



Exploratory Project

Class Timetable Generator

A Full-Stack Solution for Efficient Lecture Planning

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Objective

- **Automate Class Scheduling:** Develop a web-based tool to streamline timetable creation, eliminating manual effort with a custom Python algorithm.
 - **Support Flexible Scheduling Options:** Enable "All Together" (consecutive hours) and "Distributed Across Days" (random 1 or 2-hour blocks) modes for tailored schedules.
 - **Integrate Excel Input:** Allow educators to upload subject, teacher, and venue constraints via Excel for efficient scheduling.
 - **Provide an Intuitive Interface:** Offer a user-friendly web interface for uploading data, selecting scheduling preferences, and viewing multiple generated timetables.
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Project Overview

- **Automation:** Automates class scheduling with a Python algorithm, reducing manual effort and ensuring conflict-free timetables.
- **Excel Processing:** Handles Excel inputs (e.g., timetable_data.xlsx) to schedule classes, respecting teacher/venue availability and fixed slots (e.g., HL 9-11).
- **Multiple Timetable Generation:** Produces two distinct timetables per run, allowing users to choose the best fit.
- **Full-Stack Tech:** Combines a React frontend for interactive display and a Django backend with Python for scheduling logic, using pandas for Excel processing.
- **User-Friendly Design:** Features a clear interface with a subject selection form, timetable table, and dropdown to switch between generated timetables.



Key Features



- **Dual Scheduling Modes:** Supports "All Together" for consecutive hours (e.g., MATH 8-12) and "Distributed Across Days" with random 1 or 2-hour blocks (e.g., HL 10-11, 14-16).
- **Multiple Timetable Generation:** Creates two timetable options per run, accessible via a dropdown for user selection.
- **Excel-Driven Constraints:** Processes timetable_data.xlsx to manage subjects, teacher availability, and fixed lectures (e.g., HL 9-11).
- **Interactive Timetable Display:** Features a table with time slots (8:00-18:00) across Monday to Friday, showing subject and venue details.
- **User-Centric Design:** Simplifies scheduling with a form for subject selection and a clear, navigable timetable output.

How It Works

- **Upload Files:**
- `timetable_data.xlsx`: Includes CS constraints like Subjects (e.g., MATH - BOB), Fixed Lectures (e.g., HL 9-11 Monday), and Teacher Availability.
- **Generate Timetable:** Backend uses a custom Python algorithm (`generate_timetable.py`) to create two conflict-free timetables with "All Together" and "Distributed Across Days" modes.
- **Display:** Presents timetables in a table format (8:00-18:00, Monday-Friday), with a dropdown to switch between the two generated options.



Technical Architecture

- **Frontend:** React with components for UI rendering, axios for API calls, and js-cookie for CSRF token management.
- **Backend:** Django handles file uploads and API endpoints, with pandas parsing Excel data and a custom Python script (generate_timetable.py) for scheduling.
- **Data Flow:** Files → Django views.py → generate_timetable.py (scheduling logic) → JSON response → React UI.
- **Key Libraries:** pandas and openpyxl for Excel processing, with Python's logging for debugging.



Project Specialities

- **Custom Scheduling Logic:** Uses a Python algorithm to ensure conflict-free schedules with "All Together" and "Distributed Across Days" options.
- **Multiple Timetable Outputs:** Generates two timetable options per run, enhancing flexibility for educators to select the best schedule.
- **Seamless Excel Integration:** Processes Excel data to enforce constraints like teacher availability and fixed lectures effortlessly.
- **Intuitive User Interface:** Combines a React frontend with a table display and dropdown navigation for a smooth user experience.



Demo Snapshots

Timetable Generator

Choose File

No file chosen

Upload

Select Subject

Hours per week

1st Year

Distributed Across Days

Add Subject

Selected Subjects

Generate Timetables



Demo Snapshots (Input)

Subjects

	A	B	C	D	
1	Subject	Teacher	Year	Hours	
2	MATH	BOB	1st Year	3	
3	PHYSICS	ALICE	1st Year	4	
4	CHEMISTR	CAROL	1st Year	2	
5	BIOLOGY	DAVE	1st Year	2	

Venues

	A	
1	Venue	
2	LT-1.11	
3	LT-2	

Fixed Lectures

	A	B	C	D	E	F	G
1	Subject	Teacher	Year	Day	Start Hour	End Hour	Venue
2	HL	CAROL	1st Year	Monday	9	11	LT-1.11
3	OE	BOB	1st Year	Tuesday	13	15	LT-2

Teacher Availability

	A	B	C	D	E	F
1	Teacher	Monday	Tuesday	Wednesday	Thursday	Friday
2	ALICE	10-12,15-18	10-12,15-18	10-12,15-18	10-12,15-18	10-12,15-18
3	BOB	8-11,13-16	8-11,13-16	8-11,13-16	8-11,13-16	8-11,13-16
4	CAROL	9-11,13-18	9-11,13-18	9-11,13-18	9-11,13-18	9-11,13-18
5	DAVE	11-12,14-18	11-12,14-18	11-12,14-18	11-12,14-18	11-12,14-18

Venue Availability

	A	B	C	D	E	F
1	Venue	Monday	Tuesday	Wednesday	Thursday	Friday
2	LT-1.11	8-12,13-18	8-12,13-18	8-12,13-18	8-12,13-18	8-12,13-18
3	LT-2	8-12,13-18	8-12,13-18	8-12,13-18	8-12,13-18	8-12,13-18



Output

Select Subject ▾

Hours per week

1st Year ▾

Distributed Across Days ▾

Add Subject

Selected Subjects

- MATH - BOB - 4 hours - 1st Year - all_together
- PHYSICS - ALICE - 3 hours - 1st Year - distributed
- CHEMISTRY - CAROL - 4 hours - 1st Year - distributed
- BIOLOGY - DAVE - 2 hours - 1st Year - distributed

Generate Timetables

Generated Timetables

Timetable 1 ▾

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8-9					
9-10	HL, LT-1.11		CHEMISTRY, LT-2		
10-11	HL, LT-1.11		CHEMISTRY, LT-2	PHYSICS, LT-2	
11-12		BIOLOGY, LT-2		PHYSICS, LT-2	
12-13					
13-14		OE, LT-2			
14-15	CHEMISTRY, LT-2	OE, LT-2			
15-16	CHEMISTRY, LT-2				
16-17	BIOLOGY, LT-2				
17-18					PHYSICS, LT-2

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The End



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