

CSYLLABUS

Requirements definition

Version 1.0.1

Revision History

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1 INTRODUCTION

1.1 Purpose of this document

The purpose of this document is to analyze the project domain and to define the functional and nonfunctional requirements. In this document will be described what is supposed to develop viewed from the user perspective. This is a crucial part of the development being that it permits to clarify and understand project domain.

1.2 Intended audience

- Development team, as a guidance during the development activities and for the team to ensure they understand the requirements of the project.
- The supervisors who can use this document to understand the future process of the project.
- The customer who can ensure that all the requirements are captured by the team.

1.3 Scope

This document provides high level description of requirements for the CSyllabus project. Requirements definition focus on what to do and not how to do it. Also it will provide both functional and nonfunctional requirement descriptions based on client inputs along with UML diagrams.

1.4 Document Structure

The document is organized in three parts:

- Domain analysis: describes the problem and analyzes the domain from different user perspectives.
- Functional requirements: defines the requirements in a form of user stories. If user story does not provide enough details, there will be UML diagrams to ensure a clear assignment.
- Non-functional requirements: describes requirements that shows how the system should work. They serve as constraints or restrictions of the system design that should be met. Defines system attributes such as availability, security, privacy and performance.

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1.5 Definitions and Acronyms

- User *noun*: single name for all different roles of the system. User can also be a student, admin, superadmin and a guest depending on the context.
- App *noun*: refers to CSyllabus software.
- User story *noun*: short description of functionality told from user's perspective
- Use Case *noun*: list of actions or event steps typically defining the interactions between a role and a system. Can include various requirements.
- Actor *noun*: who interacts with the app.
- System *noun*: set of components working together
- Graph *noun*: shows data distribution in an intuitive form where each node represents a field.
- Administrator *noun*: who can manage the server and the app.
- DSD: Distributed Software Development
- Syllabus *noun*: an academic document that contains faculty information's including detailed list of courses available at the faculty
- Program *noun*: a list of courses in a particular subject (*e.g. Computer Science*)
- Course *noun*: shaped area of knowledge studied on university

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2 DOMAIN ANALYSIS

2.1 Problem Description

In today's modern world where educational boundaries slowly disappear transit of students from one university to another is increasing. Most of time they want to conduct an experience of studying abroad. Often different country includes different language or culture what can be challenging or even too hard to overcome. Exploring or choosing suitable faculties involves adaptation to different searching tools, sites and portals. Their mechanism of showing relevant data can be confusing and not understandable at first and demand exhaustive work to get familiar with. Even if they found similar faculty to their own or one that matches their preferences comparing available courses can be challenging. Such data are not centralized and easily offered as they should be. To remove unnecessarily work and unpleasant experience before they even start this project aim to enable and provide all relevant information's and insure that they choose best possible destination for their further education.

2.2 Goals

- G1. To assist students in making good educational choices
- G2. To assist instructors in sharing best practices
- G3. To assist education researchers in understanding the evolution of our field

2.3 Domain

- Students are interested in information's about other universities and their study plans. Students want to go to the best university that suits their needs to do so, they need to get information's about other faculties and their courses. Because foreign faculties are not often well known, and courses can have different names they will have opportunity to compare their familiar courses with available.

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3 FUNCTIONAL REQUIREMENTS

3.1 Users

It is important to clarify that the actors mentioned in this document are in scope of User. User is high level of abstraction representing a single role in the system.

- Guest: is a person that belongs to the academic community who does not have an account registered in CSyllabus system. Guest is user who has high level of overview on the main functionalities of the system but has no user-identification-required features available such as user profile or can build user engagement.
- Student: is the registered user with verified CSyllabus account. He has all features as a guest plus user-identification-required features such as user profile and possibility to leave comments or vote for course they are familiar with.
- Admin: Has the ability to list out, read, update and delete syllabuses.
- Super Admin: Has the ability to list out, read, update and delete users

3.2 User Stories

ID	Name	User Story
US1	Syllabus search	As a student I want to search for syllabi by name, faculty or country.
US2	Syllabus details	As a student I want to see syllabi details, so I can see what it contains.
US3	Course details	As a student I want to see details of course so I can see what they offer
US4	Faculty details	As a student I want to see details of faculty, so I can know more about faculty.
US6	Country and faculty choose	As a student I want to choose country and faculty I am studying at, so I can choose my own courses for comparison
US8	Similar faculty	As a student I want to see which faculties are most similar to my own, so I can see what is my best option
US9	Relevant subjects	As a student I want to see other subjects that are relevant for me

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US10	Destination country and faculty	As a student I want to choose destination country and faculty, so I can compare my courses with them.
US11	Recommended courses	As a student I want to see recommended courses, so I can maybe come to know something new
US12	Course comments	As a student I want to comment and evaluate a course
US13	Syllabus share	As a student I want to share a course in social media so others can see it
US14	Add syllabus to database	As a admin I want to have option to add new syllabi to the database so that database can expand
US18	Guest view	As a Guest I want to see the main functionalities without an account

3.3 User Story Descriptions

Story ID	US1
Story	As a student I want to search for syllabi by name, faculty or country.
Source	Team
Detailed Description	Student wants to search through the syllabuses using a filter. This filter can be the subject name, technology or any course related value, for example “Artificial Intelligence”. Also, Student can use a faculty name to refer one University specifically or one country. When User does this, the app should show him a list of the syllabuses according to given criteria.
Validation Criteria	<ul style="list-style-type: none"> • The User can choose the search criteria • The app provides the results according the chosen criteria

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Story ID	US2
Story	As a student I want to see syllabi details, so I can see what it contains.
Source	Team
Detailed Description	User can see all data that single syllabus provides. Such data if available are: faculty information's, available courses with details, study level etc.
Validation Criteria	<ul style="list-style-type: none"> • User can see more details about single syllabus after choosing it.

Story ID	US3
Story	As a student I want to see details of course so I can see what they offer
Source	Team
Detailed Description	User can see details of single course. Details include following if available: course name, belonging syllabus id, belonging faculty name, course short and long description, course tags, comments and ratings from other users and graphic statistics showing course popularity.
Validation Criteria	<ul style="list-style-type: none"> • User can see details of course • User can see comments and ratings from other users

Story ID	US4
Story	As a student I want to see details of faculty, so I can know more about faculty.
Source	Team
Detailed Description	User wants to know more about the faculty related with the syllabus. The app must show

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	a short description of the university and a link to the official website
Validation Criteria	<ul style="list-style-type: none"> • User can reach the information about the faculty associated to the syllabus • User can go from the syllabus description

Story ID	US6
Story	As a student I want to choose country and faculty I am studying at, so I can choose my own courses for comparison
Source	Team
Detailed Description	User can choose country and faculty and then he will have a list of available courses of that faculty. User can choose courses of interest to be compared with other syllabuses.
Validation Criteria	<ul style="list-style-type: none"> • User can choose his faculty and country • A list of his subjects is showed • He can see similar courses

Story ID	US8
Story	As a student I want to see which faculties are most similar to my own, so I can see what is my best option
Source	Team
Detailed Description	User can compare whole faculty syllabus with other faculties
Validation Criteria	<ul style="list-style-type: none"> • The User can see suggested option. • The User can review all the possible suggestions

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Story ID	US9
Story	As a student I want to see other subjects that are relevant for me
Source	Team
Detailed Description	User can see suggested courses without need to manually enter courses for comparison. System can suggest data based on other users.
Validation Criteria	<ul style="list-style-type: none"> • User see a list of suggested courses.

Story ID	US10
Story	As a student I want to choose destination country and faculty, so I can compare my courses with them.
Source	Team
Detailed Description	User can choose destination country and faculty, so he will get compared data based on chosen input.
Validation Criteria	<ul style="list-style-type: none"> • User can choose his destination faculty and country which are relevant in comparison

Story ID	US11
Story	As a student I want to see recommended courses, so I can maybe come to know something new
Source	Team
Detailed Description	User can see courses that system recommend to him. He can use that data in further decisions.
Validation Criteria	<ul style="list-style-type: none"> • User can see similar courses

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Story ID	US12
Story	As a student I want to comment and evaluate a course
Source	Team
Detailed Description	When students have attended a course, they can leave comment how did it looks like. Also, they can evaluate the course with a ranking system.
Validation Criteria	<ul style="list-style-type: none"> ● User can add comments to each subject ● User can evaluate each subject ● App has filters for the comments.

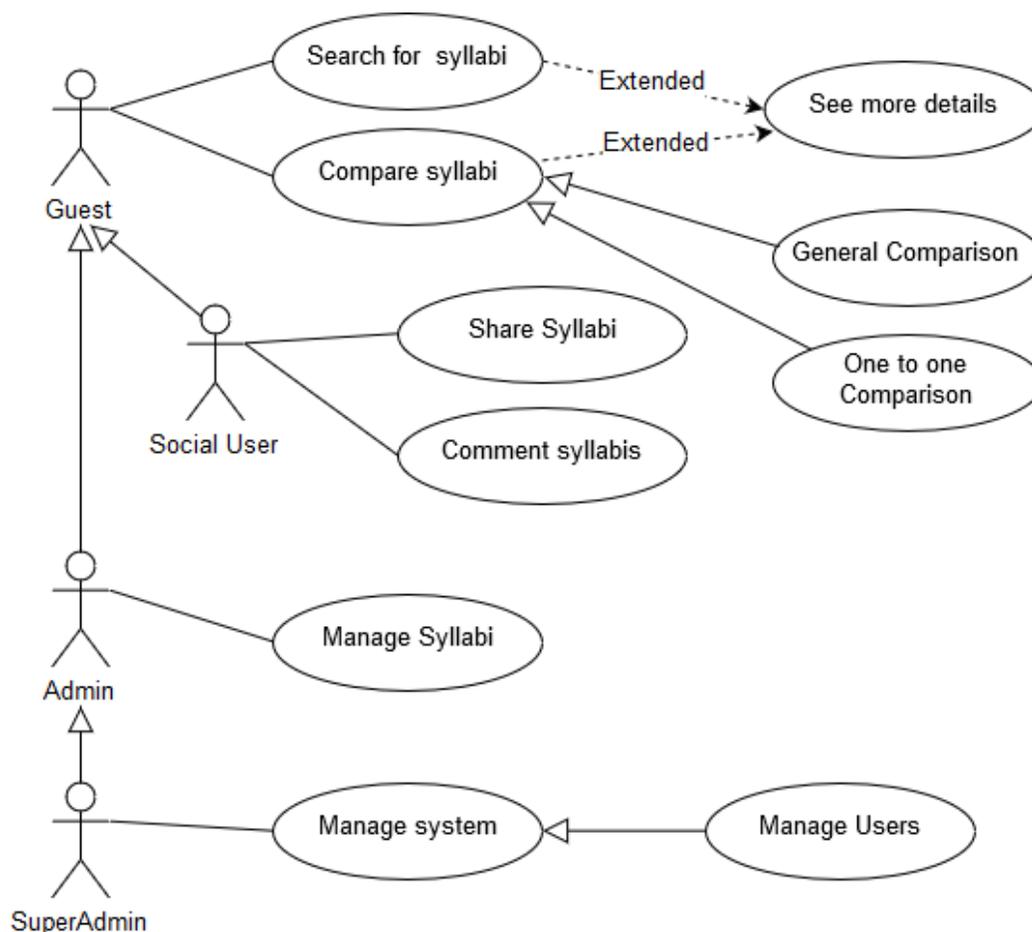
Story ID	US13
Story	As a student I want to share a course in social media so others can see it
Source	Team
Detailed Description	User can share with others syllabus with other users on other social networks
Validation Criteria	<ul style="list-style-type: none"> ● User can share syllabus

Story ID	US14
Story	As a Admin I want to have option to add new syllabi to the database so database can grow
Source	Team
Detailed Description	Admin will have option to contribute to database with his version of syllabus.
Validation Criteria	<ul style="list-style-type: none"> ● Admin can submit a form to create a new syllabus. ● Admin can send a syllabus with a specific format to the system.

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Story ID	US18
Story	As a Guest I want to see the main functionalities without an account
Source	Team
Detailed Description	A guest doesn't need to have an account. However, he must be able to see statistics using the analyzer and do the simple searching's using the syllabi explorer.
Validation Criteria	<ul style="list-style-type: none"> The main functionalities must be available for the guest without the need of creating account

3.4 Use Cases Diagram



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3.5 Use Cases Descriptions

Use case name	Search for syllabus
User stories related	US1, US18
Actor	Student, Guest
Pre-conditions	User is in the app home
Flow of events	<ol style="list-style-type: none"> 1. User writes in the search engine search criteria as name, country, faculty and click in go. 2. System performs a query in the database according the criteria. 3. System shows to User in the interface the results found with a list of syllabi.
Post conditions	User can navigate across results
Exceptions	<p>System did not find results: Show to User the problem and come back to home.</p> <p>User wrote a indecipherable word: Show to User the problem and come back to home.</p>

Use case name	See more details
User stories related	US2, US3, US4, US18
Actor	Student, Guest
Pre-conditions	User has done a search
Flow of events	<ol style="list-style-type: none"> 1. User selects a syllabus 2. System shows to User a completed description of the syllables 3. System shows to User the faculty associated and a link to his website
Post conditions	User can see details
Exceptions	A syllable does not have one detail, for example the name of faculty: System sends a message to administrator informing about the error.

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Use case name	Compare Syllabi
User stories related	US6
Actor	Student
Pre-conditions	User is already registered, User is in the comparator interface.
Flow of events	<ol style="list-style-type: none"> 1. User submits his faculty and course 2. User selects his subjects 3. User select the type of comparison: General or one to one. 4. User select a destination university or faculty (Optional)
Post conditions	System must know if it's a general comparison or directed.
Exceptions	<p>The faculty is not in the database: It's registered and the User must write his syllabi subjects manually or sends to administration the descriptions files.</p> <p>The User does not select a destination faculty: The system does a general comparison</p>

Use case name	Compare Syllabi: General comparison
User stories related	US8, US9
Actor	Student
Pre-conditions	User already has submitted his subjects
Flow of events	<ol style="list-style-type: none"> 1. User adds country or city preference. 2. System performs the comparison algorithm with all the syllabi in the database and according to the filters 3. System shows to User the most similar faculties to home. 4. System shows to User the most important or better ranked syllabi corresponding his subjects. 5. System shows subjects suggested according the student profile.

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Post conditions	User can see all the possible comparisons
Exceptions	A subject does not have a possible equivalent: Systems shows to User the error.

Use case name	Compare Syllabi: One to one comparison
User stories related	US10, US11
Actor	Student
Pre-conditions	User already has submitted his subjects, User already has submitted the destiny faculty and course.
Flow of events	<ol style="list-style-type: none"> 1. System shows to User the syllabi of the destiny faculty. 2. System shows to User which are the similar subjects between both and which ones are different. 3. System shows a percent of similarity
Post conditions	User can know if the two syllabuses are different or no. User can navigate across the syllabus and know more about the faculties
Exceptions	User wants to change the destination faculty: The system provides it in the same interface

Use case name	Comment course
User stories related	US12, US13
Actor	Student
Pre-conditions	User is looking at course
Flow of events	<ol style="list-style-type: none"> 1. User selects add comment 2. User writes and submits the comment 3. User rate course 4. System verify if the comment is entered

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	5. System add the comment to the course page
Post conditions	The comment and the rank are added
Exceptions	The comment is missing: System shows user the error

Use case name	Manage syllabi
User stories related	US14
Actor	Admin
Pre-conditions	Admin is in the manage section
Flow of events	<ol style="list-style-type: none"> 1. System shows to User his subjects 2. User selects an action: Delete, upgrade or add a subject. 3. In the case of add and upgrade the system shows to User a form to fill out. 4. User fills out the form and submit the new syllables 5. System verifies if all the fields are completed 6. System add the syllables to the database
Post conditions	A new Syllabus is added
Exceptions	User does not want to submit the form: System shows to user an option to upload a file with free format, After, this is analyzed by de the administrator

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4 NON-FUNCTIONAL REQUIREMENTS

4.1 Usability and Portability

- CSyllabus will be a web-based app responsive for desktop and mobile usage. In this way, User can use the app with a different browser from various locations if has internet connection.
- The application must offer interface following one of popular design guidelines such as material or angular design.
- The application must be easy to use and understandable. It must not require specific knowledge of new technologies.
- The application must not require more than one hour of training to overcome its functionalities
- Browser compatibility to most popular modern browsers and their mobile versions: Chrome, Firefox, Opera, Edge, Safari

4.2 Availability

System will be available through web application. The system will be available for normal use every single day except in maintenance days that will be shorter than 2 days per occasion. This requirement should be met by using a server from a server host with a history of good business practice. This requirement should be met by planning a good system architecture and design. An important factor is hosting on a server which has enough resources as well. For smaller average response time we will design a frontend as a single page application with minified resources. Http server policies should be set as well, such as browser caching and resources compression policies.

4.3 Privacy and Security

The data used in this project will be publicly visible to all Users except in situations where data owner insist otherwise. The personal data of the user will be publicly visible in user profile except when user manually hide information's. Syllabuses will be available only with the authorization of the respective faculties or universities. This requirement should be met by designing user authentication system for restricting permissions to private data.

All the interactions with the system are encrypted in transport and not volatile to man in the middle attack. This requirement should be met by using a trusted SSL certificate and permanently redirecting http to https protocol.

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4.4 Performance

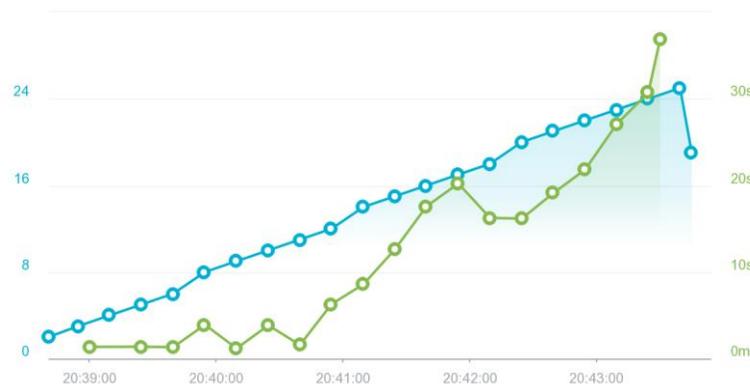
The System will be scaled according to user's acquisition and content growth so that every page loads under 2 seconds. Architecture will be designed per latest architectural guidelines. Since this application will be created in the context of the DSD course, our team will not build or require any dedicated infrastructure for it. Database will have minimum 2 syllabuses for comparison.

4.5 Validating non-functional requirements

- Response time and performance are validated through some popular testing tools:
 - *Google PageSpeed* Insights: **100/100 optimization result**
 - *Pingdom test*: **A92 performance** grade being **better than 92%** of sites
 - *Yslow*: **81% score**

Considering that initial loading of single page applications is usually longer than that of server side rendered sites these results are excellent.

- Scalability is validated with stress test done at <https://loadimpact.com/>:



Result of stress test

Blue line shows simultaneous users conducting 5 requests each, green line shows response time. It is evident that response time becomes a linear bottleneck at 60(12*5) simultaneous request

To validate security, we conducted ssl keycheck at <https://www.sslshopper.com/> , results are that certificate should be trusted by all major web browsers. We also conducted http to https permanent redirect check at <http://www.redirect-checker.org/> .