
Automated Examination Timetable for NCE Programmes of Federal College of Education, Obudu, Cross River State, Nigeria

Edward Elaunire Idiege (Ph.D.)^[1] and Samuel Eneji Eneji (Ph.D.)^[2]

^[1]Department of Psychology, Federal College of Education,
Obudu, Cross River State, Nigeria

^[2]Department of Computer Science,
Federal College of Education, Obudu, Cross River State, Nigeria

Abstract. Timetabling is a critical aspect of academic administration in tertiary institutions, ensuring the efficient allocation of resources such as lecture halls, students, and faculty members for both lectures and examinations. However, manual examination timetable planning is often associated with errors, scheduling conflicts, and inefficiencies, leading to overcrowding, misallocation of resources, and delays. This study aims to design and develop an automated examination timetable system for NCE programmes at the Federal College of Education, Obudu. The system employs Object-Oriented Analysis and Design Methodology (OOADM) to create a database that stores lecture venues, course credit loads, and student enrolment data. The system generates an automated examination timetable, ensuring optimal scheduling while eliminating conflicts. By integrating the timetable into the college's platform, students and lecturers can easily access it through digital devices. The automated system significantly improves efficiency, reduces administrative costs, and enhances the examination planning process. The study concludes that automation is essential for modernizing educational practices and optimizing examination administration in Nigerian Colleges of Education.

Keywords: Examination Timetabling, Automation in Education, Scheduling, Optimization

Introduction

Timetabling is a crucial aspect of academic administration in tertiary institutions, ensuring the efficient allocation of resources such as lecture halls, students, and faculty members for both lectures and examinations. According to Etuh, Ajoda, and Yusuf (2019), an examination timetable is a structured table that organizes a set of meetings at specific times and places, integrating various resources such as rooms, people, and equipment. A timetable, in general, displays the schedule of activities in a defined sequence, indicating when events will take place but not necessarily assigning specific resources (Etuh, Ajoda & Yusuf, 2019).

Tertiary institutions typically categorize timetables into two major types: lecture timetables and examination timetables (Pandya, Chaudhary, & Singh, 2023). A lecture timetable is a structured schedule that assigns specific periods and venues for instructional activities, ensuring the effective delivery of lectures. On the other hand, an examination timetable is designed to allocate specific time slots and venues for examinations, ensuring smooth and conflict-free assessment processes. However, the traditional manual approach to examination timetabling has presented numerous challenges, including errors, scheduling conflicts, and inefficiencies in venue allocation. These issues have often resulted in overcrowding, misallocation of resources, and conflicts between students and faculty members (Soyemi, Akinode & Olorunhobi, 2017).

Manually preparing examination timetables is a time-consuming and resource-intensive process. Challenges such as double-booking of venues, assigning multiple courses to the same room, and scheduling examinations at conflicting times have been recurring problems. Additionally, in some cases, a course may be assigned multiple venues, causing confusion

among students and examiners (Soyemi, Akinode & Olorunhobi, 2017). These inefficiencies highlight the need for an automated system that can streamline the examination scheduling process.

The emergence of automation and digital solutions has revolutionized many aspects of administrative processes in higher education. Automation significantly reduces human errors, enhances efficiency, and minimizes the time and cost associated with manual timetabling (Hambali, Olasupo & Dalhatu, 2000). In the 21st century, automation plays a pivotal role in optimizing academic planning and improving institutional management. By implementing an automated examination timetable system, educational institutions can efficiently allocate resources, eliminate scheduling conflicts, and improve accessibility for students and faculty. Automated examination timetabling enhances overall examination administration, particularly in Nigerian Colleges of Education, where traditional methods often lead to errors that negatively impact students' academic experiences (Eneji et al., 2024; Daramola, 2024).

This study aims to design and develop an automated examination timetable for NCE programmes at the Federal College of Education, Obudu. The proposed system will create a database containing comprehensive records of lecture venues, course credit loads, student enrolment per course, and other relevant details. By leveraging automation, the system will generate examination timetables efficiently and integrate them into the college's platform, making them easily accessible to students, lecturers, and other stakeholders. The implementation of this system will address the challenges associated with manual timetabling, ensuring a more efficient, cost-effective, and conflict-free examination scheduling process.

Objective of the Study

This study aims to design and develop an automated examination timetable system for NCE programmes at FCE, Obudu. The specific objectives include:

- i. Creating a database to store lecture venues with their capacities, course details with credit loads, and student enrolment per course.
- ii. Developing a module to automatically generate the examination timetable.
- iii. Integrating the timetable into the College Platform for easy access by students, lecturers, and other stakeholders.

Significance of the Study

The automated timetable system will benefit students, lecturers, and the college community by:

- i. Providing easy and convenient access to examination schedules.
- ii. Enhancing efficiency and reducing costs in timetable planning.
- iii. Ensuring continuous availability and visibility of the timetable.

Methodology

The study adopts **Object-Oriented Analysis and Design Methodology (OOADM)**, which integrates processes and data into objects modelled after real-world entities. Key tasks include:

- i. Identifying, organizing, and defining object interactions and behaviours.
- ii. Using **Use Cases** to outline system functions and **Object Models** to describe class relationships and properties.

Method of Data Collection

Data was obtained through:

- i. **Physical Assessment:** Direct evaluation of lecture venues and seating capacities.

- ii. **Records Review:** Student enrolment data from the admission unit and departmental records.
- iii. **Interviews:** Discussions with timetable planners to understand scheduling constraints at FCE, Obudu.

Analysis of the Proposed System

The proposed system is a computerized version of the manual examination timetable planning process for NCE programmes in FCE, Obudu.

1. The proposed system creates a database of all lecture venues and the siting capacities, number of courses offered and their credit loads per semester, number of periods assigned for lectures per working days, number of enrolment per course, number of combinations and free periods per working day.
2. The system separates general and education courses from departmental.
3. The system automatically begins timetable planning by;
 - i. Comparing available venues and merging combinations for general and education courses.
 - ii. Considers favourable days as contained in the database and then creates examination timetable for the general and education courses per level, per semester.
 - iii. Consider larger classes from the departmental and categorize them as large class.
 - iv. The combinations that are few in numbers are also categorize as small class.
 - v. The total number of both small and large classes are determined.
 - vi. The system then assigns classes to courses for any given examination accordingly.
4. The finished timetable is generated as a table for physical examination by officer in charged.
5. A certified timetable is release for official use.

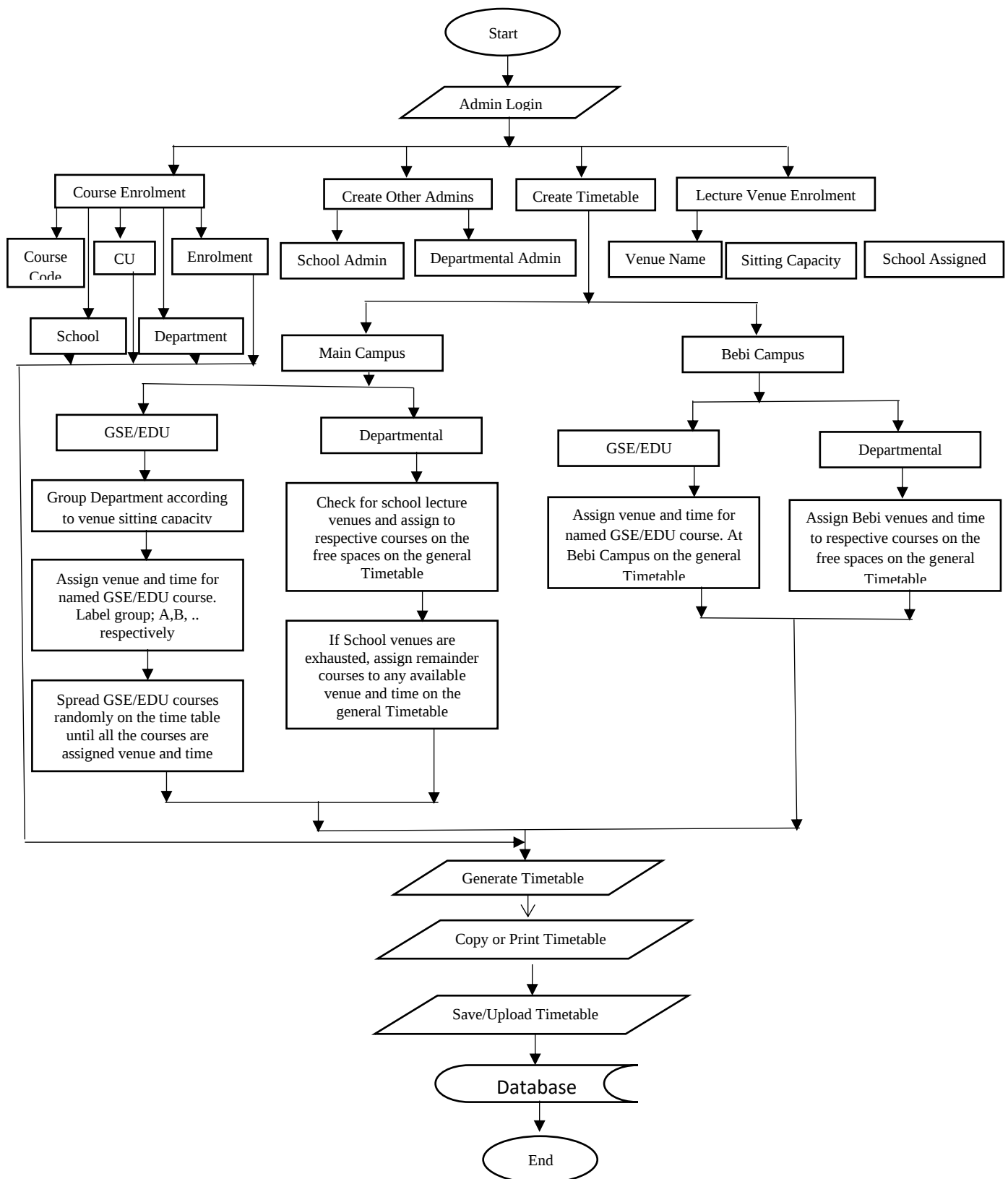


Figure 1: System Design for the Automated Examination Timetable

System Implementation and Result

The designed system is implanted in modules. The modules include: main campus and Bebi Campus. Both campuses generate the general timetable, while the users have the option of filtering the result per school, department, and year of study.

The new system is web based and runs online. Once the Admin provides the needed data and save to the database. The rest work will be to query the database using the buttons provided at the interfaces to get what he or she wants as regards the college examination timetable.



Figure 2: System Login Interface

This is the first screen loaded when the system is initiated. It provides users with opportunity to navigate the timetable system.

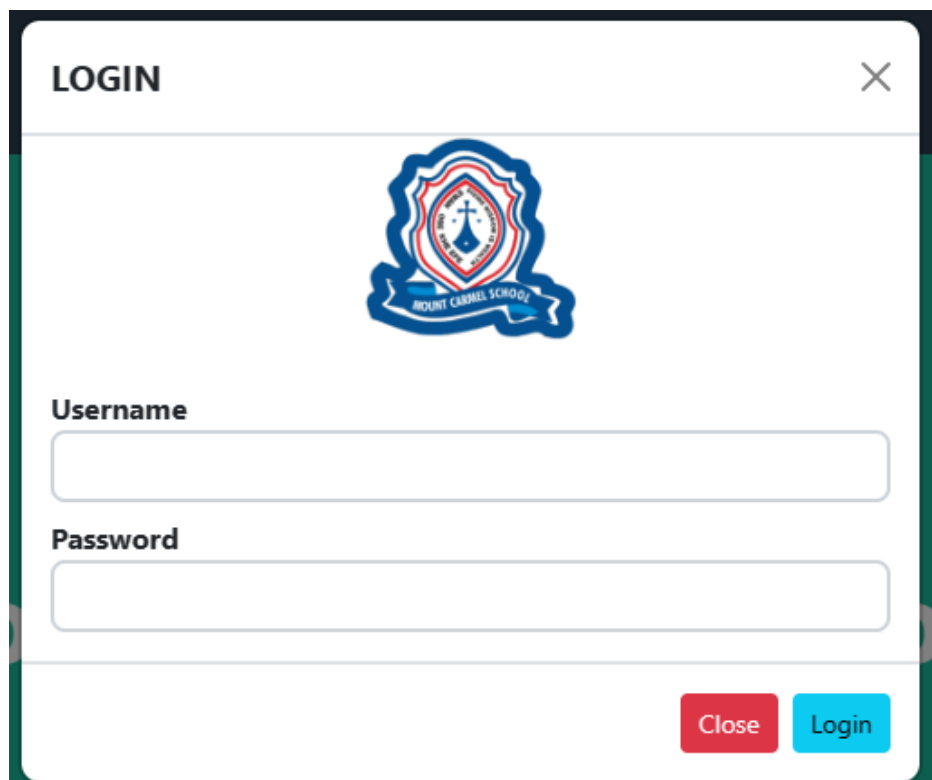


Figure 3: Admin Login

The Admin Login provides the System Admin with the interface to provide his login details. At the interface, the Admin is expected to provide his Username and Password. If the login details provided are correct, the Admin is granted access to the system resources.

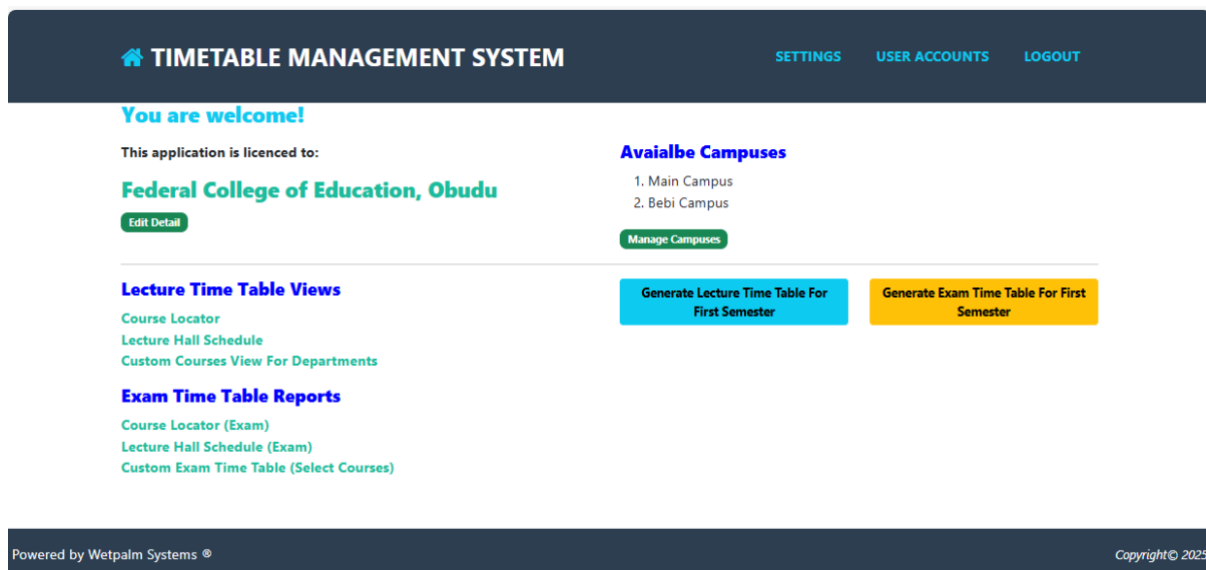


Figure 4: Navigation Interface

Figure 4 provides the Admin and any other user that is granted access by the Admin to select the operation so desired by viewing the options as displayed on the form and clicking on any of the desired options.

Plot Exam Time Table For First Semester

Campus

Level

Start Date

End Date

Previous schedule for this level and campus would be lost

Plot Exam Time Table

Existing Examination Time Table Plots

SN	Level	Exam Starts	Exam Ends	Plotted On
1	NCE I	Jan. 20, 2025	Jan. 31, 2025	Jan. 6, 2025
2	NCE II	Jan. 13, 2025	Jan. 24, 2025	Jan. 6, 2025

Figure 5: Plot Exam timetable

The window gives the Admin the opportunity select variables to plot an examination timetable or view existing examination timetable.

FEDERAL COLLEGE OF EDUCATION, OBUDU										
FIRST SEMESTER TIME TABLE										
First Semester Examination Timetable 2025										
DAY/TIME	7:00 - 8:00	8:00 - 9:00	9:00 - 10:00	10:00 - 11:00	11:00 - 12:00	12:00 - 1:00	1:00 - 2:00	2:00 - 3:00	3:00 - 4:00	4:00 - 5:00
MON		GSE 011 SNLT		GSE 111 SNLT		CRS 111 EBB	ANF 118 JDA1	CRS 112 EBB	ANF 111 JDA1 CSC 114 HPE1	ANF 112 SNLT
TUESDAY			ANF 114 JDA1		EDU 113 PAV	EDU 113 PAV			ANF 117 JDA1 CSC 111 HPE1	
WEDNESDAY				ANF 116 JDA1	ANF 116 JDA1		GSE 112 SNLT	CRS 113 EBB	CRS 115 EBB	ECO 114 NCB1
THURSDAY				CSC 113 HPE1	ANF 113 JDA1	ANF 113 JDA1 EDU 112 PAV	EDU 112 PAV ECO 111 NCB1	CRS 114 EBB ECO 111 NCB1		
FRIDAY	ANF 115 JDA1	ANF 115 JDA1	ECO 113 NCB1				CSC 112 HPE1	CSC 112 HPE1		ECO 112 NCB1

Figure 6: Sampled Year one Examination Timetable Filtered from the Database

Figure 6 shows a sampled year one examination timetable generated from the database for NCE 1 of the college Main Campus for 2024/2025 academic session.

Developed System Manual

All courses would be allocated a maximum period of 2 hours, so all courses with credit unit exceeding the value of 2 may be assigned additional hour manually.

Courses with no classroom hours allocated should not be entered into the system. Courses such as **project and teaching practice** fall into this category.

ONLY ONE SEMESTER WOULD BE AVAILABLE AT A GO. THE TIME TABLE MUST BE GENERATED EVERY SEMESTER

INITIAL SETUP

- Name of the institution is the first thing that must be updated
- Choose the correct semester for which the current time-table is being administered (First/Second)
- Next is to make sure that all required academic levels are shown in the space provided. **If not, you are required to add new levels**
- All the campuses whose time table would be administered should be added next. **Click on the campus name under settings to manage the campus**
- Under the campuses are the lecture halls, these should be added next. All the lecture rooms belonging to the departments must be added too
- Departments also falls under campuses, so all departments under each campus must also be entered
- If there exist course combinations, click on the department names to create the course combination for each department. This is very important to the plotting of the time-table
- The next step is to add all the courses offered in each department into the system. This can be achieved by clicking on the **Add Course** button
- All courses must be entered with their respective preferred lecture hall

- x. Courses can also be uploaded from a **csv** file
- xi. Course appearing in **RED** colour indicates that the course is not plotted on the time table
- xii. Please note that courses are not dependent on department but on campus. So a single course can be entered from 2 or more different campuses
- xiii. Only courses with the same level and same preferred lecture hall can be uploaded in the same file

OTHER INSTRUCTIONS

- i. Clicking on **LECTURES' SCHEDULER** at the top banner would always return the user to the admin home page
- ii. Time table would be generated for each study level one at a time. i.e. the process would be repeated for each level of study until all the levels are covered

Figure 7: Plot Timetable for the First Time

In the Figure above, selecting **option 1** would remove all the previously plotted time table for the selected level and make new plots afresh

- iii. Using option 1 will always re-arrange the way the courses are placed on the time table please beware!
- iv. Selecting **option 2** would not remove existing time table, but tries to plot those course that were not previous plotted on the time table
- v. **OPTION 1 MUST NEVER BE USED AFTER TIME TABLE HAS BEEN RELEASED TO THE PUBLIC FOR USE!**
- vi. If a new course is added to the system after the time table has been plotted option 2 is the way to go.

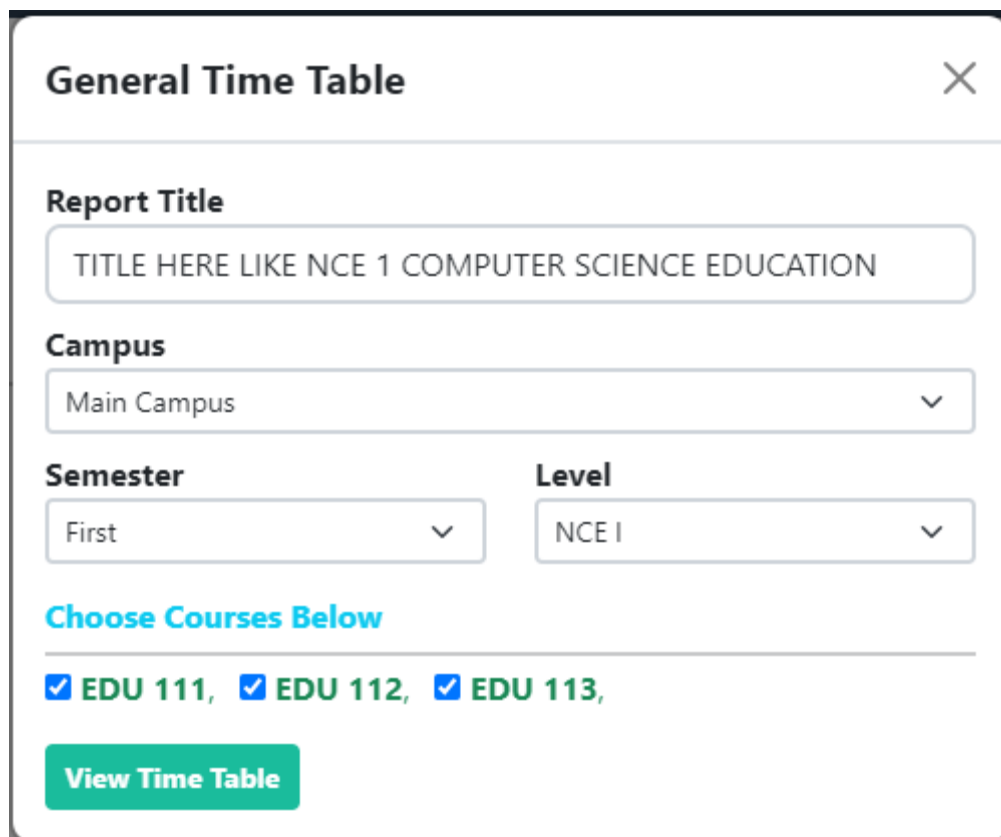
VIEWING TIMETABLE

There are 3 options that can be employed to see the time table

- i. Use the **Course Locator** option to see where a particular course appears on the time table.
- ii. Use the **Lecture Hall Schedule** option to see the courses plotted for a specific lecture hall for a week

- iii. Use the **Custom Courses View** to generate time table for a department

To use the **Custom Courses View** option, all courses for the specific department and level must be chosen as shown in figure below.



The screenshot shows a web interface titled "General Time Table" with a close button (X) in the top right corner. Below the title, there are four input fields: "Report Title" (containing "TITLE HERE LIKE NCE 1 COMPUTER SCIENCE EDUCATION"), "Campus" (a dropdown menu showing "Main Campus"), "Semester" (a dropdown menu showing "First"), and "Level" (a dropdown menu showing "NCE I"). Below these fields, there is a section titled "Choose Courses Below" with a horizontal line. Under this line, three courses are listed: "EDU 111", "EDU 112", and "EDU 113", each preceded by a blue checkmark. At the bottom of the form is a green button labeled "View Time Table".

Figure 8: View Timetable Design Window

Select all the courses related to your department and level and generate the time table for your department and level.

Summary

This study addresses the challenges associated with manual examination timetabling in tertiary institutions, specifically in the NCE programmes of the Federal College of Education, Obudu. Manual timetabling often leads to scheduling conflicts, resource misallocation, overcrowding, and administrative inefficiencies. The study highlights the importance of automation in overcoming these challenges, ensuring a seamless and optimized scheduling process.

The proposed system utilizes Object-Oriented Analysis and Design Methodology (OOADM) to develop an automated examination timetable. A database is created to store information on lecture venues, seating capacities, student enrolment per course, and credit loads. The system automatically assigns examination schedules by analysing available resources and ensuring no conflicts occur. It categorizes courses into general, education and departmental courses, assigns appropriate venues, and generates a final timetable for review and approval. The integration of the timetable into the college's platform ensures accessibility for students, lecturers, and administrators.

The automated examination timetabling system enhances efficiency, minimizes scheduling errors, and reduces the costs associated with manual timetable preparation. The study also provides detailed system setup instructions, data collection methods, and operational

guidelines for effective implementation. By leveraging automation, the system improves examination administration, making the scheduling process faster, more reliable, and easily accessible.

Conclusion

The study successfully designed and implemented an automated examination timetable system for the Federal College of Education, Obudu. The system eliminates the inefficiencies of manual timetabling, reduces human errors, and ensures proper resource allocation. By automating the process, the institution benefits from improved planning, reduced administrative workload, and enhanced accessibility of examination schedules.

The adoption of automation in examination timetabling is crucial for modernizing academic administration. This transition not only ensures optimal utilization of resources but also enhances the overall academic experience for students and faculty. The study concludes that the implementation of an automated examination timetable system is a significant step toward improving the efficiency and effectiveness of examination scheduling in Nigerian Colleges of Education.

References

- Daramola, E. J. (2024). Racially just policy change: Examining the consequences of Black education imaginaries for K–12 policy. *Educational Evaluation and Policy Analysis*, 46(2), 329-357. <https://doi.org/10.3102/01623737231217983>.
- Eneji, S. E., Kayang, G. P., & Angim, M. U. (2024). *Need for automated lecture timetable in Federal College of Education, Obudu*. A paper presented at the Colleges of Education Academic Staff union (COEASU) South-South Zone Annual conference on the theme: Integrating Emerging Technologies Education for Global Competitiveness” March 19th – 22nd, 2024. Mini Theatre Hall, College of Education, Afaha Nsit, Akwa Ibom State.
- Etuh, E., Ajodoh, O. F., & Yusuf, S. O. (2019). Design of Automated Departmental Lecture Timetable System. *Review of Computer Engineering Research*, 6(1), 24-34.
- Falmyi, B.I., Fele, T., & Ayemi, A.O. (2022). Android lecture timetable application for tertiary institution. *Journal of Multidisciplinary Engineering Science and Technology (JEMST)* 9(3), 15174-15178.
- Hambali, A. M., Olasupo, Y. A., & Dalhatu, M. (2020). Automated University Timetable Using Heuristic Approach. *Nigerian Journal of Technology (NIJOTECH)*, 39(1), 1-14.
- Pandya, P., Chaudhary, P.N., & Singh, D. B. (2023). Automated college timetable generator. *International Journal of Emerging Technologies and Innovative Research*, 10(4), g238-g240.
- Soyemi, J., Akinode, J., & Oloruntoba, S. (2017). Automated Lecture Time-tabling System for tertiary Institutions. *International Journal of Applied Information System (IJAIS)*, 12(5), 20-27.