American International Journal of Computer Science and Information Technology
Volume.10, Number 3; May-June, 2025;
ISSN: 2837-388X | Impact Factor: 8.61
https://zapjournals.com/Journals/index.php/aijcsit/
Published By: Zendo Academic Publishing

COMPREHENSIVE RESULT COMPUTATION TOOLKIT WITH BORDER SCORES MODERATION

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Article Info
Keywords: Graphical User Interface (GUI), Border Scores, Cumulative Grade Point Average, Cumulative Total Credit register, Course Summary, Course Registration.
DOI
10.5281/zenodo.15496329

Abstract
At the end of every session, level coordinators, departmental, and faculty examination board members at the University of Jos faced with the challenge of checking each level's senate format results to ensure that it conformed to the standard set by the University. Some of the items checked includes: Scores and the corresponding grade points and grade letters, Total Credits Register (TCR) and Cumulative Total Credits Register (CTCR) by each student, Number of Semester spent (NSS), preparation of summary pages, etc. In most cases, the results are not void of errors, despite the arrays of board members who have checked the results. To mitigate these deficiencies, a comprehensive user friendly result computation toolkit was developed. This toolkit is designed to meet up with the peculiarity of Senate format result for University of Jos, Nigeria. It computes and prepares senate format results, summary sheets for final year and non-graduating levels, border scores moderation, and senate course by course summary sheets. The tool automatically collates all missing results and affected students proactive before the results are presented to senate. This will help the level coordinators to contact the concerned staff about the students whose results were missing. The current practice in most universities is that students who registered a course and wrote the exam but did not receive a score are only aware of their missing results when the results are approved and pasted. This tool mail

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missing result requests directly to concerned lecturers. The proposed tool computes all cumulative and sessional performance indexes i.e. Grade Point Average (GPA), Cumulative Grade Point Average (CGPA), TCR, CTCR, etc. The tool automatically identified students whose TCR or CTCR was below or above the approved permissible limits, as well as students who had exceeded their residency period or were in their last residency period. The tool was developed using Python and compiled as a standalone executable window software. Hence, no installation of programming languages or their dependencies is required. More importantly, the tool includes a top level Graphical User Interface (GUI) for students' course registration. When a student logs into the system using his/her matric number for course registration, only the courses that the student is eligible to register will be available on the GUI. Hence, the cases of registering courses for which the student has not passed the prerequisites are eliminated. With this tool, no results are manually typed; all results brought by individual course lecturers for a particular department are hosted on one machine and then uploaded. To the best of our knowledge, this is the first tool developed that meets up with the peculiarity of University of Jos senate format result. The tool was used to prepare the 2019–2020 sessional results to date.

1. Introduction

Some functionalities of the proposed tool have been presented in some of our papers. The aim of developing this tool is to provide a robust comprehensive result computation and academic record/transcript management system in one application. The tool has 19 main functions ranging from uploading of all courses offered by a department, uploading and validation of course registration, preparation of workbooks, uploading of previous records and spillover students record, uploading of results and preparation of senate format result with computed cumulative performance indexes, electronic mailing of approved course registration and semester/sessional results to students, up to preparation of academic transcript. Only two of the nineteen functions i.e. students' course registration and moderation, are presented in this paper. The moderation function is used to evolve the final senate format result along with some statistical summary sheets that can be of great value to the university, course lecturers, level coordinators, and consequently the students. This information can be used to enhance the collaboration and pairing of lecturers to achieve optimum delivery and self-development. The tool is user friendly, developed using Python [1][2], and it does not require any prior knowledge of programming for it usage. In addition, it is compiled as a standalone windows application software; hence, no need for installation of any programming language or their dependencies are required as the case is with other related softwares [3][4][5]. This version runs on only windows. The ones for other platforms, e.g. Linux is compiled on demand.

2. Entry Point

The tool has only one entry point; hence, it is easy to use. Any of the 19 functions the tool is developed to perform is to be selected from the main Graphical User Interface (GUI), this may be followed by dialog message boxes or top-level GUIs, where applicable. The main GUI is shown in Fig. 1. To make the tool much more user friendly, all the functions are arrange in a dropdown menu starting from the first to the last, in order of which they should be executed where applicable. Each function carries the exact name of the expected outcome, which eliminates the burden of memorizing the intended actions of each selected function.

3. Students' Course Registration

This function is used to register courses to be taken by students. When a student logs into the system using his/her matric number for course registration, only the courses the student is eligible to register will be available on the GUI along with the student's name and matric number, as shown in Fig. 2. All courses with prerequisites for which the student has not passed the prerequisites will not appear on the GUI. Therefore, the cases of registering courses for which the student has not passed the prerequisite are eliminated. The courses are selected by checking the required checkbox. Then, the registration is saved. Before saving the registration, the system checks the

registered units. If the total registered credits units is within the approved permissible range, the registration is saved. However, if the total registered credit units is bellow or above the permissible range, the registration will be declined with a message stating the reasons for the decline.

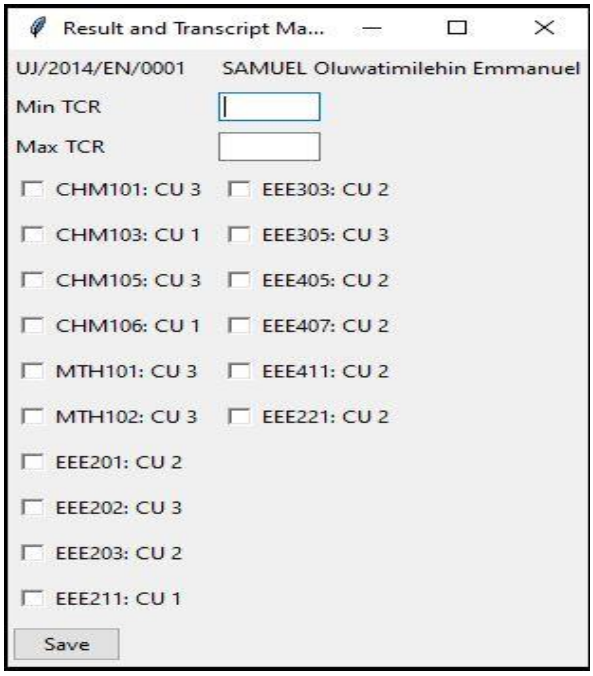

Fig. 2: Top-level course registration GUI

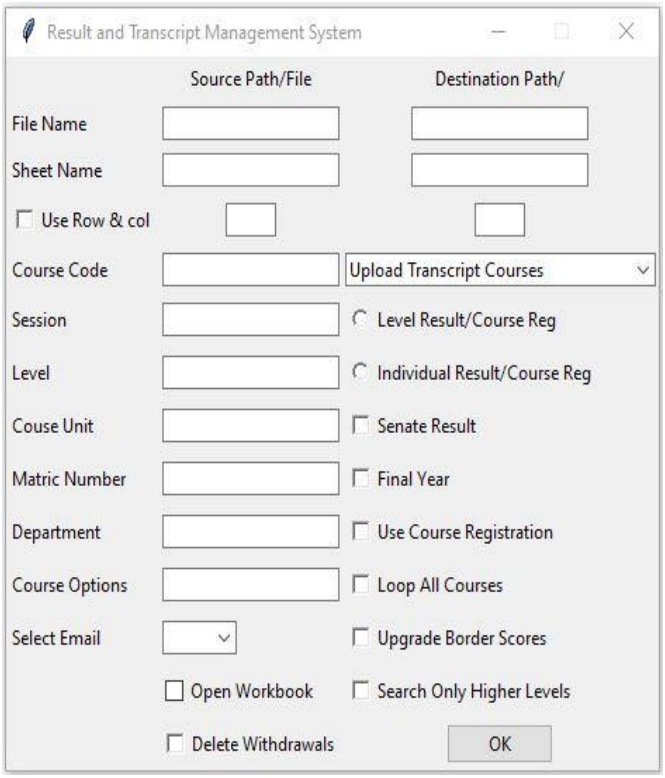

Fig. 1: Main GUI

4. Moderation

When the moderation function is selected, after clicking OK in the main GUI after the completion of the necessary information, a top-level GUI, as shown in Fig. 3 will appear. Two moderation schemes are implemented in the proposed system. The first one is related to upgrading the scores of students with certain scores, while the second one, in addition to the aforementioned, all border scores will be upgraded to the next grade. If you want to upgrade students who score at least 43 to be upgraded to 45, enter 43 in the Upgrade Score and 2 in the Max added marks Edit box and uncheck the ALL Borders checkbox. All students with 43 and 44 marks will be upgraded to 45. If all borders are checked then all students that need at most 2 marks to move to next grade will be upgraded to the next grade e.g. 43 and 44 will be upgraded to 45, while 48 and 49 to 50, 58 and 59 to 60, 68 and 69 to 70. Note that the maximum marks to be added and border scores are subject to the policy of each institution because each institution is autonomous. The minimum and maximum TCR and CTCR in the top-level GUI are used to identify students with TCR and CTCR outside the approved limits, different colours are used for this identification. The number of semesters to be added to the existing semester spent should be included in the Add NSS edit box. For the first semester computation is 1 while for session is 2. NSS stands for number of semester spent. This information is used to identify students in their last residency period (blue color) and those that have exceeded their residency (red color). This information can be used by level coordinators to advice students that are in their last residency. The minimum CGPA below which a student withdraws or is on probation is entered in the withdrawal CGPA Edit textbook. The number of consecutive session(s) for which a student falls below this minimum CGPA he/she is liable for withdrawal is selected from the dropdown box. For one session, 1 should be selected, which implies that there is no room for probation, while for two sessions, select 2 this implies that the first session the student CGPA falls below this minimum will be probation, and if he/she falls below it the next

consecutive session, the student will be withdrawn. After moderation, the final senate format result is computed and displayed in Fig. 5.

Even if marks are not added, the moderation function must be executed because it is in this function that the NSS is updated. The senate summary Fig. 6 and 7, level summary (Fig. 9) and missing result sheet (Fig. 4) will be populated.

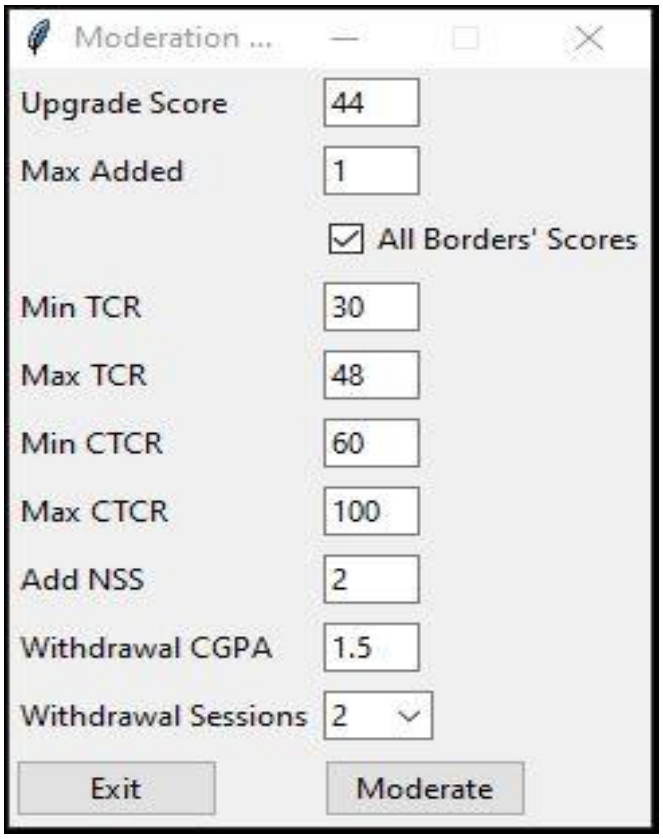

Fig. 3: Moderation of top-level GUI

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500 B.ENG ELECTRICAL AND ELECTRONIC ENGINEERING 2023/2024 SESSION				
Withheld Results				
S/N	Matric	Name		
1	UJ/2015/EN/0120	Good OK	EEE401	
2	UJ/2018/EN/0045	Right Wisdom	EEE305	CHM105
3	UJ/2018/EN/0073	Alexander Prince	EEE305	CHM105

Fig. 4: Missing Results

3.1 Missing Result

The missing result sheet (Fig. 4) contains all the students and the corresponding courses for which the students had valid registration but no score was uploaded for them. This will help level coordinators to contact the course lecturer for possible reasons instead of waiting until when results were released before students will start filling forms for release of the results of courses they wrote the exams but no score was awarded to them. Currently, at the University of Jos, students are only aware of missing results at the end of the semester when the results are released or published. The responsibility of sorting missing results cases is assigned to students with little or no involvement in the department. This tool proactively collates withheld (missing results) cases in one sheet during the compilation of the results. This will enable the level coordinators to contact the subject teachers and the department to which the concerned courses are domesticated. This makes it possible to rectify missing results cases before the results are presented to senate.

3.2 Course Summary and Level Summary

The level summary is different from the course summary. The course summary gives the summary of the performance of the students in each course. These students can come from any level, including carry over students, as shown in Fig. 8. This information is very useful to the university and the course lecturer, but it is of little value to level coordinators as it does not provide information specifically about the levels they are coordinating. To circumvent the deficiency of the course summary, the level summary was computed. The level summary

summarizes the student performance at each level for all courses offered. This is highly resourceful for level coordinators when advising students. The course summary contains only the summary of courses domiciled at the given level (Fig. 8), while the level summary contains all the courses offered by the students at the given level, including carryover courses taken by the same students from other levels courses, as shown in Fig 9.

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S/N	MAT.NO	NAME	ME	MNSA	NSS	100 Level Summary					CHM	GP	CHM	GP	CHM	GP	CHM	GP
						TCR	TCE	TGP	GPA	Remark	101		103		105		106	
											3		1		3		1	
1	UJ/2015/EN/019	CF	UME	15	2	14	11	34	2.43	RPT: CHM101,	43	0	60	4	50	3	50	3
2	UJ/2015/EN/0999	GH	UME	15	2	14	14	46	3.29	PASS	68	4	80	5	55	3	45	2
3	UJ/2015/EN/0118	DD	UME	15	2	14	14	49	3.5	PASS	55	3	60	4	70	5	55	3
4	UJ/2015/EN/0023	GH	UME	15	2	14	14	63	4.5	PASS	67	4	45	2	88	5	60	4
5	UJ/2014/EN/0001	JK	UME	15	2	14	13	48	3.43	RPT: CHM106,	58	3	55	3	45	2	33	0
6	UJ/2014/EN/0086	KL	UME	15	2	14	14	52	3.71	PASS	45	2	66	4	77	5	56	3
7	UJ/2019/EN/0141	KL	UME	15	2	14	14	41	2.93	PASS	68	4	45	2	45	2	55	3
8	UJ/2019/EN/0164	KP	UME	15	2	14	14	58	4.14	PASS	66	4	45	2	66	4	46	2
14	UJ/2018/EN/XX71	OK	UME	15	2	14	7	15	1.07	Probation, RPT: CHM103, MTH101	45	2	33	0	45	2	58	3
15	UJ/2018/EN/0073	XX	UME	15	2	8	5	19	2.38	RPT: CHM105,	68	4	45	2	34	0	77	5
16	UJ/2018/EN/0075	PP	UME	15	2	14	14	60	4.29	PASS	50	3	54	3	78	5	50	3
17	UJ/2018/EN/0084	XC	UME	15	2	14	14	62	4.43	PASS	60	4	48	2	89	5	55	3
18	UJ/2018/EN/0087	CV	UME	15	2	14	11	39	2.79	RPT: CHM105,	70	5	45	2	43	0	60	4

Fig. 5: Senate Format

3.3 Senate Summary

There are two senate summaries produced by the tool, one for the graduating level and the other for non-graduating levels. The non-graduating levels summary gives the statistic of the number of students that passed all their courses, those with repeat or pending courses to register, number on probation, voluntary withdrawals, withdrawals based on academic deficiency, and number of withheld cases, as depicted in Fig. 6. In addition to the aforementioned information, the graduate level summary gives the number of students who graduated with a given class of degree as shown in Fig. 7.

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SUMMARY

S/NO	OURSE COD	COURSE TITLE	CREDIT UNITS	A	B	C	D	F	PASS	FAIL	TOTAL	SHEET
1	EEE501	ADVANCE CIRCUIT THEORY	3	2	9	5	2	2	18	2	20	14
2	EEE503	ADVANCED ELECTROMAGNETIC FIELDS	3	3	4	3	3	7	13	7	20	16
3	EEE505	ENERGY SYSTEMS	2	6	1	5	2	6	14	6	20	18
4	EEE507	POWER SYSTEMS PROTECTION	2	2	4	9	3	2	18	2	20	19
5	EEE509	ENGINEERING MANAGEMENT	2	2	4	9	3	2	18	2	20	20
6	EEE511	RELIABILITY AND MAINTANABILITY	2	3	4	7	2	4	16	4	20	21

Fig. 8: Course Summary

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SUMMARY											
S/NO	COURSE CODE	COURSE TITLE	CREDIT UNITS	A	B	C	D	F	PASS	FAIL	TOTAL
1	EEE501	ADVANCE CIRCUIT THEORY	3	3	8	4	2	0	17	0	17
2	EEE503	ADVANCED ELECTROMAGNETIC FIELDS	3	3	3	3	6	0	15	0	15
3	EEE505	ENERGY SYSTEMS	2	5	2	4	3	4	14	4	18
4	EEE507	POWER SYSTEMS PROTECTION	2	3	3	8	3	1	17	1	18
5	EEE509	ENGINEERING MANAGEMENT	2	2	4	8	3	1	17	1	18
6	EEE511	RELIABILITY AND MAINTANABILITY	2	2	4	7	2	3	15	3	18
7	EEE403	Telecommunication Principles	2	0	0	1	0	0	1	0	1
8	EEE303	Electromagnetic Fields and Waves	2	0	0	1	0	0	1	0	1

Fig. 9: Level Summary

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100 B.ENG ELECTRICAL AND ELECTRONIC ENGINEERING 2019/2020 SESSION	
SUMMARY	
SUMMARY	NUMBER OF STUDENTS
NUMBER OF PASSES	11
NUMBER TO REPEAT/REGISTER COURSE(S)	6
NUMBER OF PROBATION	1
NUMBER OF VOLUNTARY WITHDRAWALS	0
NUMBER WITHDRAWN FROM PROGRAMME	0
NUMBER OF RESULTS WITHHELD	0
TOTAL	18

Fig. 6: Summary

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500 B.ENG ELECTRICAL AND ELECTRONIC ENGINEERING 2023/2024 SESSION		
SUMMARY		
CLASS OF DEGREE	NUMBER OF STUDENTS	RANGE
FIRST CLASS	1	4.50 - 5.00
SECOND CLASS UPPER	4	3.50 - 4.49
SECOND CLASS LOWER	4	2.50 - 3.49
THIRD CLASS	0	1.50 - 2.49
NUMBER TO REPEAT/REGISTER COURSE(S)	9	
NUMBER OF PROBATION	0	
NUMBER OF VOLUNTARY WITHDRAWALS	0	
NUMBER WITHDRAWN FROM PROGRAMME	0	
NUMBER OF RESULTS WITHHELD	0	
TOTAL	18	

Fig. 7: Final Year Summary

4. Conclusion

This paper demonstrates the robustness of the result computation and academic record management system for preparation of various statistical results summary and computation of cumulative performance indexes. The merits of each summary are highlighted. Further work will focus on the preparation and dissemination of academic transcripts and incorporation of audio result system for visually impaired students in special education departments.

References

Product of Tutorial Point (1) pvt. Ltd, Python 3 tutorial points, Simple Easy Learning. www.tutorialspoint.com, 25/07/2019

Burkhard A. Meier, Python GUI Programming Cookbook. Packt Publishing, Ltd. Livery Place, 35 Livery Street, Birmingham, B3 2PB, UK. ISBN 978-1-78712-945-0, 2017

Akinola, R.O. Computationally Efficient Algorithm for computing Cumulative Grade Points, Average of several Students. African Journal of Computing & ICT, Vol 7, No 2, PP27-32, June 2014

Käfer, Julia; Kuger, Susanne; Klieme, Eckhard; Kunter, Mareike. The significance of dealing with mistakes in student achievement and motivation: results of doubly latent multilevel analyses**.** *European Journal of Psychology of Education, 2019.*

Clive R. Belfield, Predicting Success in College: The Importance of Placement Tests and High School Transcripts. Community College Research Center, United States, 2012.