StudyBuddy

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CS34: Web Technologies

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Faculty Intern: Barbara-Marie-Doh

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Introduction

StudyBuddy is a data-driven learning tool designed to support students who study independently. Many self-learners take notes and revise on their own, but still struggle to know how well they truly understand the material. StudyBuddy brings studying, assessment, feedback, and planning into one place, helping students learn with more clarity and purpose. The platform allows students to create and organize notes, and generate quizzes directly from their own study materials using AI. After taking quizzes, students receive correction feedback and performance data that highlights their stance. An administrative layer is included to manage users and control AI usage, since the system relies on a paid AI API.

Architecture

StudyBuddy follows a simple three-tier architecture made up of the frontend, backend, and database, with an external AI service.
The frontend provides a responsive web interface where students interact with the system. Through this interface, users can take notes, organize folders, generate quizzes, view results, and manage their study schedules.
The backend is built with Node.js and Express. It handles application logic such as the user authentication, note and quiz management, scheduling, and communication with the AI API. Express routes manage requests between the frontend and the database, ensuring smooth data flow across the system.
The database uses PostgreSQL, which stores all persistent data securely. This includes user accounts, notes, quizzes, quiz results, study plans, and events. PostgreSQL was chosen for its reliability, strong relational structure, and support for structured and semi-structured data.
StudyBuddy also integrates an external AI API (GROQ) to generate quizzes and power the Buddy chatbot. I hosted the front end with vercel and the back end on railway.

Database

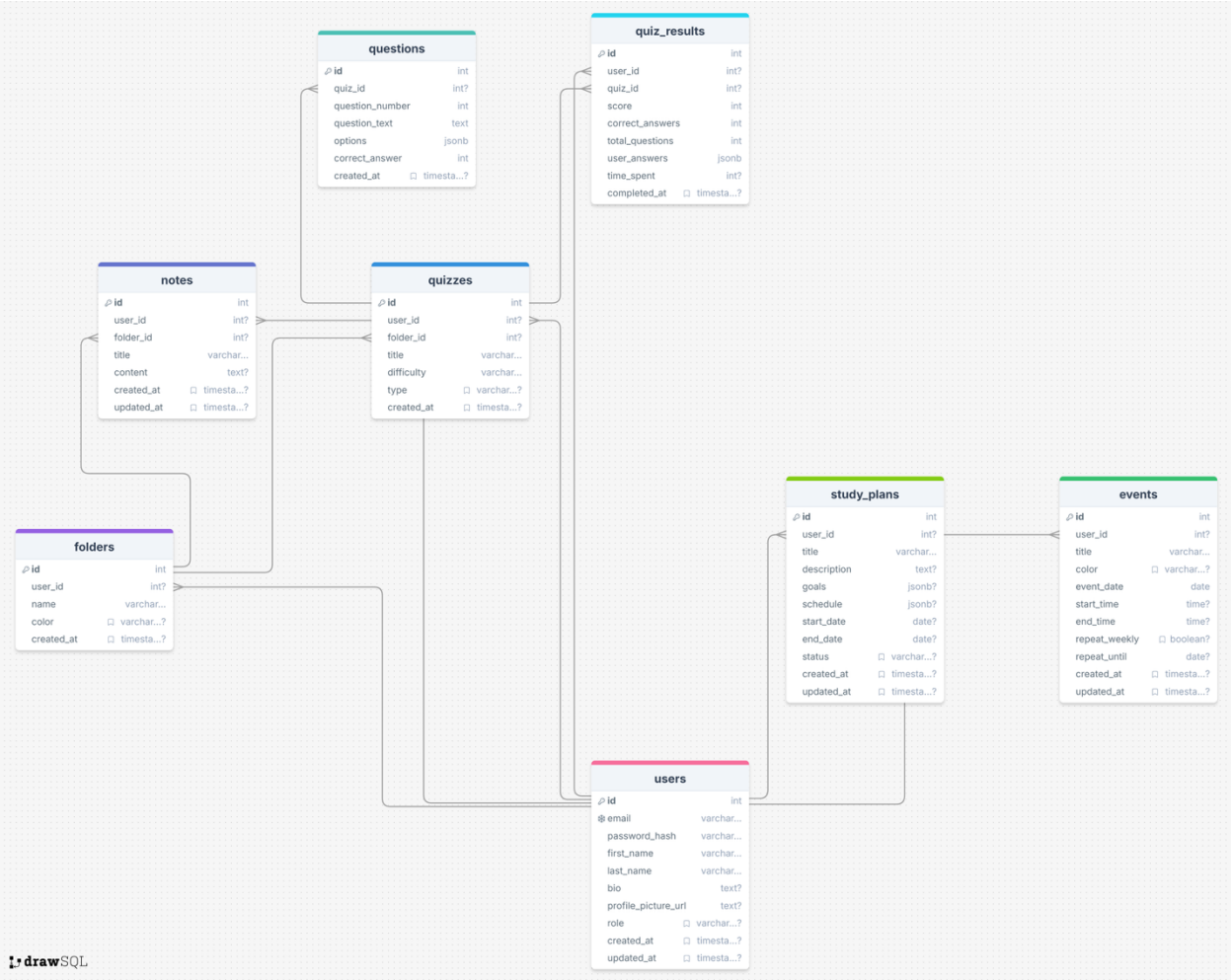
The database is centered around the users table, which stores account details and user roles, whether they are a student or an administrator. Most of the other tables are directly linked to users.

Students can create folders to organize their work. Each folder can contain multiple notes, allowing users to group content by subject or topic. Notes store written content that can later be used for revision or quiz generation.

From notes or uploaded PDFs, students can generate quizzes. Each quiz is linked to multiple questions, which store the question text, answer options, and correct answers. When a quiz is completed, the results are saved in the **quiz_results** table, recording scores, correct responses, time spent, and completion time. This data supports performance tracking and feedback.

For planning and time management, students can create **study_plans**, which define goals and timelines. These plans are linked to specific events, such as study sessions or deadlines, allowing students to manage their schedules effectively within the platform.

Overall, the ER design clearly connects users and their learning content



LINKS

For the slides, this is the viewer's link for the live Canva presentation:
https://www.canva.com/design/DAG7z3i6znk/SFtGFdYt5RZ5D3tjRFLC6A/view?utm_content=DAG7z3i6znk&utm_campaign=designshare&utm_medium=link2&utm_source=uniquelinks&utlId=haa039f4a70

For the presentation Video, this is my YouTube link:
https://youtu.be/s7ZjkdeY76E

For the deployed StudyBuddy website:
https://studybuddy-six-blush.vercel.app/

NB:

With the deployed site, I advise you kindly to use Edge or Safari because Google Chrome is accidentally flagging my site as dangerous, even though I have reached out to them that it is my school project, and they said they would get back to me. I had a lot of API keys and Secrets stored in my .env file and the railway database so setting up locally might be an issue:
For my railway account, I have roughly 25 days more on the free tier I am using for their PostgreSQL and my Backed

For the admin page, these are the credentials:

Email: eldad.opare@gmail.com
Password: Study@Buddy2025

And finally, for the code, this is my GitHub repository link:
https://github.com/EldadOpare/studybuddy.git

AI Usage

AI tools were used in the development of StudyBuddy as supporting aids for productivity and learning, not as substitutes for independent thinking or implementation. All system design, architectural decisions, logic, and testing were carried out by me. AI outputs were treated as suggestions and references, then reviewed, adapted, and validated before I used them.
No sensitive data, such as API keys, credentials, user information, or proprietary content, was shared with any AI system.

Use of Claude (Anthropic)

Claude was used selectively during development to assist with small, well-defined tasks such as clarifying concepts, generating templates, and troubleshooting common issues. Its role was similar to that of technical documentation or an online forum, helping reduce friction during development rather than driving core functionality.

The typical situations I used it for included:

- Generating template files and setup guides
- Explaining why certain errors occurred and how to resolve them
- Assisting with deployment commands and environment configuration
- Clarifying JavaScript interaction patterns
- The MCQ flow UI design in the quizzes and the results
- How to design the calendar more efficiently than the hard-coded one I had.
- The database dummy accounts when I had to test the users page
- The way to have the colour palette and match them in the create event modal
- How to make reusable toast designs
- In the note editor, how to use the browser API for the text formatting features

Sample Prompts and How They Were Used

To demonstrate responsible use, the following examples reflect the type of assistance I requested:

Prompt:

“Generate a simple system prompt template for a chatbot.”

Use:

Helped define a starting structure for the Buddy chatbot’s behavior, which I later refined and constrained.

Prompt:

“Give me the CLI commands needed to deploy a Node.js backend to Railway.”

Use:

Provided deployment command references that were verified and adapted during production setup and the railway cheat sheet site since some of the commands it gave were outdated.

Prompt:

“How do you handle keyboard shortcut combinations in JavaScript event listeners?”

Use:

Used to understand event handling patterns for shortcut-based interactions in the note editor.

Prompt:

“Why might my Groq API stop generating responses?”

Use:

Helped identify context overflow as a possible cause, which informed the decision to limit extracted document text used during quiz generation to ensure stability in the AI’s responses.

Prompt:

“Generate a reusable script that users will use to update their database with my admin’s credentials?”

Use:
This is what I used to do to create the create_admin.js in the database folder that fills their database with the administrator’s details I shared with you earlier.

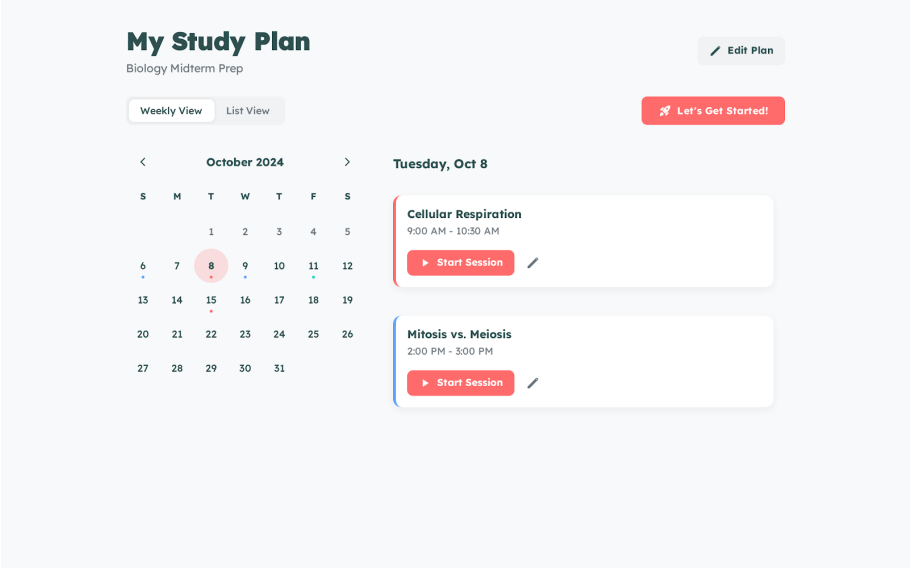
Prompt:
“Generate a template README file and setup guide for my studybuddy project.”

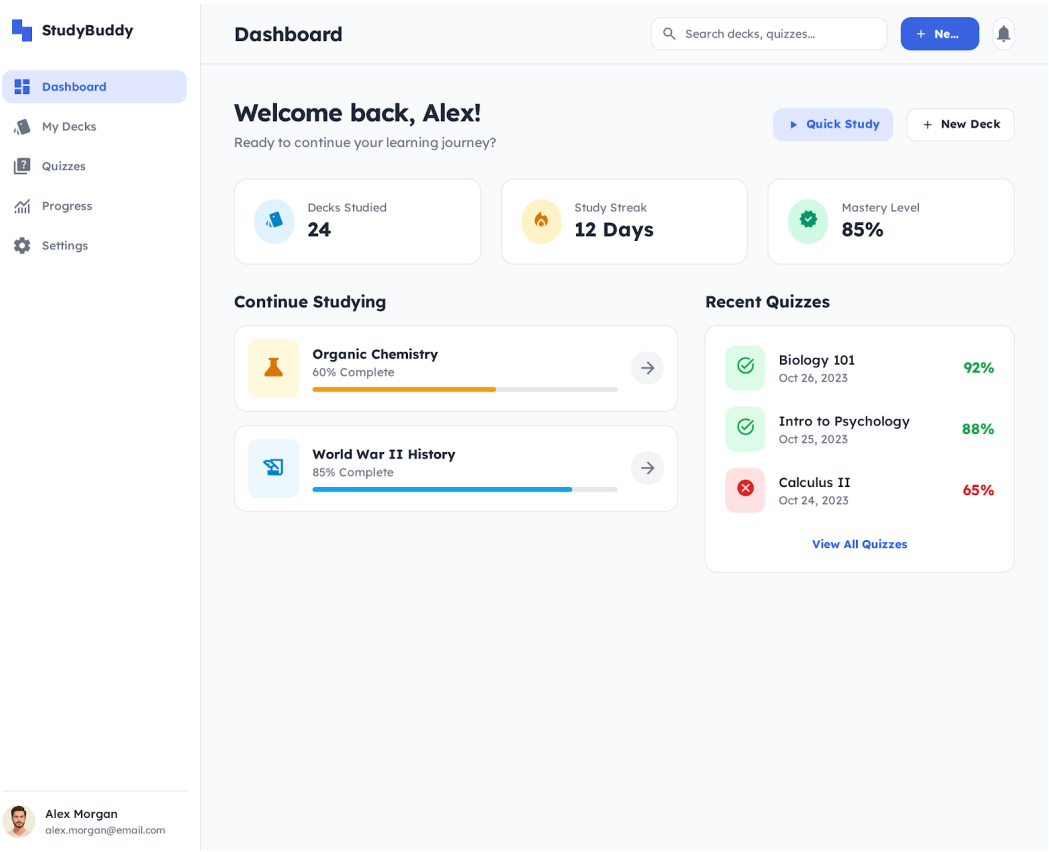
Use:
Provided a documentation starting point that was refined and tweaked for StudyBuddy.

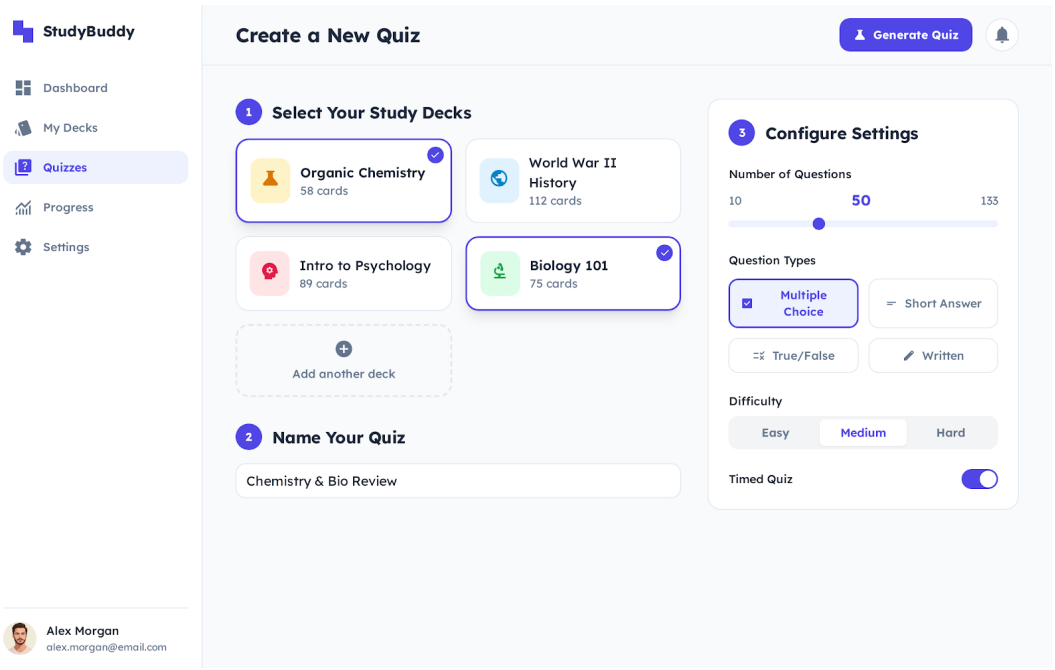
Design Inspiration with Stitch AI

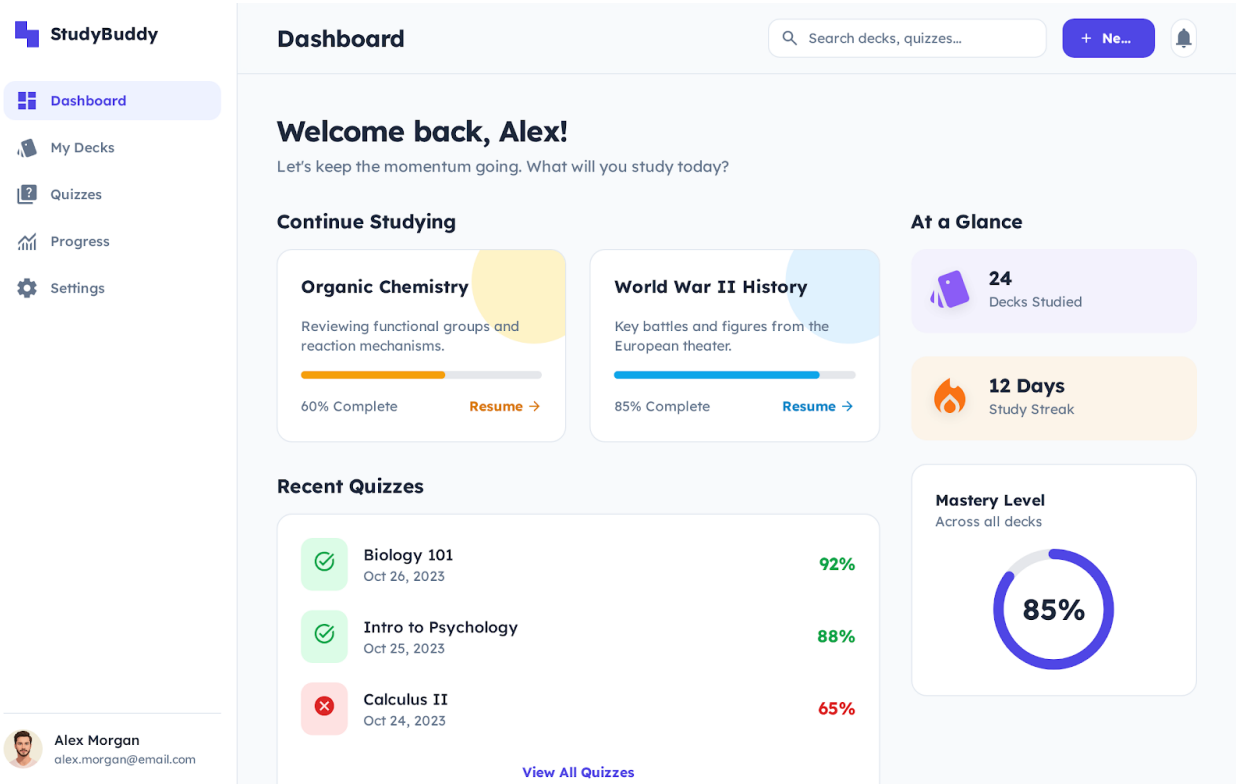
Stitch AI was used briefly for UI design inspiration only. Due to time constraints, it served as a lightweight alternative to Figma, which I used in the previous group projects. Stitch AI generated visual layout ideas for dashboards and content pages.
All user interface implementation, including HTML structure, CSS styling, and responsiveness, was done manually. The tool influenced visual direction but did not generate production code as I just used it as an image generator for UI inspiration.

These are some of the designs I got from stich


My Study Plan
Biology Midterm Prep
Edit Plan
Weekly View
List View
Let's Get Started!
October 2024
S M T W T F S
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
Tuesday, Oct 8
Cellular Respiration
9:00 AM - 10:30 AM
Start Session
Mitosis vs. Meiosis
2:00 PM - 3:00 PM
Start Session


StudyBuddy
Dashboard
My Decks
Quizzes
Progress
Settings
Alex Morgan
alex.morgan@email.com
Dashboard
Search decks, quizzes...
Ne...
Welcome back, Alex!
Ready to continue your learning journey?
Quick Study
New Deck
Decks Studied
24
Study Streak
12 Days
Mastery Level
85%
Continue Studying
Organic Chemistry
60% Complete
World War II History
85% Complete
Recent Quizzes
Biology 101
Oct 26, 2023
92%
Intro to Psychology
Oct 25, 2023
88%
Calculus II
Oct 24, 2023
65%
View All Quizzes


StudyBuddy
Dashboard
My Decks
Quizzes
Progress
Settings
Alex Morgan
alex.morgan@email.com
Create a New Quiz
Generate Quiz
1 Select Your Study Decks
Organic Chemistry
58 cards
World War II History
112 cards
Intro to Psychology
89 cards
Biology 101
75 cards
Add another deck
2 Name Your Quiz
Chemistry & Bio Review
3 Configure Settings
Number of Questions
10
50
133
Question Types
Multiple Choice
Short Answer
True/False
Written
Difficulty
Easy
Medium
Hard
Timed Quiz


StudyBuddy
Dashboard
My Decks
Quizzes
Progress
Settings
Alex Morgan
alex.morgan@email.com
Dashboard
Search decks, quizzes...
Ne...
Welcome back, Alex!
Let's keep the momentum going. What will you study today?
Continue Studying
Organic Chemistry
Reviewing functional groups and reaction mechanisms.
60% Complete
Resume →
World War II History
Key battles and figures from the European theater.
85% Complete
Resume →
Recent Quizzes
Biology 101
Oct 26, 2023
92%
Intro to Psychology
Oct 25, 2023
88%
Calculus II
Oct 24, 2023
65%
View All Quizzes
At a Glance
24
Decks Studied
12 Days
Study Streak
Mastery Level
Across all decks
85%

StudyBuddy

Get Started with StudyBuddy

Unlock your full learning potential.

Sign up with Google

OR

Full Name

Enter your full name

Email Address

Enter your email address

Password

Create a password

Confirm Password

Confirm your password

Create Account

Already have an account? Log In

StudyBuddy

Dashboard

Create Quiz

My Quizzes

Profile

Settings

Alex Johnson
alex.j@email.com

Create Quiz / Upload Materials / Configure Quiz / Generate

Create a New Quiz

Step 1: Upload Your Study Materials

Upload your notes, documents, or PDFs. Our AI will use them to generate questions.

Drag & drop files here

Supports: PDF, DOCX, TXT

Browse Files

Chapter_5_History_Notes.pdf

Biology_Lecture_Slides.docx

Step 2: Configure Your Quiz

Number of Questions

20

Difficulty Level

Easy | Medium | Hard

Question Types

Mix

Time Limit (Optional)

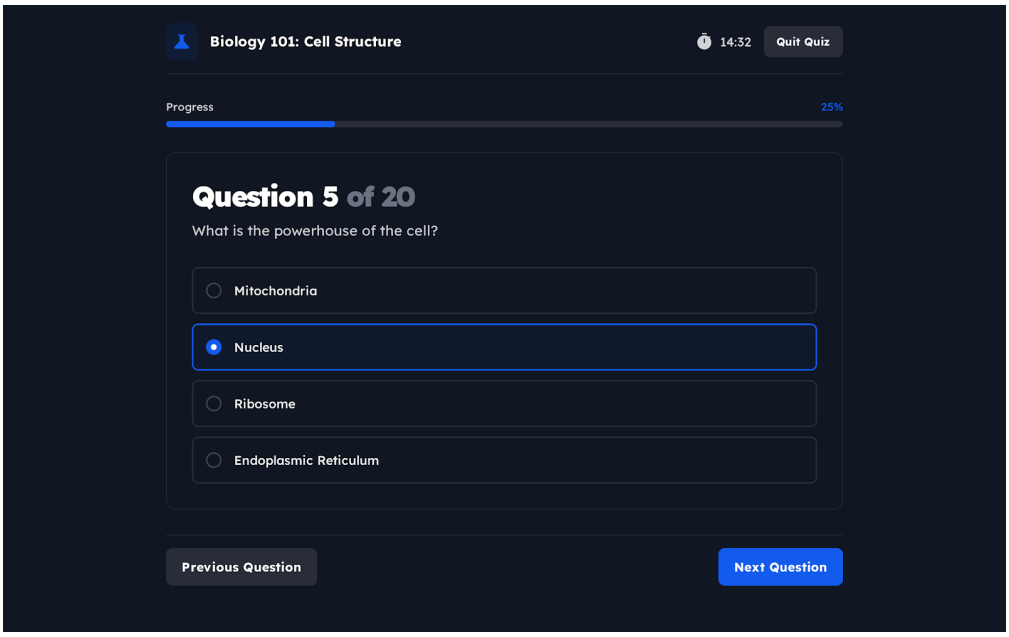
30 minutes

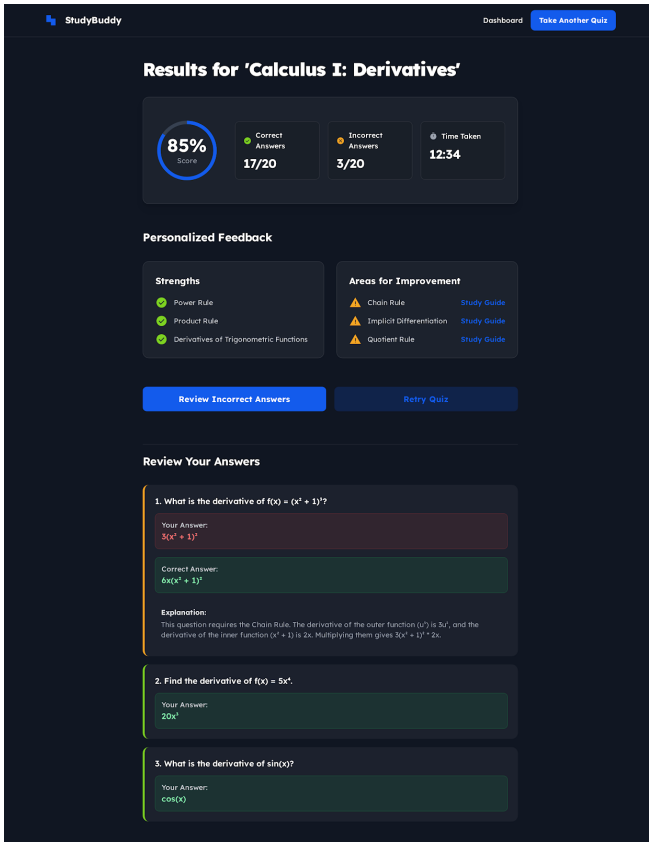
Quiz Summary

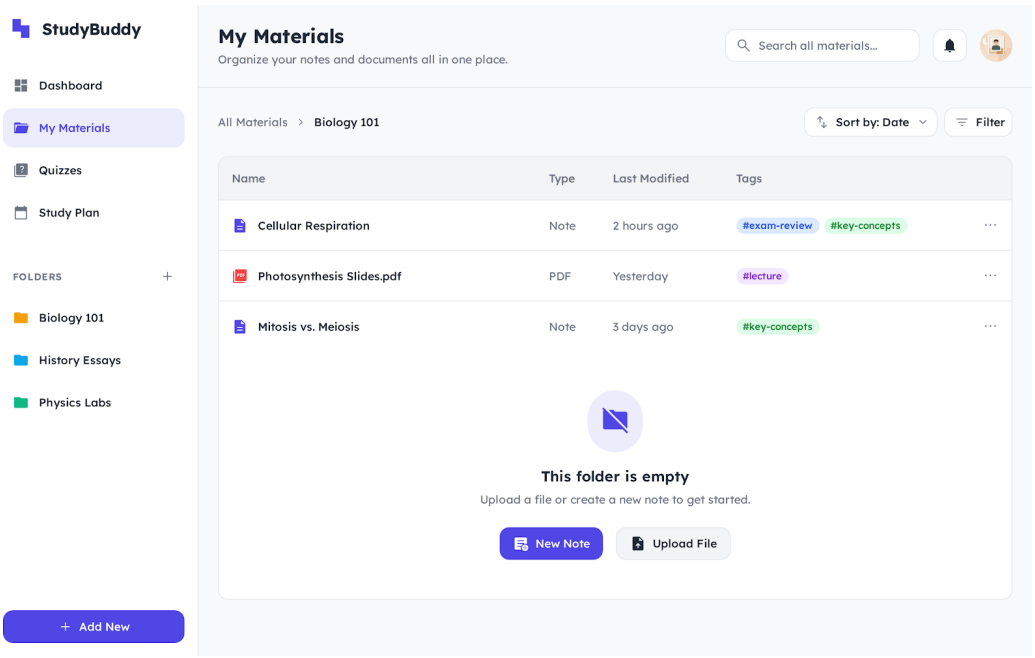
Materials	2 Files
Questions	20
Difficulty	Medium
Question Types	Mix
Time Limit	30 minutes

Generate Quiz

Cancel


Biology 101: Cell Structure
14:32
Quit Quiz
Progress
25%
Question 5 of 20
What is the powerhouse of the cell?
Mitochondria
Nucleus
Ribosome
Endoplasmic Reticulum
Previous Question
Next Question


StudyBuddy
Dashboard
Take Another Quiz
Results for 'Calculus I: Derivatives'
85%
Score
Correct Answers
17/20
Incorrect Answers
3/20
Time Taken
12:34
Personalized Feedback
Strengths
Power Rule
Product Rule
Derivatives of Trigonometric Functions
Areas for Improvement
Chain Rule
Study Guide
Implicit Differentiation
Study Guide
Quotient Rule
Study Guide
Review Incorrect Answers
Retry Quiz
Review Your Answers
1. What is the derivative of f(x) = (x² + 1)³?
Your Answer:
3(x² + 1)²
Correct Answer:
6x(x² + 1)²
Explanation:
This question requires the Chain Rule. The derivative of the outer function (u³) is 3u², and the derivative of the inner function (x² + 1) is 2x. Multiplying them gives 3(x² + 1)² * 2x.
2. Find the derivative of f(x) = 5x⁴.
Your Answer:
20x³
3. What is the derivative of sin(x)?
Your Answer:
cos(x)


StudyBuddy
Dashboard
My Materials
Quizzes
Study Plan
FOLDERS
Biology 101
History Essays
Physics Labs
Add New
My Materials
Organize your notes and documents all in one place.
Search all materials...
All Materials
Biology 101
Sort by: Date
Filter
Name
Type
Last Modified
Tags
Cellular Respiration
Note
2 hours ago
#exam-review
#key-concepts
Photosynthesis Slides.pdf
PDF
Yesterday
#lecture
Mitosis vs. Meiosis
Note
3 days ago
#key-concepts
This folder is empty
Upload a file or create a new note to get started.
New Note
Upload File