses the available online courses offered by the institution.
* Priority: Medium
* Source: John Smith (Student)
* Actors: Student

Flow of Events:

Basic Flow:

1. The student navigates to the course browsing page.
2. The system displays a list of available online courses, categorized by semester or other relevant criteria.
3. The student can search for specific courses using keywords or filters.
4. The student can view detailed course information (e.g., course description, instructor, schedule).

* Preconditions: The student is logged in to the OCES.
* Postconditions: The student has browsed the course offerings and identified courses of interest.
* Notes/Issues: The course listings should be user-friendly and allow for easy searching and filtering.

# Other Nonfunctional Requirements

## Performance Requirements

* The system should load the login page within 3 seconds under normal load conditions to ensure a smooth user experience.
* Course browsing functionality should display search results within 5 seconds, even when handling a large dataset of courses.
* The enrollment process should complete within 10 seconds after the user confirms their course selection.

## Safety Requirements

* The system should implement measures to prevent unauthorized access to user accounts and sensitive data.
* User passwords must be securely hashed and stored to prevent unauthorized access in case of a data breach.
* The system should have built-in mechanisms to detect and prevent SQL injection attacks and other common security vulnerabilities.

## Security Requirements

* The OCES will comply with all relevant data privacy regulations, such as FERPA (Family Educational Rights and Privacy Act) in the United States.
* User passwords will be stored using a secure hashing algorithm (e.g., bcrypt) to prevent unauthorized access in case of a data breach.
* The OCES will utilize secure communication protocols (HTTPS) to encrypt data transmission between the web browser and the server.
* Regular security audits and penetration testing will be conducted to identify and address any vulnerabilities in the system.

## Software Quality Attributes

* **Usability**: The system should have an intuitive user interface with clear navigation and informative error messages to enhance user satisfaction.
* **Maintainability**: Code should be well-documented and follow coding standards to facilitate future updates and maintenance.
* **Reliability**: The system should have automated tests in place to detect and prevent regression issues, ensuring consistent performance.
* **Portability**: The system should be designed to be platform-independent, allowing it to run on different operating systems and web browsers without compatibility issues.
* **Scalability**: The system architecture should be scalable to accommodate a growing user base and increasing data volume without significant performance degradation.

# Other Requirements

The OCES project does not have any additional requirements beyond those already specified in the Software Requirements Specification (SRS). All necessary functionalities, performance criteria, safety measures, security protocols, and software quality attributes have been addressed in previous sections of the document.

# System Requirements Chart

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID** | **Priority** | **Type** | **Source** | **Contained in Use Case(s)** | **Description** |
| REQ-101 | High | F | John Smith (Student) | UC1: Student Register | The system shall allow a new student to register for an account by entering their name, email address, password, and other relevant information. |
| REQ-102 | High | F | John Smith (Student) | UC1: Student Register | The system shall validate all entered registration information to ensure it meets predefined criteria (e.g., email format, password strength). |
| REQ-103 | High | F | John Smith (Student) | UC2: Student Login | The system shall allow a registered student to login using their username or email address and password. |
| REQ-104 | Medium | F | John Smith (Student) | UC2: Student Login | The system shall authenticate the login credentials against stored user data and grant access upon successful verification. |
| REQ-201 | High | F | John Smith (Student) | UC3: Student Browse Courses | The system shall display a list of available online courses offered by the institution. |
| REQ-202 | Medium | F | John Smith (Student) | N/A | The system shall allow students to view course capacity limits (number of seats available) for each course offering. |
| REQ-301 | High | F | John Smith (Student) | UC4: Student Enroll in Course | The system shall allow students to enroll in available courses by selecting the desired course and confirming their selection. |
| REQ-302 | Medium | F | John Smith (Student) | UC5: Student Waitlist for Course | The system shall add students to a waitlist for full courses and notify them via email when a spot becomes available. |
| REQ-303 | Medium | F | John Smith (Student) | UC6: Student Cancel Enrollment | The system shall allow students to self-service cancel their enrollment from registered courses. |
| REQ-304 | Medium | F | N/A | N/A | The system shall automatically send notification emails to waitlisted students when a spot becomes available in their desired course. |
| REQ-401 | Medium | NF | System Administrator | N/A | The system shall adhere to WCAG accessibility guidelines to ensure usability for individuals with disabilities. |
| REQ-402 | High | NF | System Administrator | N/A | The system response time for user actions (e.g., enrollment confirmation) shall not exceed 2 seconds under normal load conditions. |
| REQ-403 | High | NF | System Administrator | N/A | The system shall implement secure password hashing (e.g., bcrypt) to protect user passwords in case of a data breach. |
| REQ-404 | Medium | NF | System Administrator | N/A | The system shall utilize HTTPS to encrypt communication between the web browser and the server. |
| REQ-405 | Low | NF | System Administrator | N/A | The system code shall be well-documented and follow coding standards to facilitate future maintenance and updates. |

Appendix A: Glossary

* **Account:** A user profile within the OCES that allows a registered student to access course listings and enrollment functionalities.
* **Course:** An online learning module offered by the institution through the OCES.
* **Enrollment:** The process by which a student registers for a specific course offered through the OCES.
* **Login:** The process of authentication where a registered student enters their username or email address and password to gain access to the OCES functionalities.
* **Non-functional Requirement (NFR):** A requirement that specifies the overall qualities of a system, rather than specific functionalities. Examples include performance, security, and usability.
* **Online Course Enrollment System (OCES):** The software application that facilitates student registration, course browsing, and enrollment for online courses.
* **Password:** A secret string of characters used for user authentication during the login process.
* **Priority:** An indicator of the relative importance of a requirement. (e.g., High, Medium, Low)
* **Student:** A user of the OCES who is enrolled in or seeking to enroll in online courses offered by the institution.
* **System Administrator:** A user with the authority to manage user accounts and system configurations within the OCES.
* **UC (Use Case):** A high-level description of a system functionality from the perspective of an actor (user) interacting with the system to achieve a specific goal.
* **User:** An individual who interacts with the OCES, including students and potentially system administrators.
* **Username:** A unique identifier used by a registered student for login purposes within the OCES.
* **Waitlist**: A queue system within the OCES where students can be added for full courses. Students on the waitlist are notified if a spot becomes available in their desired course.

Appendix B: Analysis Models

<Optionally, include any pertinent analysis models, such as data flow diagrams, class diagrams, state-transition diagrams, or entity-relationship diagrams.>

**Don’t do any of these for CS421 SRS. You will create these models during the high level design deliverable.**

Appendix C: To Be Determined List

1. **TBD - Database Requirements (Section 6):**

* A more detailed description of the data entities and their attributes within the OCES database is needed.
* This should include information about student data, course data, enrollment data, and potentially waitlist data.

1. **TBD - Error Handling (Not Currently Documented):**

* The SRS should define how the system will handle errors that may occur during user interactions (e.g., invalid login credentials, network errors).
* This should include the specific error messages displayed to the user and any retry mechanisms implemented.

1. **TBD - System Interfaces (Not Currently Documented):**

* If the OCES interacts with any external systems (e.g., student information system), these interfaces need to be documented.
* This would include details about the data exchanged and the communication protocols used.