

Indian Institute of Information Technology, Dharwad

# Automated Time Table Generator

## User Manual

**Developed by:** Software Sages

**Version:** 1.0

**Date:** Nov, 2025



# Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>System Requirements</b>	<b>2</b>
2.1	Software Requirements . . . . .	2
2.2	Installation . . . . .	2
<b>3</b>	<b>Folder Structure</b>	<b>2</b>
<b>4</b>	<b>Input File Specifications</b>	<b>3</b>
4.1	1. rooms.csv . . . . .	3
4.2	2. Course Files (courses*.csv) . . . . .	3
4.3	3. time_slots.json . . . . .	3
<b>5</b>	<b>Usage Instructions</b>	<b>3</b>
5.1	1. Generate Class Timetable . . . . .	3
5.2	2. Generate Exam Schedule . . . . .	4
5.3	3. Generate Faculty Timetables . . . . .	4
<b>6</b>	<b>Module Descriptions</b>	<b>4</b>
6.1	timetable.py — Class Timetable Generator . . . . .	4
6.1.1	Outputs . . . . .	4
6.2	exam.py — Automated Exam Scheduler . . . . .	4
6.2.1	Outputs . . . . .	5
6.3	faculty.py — Faculty Timetable Generator . . . . .	5
6.3.1	Outputs . . . . .	5
<b>7</b>	<b>Troubleshooting</b>	<b>5</b>
<b>8</b>	<b>Conclusion</b>	<b>5</b>

# 1 Introduction

This project provides a complete automation suite for academic scheduling. It consists of three independent but interconnected Python modules:

- **timetable.py** — Generates balanced class timetables.
- **exam.py** — Generates exam schedules with room allocation and invigilation.
- **faculty.py** — Generates individual timetables for each faculty member.

All modules produce professional Excel outputs using the `openpyxl` engine and support multi-department, multi-semester scheduling.

## 2 System Requirements

### 2.1 Software Requirements

- Python 3.10+
- Required Python libraries:
  - `pandas`
  - `openpyxl`
  - `re` (built-in)
  - `datetime` (built-in)

### 2.2 Installation

Install dependencies:

```
pip install pandas openpyxl
```

## 3 Folder Structure

```
timetable.py
exam.py
faculty.py
data/
    rooms.csv
    faculty.csv
    time_slots.json
    courses*.csv
Balanced_Timetable_latest.xlsx
final_exam_schedule.xlsx
Faculty_Timetable_Grid_*.xlsx
```

## 4 Input File Specifications

### 4.1 1. rooms.csv

Mandatory columns:

- Room\_ID
- Capacity
- Type
- Facilities

### 4.2 2. Course Files (courses\*.csv)

Each course CSV must include:

- Course\_Code
- Course\_Title
- L-T-P-S-C
- Faculty
- Semester\_Half
- Elective
- Students

### 4.3 3. time\_slots.json

Example:

```
{  
    "time_slots": [  
        { "start": "09:00", "end": "10:00" },  
        { "start": "10:00", "end": "11:00" }  
    ]  
}
```

## 5 Usage Instructions

### 5.1 1. Generate Class Timetable

Run:

```
python timetable.py
```

Output:

Balanced\_Timetable\_latest.xlsx

## **5.2 2. Generate Exam Schedule**

Run:

```
python exam.py
```

Output:

```
final_exam_schedule.xlsx
```

## **5.3 3. Generate Faculty Timetables**

Run:

```
python faculty.py
```

Output:

```
Faculty_Timetable_Grid_<timestamp>.xlsx
```

# **6 Module Descriptions**

## **6.1 timetable.py — Class Timetable Generator**

This module:

- Allocates course slots based on L/T/P hours.
- Ensures no faculty conflicts.
- Matches classrooms/labs based on capacity.
- Synchronizes elective baskets across groups.
- Avoids break time slots.
- Colors and merges identical adjacent cells in Excel.

### **6.1.1 Outputs**

- Section-wise timetables
- Legends for each department
- Fully color-coded sheets

## **6.2 exam.py — Automated Exam Scheduler**

Handles:

- Merged exam scheduling across departments.
- Max 1 exam/group/day.
- Max 4 total exams/day.

- Half-capacity rule for seating.
- Hall-last room allocation.
- Morning/afternoon elective splitting.
- Automatic invigilator assignment.

### 6.2.1 Outputs

- Merged exam sheet
- Exam grid (Date × Slot)
- Course legend
- Colored, readable Excel format

## 6.3 faculty.py — Faculty Timetable Generator

This module:

- Reads the generated class timetable.
- Extracts Day × Slot × Room × Course.
- Maps course codes to faculty using CSVs.
- Creates individual sheets for each faculty member.

### 6.3.1 Outputs

- All faculty timetables
- Index sheet listing all faculty and total class count

## 7 Troubleshooting

- **Missing CSV columns:** Check for correct headers (case-sensitive).
- **Faculty not assigned:** Ensure Faculty column is not empty.
- **Empty timetable blocks:** Course may have 0 students.
- **Overlapping slots:** Check elective basket definitions.

## 8 Conclusion

This automation suite significantly reduces manual effort in:

- Class timetable preparation
- Exam planning and room allocation
- Faculty timetable creation

It ensures fairness, accuracy, and consistency across departments.