

# **Software Requirements Document**

**for**

**LAU Virtual Learning Assistant  
LAU VLA SRS Version 1.1**

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# **1. Introduction**

## **1.1 Purpose**

The purpose of the VLA solution requested by LAU IT is to help students in their academic performance and aid them in their academic journey. This is mainly due to the drop in the student's performances as reported by LAU's Dean of Students Office (DoS), especially after the COVID-19 pandemic. Hence, the VLA solution aims to:

1. Assist the students at LAU with their studies for the courses and examinations.
2. Aid the students by tracking mechanisms to help them to stay on track with their courses and assignments to improve their academic performance.
3. Provide the students with an efficient way that reduces their wasted time on organizing their studies.

The VLA tool is meant to supplement existing solutions available for students at LAU and to act as a complimentary component to the services offered by the DoS and Academic Support office at LAU. In other words, while the VLA tool is a standalone software, it still exchanges data with other LMS software such as BlackBoard, to provide optimal results for its target audience.

This document referenced under "OPENG/LAU-VLA-V1.0" and publicly as "LAU VLA SRS Version 1.0" aims to provide sufficient and detailed information regarding the product specification of the VLA tool for the LAU IT department and its relevant stakeholders. The Software Requirements Specification (SRS) document entails what the system shall provide and perform through describing high-level requirements. As such, the document includes the project's scope, objectives, user and system requirements, domain requirements, performance requirements, dependency graph, and desired functionalities and their accompanying constraints.

*Notice: this document constitutes as a binding agreement of the deliverable system after the agreement of both parties to proceed with the next phase of the project. Any additions or changes in the SRS document after this process can be refused freely by Op-Engineers without prejudice.*

## **1.2 Document Conventions**

**1.2.1** This document uses an inclusive language as such, the pronouns they/their/them are used for all subjects discussed regardless of gender, and hence should not be confused as to mean a group of people.

**1.2.2** Cornell Note Taking Method Page and Note Taking Page are interchangeable.

**1.2.3** The words section, class, and course are interchangeable.

**1.2.4** The letter D next to the FREQ/NFREQ indicates a Domain Functional Requirement and Domain Non-Functional Requirement, respectively.

## **1.3 Product Scope**

As previously mentioned in the introduction, the VLA tool constitutes as a method to help students organize their study life by providing ways to boost their efficiency and academic competence. This VLA tool hence overarches LAU's DoS vision in delivering support for all students to unlock their fullest potential. The main features of the VLA tool are:

1. *Study Time Helper* Inform students if their studying hours for each course on the LMS are adequate and if they are reaching each instructor's recommended studying hours for their course/section.
2. *Task Tracking* Support students in their tasks completion process by following up on uncompleted tasks to ensure they are delivered on time which helps students reduce the number of missed tasks.
3. *Content Query* Provide a querying mechanism to students to search for course material and/or for relevant content on the internet which might assist their learning comprehension for the specified course material.
4. *Exam Assistance* Assist the students in their examinations by displaying relevant information that will equip the student with the necessary assigned material and time needed to study that exam.
5. *Note Taking* Help students in creating a notes directory that stores their saved text from the instructor's uploaded material which can then be downloaded as a single file or as a collection of all notes for a given course. The student can also reach out to the instructor(s) by directly sending the saved note(s) to them.

## **1.4 References**

The provided SRS has been prepared through discussions with LAU's IT department, DoS, and other managerial stakeholders at LAU. Also, various representative student input was taken to ensure a relevant high-quality software for the LAU community. Among the references used in this document are as follows:

1. Interview documents.
2. ISO/IEC/ STANDARD IEEE 29148.
3. DoS Report on Student Performance 2018-2022.
4. LAU IT Guidelines for System Administrators.
5. LAU Student Demographics Report 2018-2022.
6. LAU Code of Ethics 2022.
7. Cornell Note Taking Method.

## **1.5 Glossary**

The following table includes definitions for any unique symbols or notations that are used in the document.

<b>Term</b>	<b>Definition</b>
SRS	Software Requirements Specification
LAU	Lebanese American University
DoS	Deans of Students
IT	Information Technology (Department at LAU)
IEEE	The Institute of Electrical and Electronics Engineers
LMS	Learning Management System
VLA	Virtual Learning Assistant
SaaS	Software as a Service
FREQ	Functional Requirement
NFREQ	Non-functional Requirement
FAQ	Frequently Asked Questions
SCAP	Security Content Automation Protocol

*Table 1: Document Conventions*

## **2. Overall Description**

### **2.1 User Classes and Characteristics**

The VLA system has three user classes:

1. Students.
2. Instructors.
3. IT Administrators.

### **2.2 User Requirements: Product Functions**

**2.2.1** The VLA tool shall enable instructors to assign required study hours to uploaded material.

**2.2.2** The VLA tool shall track each student's total study hour per material on the LMS.

**2.2.3** The VLA tool shall compare the student's total study hours against the instructor's required study hours.

**2.2.4** The VLA tool shall calculate the average of students' assigned study hours per section.

**2.2.5** The VLA tool shall inform each student if their study hours are below the class average.

**2.2.6** The VLA tool shall track the student's completion status of each task assigned to them.

**2.2.7** The VLA tool shall track the completeness percentage of each task/lesson.

**2.2.8** The VLA tool shall notify the student of the status of incomplete remaining tasks.

**2.2.9** The VLA tool shall let a student to manually configure notification times or conditions to receive a notification.

**2.2.10** The VLA tool shall have a query feature to find specific pages/slides that contains the inputted specific keyword/topic name they are searching for.

**2.2.11** The VLA tool shall enable the student to prioritize the exam-related tasks from the list of tasks.



**2.2.12** The VLA tool shall display all assigned exam material upon clicking the exam task.

**2.2.13** The VLA tool shall indicate for every material whether it needs revision or not based on the study hours tracked on that section/course.

**2.2.14** The VLA tool shall provide a note taking tool that the student can use to write notes which will be saved next to the corresponding material.

**2.2.15** The VLA tool shall enable the student to download their notes from the material uploaded or combine all or a subset of the notes in one file per section/class.

**2.2.16** The VLA tool shall be able to screenshot material to save it in notes.

**2.2.17** The VLA tool shall enable students to send one or more notes via e-mail to their instructor to inquire about the noted material.

**2.2.18** The VLA shall allow the student to use the query feature in order to search within the scope of the various materials and files of the course provided by the LMS.

**2.2.19** The VLA tool shall provide e-mail communication button between the instructor and the student on the LMS.

**2.2.20** The VLA system shall allow an instructor to upload their course content.

**2.2.21** At the end of each week, the VLA system generates a downloadable file for the instructor that includes detailed report which describes each students' performance in the past week.

## **2.3 User Requirements: Design and Implementation Constraints**

**2.3.1** The VLA system shall run on Linux/UNIX-based Operating Systems. Preferably, Red Hat Enterprise Distribution. (UNIX based Architecture and Operating Systems offer more reliability than Windows Server).

**2.3.2** The VLA tool shall have different privileges for each user class.

**2.3.3** The VLA tool shall accept from users the following formats only: JPEG,JPG,PDF, XLSX, DOC, DOCX, PPT, PPTX, TXT, HTML, CSS. MP4, MP3. AI, PSD.

**2.3.4** The VLA system shall implement LAU e-mails to be the only mode of external communication from the tool. (Enables LAU to monitor and have access to e-mails sent and received in case of dispute)

**2.3.5** The VLA system shall have a process time of less than 2000 milliseconds.

**2.3.6** The VLA system shall have a response time of less than 4000 milliseconds.

**2.3.7** The VLA system shall be in up and in available status 99% of the time.

**2.3.8** The VLA system shall have periodical maintenance on the third Friday of every month between 22:00 and 2:00.

**2.3.9** The VLA system shall accommodate up to 10,000 active users. (Deduced from LAU demographics which has an upper capacity of 10,000 students)

**2.3.10** The VLA system shall make use of the LMS' Database which contains information regarding all the users.

**2.3.11** The VLA system shall respect LAU's Code of Ethics document which entails the privacy rights of students and the treatment of their information with third parties.

**2.3.12** It is desirable that the VLA system should implement a color scheme similar to LAU BlackBoard Version 12.03.

**2.3.13** The system shall be developed using languages the languages are HTML, CSS, JavaScript, PHP, and SQL.

**2.3.14** The system shall have a secure encrypted connection between the VLA and the LMS.

**2.3.15** The system shall have the user's notes (if student), communication history, and sensitive information fetched from the database encrypted.

## **2.4 User Documentation**

The VLA tool shall be accompanied with three different user documentations:

1. Description Document: entails the overview of the services and features of the system.

2. User Manual: entails details on how to use the product with examples and illustration of the features.
3. FAQ: a compiled repository of Frequently Asked Questions from sample audience which contains the most asked questions from the population on features and “how-to” of the product.

## **3. System Requirements**

### **3.1 Functional Requirements**

**3.1.1 FREQ-1:** The VLA system shall classify users upon log in as an instructor, student, or administrator.

**3.1.2 FREQ-2:** The VLA system shall obtain the LMS’ data to supply the logged in user dashboard for an instructor, student, administrator.

**3.1.3 FREQ-3:** The VLA system shall have modifiable permissions (grants/revokes access) to be used by administrators.

**3.1.4 FREQ-4:** The VLA system shall read PDF, Microsoft Office documents, files from BlackBoard that are uploaded by the logged in instructor.

**3.1.5 DFREQ-5:** The VLA system should use the notification feature of the BlackBoard LMS.

**3.1.6 FREQ-6:** The VLA system shall enable the instructor to classify tasks into exam or material task to be assigned to all students enrolled in the section.

**3.1.7 FREQ-7:** The VLA system shall enable the instructor to create a set of materials to be part of an exam task.

**3.1.8 FREQ-8:** The VLA system shall enable the instructor manually assign/restrict the view of certain tasks from a student.

**3.1.9 FREQ-9:** The VLA system shall provide for the instructor to assign material task with a required study hours with integer values greater than 0 for the uploaded material.

**3.1.10 FREQ-10:** The VLA system shall store the total session(s) time spent on a material task with a timestamp

**3.1.11 FREQ-11:** The VLA system shall compare the student's total time spent on a material task against an instructor's required study hours.

**3.1.12 FREQ-12:** The VLA system shall calculate the average study hours of the all the students in a section/course for a material task that has required study hours given by the instructor.

**4.1.12.1:** if the task has 4 students or less that have studied it, the default average study hours shall be defined as the required study hours by the instructor

**3.1.13 FREQ-13:** The VLA system shall calculate the average study hours of all tasks for a student in a section/course.

**4.1.13.1:** if the section has 4 students or less, the default average study hours shall be defined as the required study hours by the instructor

**3.1.14 FREQ-14:** The VLA system shall apply the required study hours for all the sections given by the same instructor

**3.1.15 FREQ-15:** The VLA system shall enable the instructor to override manually the required study hours for a task if the required study hours has been inherited from another section.

**3.1.16 FREQ-16:** The VLA system shall notify the student if they are in the 50<sup>th</sup> percentile or lower of the section's average score.

**3.1.17 FREQ-17:** The VLA system shall display next to each task the student's completed hours against the section's average completed hours for the given task.

**4.1.17.1:** for exam tasks, the required study hours and status are those inherited from the assigned material.

**3.1.18 FREQ-18:** The VLA system shall send a notification to the student if they are missing more than 10 hours of required study hours per course. **(Based on an interview with 15 students at LAU, students chose 10 hours to be a good indicator that they are no longer on track)**

**3.1.19 FREQ-19:** The VLA system shall set a status for a task as *not started*, *in progress*, and *complete*.

**4.1.19.1:** all required tasks are initialized at *not started*.

**4.1.19.2:** if a student opens a task, the status turns into *in progress*

**4.1.19.3:** if a student finishes the required study hours, the status turns into *complete*.

**3.1.20 FREQ-20:** The VLA system shall allow the student to manually complete a task and vice versa.

**3.1.21 FREQ-21:** The VLA system shall have a progress bar for tasks that represents how far the student is far from completion based on the total session time and the required study hours task.

**3.1.22 FREQ-22:** The VLA system shall notify the student of the number of *not complete* tasks for every course once every Friday at 16:00.

**3.1.23 FREQ-23:** The VLA system shall enable the student to manually override the time of the number of *not complete* tasks notification.

**3.1.24 FREQ-24:** The VLA system shall enable the student to change the *not complete* tasks notification from being triggered by a time condition to be triggered by the event of exceeding a number of *not complete* tasks defined by the user within a timeframe set by the student.

**3.1.25 FREQ-25:** The VLA system shall have an algorithm that queries all the section material by the user's inputted word to give out all the instructor's uploaded material from the LMS in which the user's keyword matches

**3.1.26 FREQ-26:** The VLA system shall have an algorithm that queries the internet by the user's inputted word to display the three top relevant search engine results.

**3.1.27 FREQ-27:** The VLA system shall have an exams priority algorithm that displays the exam task(s) to be at the top of the tasks list.

**3.1.28 FREQ-28:** The VLA system shall display upon accessing the exam task the assigned material tasks for that exam with inheriting all the functionalities discussed above for tasks.

**3.1.29 FREQ-29:** The VLA system shall display next to each material task inside the exam task the indicator "*Recharge*" or "*Revised*".

**4.1.29.1:** The VLA system shall display *recharge* status if the material task required study hours has been *complete* before two weeks of the user's current day.

**4.1.29.2:** If more than 20% of the material task required study hours has been completed in a time period prior than three weeks from the user's current date, recharge status shall be displayed.

**4.1.29.3:** If the above two conditions are false, the system shall display next to the material task "*Revised*".

**3.1.30 FREQ-30:** The VLA system shall provide a *Cornell Note Taking Method* page that is editable for every material uploaded by instructor.

**3.1.31 FREQ-31:** The VLA system shall enable the student upon accessing the *note taking page* to copy uploaded instructor material text into the note taking page.

**3.1.32 FREQ-32:** The VLA system shall enable the student to an image from the material to be put inside the *note taking page* as a JPEG/JPG formatted image.

**3.1.33 FREQ-33:** The VLA system shall enable the student to download the *note taking page* for each respective material upload as a PDF.

**3.1.34 FREQ-34:** The VLA system shall have an option for a student to combine *note taking pages* for the available material uploaded for downloading as a PDF.

**3.1.35 FREQ-35:** The VLA system shall have an e-mail button next to the instructor in the course page that redirects the user to the mail app.

**3.1.36 FREQ-36:** The VLA system shall have an option for a student to send a text from the *note taking page(s)* an e-mail to the instructor to inquire about the chosen text.

**3.1.37 FREQ-37:** The VLA system shall generate a weekly PDF report every Saturday at 7:00 for every instructor user. The report includes the **not** started, in progress, and completed tasks, the progress of each task, the average of each task of the student against the class, and the average all the tasks of the student against the class.

**3.1.38 FREQ-38:** The VLA system shall install OpenSCAP in its back-end server for the SCAP method.

**3.1.39 FREQ-39:** The VLA shall install and run FiiX© CMMS for maintenance.

**3.1.40 FREQ-40:** The VLA system shall store generated incremental backups on the cloud.

**3.1.41 FREQ-41:** The VLA system shall store generated full backup at LAU premises.

**3.1.42 DFREQ-42:** The VLA system should use BlackBoard color palettes.

**3.1.43 FREQ-43:** The VLA system shall have a toolbar of the search query function to perform the search queries.

**3.1.44 FREQ-44:** The VLA system search query shall enable search by exact keywords given they are mentioned in the slides.

**3.1.45 FREQ-45:** The VLA system search query shall return the matched query in a new window alongside the previously mentioned internet relevant content query.

## **4. System Constraint**

### **4.1 Important Nonfunctional Requirements**

**4.1.1 NFREQ-1:** The system shall provide permission and privileges to the user according to their classification from the LMS software.

**4.1.2 DNFREQ-2:** The system shall run authentication privileges in compliance with the LMS security policy in permissions granted for users.

**4.1.3 NFREQ-3:** Over typical global average internet speed the system shall have a response time of less than 4000 millisecond at the 95<sup>th</sup> percentile.

**4.1.4 NFREQ-4:** The system shall have a processing time of less than 2000 milliseconds for all database transactions and/or processes being performed at the 95<sup>th</sup> percentile

**4.1.5 NFREQ-5:** The system shall have a REST service to support 100 requests per second with queue size of 200 request a second.

**4.1.6 NFREQ-6:** The system shall enforce SCAP security standard.

**4.1.7 NFREQ-7:** The system shall be in up status 99% of the time on the cloud under levels of normal operating volumes and concurrency, with no degradation in application performance.

**4.1.8 NFREQ-8:** The system shall support 10,000 concurrent users.

**4.1.9 NFREQ-9:** The system shall have a storage of size 1 Petabyte to accommodate for all the active users data and back-ups. (50GB/User and 0.5 Petabyte for backups)

**4.1.10 NFREQ-10:** The system shall create incremental backups from Monday to Saturday at 10:00AM.

**4.1.11 NFREQ-11:** The system shall create a full backup weekly on Sunday at 10:00.



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**4.1.12 NFREQ-11:** The system shall export the backed-up data on Sunday at 12:00 on an external hard drive to be transferred into a secure place determined by LAU.

**4.1.13 NFREQ-12:** The system shall store its data using symmetric cryptography.

**4.1.14 DNFREQ-13:** The system shall store sensitive data at LAU premises, Lebanon, to comply with LAU's privacy standards.

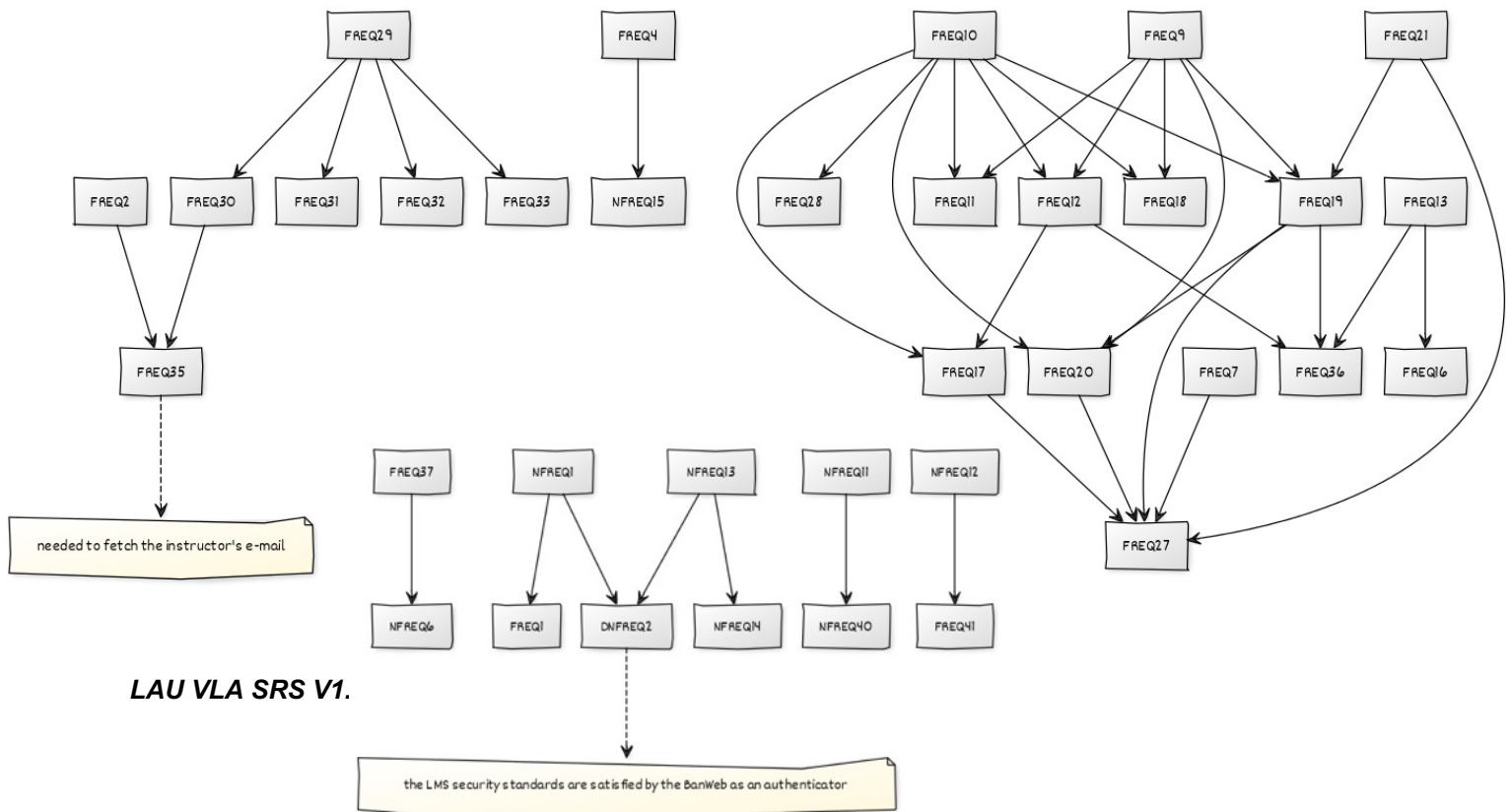
**4.1.15 NFREQ-14:** The system shall only store and/or process files with the following extensions: .JPEG,.JPG,.PDF, .XLSX, .DOC, .DOCX, .PPT, .PPTX, .TXT, .HTML, .CSS, .MP4, .M P3, .AI, .PSD

**4.1.16 NFREQ-15:** The VLA system shall have periodical maintenance on the third Friday of every month between 22:00 and 2:00.

**4.1.17 NFREQ-16:** The VLA system shall run on a RedHat Enterprise cloud-hybrid environment (UNIX Based Architecture).

**4.1.18 NFREQ-17:** The VLA system shall display a wait loading pop-up in case the response time was greater than 4000 millisecond.

## 5. Requirements Evolution



## **6. Conclusion**

This SRS document shall serve to pave a clear pathway for Op-Engineers next phases. The document included detailed information to summarize the key points and system objectives for the stakeholders and system developers. As such, the product scope, a glossary, document conventions, and a reference list was given to supplement all the needed information and an overall description with sections divided into user classes, requirements, and constraints. The preceding section were explained with a high-level and natural language to ensure clarity and transparency. Following that is the more detailed and technical system requirements specification. The system requirements specification was divided into functional and non-functional requirements. A dependency graph was added at the end of the document to visualize the dependencies and help developers to create clear relationships and guidance for them at later stages of the project. Finally, we hope this document served its purpose and has reached your esteemed expectations.