Course Scheduler Guide

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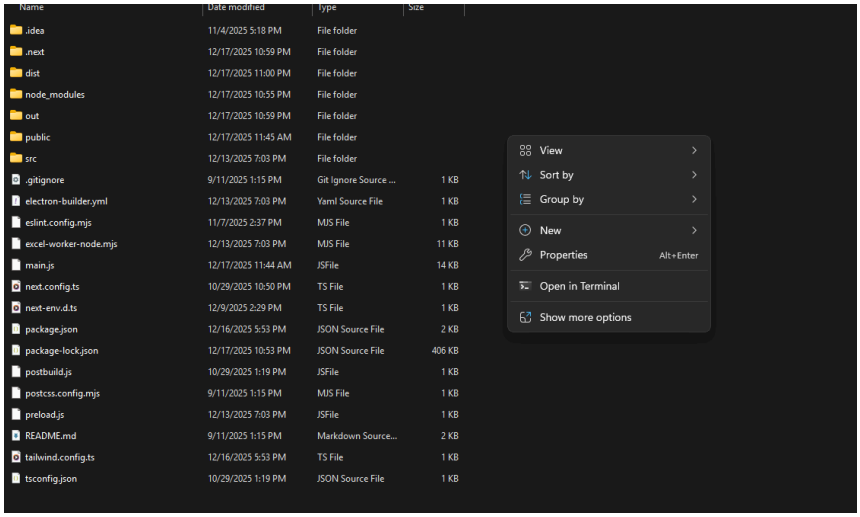
Installation

Installer

If you have the installer exe file, then installation is simple. Click on the file that has a title like this: “course-scheduler-frontend Setup 0.1.0.exe”. There may be a pop-up that says the program is not trusted. In that case, click **More Info**, and then **Run Anyway**. An installation will start on your computer, and the app will open when it is done. It will also create a shortcut on your desktop. You can now begin using the app.

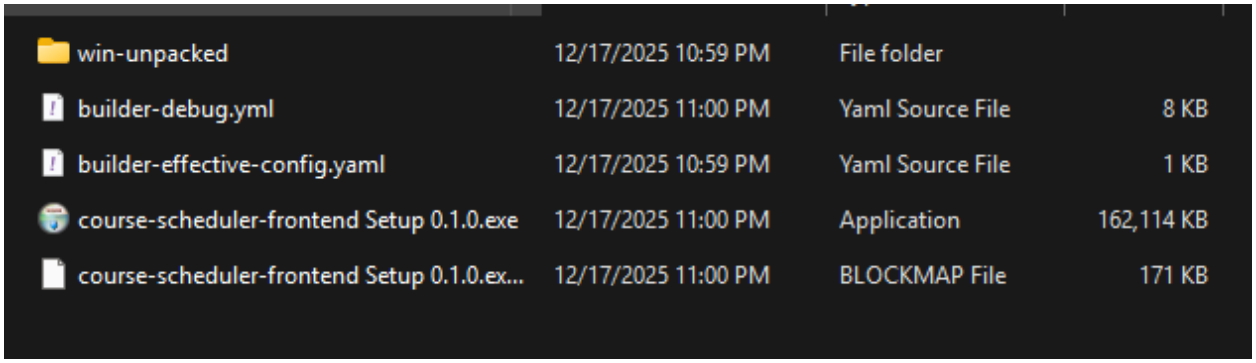
Building From Scratch

If you want to download the app but don’t have the installer .exe file, you will need to rebuild it by navigating to the code folder. Inside the code folder will be many different folders and files. Ensure you are in the **course-scheduler** folder. Right-click in the folder to open the context menu and click **Open in Terminal** (see below).

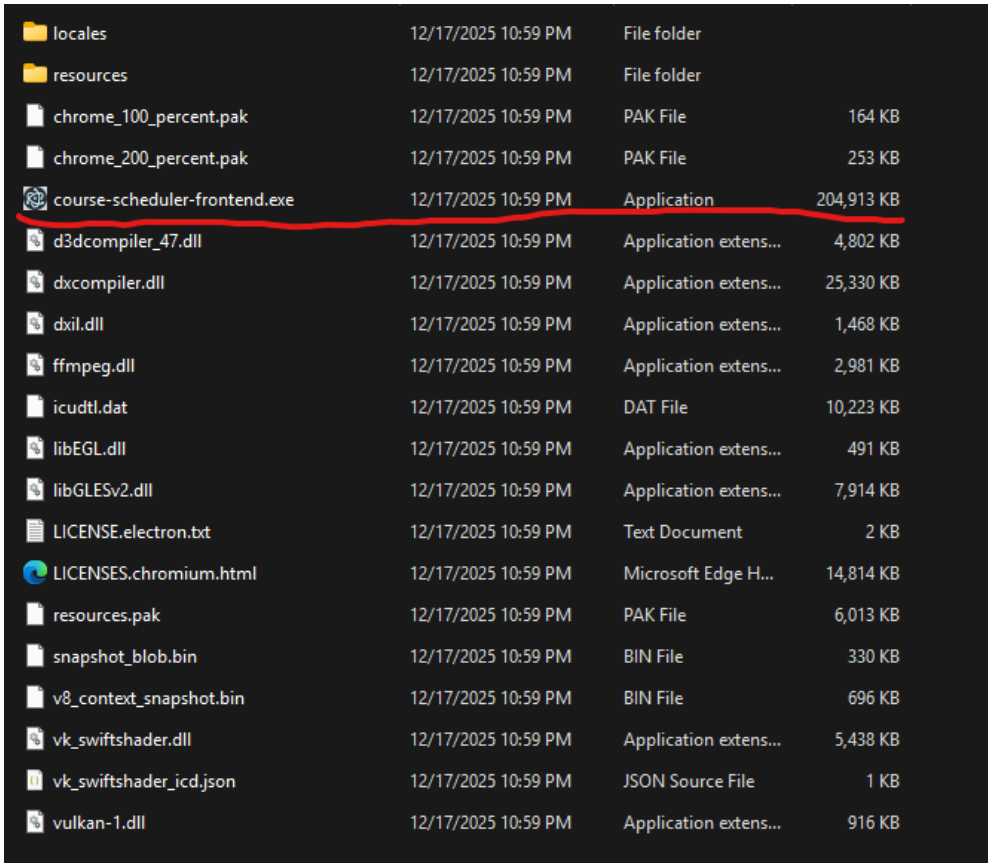


Before being able to run the build script, you need to have Node.js and npm installed. Follow [these instructions] to do so. Once you have that installed, type `npm install` in the

terminal. This will install all of the necessary dependencies for the program. Once that is done, type `npm run electron-build`. This may take over a minute to complete. Once it is done, navigate to the **dist** folder that is pictured in the directory above. In that folder, there will be an installer executable file, and then you can follow the instructions in the Installer section.



Alternatively, you can navigate to the **win-unpacked** folder, which will contain the actual executable of the app. If you click on that, it will start the app.



Home Page

The Home page serves as the central hub for managing schedule versions and navigating the application. Its primary function is **Schedule Management** (Saving/Loading) and providing access to other tools via the navigation bar.

1. Navigation Bar

Located at the top of the screen, this persistent menu allows you to switch between the application's different modules:

- **Home:** Return to this dashboard.
- **Summary:** View high-level statistics and data summaries.
- **Schedule Visualizer:** A graphical calendar view of the schedule.
- **Courses:** Manage course details and sections.
- **Lab Schedule:** Specific management for lab sections.
- **Instructor Preferences:** View or edit professor availability and preferences.
- **Conflicts:** Check for scheduling conflicts.
- **Generate:** Tools for automated schedule generation.



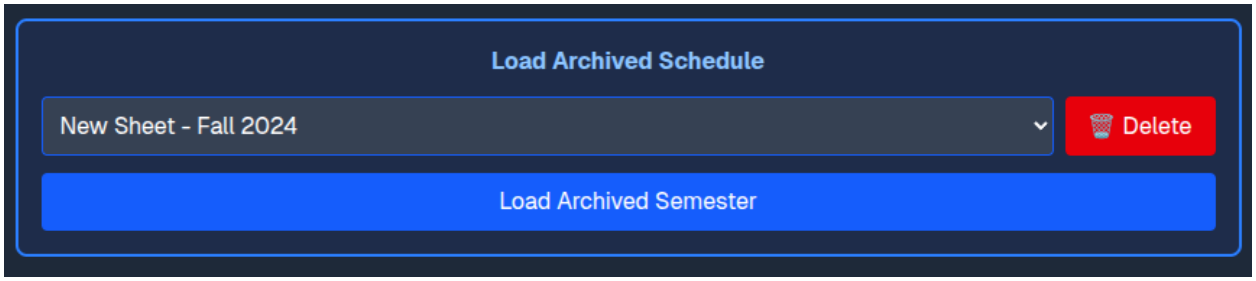
2. Schedule Management Section

This is the main workspace on the Home page, used to save your work ("Archive") or load previous versions.

A. Load Archived Schedule

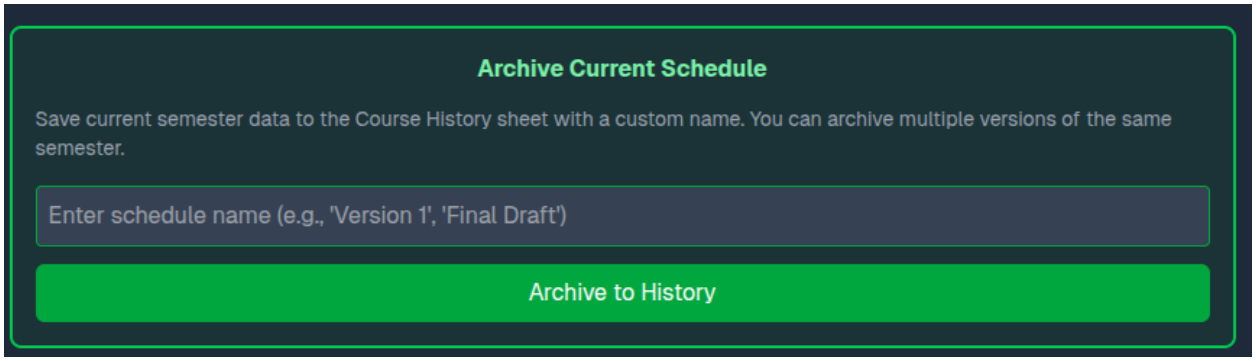
- Use this panel to retrieve a previously saved schedule from the database (Excel file).
- If there are no schedules archived then this panel will be hidden. Saving a schedule to the archive will make it appear.
- **Select Schedule:** Use the dropdown menu to choose a specific version (listed by Name and Semester).
- **Load Button:** Click **"Load Archived Semester"** to bring that schedule's data into the active workspace.
    - Note: If you have unsaved changes in your current session, the system will prompt you to save them before loading the new file to prevent data loss.

- **Delete Button (🗑️):** Click the red trash icon next to the dropdown to permanently delete the selected archive version.



B. Archive Current Schedule (Save)

- Use this panel to save your current work.
- **Schedule Name:** Enter a descriptive name for your current version (e.g., "Fall 2024 Draft 1", "Final Version").
- **Archive Button:** Click **"Archive to History"** to save all current sections, courses, and assignments to the master file.
- Tip: You can save multiple versions of the same semester by giving them different names.



C. Status Indicators

- **Master Status:** Displays messages (e.g., "✅ Loaded") to confirm successful actions or alert you to errors.
- **Schedule Indicator:** (Located below the header) Shows the name of the currently active schedule and semester you are working on.

Troubleshooting:

If you ever find the app running slower than usual, or it freezes up, consider looking at the master file and see if the section assignments sheet or course history sheet has too many entries. If, for some reason, the archive won't delete with the button, then you can navigate to

the course history sheet, too, and delete it from there. If you notice there is too many entries in the Load from Archive option (that you did not archive), the formatting is likely outdated in the **Course History** sheet in the master file. Therefore, you should manually delete them in the master file.

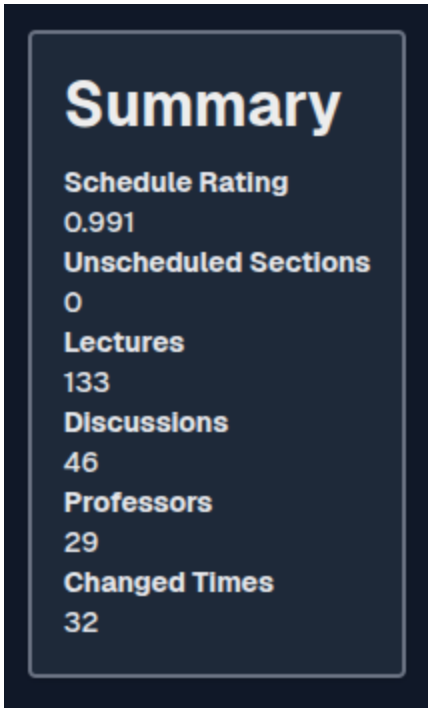
Summary Page

The Summary page provides an automated evaluation and statistical breakdown of your current course schedule. It is used to quickly assess the quality of a schedule and identify potential issues before finalizing it.

1. Statistics Dashboard

This section displays key metrics about the active schedule:

- **Schedule Rating:** A numerical score representing the overall "health" or quality of the schedule based on algorithmic criteria. The closer the score is to 1.0, the better the schedule is rated. If the schedule has a rating of 0 that means a hard constraint is being violated. The score on this page does not consider the penalty of switching course times, unlike the score on the generate page.
- **Unscheduled Sections:** The number of sections that have not yet been assigned a valid time or location.
- **Lectures & Discussions:** A count of the total number of lecture sections and discussion sections currently in the system.
- **Professors:** The total number of unique instructors assigned or involved in the schedule.
- **Changed Times:** Tracks the number of sections where the scheduled time has been modified from its original or preferred state.



2. Schedule Analysis

This section generates a report of specific observations, warnings, or conflicts discovered within the schedule. Most warnings give some level of indication of how much impact it has on the schedule rating. Warnings are ordered from lowest rating (most critical) to highest rating (least critical.

- Color-Coded Warnings (⚠):
    - **Neutral:** 0.8-0.9 Low-priority observations or minor notes.
    - **Yellow:** 0.5-0.8 Moderate warnings or deviations from ideal preferences.
    - **Red:** 0-0.5 High-priority issues or critical conflicts that likely require immediate attention.
- **Issue Breakdown:** Each analysis item includes a **Title** describing the problem and a list of specific **Reasons** explaining exactly why the warning was triggered (e.g., specific professor overlaps or room capacity issues).
- **"No conflicts found!":** If this message appears, your schedule meets all analyzed constraints and preferences.



3. Data Loading

- The page automatically re-analyzes the schedule whenever you navigate to it or when the underlying master file data is updated.
- If the data is still loading, a "Loading course data..." screen will appear until the analysis is complete.

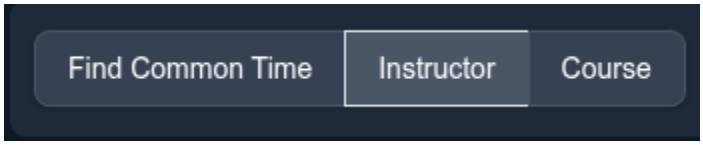
Schedule Visualizer Page

The Schedule Visualizer is a powerful calendar tool that provides a graphical representation of the schedule. It allows you to view, compare, and edit course timings in an intuitive weekly grid format.

1. View Modes

Use the toggle buttons at the top to switch between different visualization strategies:

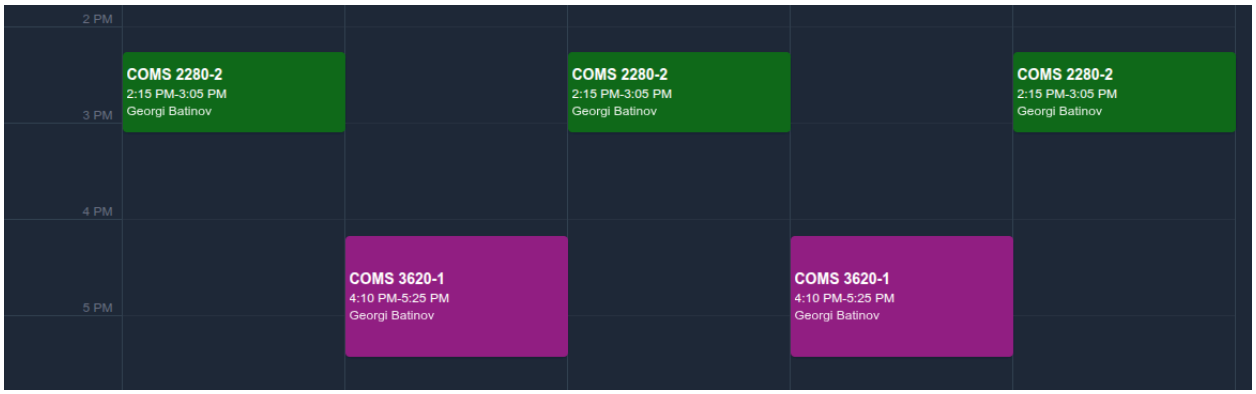
- **Instructor Mode:**
    - **Goal:** Check an individual professor's teaching load.
    - **Usage:** Select a professor from the dropdown to see only their assigned sections on the calendar.
- **Course Mode:**
    - **Goal:** Visualize when specific courses are offered.
    - **Usage:** Select one or multiple courses (e.g., "CS 101", "CS 102") to see all their sections overlaid on the same grid. This is perfect for checking if core requirements overlap.
- **Find Common Time (Compare Mode):**
    - **Goal:** Find free time slots shared by a group of professors (e.g., for scheduling a department meeting).
    - **Usage:** Select multiple professors. The calendar will calculate and display **"Available"** green blocks where all selected instructors are free.



2. Calendar Grid

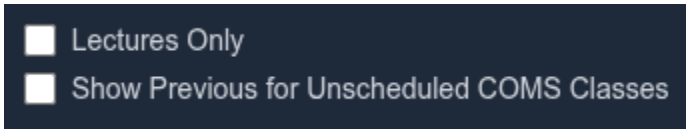
- **Structure:** A standard Monday–Friday weekly view, running from 7:00 AM to 6:00 PM.
- **Event Blocks:**
    - **Standard Sections:** Colored blocks representing scheduled classes.
    - **"Previous" Sections:** (Optional) Orange blocks showing where a section was scheduled in a past semester.
    - **Free Time:** Green blocks (in Compare Mode) indicating shared availability.
- **Interactions:**

- **Hover:** Hovering over a block reveals detailed information (Course Code, Title, Professor, Exact Time).
- **Clustering:** If multiple events overlap (e.g., two classes at the same time), they are visually stacked. Clicking a stack expands it into a detailed "pop-out" grid so you can see every individual event.
- **Edit:** Click the **pencil icon** in the top-right corner of any event block to open the **Section Edit Modal**, allowing you to change its time, room, or instructor directly from the calendar.



3. Filters

- **Lectures Only:** A checkbox to hide labs, discussions, and other non-lecture components, providing a cleaner view of the core teaching schedule.
- **Show Previous for Unscheduled:** If a course hasn't been scheduled yet for the current semester, this option displays its time slot from the previous archive (marked in orange). This helps you maintain historical consistency.



Courses Page

The Courses page is the primary interface for managing the department's curriculum and individual course sections. It provides a detailed view of all offerings and allows for granular editing of course metadata and scheduling details.

1. Searching and Filtering

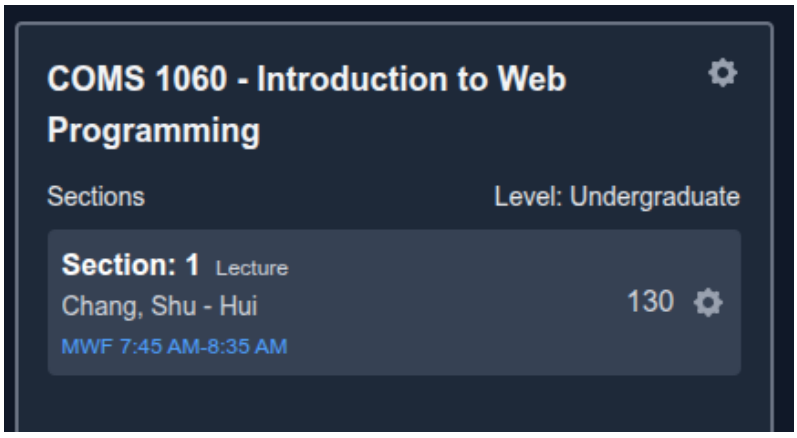
- **Search Bar:** Filter the list of courses by course code, title, section identifier, professor name, or scheduled time.
    - Tip: Searching for **"TBD"** will show all lecture sections that do not currently have an assigned instructor.
- **Section Type Filter:** Use the dropdown menu to filter courses by specific components, such as **Lectures**, **Discussions**, **Labs**, or **Seminars**. You can select multiple types simultaneously.
- **Hide Empty Courses:** A toggle switch to filter out courses that do not have any sections currently assigned or that don't match your active filters.



2. Course Cards

Each course is displayed in a dedicated card containing:

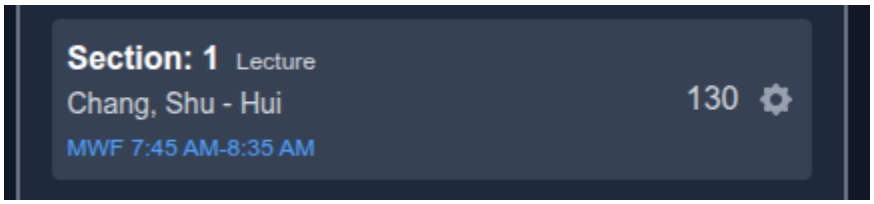
- **Header:** Displays the course definition (e.g., "CS 101: Introduction to Programming") and the academic level (Undergraduate/Graduate).
- **Edit Course (⚙):** Clicking the gear icon in the top right of the card opens a modal to edit course-level settings.
- **Section List:** A breakdown of all sections associated with that course.



3. Section Details

Within each course card, individual sections are listed with the following information:

- **Section ID & Type:** Displays the section number (e.g., "Section: 01") and its type (e.g., "Lecture").
- **Instructor:** The name of the assigned professor (or "TBD" if unassigned).
- **Time & Modality:** Shows the scheduled meeting time and labels for **Online** or **Arranged** sections.
- **Capacity:** The student enrollment limit for that section.
- **Edit Section (⚙):** Clicking the gear icon next to a specific section opens a modal to modify its specific details, such as instructor assignment, time slots, or capacity.



4. Data Management

- **Local Persistence:** Your filter preferences (Section Type and "Hide Empty" status) are remembered by your browser and will persist even if you refresh the page.
- **Master File Sync:** Edits made to courses or sections on this page are updated in the application's central data store and are ready to be archived to the master Excel file via the Home page.

Lab Schedule Page

The Lab Schedule page is a dedicated workspace for managing laboratory and experiential course sections. It provides a specialized grid view to assign labs to specific physical resources (tables) and time slots, ensuring optimal use of limited lab space.

1. Interface Overview

- **Tables:** The core organizational unit of this page. You can create multiple "Tables" representing different physical lab spaces, student groups, or equipment setups.
- **Grid System:** Each table displays a weekly calendar (Monday–Friday) with pre-defined time slots tailored for lab sessions (e.g., 7:45 AM, 9:55 AM, etc.).

2. Managing Tables

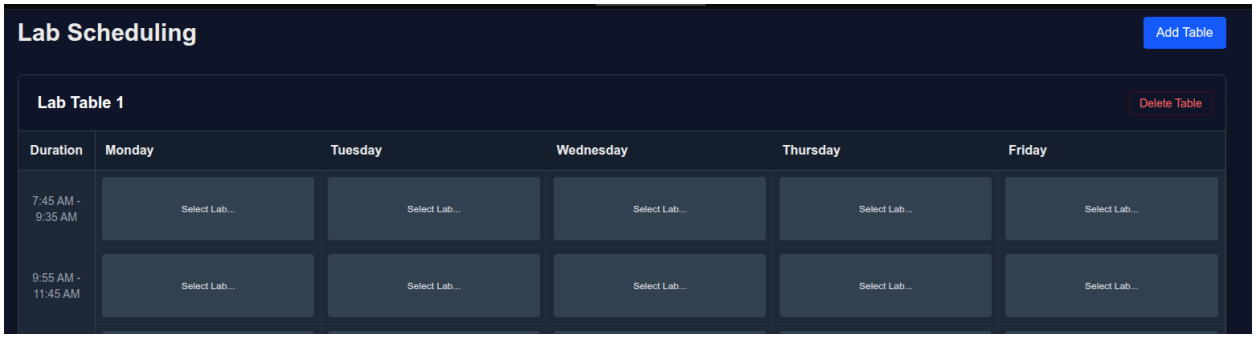
- **Add Table:** Click the **"Add Table"** button in the top right to create a new scheduling grid.
- **Rename Table:** Click directly on the table name (e.g., "Lab Table 1") to edit it. This is useful for labeling specific rooms or equipment clusters.
- **Delete Table:** Click the **"Delete Table"** button in the table header to remove that grid. **Warning:** This will unassign all lab sections currently scheduled on that table.

3. Scheduling Labs

- Assigning a Lab:
    - Locate an empty time slot on the desired day and table.
    - Click the dropdown menu ("Select Lab...") within that cell.
    - Choose a lab section from the list of **Available Labs** (labs that have not yet been scheduled).
- **Viewing Assignments:** Once assigned, the cell will turn indigo and display the course code (e.g., "CS 101-01").
- **Removing an Assignment:** Hover over a scheduled lab block and click the **"X"** icon that appears in the bottom right corner. This returns the section to the "Available Labs" pool.

4. Saving

- **Auto-Save:** Like other scheduling pages, your changes are automatically saved to the master file a few seconds after your last edit. A "Saving..." indicator will appear at the top of the screen.
- **Force Save:** Navigating away from the page triggers an immediate save to prevent data loss.



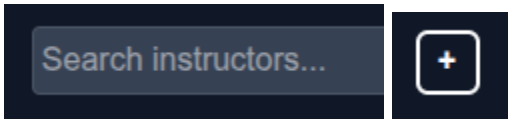
Note: This page may not restore correctly when loading from archive

Instructor Preferences Page

The Instructor Preferences page is the central hub for managing faculty data and their specific teaching constraints. This tool ensures that the generated schedule respects the availability and workload preferences of each professor.

1. Navigation & Search

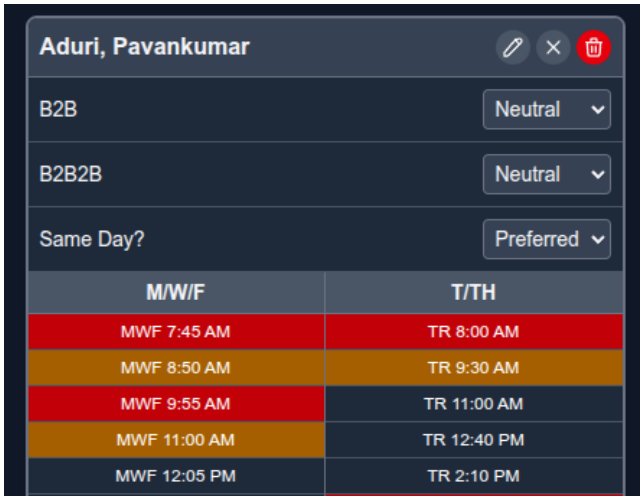
- **Search Bar:** Located at the top, use this to filter the list of instructors by name.
- **Add Instructor (+):** A button at the bottom of the grid allows you to create a new instructor profile from scratch.



2. Instructor Cards

Each professor is displayed as a comprehensive card containing their settings:

- Identity Management:
    - **Rename:** Click the professor's name or the pencil icon to edit their display name.
    - **Unassign (X):** The "X" icon removes all currently assigned sections for this instructor in the active schedule, freeing them up without deleting the instructor profile.
    - **Delete (🗑️):** The red trash can icon **permanently deletes** the instructor and all their stored preferences from the system. Use with caution.
- General Preferences:
    - **B2B (Back-to-Back):** Preference for teaching classes consecutively (Preferred, Neutral, Deferred).
    - **B2B2B (Three in a Row):** Preference for teaching three classes consecutively.
    - **Same Day:** Preference for consolidating teaching load onto specific days (e.g., all T/Th).



3. Availability Grid (Time Slots)

The core of the preference system is the interactive weekly grid (M/W/F and T/TH columns):

- **Interaction:** Click any time slot to cycle through preference levels, or click and drag to paint multiple slots at once.
- Preference Levels:
    - **White: Preferred** (Ideal teaching time).
    - **Yellow: Neutral** (Acceptable if necessary).
    - **Red: Deferred** (Cannot teach or strongly dislikes).

TIPS: Since there are a couple of times that are commonly untaught (MWF 7:45 AM, MWF 4:25 PM (Department meetings), MWF 5:30 PM, TR 8:00 AM), it is recommended that you set the tiles for every instructor **Red** in those slots, unless they actually want to teach at that time. Otherwise, use the **Red** option carefully; otherwise, it could prevent a schedule from generating. If you notice that a professor has low happiness, try changing that preference from **Yellow** to **Red**, and regenerate the schedule.

4. Saving Data

- **Auto-Save:** The system automatically saves changes to the master file shortly after you stop interacting with the page. A "Saving..." indicator in the header confirms this action.
- **Safety:** Navigating away from the page triggers an immediate save to ensure no data is lost.

Conflicts Page

The Course Conflicts page allows you to define and manage specific scheduling constraints between pairs of courses. This is critical for preventing scheduling overlaps that would make it impossible for students to take required corequisites or common combinations of classes.

1. Interface Overview

- **Search Bar:** Quickly locate specific courses by their code (e.g., "CS 101") or title.
- **Course Cards:** Each course in the curriculum has its own card listing its defined conflicts.



2. Managing Conflicts

- Add a Conflict:
    - At the bottom of any course card, use the **"Add conflict..."** dropdown menu.
    - Select another course from the list. This establishes a symmetric relationship (adding B to A also adds A to B).
- Conflict Levels:
    - **Hard Conflict:** These courses **must never** be scheduled at the same time. This is used for corequisites or courses in the same required sequence. If you set a hard conflict with courses that have lots of sections it may prevent a schedule from being generated.
    - **Soft Conflict:** It is **preferable** that these courses do not overlap, but it is permitted if no other solution exists.

    - **No Conflict:** Effectively removes the constraint. There is no reason to ever select this.
- **Changing Levels:** Use the dropdown next to an existing conflict (e.g., "Soft Conflict") to upgrade it to "Hard" or downgrade it.
- **Remove Conflict:** Click the **"Remove"** button next to a listed conflict to delete the relationship entirely.



3. Saving

- **Auto-Save:** Any addition, removal, or modification of a conflict triggers an automatic save to the master file. A "Saving..." indicator will momentarily appear in the header.
- **Symmetry:** Changes are always applied bidirectionally to ensure data consistency (e.g., removing a conflict from Course A also removes it from Course B).

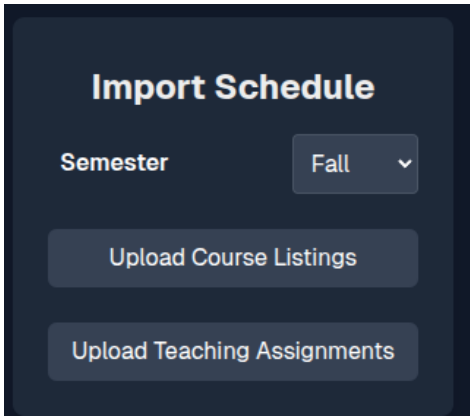
Generate Page

The Generate page is the engine of the application. It handles the initial import of raw data from University systems and contains the algorithmic tools used to automatically build or optimize course schedules.

1. Data Import (Import Schedule)

Before generating a schedule, you must import the raw Excel files provided by the University.

- **Semester Selection:** Choose whether you are importing data for the **Fall** or **Spring** semester.
- **Upload Course Listings:** Upload the .xlsx file containing the comprehensive list of all department course sections. This is the file that comes from Workday (ISU_Course_Section_Offering Unedited Fall 2026.xlsx). You need to upload a version of the course listings that includes departments that have potentially conflicting courses, at least once for both a fall and a spring semester. If only Fall, non-CS classes are in the system, then it will always consider the old times with Fall, which would be inaccurate when making a Spring schedule. This may need to be experimented with: try making a Spring schedule by uploading course listings with the non-CS classes, and check in the schedule visualizer if the old times being displayed for non-CS classes are the Fall or Spring times. There is no way for our scheduler to consider conflicts with non-CS classes if they never get uploaded. To check whether non-CS classes are in the system, you can either look in the section assignments sheet in the master file or go to the conflicts page and see if you can select a non-CS class as a conflict. The master file should always keep Fall and Spring sections for the non-CS classes in the section assignments sheet; they don't get archived or replaced when loading from archive.
- **Upload Teaching Assignments:** Upload the .xlsx file that maps specific instructors to those course sections (Teach_2025-26.xlsx). It is important that this file keeps a consistent format.
- **Merge Logic:** Upon upload, the system will automatically cross-reference these files. If instructors in your master database are missing from the new upload, the system will ask if you wish to keep their existing preference profiles.

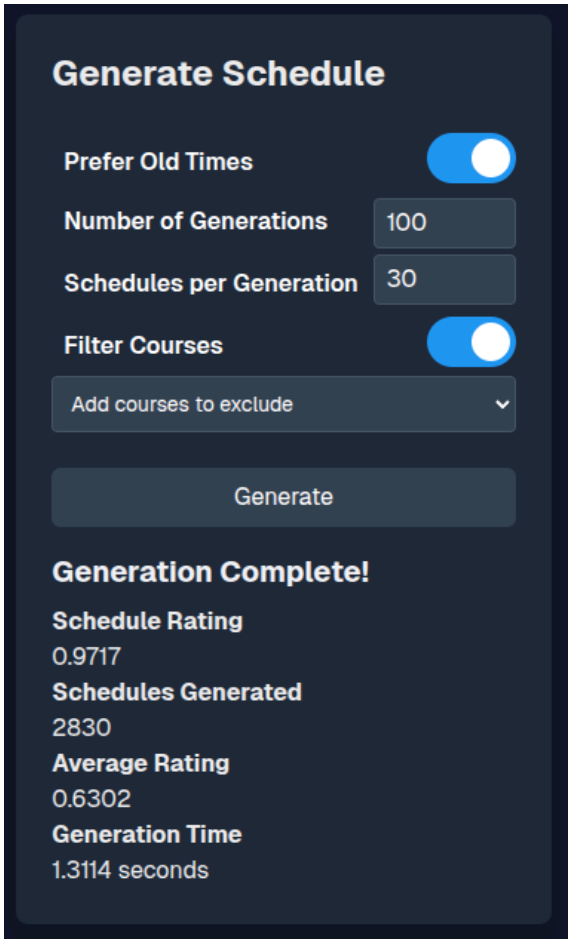


2. Automated Generation (Generate Schedule)

Once data is imported, you can use the generation tool to create a high-quality schedule based on your defined conflicts and instructor preferences. Note that the genetic algorithm used for course scheduling is based on randomness and does not ensure that a similar schedule will be generated with the same input.

- **Prefer Old Times:** When enabled, the algorithm will try to keep sections in their "historical" or currently assigned time slots whenever possible. Professor preferences will more likely be violated by doing this. However, if Prefer Old Times is turned off, then it will generate a schedule from scratch.
- **Number of Generations:** Set how many iterations the algorithm should run (default: 100). Higher numbers may yield better results, but take longer.
- **Schedules per Generation:** The number of candidate schedules the algorithm considers in each iteration (default: 30).
- **Filter Courses (Exclude/Include):**
    - Toggle this to choose whether the list of selected courses should be **Excluded** from generation (kept at their current times) or if they are the **Only** courses that should be moved.
    - Use the dropdown to add specific courses to this list.
    - Courses that are arranged will not be scheduled using the schedule generation algorithm and will not show in the list.
- **Generate Button:** Starts the process. While running, a "Generating..." label will appear. After the generation is complete it will be replaced with a “Saving…” label and show the generation results. Switching to a different page before the save is complete might result in a failure to save. **Note:** Clicking generate will affect the current schedule, so consider archiving before doing this.

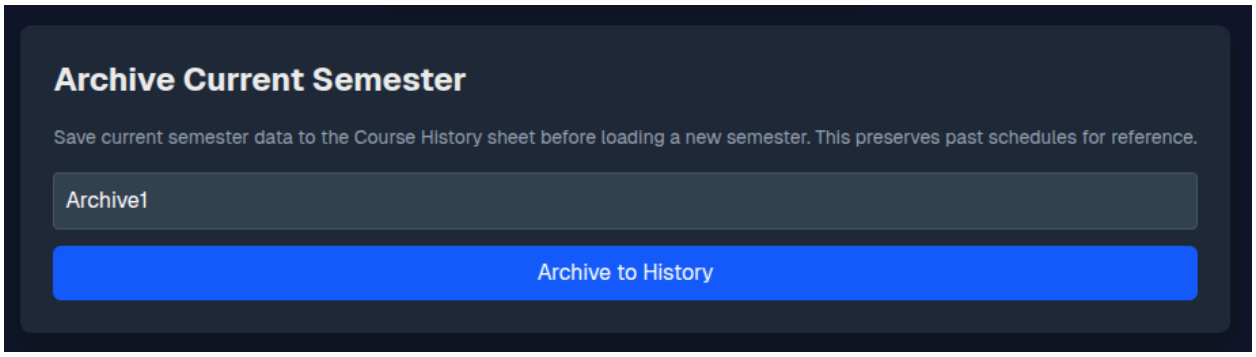
- **Results Dashboard:** Once complete, the system displays the **Schedule Rating** (quality score), **Average Rating**, and total **Generation Time**.



3. Archive Current Semester

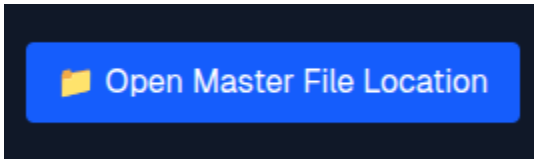
Use this section to take a "snapshot" of your work.

- **Archive Name:** Enter a label (e.g., "Draft 2", "Final for Registrar").
- **Archive to History:** Saves all current section times and assignments into the "Course History" sheet of the master file. This allows you to safely load new data later without losing this version of the schedule.



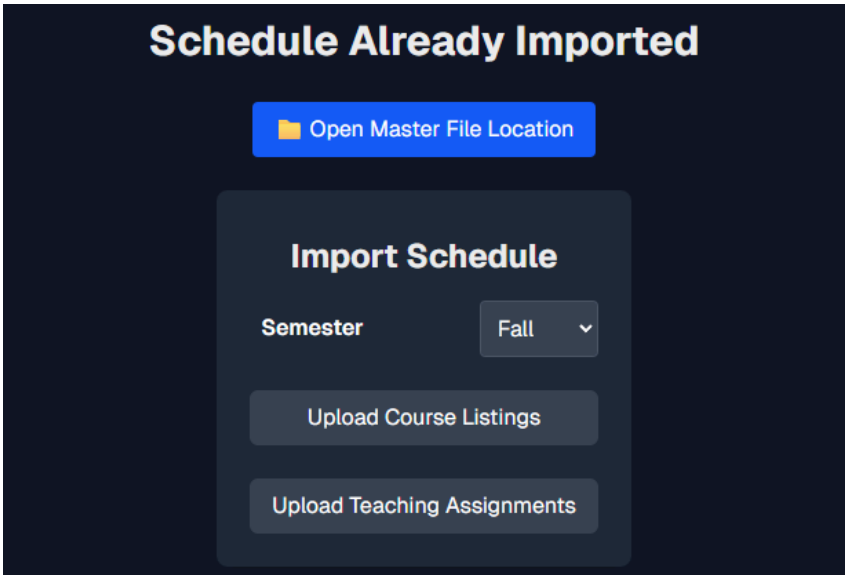
4. Utilities

- **Open Master File Location:** A shortcut to open the folder on your computer where the application's central database (master_course_schedule.xlsx) is stored. This is useful for manual backups or troubleshooting.



The Master File

On the Generate page, there is a blue button near the top that says **Open Master File Location.**



This button opens the file explorer and highlights the file **master_course_schedule.xlsx.** If you open the file it will show all the data from the program, but formatted in Excel. The first sheet in the master file is **Professor Preferences**. Naturally, this associates with the Instructor Preferences page.

First Name	Last Name	Same Day Pre	B2B Preferen	B2B2B Prefer	MWF 7:45 A
Pavankumar	Aduri	preferred	neutral	neutral	deferred
Samik	Basu	neutral	neutral	neutral	deferred
Ying	Cai	neutral	neutral	neutral	deferred
Soma	Chaudhuri	preferred	preferred	neutral	deferred
Gianfranco	Ciardo	neutral	neutral	neutral	deferred
Myra	Cohen	neutral	deferred	deferred	deferred
Oliver	Eulenstein	preferred	neutral	neutral	deferred
Hongyang	Gao	neutral	neutral	neutral	deferred
Mengdi	Huai	neutral	neutral	neutral	deferred
Xiaoqiu	Huang	neutral	neutral	neutral	deferred
Ali	Jannesari	neutral	neutral	neutral	deferred
Yan-Bin	Jia	neutral	neutral	neutral	deferred
Regis	Kopper	neutral	neutral	neutral	deferred
James	Lathrop	neutral	neutral	neutral	deferred
Wei	Le	preferred	neutral	neutral	deferred
Liyi	Li	neutral	neutral	neutral	deferred
Qi	Li	neutral	neutral	neutral	deferred
Yang	Li	neutral	neutral	neutral	deferred
Jack	Lutz	neutral	neutral	neutral	deferred
Robyn	Lutz	neutral	neutral	neutral	deferred
Chenglin	Miao	neutral	neutral	neutral	deferred
Andrew	Miner	neutral	neutral	neutral	deferred
Meisam	Mohammady	neutral	neutral	neutral	deferred
Gurpur	Prabhu	neutral	neutral	neutral	preferred

Many of the columns are self-explanatory. Note, though, that **preferred** associates to black tiles in the preferences page, **neutral** means the yellow tiles, **deferred** means the red tiles. The last column in this sheet, which is not pictured, is **Last Updated**, which logs the date of the last time one of their preferences was changed.

The next sheet is the **Courses** sheet, which associates with the Courses page. This sheet just holds information about courses (not sections), but here you could manually change course codes, names, etc, just as you could on the courses page.

After that is the **Section Assignments** sheet. This sheet is where you would actually see what times certain sections got scheduled. The first few rows just hold information about what schedule it is (the name from the archive). After that, you can see that columns show, Course Code, Section ID, Section Type (lecture/discussion etc), Professor First Name, Professor Last Name, Capacity, Semester, Scheduled Time, Scheduled Days, Old Time, Old Days, Is Online, and Is Arranged. Most of these are probably self-explanatory. The most important columns to note are the **Scheduled Time/Days**, and **Old Time/Days**. Scheduled Time/Days are the times that our program schedules . Old Time/Days are the times that you uploaded with the course listings. Also, note that you will see many rows without scheduled times, which is because they are either non-CS classes or online/arranged sections.

The next sheet is the **Teaching Loads,** which just shows how many sections each instructor teaches for what course. There are multiple rows for some professors if they teach different courses. Also, the headers may be inaccurate on this sheet, but you can infer what the headers are supposed to say.

The **Schedule Summary** sheet shows a general overview of when COMS sections were scheduled, but this page isn't terribly useful. Also, it shows inaccurate data for Lab times. If they weren't scheduled for a new time, it shows their old time.

The **Course Conflicts** sheet displays all conflicts for each course, along with their corresponding conflict levels. This directly associates with the Conflicts page. Note that there is only one entry per conflict, because conflicts go both ways. If you have a conflict between COMS 1010 - COMS 1270 in the sheet, then COMS 1270 - COMS 1010 will not also be in the sheet; they mean the same thing.

The **Lab Schedules** sheet is associated with the Lab Schedule page. This sheet is also self-explanatory. One thing to note, though, is that when restoring from an archive, lab tables may not restore correctly.

The **Course History** sheet holds all the archived schedules. It should only hold COMS sections and it holds all the essential information about the sections, including the name of the

archive. The headers may be inaccurate on this sheet, too, due to late additions, but again, you can infer what the headers are supposed to be.

One last thing to note with the master file is that **you cannot have the master file open and make changes on the course scheduler app at the same time.** This is because Excel does not like having multiple things trying to write to it at the same time. So, if you have a change you want to make using the app, you need to close the master Excel file.