CHAPTER 5

CONCLUSION

First semester course unit timetable of FAS, USJP has been modeled in this study. For the model formulation, both graph theoretic and ILP approach has been used. For the three years of studies, timetables were modeled separately and finally three of them were joined together to analyze the feasibility. Using graph vertex coloring algorithm course units were grouped such a way that two course units in the same group can be scheduled simultaneously while two course units in two groups cannot. For the first year, graph coloring algorithm results 20 groups and for the second and third years there are 23 and 24 groups respectively.

Using those resulted groups of course units a binary ILP model has been defined for each of the three years. The uniqueness property and the completeness property were defined as the hard constraints which are the essential parts for a feasible timetable while the objective (soft constraint) of optimizing the timetable is given as the objective function of the ILP. Hence the objective is to minimize the cost of assigning courses to time periods. When constructing the timetable it was assumed that teacher will not become a constraint to the solution where allocation of teachers to course units is a responsibility of the department which the subject is offering. Further it was assumed that lecture halls belong to each department is accessible to all departments. With those assumptions, it was able to model a conflict free efficient timetable for the FAS. The model was able to optimize the idle time of the students by reducing the maximum idle time to three hours. Further it was able to implement the result with the currently available lecture halls. Hence this model helps to utilize both physical and human (student) resources in the faculty.

The problem was solved effectively for the first semester which can be extended to the second semester and it can be used for other faculties as well.However, the size of the problem creates complications in achieving an optimum solution. It is therefore necessary to find a way of decreasing machine time, which has not been discussed here.

5.1 Limitations of the Study

This study was conducted with the data collected in 2015. But this data can be changed year by year. Some combinations have been introduced in 2015 which are not offered to third year students. But for the comparison it is assumed that those are offering to all students.

The number of students in each subject depends on the year of the study. Here it has taken to be fixed for all three years for the categorization of subjects and lecture halls. The ordering of course unit groups are taken to be arbitrary, since one cannot give preferences to the subjects. But in departmental level they have their own preferences which are difficult to absorb. If some ordering method can be applied, one would obtain more efficient results.

This study has not considered the distance that the students have to walk when they transferring from one lecture to the other. Here we have assumed that any student is able to access to any of the lecture halls within 10 minutes. But the present some physical science subjects are not conducted in some biology lecture halls and vice versa.

5.2 Further Improvements and Suggestions

This study only searched for a feasible and efficient course unit timetable. Basically it was suggested for the optimization of lecturing hours. The analysis revealed that it can be implemented with the available resources, but it does not allocate each course unit to a lecture hall. As a suggestion it would be assigned using an assignment algorithm such as Hungarian algorithm by further analysis.

Another problem that the faculty management faces is the scheduling the practical sessions. For the subjects, MAT, PHY, CHE, ZOO, PST, ARM, BIO, STA, CSC, ICT and FST, students are having practical. With the limited capacity of laboratories the same practical is repeated several times per week by grouping students. This situation has not been considered in this study, since it requires the data separately from the departments. Hence one can further develop this result by scheduling the practicalsessions.

The timetable which has been modeled only resulted the scheduling of general lectures. But for the fourth year students their special course units have not been scheduled. Mostly the special timetable is decided by the department involved. But if one interests it can be also scheduled by offering a departmental timetable.

One objective of this study is to minimize the wastage of the resources used in the timetabling process, both human and physical resources. An automated system will probably reduce such wastage of human resources, but a detailed cost analysis has not done due to the difficulties in getting information. Having such data a cost analysis can be done and the adequacy of this model would be further verified.

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APPENDIX A-QUESTIONNAIRE

Questionnaire on the faculty time table

This questionnaire is part of a research which intends to gather responses from students at the Faculty of Applied Sciences related to the master time table of the faculty.
By completing this form you will be making an important contribution to redesign the time table in an efficient way.

Background information

1. Your year of Study
   ☐ First ☐ Second ☐ Third ☐ Special

2. Your Stream Of Study
   ☐ Physical ☐ Biological ☐ Other

3. You are coming to the university from:
   ☐ Home ☐ Boarding ☐ Hostel ☐ Other

4. Time taken to travel from your residence to the university
   ☐ Less than a half an hour ☐ Around an hour ☐ More than an hour

Preferences of Lecture Halls

5. Rank the following lecture halls as you prefer for lectures for a group with more than 100 students (1-for highest preference, 2 for the next, etc.)
   ☐ Science Auditorium (S1) Biology Auditorium (A1)
   ☐ Chemistry Lecture Theatre 1 (C1) New Faculty Complex
   ☐ Chemistry Lecture Theatre 2 (C2)
   ☐ Physics Lecture Theatre 1 (P1)

Time of Lectures

6. Your most preferred time to attend the lectures

☐ Morning (8-12) ☐ Afternoon (1-3) ☐ After 3 p.m.

7. Rank the days of the week for morning lectures in your preference order.

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday

8. Rank the days of the week for evening lectures in your preference order.

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday

9. Your most preferred time for practical classes

☐ Morning (8-12) ☐ Afternoon (1-3) ☐ After 3 p.m.

10. Your preference on maximum time gap between two consecutive lectures

1 30 minutes
2 60 minutes
3 More than 60 minutes

11. Do you prefer to have a free day within the week days while having frequent lectures on other days?

☐ Yes ☐ No

12. State any other issues that you are facing with the current time table.

Many thanks for your time.

Responses of the second year physical science students:

Note: The numbers represent the rankings of the students for each time periods and days.

Student no	lecture-time	Monday morning	Tuesday morning	Wednesday morning	Thursday morning	Friday morning	gap
1	1	4	1	3	4	5	2
2	2	2	1	3	4	5	2
3	1	1	1	2	4	5	2
4	1	4	1	2	3	5	1
5	1	3	1	3	3	4	1
6	1	1	2	3	3	4	1
7	1	3	1	3	2	4	1
8	2	1	2	2	2	4	3
9	1	1	1	2	3	4	2
10	2	2	1	3	3	4	2
11	1	4	2	3	3	4	1
12	1	4	3	3	3	5	2
13	1	1	2	3	3	4	2
14	1	1	1	3	3	5	1
15	1	2	2	3	3	5	2
16	1	3	1	3	3	5	2
17	1	4	1	2	3	5	2
18	1	3	1	2	3	5	2
19	1	2	2	2	3	5	2
20	1	2	2	2	3	5	2
21	1	2	2	2	3	5	1
22	1	3	2	2	2	5	3
23	1	3	1	2	2	5	1
24	2	3	1	2	4	5	1
25	2	3	1	3	4	5	1
26	1	3	2	3	2	5	1
27	2	3	2	3	3	5	2
28	1	3	2	3	4	5	2
29	1	4	1	3	2	5	2
30	1	1	1	3	3	5	2
31	1	4	1	3	3	5	1
32	2	4	2	3	3	5	2
33	1	4	3	3	4	5	2
34	1	3	1	3	4	5	1
35	1	2	1	2	4	5	1
36	1	3	1	2	4	5	1
37	1	2	2	2	3	5	2

38	1	2	2	2	4	4	1
39	2	2	2	2	3	4	2
40	2	2	2	2	3	5	2
41	1	2	2	2	3	5	2
42	1	4	2	3	3	5	2
43	1	4	3	3	3	5	2
44	1	4	1	3	3	5	2
45	1	4	1	3	3	5	2
46	1	4	1	3	3	5	1
47	2	4	1	3	3	5	1
48	1	4	1	3	3	5	1
49	1	4	1	3	3	5	2
50	1	3	1	3	4	5	1
51	1	1	2	3	4	5	1
52	2	3	1	3	3	5	2
53	1	3	2	3	3	5	2
54	2	3	1	2	3	4	2
55	2	2	1	2	3	4	2
56	2	1	1	2	3	4	2
57	2	1	2	2	3	3	2
58	1	3	3	2	4	4	3
59	1	3	1	2	4	4	2
60	1	1	1	2	3	5	2
61	1	1	2	2	3	5	2
62	1	3	2	2	3	5	2
63	1	3	1	3	3	5	2
64	1	3	1	3	3	5	2
65	1	3	2	3	3	5	1
66	1	3	2	2	3	5	3
67	1	4	1	3	3	5	1
68	1	4	2	3	3	5	1
69	1	3	1	3	3	5	2
70	1	2	1	3	3	5	1
71	1	3	1	2	3	5	2
72	1	4	2	2	3	5	2
73	1	2	2	2	3	5	2
74	1	1	2	2	3	5	1
75	1	1	2	2	4	4	1
76	1	4	1	2	2	4	2
77	1	3	1	2	3	5	3
78	1	1	2	2	3	5	3
79	1	3	1	2	3	5	1
80	1	3	1	2	3	5	1
81	1	2	1	2	4	5	1

82	1	2	1	2	4	5	2
83	1	1	1	2	4	5	1
84	1	4	1	2	4	5	2
85	1	3	1	2	4	5	2
86	1	2	2	2	4	4	3
87	1	2	1	2	4	4	1
88	1	2	1	2	4	4	1
89	1	2	1	2	4	4	1
90	1	2	1	2	3	4	2
91	1	3	2	3	3	4	1
92	1	1	2	3	3	4	2
93	2	2	1	3	3	4	2
94	1	2	2	2	3	4	2
95	1	2	1	3	3	4	2
96	1	2	2	3	2	4	2
97	1	3	2	2	3	4	2
98	2	3	2	2	3	5	2
99	1	3	2	2	3	5	1
100	1	3	1	2	3	5	1
101	1	2	1	2	3	5	1
102	1	2	1	3	3	5	1
103	1	2	1	3	4	5	1
104	1	2	1	2	4	4	2
105	1	2	1	2	4	4	1
106	1	2	2	2	4	5	2
107	1	2	2	2	4	5	1
108	1	2	1	2	3	5	2
109	1	3	2	2	3	5	2
110	1	2	1	2	3	5	2
111	1	3	1	2	3	5	2
112	1	4	1	3	3	5	2
113	1	3	1	2	2	5	2
114	1	4	1	2	3	5	1
115	1	4	1	3	3	5	1
116	1	3	1	3	3	5	1
117	1	3	1	3	3	5	1
118	1	3	1	3	3	5	1
119	1	4	2	3	3	5	1
120	1	1	2	2	3	5	1
121	1	2	2	2	3	5	1
122	2	2	2	2	3	5	2
123	1	3	1	3	3	5	2
124	1	4	1	3	4	5	2
125	1	3	1	3	4	5	1

126	1	4	1	3	2	5	3
127	1	3	1	2	3	5	1
128	1	4	1	2	3	5	2
129	1	4	1	2	3	5	1
130	1	4	1	2	3	5	2
131	1	3	2	2	3	5	2
132	1	2	2	2	3	5	2
133	2	3	2	3	3	5	1
134	1	2	2	3	3	5	2
135	1	3	2	3	4	5	2
136	1	2	1	3	4	5	1
137	1	3	2	2	4	5	2
138	1	2	1	2	2	5	1
139	1	3	1	2	3	5	2
140	1	3	1	1	3	5	1
141	1	3	1	1	3	5	2
142	1	3	2	2	3	5	1
143	1	4	1	2	3	5	2
144	1	2	1	2	3	5	2
145	1	2	2	2	3	5	1
146	1	2	1	2	4	5	1
147	1	3	2	2	2	5	1
148	1	2	2	2	3	5	1
149	2	2	1	1	3	5	1
150	1	3	1	1	3	4	2

Responses of the second year Biological science students:

Student no	lecture-time	Mondaymorning	Tuesdaymorning	Wednesdaymorning	Thursdaymorning	Fridaymorning	gap
2	2	3	1	2	4	5	2
3	1	1	2	3	4	5	1
4	1	1	2	3	5	4	1
5	1	1	2	3	4	5	1
6	1	1	2	3	4	5	2
7	1	1	2	3	4	5	2
8	2	1	2	3	4	5	2
9	1	1	2	3	4	5	1
10	2	1	2	3	5	4	1
11	2	1	2	3	4	5	1
12	2	1	2	3	4	5	3
13	2	1	2	3	4	5	2
14	1	2	1	3	4	5	2
15	1	2	1	3	4	5	1
16	1	2	1	3	4	5	1
17	1	3	1	2	4	5	3
18	1	1	3	2	4	5	3
19	1	3	1	2	4	5	1
20	1	3	1	2	5	4	3
21	1	3	1	2	4	5	1
22	1	3	1	2	4	5	1
23	1	2	1	3	4	5	2
24	2	2	1	3	4	5	2
25	2	1	2	3	4	5	2
26	1	1	2	3	4	5	2
27	2	1	2	3	4	5	2
28	1	3	2	1	4	5	2
29	1	2	3	1	4	5	1
30	1	2	1	3	4	5	3
31	1	1	2	3	4	5	3
32	2	2	1	3	4	5	1
33	1	1	2	3	4	5	1
34	1	3	1	2	4	5	2
35	1	1	3	2	4	5	3
36	1	2	1	3	4	5	1
37	2	1	2	3	4	5	1
38	2	2	1	3	4	5	2

39	2	1	2	3	4	5	2
40	2	3	1	2	4	5	2
41	1	2	1	3	4	5	1
42	1	1	2	3	4	5	2
43	1	2	1	3	4	5	1
44	1	3	1	2	4	5	2
45	1	2	1	3	4	5	1
46	1	1	2	3	4	5	2
47	2	1	2	3	4	5	1
48	1	1	2	3	4	5	3
49	1	2	1	3	4	5	2
50	1	1	2	3	4	5	1
51	1	3	1	2	4	5	2
52	2	2	1	3	4	5	2
53	1	1	2	3	4	5	3
54	2	1	2	3	4	5	1
55	2	1	2	3	4	5	1
56	1	1	2	3	4	5	2
57	1	2	1	3	4	5	1
58	1	1	2	3	4	5	2
59	1	1	2	3	4	5	2
60	1	3	1	2	4	5	3
61	1	2	1	3	4	5	2
62	1	2	1	3	4	5	2
63	1	1	2	3	4	5	2
64	1	1	2	3	4	5	2
65	1	1	2	3	4	5	1
66	1	3	1	2	4	5	1
67	1	3	1	2	4	5	2
68	1	3	1	2	4	5	1
69	1	3	1	2	4	5	2
70	1	2	1	3	4	5	1
71	1	1	2	3	4	5	1
72	1	2	1	3	4	5	2
73	1	1	2	3	4	5	1
74	1	2	1	2	4	5	2
75	1	1	2	3	4	5	1
76	1	3	1	2	4	5	2
77	1	1	2	3	4	5	1
78	1	2	1	3	4	5	1
79	1	2	1	3	4	5	2
80	1	1	3	2	4	5	1
81	1	1	2	3	4	5	2
82	1	3	1	2	4	5	1
83	1	1	2	3	4	5	2

84	1	2	1	3	4	5	1
85	1	1	2	3	4	5	2
86	1	1	2	3	4	5	1
87	2	1	2	3	4	5	2
88	2	1	2	3	4	5	1
89	2	2	1	3	4	5	2
90	1	2	1	3	4	5	1
91	1	1	2	3	4	5	2
92	2	1	2	3	4	5	1
93	2	3	1	2	4	5	2
94	1	1	2	3	4	5	2
95	1	2	1	3	4	5	2
96	1	3	1	2	4	5	2
97	1	3	1	2	4	5	2
98	2	3	1	2	4	5	2
99	2	3	1	2	4	5	2
100	1	2	1	3	4	5	1
101	1	2	1	3	4	5	1
102	1	2	1	3	4	5	1
103	1	1	2	3	4	5	1
104	1	1	2	3	4	5	2
105	1	2	1	3	4	5	2

Responses of the first year students

Student no	lecture-time	Mondaymorning	Tuesdaymorning	Wednesdaymorning	Thursdaymorning	Fridaymorning	Gap
1	1	3	1	2	4	5	2
2	2	3	1	2	4	5	2
3	1	3	1	4	2	5	2
4	1	2	1	3	4	5	3
5	1	2	1	4	3	5	3
6	1	2	1	5	3	4	1
7	2	2	1	3	4	5	2
8	1	1	2	3	4	5	3
9	2	1	2	3	4	5	2
10	2	2	1	3	4	5	2
11	2	1	2	3	4	5	2
12	2	3	1	2	5	4	2
13	2	2	1	3	4	5	2
14	1	2	1	3	4	5	2
15	2	3	1	2	4	5	2
16	2	3	1	2	4	5	2
17	2	2	1	3	4	5	1
18	2	2	1	3	4	5	2
19	1	1	2	3	4	5	3
20	1	3	1	2	4	5	2
21	2	3	1	2	5	4	3
22	1	1	3	2	4	5	3
23	2	3	1	2	4	5	1
24	1	2	1	3	4	5	1
25	1	3	2	1	4	5	1
26	2	3	1	2	4	5	1
27	2	3	1	2	4	5	1
28	2	2	3	1	4	5	1
29	1	2	1	3	4	5	3
30	1	1	2	3	4	5	2
31	1	1	2	3	4	5	1
32	1	1	2	3	4	5	3
33	2	1	2	3	4	5	3
34	1	1	2	3	4	5	3
35	1	2	1	3	4	5	1
36	1	2	1	3	4	5	1
37	2	2	1	3	4	5	2

38	1	2	1	3	4	5	2
39	2	2	1	3	4	5	3
40	1	2	3	1	4	5	2
41	1	4	3	1	2	5	3
42	1	1	2	3	4	5	2
43	1	1	2	3	4	5	3
44	1	2	1	3	4	5	2
45	1	2	1	3	4	5	3
46	2	3	1	2	4	5	2
47	2	1	2	3	4	5	3
48	2	2	3	1	4	5	2
49	1	2	1	3	4	5	1
50	1	3	1	2	4	5	2
51	1	3	1	2	4	5	1
52	2	3	1	2	4	5	1
53	1	3	1	2	4	5	1
54	2	3	1	2	4	5	2
55	1	1	2	3	4	5	1
56	2	1	2	3	4	5	2
57	1	2	1	3	4	5	2
58	2	1	2	3	4	5	2
59	1	1	2	3	4	5	2
60	2	3	2	1	4	5	2
61	1	3	1	2	4	5	3
62	2	1	2	3	4	5	1
63	1	2	1	3	4	5	2
64	2	1	2	3	4	5	2
65	1	2	1	3	4	5	3
66	2	1	2	3	4	5	3
67	1	2	3	1	4	5	2
68	1	2	1	3	4	5	2
69	1	2	1	3	4	5	1
70	1	2	1	3	4	5	1
71	1	2	1	3	4	5	1
72	1	2	1	3	4	5	3
73	1	2	1	3	4	5	2
74	1	2	1	3	4	5	2
75	1	2	1	3	4	5	2
76	2	2	1	3	4	5	2
77	2	2	1	3	4	5	2
78	2	2	1	3	4	5	2
79	2	2	1	3	4	5	1
80	2	2	1	3	4	5	1
81	1	3	1	3	4	5	1
82	2	3	1	3	4	5	3

83	1	1	2	4	3	5	2
84	1	2	1	4	3	5	2
85	1	1	2	3	4	5	2
86	1	2	1	3	4	5	2
87	2	1	2	3	4	5	2
88	1	3	2	1	4	5	2
89	2	3	1	2	4	5	3
90	1	3	1	2	4	5	3
91	2	2	1	3	4	5	2
92	1	2	1	3	4	5	2
93	2	1	2	3	4	5	1
94	1	2	1	3	4	5	2
95	2	2	1	3	4	5	2
96	1	2	1	3	4	5	2
97	2	2	3	1	4	5	1
98	1	2	1	3	4	5	1
99	1	3	1	2	4	5	2
100	1	3	2	1	4	5	1
101	1	3	1	2	4	5	1
102	1	1	2	3	4	5	1
103	1	2	1	3	4	5	1
104	2	1	2	3	4	5	1
105	2	2	1	3	4	5	1
106	1	1	2	3	4	5	2
107	2	2	1	3	4	5	1
108	1	2	1	3	4	5	2
109	2	3	1	2	4	5	3
110	1	3	1	2	4	5	1
111	2	3	1	2	4	5	1
112	1	1	2	4	3	5	2
113	2	1	2	3	4	5	2
114	1	1	2	3	4	5	2
115	2	1	2	3	4	5	1
116	1	2	1	4	3	5	2
117	2	2	1	3	4	5	1
118	1	2	1	3	4	5	2
119	2	3	1	2	4	5	2
120	2	3	2	1	4	5	2
121	2	3	2	1	4	5	2
122	2	3	2	1	4	5	2
123	2	1	2	4	3	5	2
124	1	1	2	3	4	5	2
125	1	2	1	3	4	5	2
126	1	1	2	3	4	5	1
127	2	2	1	3	4	5	1

128	1	1	2	3	4	5	1
129	2	2	1		4	5	1
130	1	2	1	3	4	5	1
131	2	1	2	3	4	5	2
132	1	2	1	3	4	5	2
133	2	3	1	2	4	5	2
134	1	3	2	1	4	5	1
135	2	2	1	3	4	5	2
136	2	1	2	3	4	5	1
137	2	1	2	3	4	5	2
138	1	2	1	3	4	5	1
139	1	2	1	3	4	5	3
140	1	2	1	3	4	5	1
141	1	3	1	2	4	5	1
142	2	1	2	3	4	5	1
143	1	2	1	3	4	5	1
144	2	1	2	3	4	5	1
145	1	2	1	3	4	5	1
146	2	1	2	3	4	5	1
147	1	2	1	3	4	5	1
148	2	1	2	3	4	5	1
149	1	2	1	3	4	5	1
150	2	2	1	3	4	5	1
151	1	2	1	3	4	5	1
152	2	2	1	3	4	5	1
153	1	3	2	1	4	5	2
154	2	3	1	2	4	5	2
155	2	1	2	3	4	5	2
156	1	3	1	2	4	5	2
157	1	2	1	3	4	5	2
158	2	1	2	3	4	5	1
159	2	3	1	2	4	5	1
160	1	1	2	3	4	5	1
161	2	2	1	3	4	5	1
162	1	2	1	3	4	5	1
163	2	2	1	3	4	5	3
164	2	2	1	3	4	5	2
165	2	2	1	3	4	5	1
166	1	2	1	3	4	5	2
167	1	2	1	3	4	5	1
168	1	3	2	1	4	5	2
169	1	3	1	2	4	5	1
170	1	1	2	3	4	5	2
171	1	1	2	3	4	5	1
172	2	3	1	2	4	5	2

173	2	3	1	2	4	5	2
174	1	2	1	3	4	5	2
175	2	2	1	3	4	5	2
176	2	3	2	1	4	5	2
177	2	1	2	3	4	5	2
178	1	1	2	3	4	5	2
179	2	3	1	2	4	5	2
180	2	2	1	3	4	5	2
181	1	2	1	3	4	5	2
182	1	2	1	3	4	5	1
183	1	2	1	3	4	5	1
184	1	2	1	3	4	5	1
185	1	3	1	2	4	5	1
186	1	3	1	3	4	5	1
187	1	3	1	2	4	5	1
188	2	3	1	2	4	5	1
189	1	1	2	3	4	5	3
190	1	2	3	1	4	5	2
191	1	2	1	3	4	5	2
192	2	3	2	1	4	5	2
193	2	2	1	2	4	5	3
194	1	1	2	3	4	5	2
195	1	2	1	3	4	5	2
196	1	3	1	2	4	5	2
197	1	2	1	3	4	5	2
198	1	1	2	3	4	5	2
199	1	2	1	3	4	5	2
200	1	2	1	3	4	5	2

APPENDIX B

Maple 12 coding for graph coloring

Maple results of initial coloring

> restart; with(GraphTheory);

>A := matrix([[CHE, ZOO, PHY, PBT, EMF, ARM, BIO, ICT, MAN, PST, MAT, CSC, STA, ECN, FSC]]);

>G2 := Graph(A, ARM, BIO, ARM, CHE, ARM, MAN, ARM, ZOO, BIO, CHE, BIO, FSC, BIO, ICT, CHE, EMF, CHE, FSC, CHE, ICT, CHE, MAN, CHE, MAT, CHE, PBT, CHE, PHY, CHE, PST, CHE, STA, CHE, ZOO, CSC, MAT, CSC, PHY, CSC, STA, ECN, MAT, ECN, STA, EMF, MAN, EMF, PBT, EMF, PHY, EMF, ZOO, ICT, MAT, ICT, PHY, MAN, MAT, MAN, PBT, MAN, PHY, MAN, ZOO, MAT, PHY, MAT, STA, PBT, ZOO, PHY, PST, PHY, STA, PHY, ZOO);

>IsVertexColorable(G2, 5, 'Co'); true

> Co; [[CHE, CSC, ECN], [ARM, EMF, FSC, ICT, PST, STA], [BIO, MAN], [PBT, PHY], [MAT, ZOO]]

Maple results of the coloring the first year course units.

Gnew1 := Graph(V1, E1)

Gnew1 := 'Graph 3: a directed unweighted graph with 55 vertices and 1183 arc(s)'

>IsVertexColorable(Gnew1, 20, 'Co1');

true

> Co1;

[1, 6, 9], [2, 7, 10], [3, 8], [4], [5], [11, 14, 27, 36, 39], [12, 15, 28, 37, 40], [13, 16, 29,38, 41],[17, 23, 30, 32, 42], [18, 24, 31, 33], [19, 25, 34,

43], [20, 26, 35, 44],[21, 45, 46], [49, 52], [50, 53], [51, 54], [55], [22, 47], [48]]

Maple results of the coloring the Second year course units.

>Gnew2 := Graph(V2, E2);
Gnew2 := ‘Graph 2: a directed unweighted graph with 62 vertices and 1482 arc(s)‘
>IsVertexColorable(Gnew2, 23, ’Co2’);
true;
> Co2; [[1, 6, 9], [2, 7, 10], [3, 8], [4], [5], [11, 15, 22, 30, 33], [12, 16, 23, 31, 34], [13, 17, 24, 32, 35], [14, 25, 36, 46], [18, 26, 27, 37, 56], [19, 28, 38, 57], [20, 29, 39, 58], [21, 40, 42, 59], [41, 43, 60], [47, 50, 61], [48, 51, 62], [49, 52], [53], [54], [55], [44], [45]]

Maple results of the coloring the Third year course units.
>Gnew3 := Graph(V3, E3);
Gnew3 := ‘Graph 2: a directed unweighted graph with 65 vertices and 1719 arc(s)‘
>IsVertexColorable(Gnew3, 24, ’Co3’);
true
[1, 7, 12], [2, 8, 13], [3, 9], [4, 10], [5, 11], [6], [14, 19, 29, 40, 44], [15, 20, 30,41, 45], [16, 31, 42, 46], [17, 32, 43], [18, 33, 52], [21, 25, 34, 36], [22, 26, 35,37], [23, 27, 38, 47], [24, 28, 39, 48], [49, 53], [50, 54], [51, 55], [56, 61], [57,62], [58, 63], [59, 64], [60, 65],[57]]

MATLAB 14 codes to execute the linear programming model and to generate the time table.

```
function Time=SemesterI_TimeTable(Year)
Time=Year;
if Time==1

%import data
[l1]=xlsread('Grouping.xlsx','onehr');
[l2]=xlsread('Grouping.xlsx','twohr');
[T1]=xlsread('Grouping.xlsx','Timeslots');

C1=length(l1); C2=length(l2);
t_courses=length(l1)+length(l2); % total no of courses
n_times=length(T1); %total no of time slots
variables=t_courses*n_times;

% First constraint-matrix A1 for the completness property
l=1;u=n_times;
A1=zeros(t_courses,variables); %initializing
fori=1:t_courses
for q=l:u
A1(i,q)=1;
end
l=u+1;
u=u+n_times;
end


% H is the array representimg the duration for each
course
H=ones(C1+C2,1); %initializing
```

```
fori=C1+1:t_courses
H(i)=2;
end
%Second constraint-matrix A2 represents conflicts free
A2=zeros(n_times,variables);% initializing

fori=1:n_times
for q=1:t_courses
A2(i,n_times*q+i-n_times)=1;
end
end
% B is the array with ones-r.h.s. of the constraints
 B=ones(n_times,1);
% integer linear program
intcon=1:756; % all decision variables are integers

% z is the objective function
 z=zeros(variables,1);
k=1;
fori=1:t_courses
for q=1:n_times
z(k)=sqrt(q)+1;
k=k+1;
end
end
% giving lower and upper bounds for decision
variables(binary)
lb=zeros(variables,1);
ub = ones(variables,1);
% y is the solution of the ILP
y=intlinprog(z,intcon,A2,B,A1,H,lb,ub);

% representing the solution in to matrix
```

```
n=1;X=zeros(C1+C2,n_times);
for p=1:C1+C2
for q=1:42
X(p,q)=y(n);
       n=n+1;
end
end
TT=zeros(1,45);%dummy timetable
%Courses=1:C1+C2;

fori=1:C1+C2
for j=1:n_times
if X(i,j)==1
TT(j) = i;

end
end
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    TimeTable1=zeros(9,5);%represent only the group
numbers
  %Table gives values for each timeperiod according to
preferences
Table1=[1,2,3,4,5;6,7,8,9,10;11,12,13,14,15;16,17,18,19,2
0;21,22,23,24,25,;26,27,28,29,30;31,32,33,100,35;36,37,10
0,100,100;41,42,100,100,100];

fori=1:9
for j=1:5
for k=1:45
if Table1(i,j)==k
TimeTable1(i,j)= TT(k);

end
```

```
end
end
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
  %following loop will assign consecutive time periods
fori=C1+1:t_courses
for p=1:9
for q=1:5
if TimeTable1(p,q)==i
for t=1:9
for s=1:5
if (t~=p && s~=q)
if TimeTable1(t,s)==i
TimeTable1(t,s)=TimeTable1(p+1,q);
TimeTable1(p+1,q)=i;
end;
end
end
end
end
end
end
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%Adjust the two hrs in 11-12
i=4;
for k=C1+1:t_courses
for j=1:5
if (TimeTable1(i,j)==k && TimeTable1(i+1,j)==k)

TimeTable1(i,j)=0;
TimeTable1(i+2,j)=k;
end
end
```

```
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
GUI Table
[credit,courseunit,compose]=xlsread('Grouping.xlsx','Shee
t2');

NewTable=cell(9,5);
fori=1:9
for j=1:5
for p=1:t_courses

if compose{p,2}==TimeTable1(i,j)
NewTable{i,j}=compose{p,1};

end
end
end
end
f = figure('Position',[0 0 1 1]);
set(f,'unit','normalized');
% Column names and column format
columnname =
{'Monday','Tuesday','Wednesday','Thursday','Friday'};
%columnformat = {'char','char','char','char','char'};
columnformat =
{'numeric','numeric','numeric','numeric','numeric'};


FontSize = 9;
FontWeight='bold';
```

```
rownames = {'8.00-8.50','8.55-9.45','10.15-11.05','11.10-
12.00','1.00-2.00','2.00-3.00','3.00-4.00','4.00-
5.00','5.00-5.45'};
% Define the data
fori=1:9
for j=1:5
d{i,j}=NewTable{i,j};

end
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Create the uitable
t = uitable('Data', d,...
            'ColumnName', columnname,...
            'ColumnFormat', columnformat,...
                'ColumnWidth',{300 },...
            'FontSize',FontSize,...
            'FontWeight',FontWeight,...
             'RowName',rownames);
%set(t,'BackgroundColor',[0 0.9 1]);
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
if Time==3

[l1_3]=xlsread('Grouping3.xlsx','onehr');
[l2_3]=xlsread('Grouping3.xlsx','twohr');
[T1_3]=xlsread('Grouping.xlsx','Timeslots');
C1_3=length(l1_3); C2_3=length(l2_3);
t_courses3=length(l1_3)+length(l2_3); % total no of
courses
n_times=length(T1_3); %total no of time slots

l=1;u=n_times;
```

```
A1_3=zeros(t_courses3,t_courses3*n_times); %initializing
fori=1:t_courses3
for q=l:u
   A1_3(i,q)=1;
end
l=u+1;
u=u+n_times;
end
H_3=ones(C1_3+C2_3,1); %initializing

fori=C1_3+1:t_courses3
    H_3(i)=2;
end
A2_3=zeros(n_times,t_courses3*n_times);% initializing

fori=1:n_times
for q=1:t_courses3
    A2_3(i,n_times*q+i-n_times)=1;
end
end

B_3=ones(n_times,1);

% integer linear program
intcon=1:1008; % all decision variables are integers

% z is the objective function
z=zeros(n_times*t_courses3,1);
k=1;
fori=1:t_courses3
for q=1:n_times
z(k)=sqrt(q)+1;
k=k+1;
```

```
end
end
% giving lower and upper bounds for decision
variables(binary)
lb=zeros(n_times*t_courses3,1);
ub = ones(n_times*t_courses3,1);
% y is the solution of the ILP
y=intlinprog(z,intcon,A2_3,B_3,A1_3,H_3,lb,ub);

% representing the solution in to matrix
n=1;X=zeros(C1_3+C2_3,n_times);
for p=1:C1_3+C2_3
for q=1:42
X(p,q)=y(n);
       n=n+1;
end
end

TT=zeros(1,45);
Courses=1:C1_3+C2_3;

fori=1:C1_3+C2_3
for j=1:n_times
if X(i,j)==1
TT(j) = i;

end
end
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
TimeTable3=zeros(9,5);
Table3=[1,2,3,13,14;4,5,6,15,16;7,8,9,17,18;10,11,12,19,2
0;21,22,23,36,37;24,25,26,38,39;27,28,29,100,100;30,31,32
,100,100;33,34,100,100,100];
```

```
fori=1:9
for j=1:5
for k=1:45
if Table3(i,j)==k
TimeTable3(i,j)= TT(k)
end
end
end
end
fori=C1_3+1:t_courses3
for p=1:9
for q=1:5
if TimeTable3(p,q)==i
for t3=1:9
for s=1:5
if (t3~=p && s~=q)
if TimeTable3(t3,s)==i
TimeTable3(t3,s)=TimeTable3(p+1,q);
TimeTable3(p+1,q)=i;
end;
end
end
end
end
end
end
end
i=4;
for k=C1_3+1:t_courses3
for j=1:5
if (TimeTable3(i,j)==k && TimeTable3(i+1,j)==k)
TimeTable3(i,j)=0;
TimeTable3(i+2,j)=k;
end
```

```
end

end
TimeTable3(3,1)=23;TimeTable3(9,1)=11;TimeTable3(6,3)=16;
TimeTable3(8,2)=9;TimeTable3(5,4)=17;TimeTable3(6,4)=17;
TimeTable3(4,4)=12;TimeTable3(7,2)=18;TimeTable3(9,2)=8;T
imeTable3(4,1)=4;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
[credit3,courseunit3,compose3]=xlsread('Grouping3.xlsx','
groups3');

NewTable3=cell(9,5);
fori=1:9
for j=1:5
for p=1:t_courses3
if compose3{p,3}==TimeTable3(i,j)
NewTable3{i,j}=compose3{p,1};

end
end
end
end

 f3 = figure('Position',[200 400 400 400]);

% Column names and column format
columnname =
{'Monday','Tuesday','Wednesday','Thursday','Friday'};
%columnformat = {'char','char','char','char','char'};
columnformat =
{'numeric','numeric','numeric','numeric','numeric'};
FontSize = 9;
FontWeight='bold';
```

```
rownames = {'8.00-9.00','9.00-10.00','10.00-
11.00','11.00-12.00','1.00-2.00','2.00-3.00','3.00-
4.00','4.00-5.00','5.00-6.00'};
% Define the data

fori=1:9
for j=1:5
d3{i,j}=NewTable3{i,j};

end
end

% Create the uitable
t3 = uitable('Data', d3,...
             'ColumnName', columnname,...
             'ColumnFormat', columnformat,...
             'ColumnWidth',{300 },...
             'FontSize',FontSize,...
              'RowName',rownames);
set(t3,'BackgroundColor',[0 1 0.7]);
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
if Time==2

[l1_2]=xlsread('Grouping2.xlsx','onehr');
[l2_2]=xlsread('Grouping2.xlsx','twohr');
[T1_2]=xlsread('Grouping.xlsx','Timeslots');
C1_2=length(l1_2); C2=length(l2_2);
t_courses2=length(l1_2)+length(l2_2); % total no of
courses
n_times=length(T1_2); %total no of time slots

l=1;u=n_times;
```

```
A1_2=zeros(t_courses2,t_courses2*n_times); %initializing
fori=1:t_courses2
for q=l:u
   A1_2(i,q)=1;
end
l=u+1;
u=u+n_times;
end

H_2=ones(C1_2+C2,1); %initializing

fori=C1_2+1:t_courses2
    H_2(i)=2;
end

A2_2=zeros(n_times,t_courses2*n_times);% initializing

fori=1:n_times
for q=1:t_courses2
    A2_2(i,n_times*q+i-n_times)=1;
end
end
B_2=ones(n_times,1);

% integer linear program

intcon=1:882; % all decision variables are integers

% z is the objective function
z=zeros(n_times*t_courses2,1);
k=1;
fori=1:t_courses2
for q=1:n_times
z(k)=sqrt(q)+1;
```

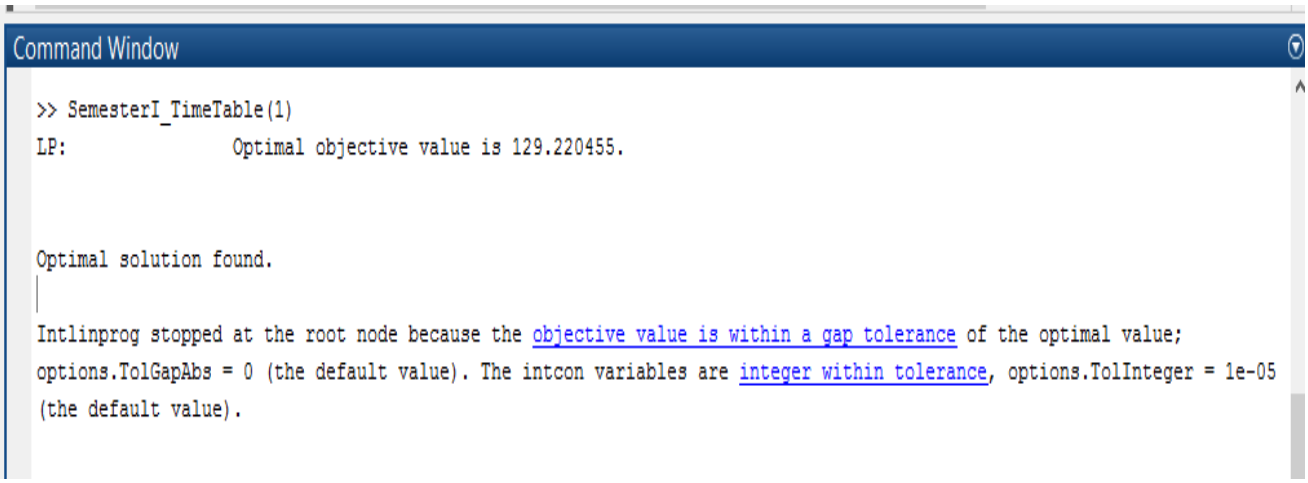
```
k=k+1;
end
end
% giving lower and upper bounds for decision
variables(binary)
lb=zeros(n_times*t_courses2,1);
ub = ones(n_times*t_courses2,1);
% y is the solution of the ILP
y=intlinprog(z,intcon,A2_2,B_2,A1_2,H_2,lb,ub);

% representing the solution in to matrix
n=1;X=zeros(C1_2+C2,n_times);
for p=1:C1_2+C2
for q=1:42
X(p,q)=y(n);
       n=n+1;
end
end
TT=zeros(1,45);
Courses=1:C1_2+C2;

fori=1:C1_2+C2
for j=1:n_times
if X(i,j)==1
TT(j) = i;

end
end
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


 TimeTable2=zeros(9,5);
```

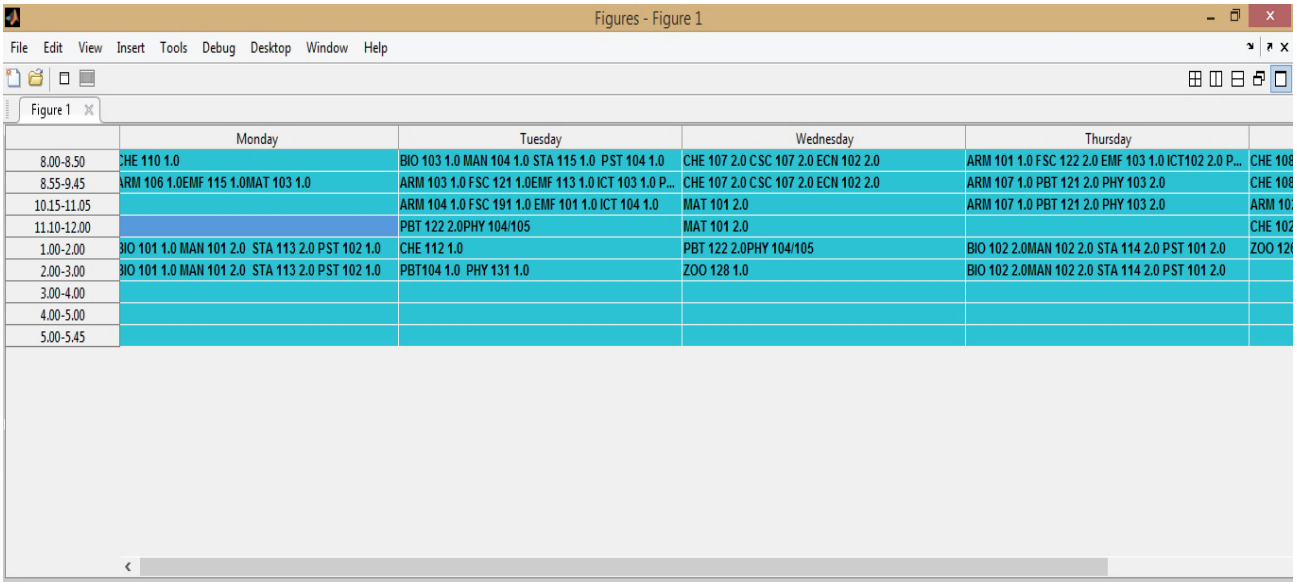
```
Table2=[11,13,15,17,19;12,14,16,18,20;1,3,5,7,9;2,4,6,8,1
0;21,23,25,27,29;22,24,26,28,30;31,32,33,100,34;35,36,37,
100,100;38,39,40,100,100];

fori=1:9
for j=1:5
for k=1:45
if Table2(i,j)==k
TimeTable2(i,j)= TT(k);

end
end
end
end
fori=C1_2+1:t_courses2
for p=1:9
for q=1:5
if TimeTable2(p,q)==i
for t2=1:9
for s=1:5
if (t2~=p && s~=q)
if TimeTable2(t2,s)==i
TimeTable2(t2,s)=TimeTable2(p+1,q);
TimeTable2(p+1,q)=i;
end;
end
end
end
end
end
end
end
```

```
i=4;
for k=C1_2+1:t_courses2
for j=1:5
if (TimeTable2(i,j)==k && TimeTable2(i+1,j)==k)
TimeTable2(i,j)=0;
TimeTable2(i+2,j)=k;
end
end

end
TimeTable2(4,5)=22;TimeTable2(7,5)=3;TimeTable2(4,2)=5;Ti
meTable2(8,3)=15;

[credit2,courseunit2,compose2]=xlsread('Grouping2.xlsx','
groups2');

NewTable2=cell(9,5);
fori=1:9
for j=1:5



for p=1:t_courses2
if compose2{p,2}==TimeTable2(i,j)
NewTable2{i,j}=compose2{p,1};
end
end
end
end
f2 = figure('Position',[200 400 400 400]);

% Column names and column format
```

```
columnname =
{'Monday','Tuesday','Wednesday','Thursday','Friday'};
%columnformat = {'char','char','char','char','char'};
columnformat =
{'numeric','numeric','numeric','numeric','numeric'};
FontSize = 9;
FontWeight='bold';

rownames = {'8.00-8.50','8.55-9.45','10.15-11.05','11.10-
12.00','1.00-2.00','2.00-3.00','3.00-4.00','4.00-
5.00','5.00-5.45'};
% Define the data

fori=1:9
for j=1:5
d2{i,j}=NewTable2{i,j};
end
end




% Create the uitable
t2 = uitable('Data', d2,...
             'ColumnName', columnname,...
             'ColumnFormat', columnformat,...
             'columnWidth',{300},...
             'FontSize',FontSize,...
              'RowName',rownames);
%set(t2,'BackgroundColor',[1 0 0.9]);
end
```

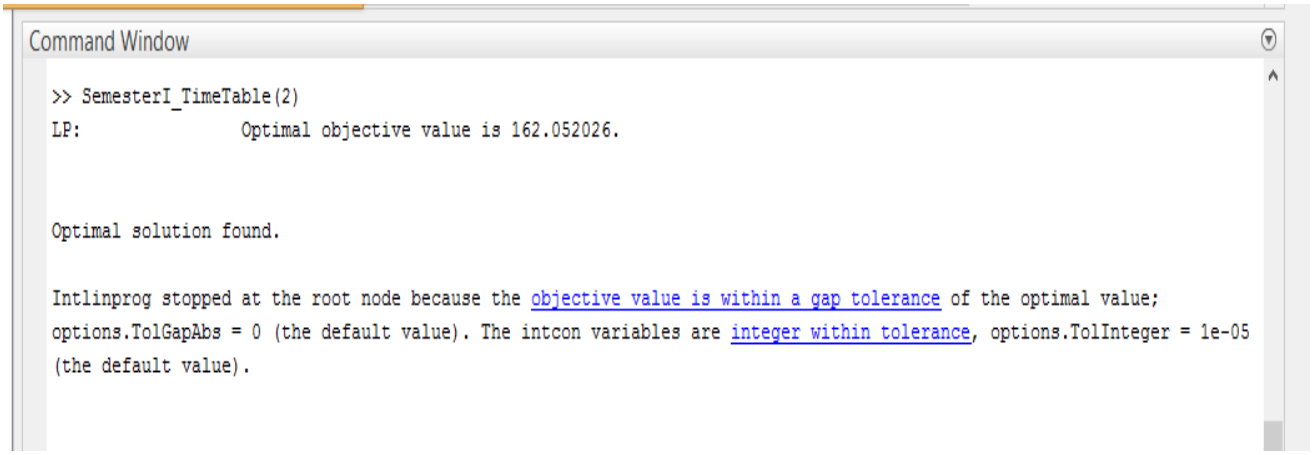
MATLAB Results

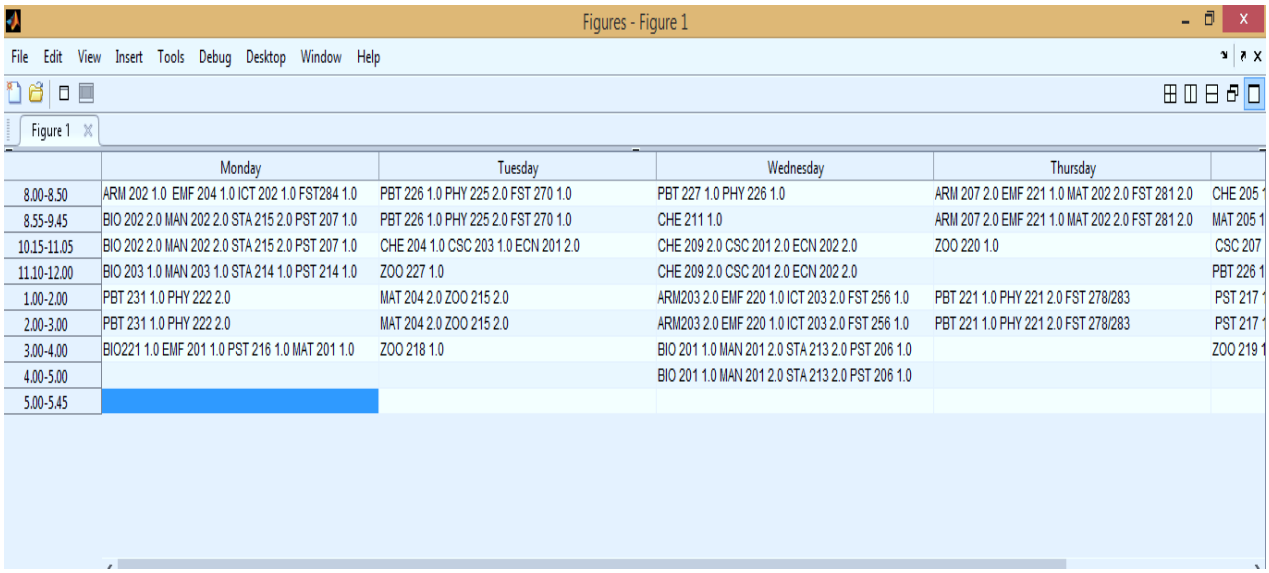




	Monday	Tuesday	Wednesday	Thursday	
8.00-8.50	CHE 110 1.0	BIO 103 1.0 MAN 104 1.0 STA 115 1.0 PST 104 1.0	CHE 107 2.0 CSC 107 2.0 ECN 102 2.0	ARM 101 1.0 FSC 122 2.0 EMF 103 1.0 ICT102 2.0 P...	CHE 108
8.55-9.45	ARM 106 1.0EMF 115 1.0MAT 103 1.0	ARM 103 1.0 FSC 121 1.0EMF 113 1.0 ICT 103 1.0 P...	CHE 107 2.0 CSC 107 2.0 ECN 102 2.0	ARM 107 1.0 PBT 121 2.0 PHY 103 2.0	CHE 108
10.15-11.05		ARM 104 1.0 FSC 191 1.0 EMF 101 1.0 ICT 104 1.0	MAT 101 2.0	ARM 107 1.0 PBT 121 2.0 PHY 103 2.0	ARM 10
11.10-12.00		PBT 122 2.0PHY 104/105	MAT 101 2.0		CHE 102
1.00-2.00	BIO 101 1.0 MAN 101 2.0 STA 113 2.0 PST 102 1.0	CHE 112 1.0	PBT 122 2.0PHY 104/105	BIO 102 2.0MAN 102 2.0 STA 114 2.0 PST 101 2.0	ZOO 12
2.00-3.00	BIO 101 1.0 MAN 101 2.0 STA 113 2.0 PST 102 1.0	PBT104 1.0 PHY 131 1.0	ZOO 128 1.0	BIO 102 2.0MAN 102 2.0 STA 114 2.0 PST 101 2.0	
3.00-4.00					
4.00-5.00					
5.00-5.45					

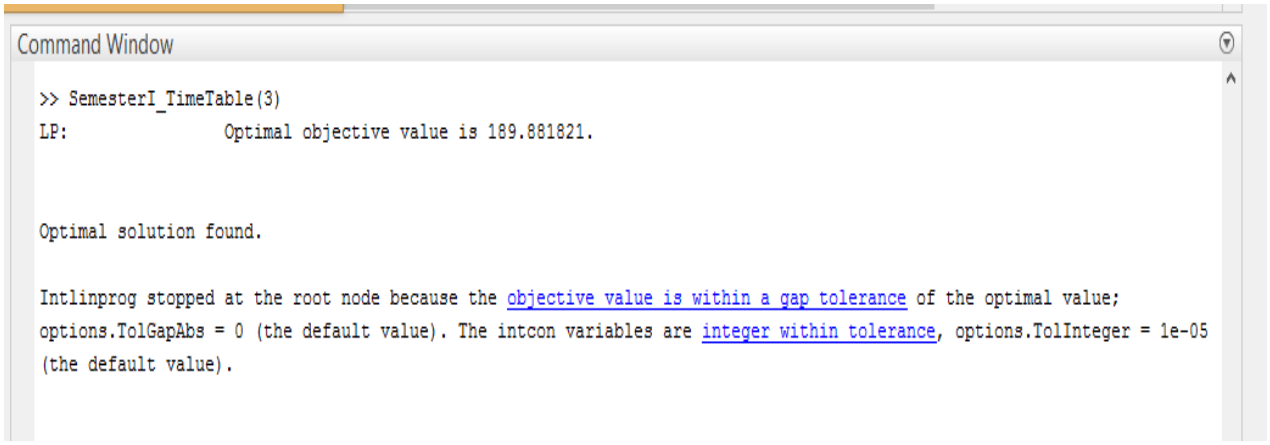
First Year Timetable

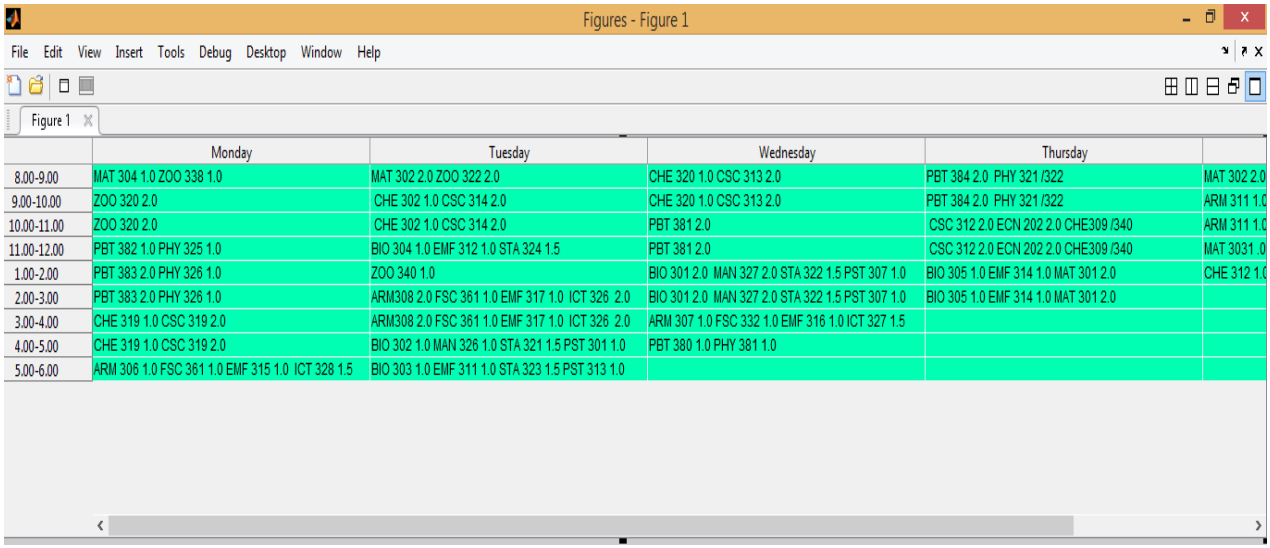




	Monday	Tuesday	Wednesday	Thursday	
8.00-8.50	ARM 202 1.0 EMF 204 1.0 ICT 202 1.0 FST284 1.0	PBT 226 1.0 PHY 225 2.0 FST 270 1.0	PBT 227 1.0 PHY 226 1.0	ARM 207 2.0 EMF 221 1.0 MAT 202 2.0 FST 281 2.0	CHE 205 1
8.55-9.45	BIO 202 2.0 MAN 202 2.0 STA 215 2.0 PST 207 1.0	PBT 226 1.0 PHY 225 2.0 FST 270 1.0	CHE 211 1.0	ARM 207 2.0 EMF 221 1.0 MAT 202 2.0 FST 281 2.0	MAT 205 1
10.15-11.05	BIO 202 2.0 MAN 202 2.0 STA 215 2.0 PST 207 1.0	CHE 204 1.0 CSC 203 1.0 ECN 201 2.0	CHE 209 2.0 CSC 201 2.0 ECN 202 2.0	ZOO 220 1.0	CSC 207
11.10-12.00	BIO 203 1.0 MAN 203 1.0 STA 214 1.0 PST 214 1.0	ZOO 227 1.0	CHE 209 2.0 CSC 201 2.0 ECN 202 2.0		PBT 226 1
1.00-2.00	PBT 231 1.0 PHY 222 2.0	MAT 204 2.0 ZOO 215 2.0	ARM203 2.0 EMF 220 1.0 ICT 203 2.0 FST 256 1.0	PBT 221 1.0 PHY 221 2.0 FST 278/283	PST 217 1
2.00-3.00	PBT 231 1.0 PHY 222 2.0	MAT 204 2.0 ZOO 215 2.0	ARM203 2.0 EMF 220 1.0 ICT 203 2.0 FST 256 1.0	PBT 221 1.0 PHY 221 2.0 FST 278/283	PST 217 1
3.00-4.00	BIO221 1.0 EMF 201 1.0 PST 216 1.0 MAT 201 1.0	ZOO 218 1.0	BIO 201 1.0 MAN 201 2.0 STA 213 2.0 PST 206 1.0		ZOO 219 1
4.00-5.00			BIO 201 1.0 MAN 201 2.0 STA 213 2.0 PST 206 1.0		
5.00-5.45					

Second Year Timetable





	Monday	Tuesday	Wednesday	Thursday	
8.00-9.00	MAT 304 1.0 ZOO 338 1.0	MAT 302 2.0 ZOO 322 2.0	CHE 320 1.0 CSC 313 2.0	PBT 384 2.0 PHY 321 /322	MAT 302 2.0
9.00-10.00	ZOO 320 2.0	CHE 302 1.0 CSC 314 2.0	CHE 320 1.0 CSC 313 2.0	PBT 384 2.0 PHY 321 /322	ARM 311 1.0
10.00-11.00	ZOO 320 2.0	CHE 302 1.0 CSC 314 2.0	PBT 381 2.0	CSC 312 2.0 ECN 202 2.0 CHE309 /340	ARM 311 1.0
11.00-12.00	PBT 382 1.0 PHY 325 1.0	BIO 304 1.0 EMF 312 1.0 STA 324 1.5	PBT 381 2.0	CSC 312 2.0 ECN 202 2.0 CHE309 /340	MAT 3031 .0
1.00-2.00	PBT 383 2.0 PHY 326 1.0	ZOO 340 1.0	BIO 301 2.0 MAN 327 2.0 STA 322 1.5 PST 307 1.0	BIO 305 1.0 EMF 314 1.0 MAT 301 2.0	CHE 312 1.0
2.00-3.00	PBT 383 2.0 PHY 326 1.0	ARM308 2.0 FSC 361 1.0 EMF 317 1.0 ICT 326 2.0	BIO 301 2.0 MAN 327 2.0 STA 322 1.5 PST 307 1.0	BIO 305 1.0 EMF 314 1.0 MAT 301 2.0	
3.00-4.00	CHE 319 1.0 CSC 319 2.0	ARM308 2.0 FSC 361 1.0 EMF 317 1.0 ICT 326 2.0	ARM 307 1.0 FSC 332 1.0 EMF 316 1.0 ICT 327 1.5		
4.00-5.00	CHE 319 1.0 CSC 319 2.0	BIO 302 1.0 MAN 326 1.0 STA 321 1.5 PST 301 1.0	PBT 380 1.0 PHY 381 1.0		
5.00-6.00	ARM 306 1.0 FSC 361 1.0 EMF 315 1.0 ICT 328 1.5	BIO 303 1.0 EMF 311 1.0 STA 323 1.5 PST 313 1.0			

Third Year Timet

APPENDIX C -FACULTY OF APPLIED SCIENCES - MASTER TIME TABLE 2016

Time	MON			TUE			WED			THU			FRI		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
8.00 - 8.50	CHE	MAT	PHY	CHE	MAN	CHE	MAT	EMF	CHE	CSC	ZOO	CHE	STA	ZOO	MAT
	CSC	PST	PBT	CSC	STA	CSC	PBT	CSC	CSC	EMF	MAT		MAN	MAT	PBT
	ECN	ARM	ICT		BIO		ARM	ECN		ECN	PST		ZOO		FSC
		FSC	PBT					ICT			BIO				
		PBT													
8.55 - 9.45	CSC	MAT	PHY	CHE	STA	ZOO	MAT	CSC	EMF	PHY	ZOO			PBT	MAT
	ECN	PST	PBT	CSC	PST	CSC	EMF	EMF	CSC	FSC	MAT	CHE		MAT	PHY
			ICT			PHY	PST	ICT		ECN	PST				
						BIO	ARM			EMF	BIO				
10.15 - 11.05	STA	MAN	ZOO	PHY	PHY	STA	CSC	CHE		MAT	PBT			STA	STA
	MAN	CSC	MAT	PBT	ECN	MAN	PST	CSC		ZOO	PHY	MAN		MAN	
	FSC		PST	BIO		FSC	ECN	ECN		BIO	FSC	PST		ZOO	
	ICT									PST		ICT		ICT	
	PST														
11.10 - 12.00	STA	MAN	ZOO	PHY	PHY	STA	CSC	CHE		MAT		MAN		EMF	STA
	MAN	CSC	MAT	PBT		MAN	ZOO	CSC		ZOO	PBT	AQS		STA	
	FSC	PST	PST	ARM	ECN					BIO	PHY	PST			
	ICT			BIO		FSC	PST					ICT		ZOO	
	PST						ECN				FSC				
01.00 - 02.00	ARM	FSC	CSC	ZOO	MAT	MAT	STA	PBT	CSC	MAN	CHE	MBL		EMF	MAT
	MAT		EMF	BIO	ZOO	ZOO	PBT		MAN	FSC	ECN	EMF		STA	
			MBL	EMF	BIO	PST	ICT			ICT		STA			
			FSC			BIO				PST		PST			
												FSC			
02.00 - 03.00	ARM	FSC				MAT				MAN		MBL			
	PHY		CSC									EMF		STA	
			EMF	EMF		ZOO			CSC		CHE	STA		MAN	
			MBL		MAT	PST	STA		MAN		ECN	FSC		AQS	
			FSC		ZOO	BIO	PBT	PBT		FSC				STA	MAT
					BIO		ICT			ICT				FSC	
03.00 - 04.00	PHY					PHY									
			STA	EMF	ICT	PBT		EMF						MAN	STA
			ZOO			ICT	PBT		STA					STA	
							STA		MAN						
04.00 - 05.00	ZOO	PHY	STA	IT	MAN	PHY	MAT		PHY					CHE	STA
	BIO	MAN		CHE	ICT	PBT			PBT						EMF
						ICT									
						PBL									
						PBT									
05.00 - 05.45	MAN	MAN	CHE	CHE	MAN		MAT		MAN						
							PST	PST							

Time Slots for Student Activities

FACULTY OF APPLIED SCIENCES –PROPSOED MASTER TIME TABLE 2016

Time	MON			TUE			WED		
	1	2	3	1	2	3	1	2	3
8.00 - 8.50	CHE 110 1.0	ARM 202 1.0	MAT 304 1.0	BIO 103 1.0	PBT 226 1.0	MAT 302 2.0	CHE 107 2.0	PBT 227 1.0	CHE 320 1.0
		EMF 204 1.0	ZOO 338 1.0	MAN 104 1.0	PHY 225 2.0	ZOO 322 2.0	CSC 107 2.0	PHY 226 1.0	CSC 313 2.0
		ICT 202 1.0		STA 115 1.0	FST 270 1.0		ECN 102 2.0		
		FST284 1.0		PST 104 1.0					
8.55 - 9.45	ARM 106 1.0	BIO 202 2.0	ZOO 320 2.0		PBT 226 1.0	MAT 302 2.0	CHE 107 2.0	ZOO 227 1.0	CHE 320 1.0
	EMF 115 1.0	MAN 202 2.0			PHY 225 2.0	ZOO 322 2.0	CSC 107 2.0		CSC 313 2.0
	MAT 103 1.0	STA 215 2.0			FST 270 1.0		ECN 102 2.0		
		PST 207 1.0							
10.15 - 11.05	MAT 102 2.0	BIO 202 2.0	ZOO 320 2.0	PBT 122 2.0	CHE 204/211	CHE 302 1.0	MAT 101 2.0	CHE 209 2.0	PBT 381 2.0
	ZOO 118/120	MAN 202 2.0		PHY 104/105	CSC 203 1.0	CSC 314 2.0		CSC 201 2.0	
		STA 215 2.0			ECN 201 2.0			ECN 202 2.0	
		PST 207 1.0							
11.10 - 12.00	MAT 102 2.0	BIO 203 1.0	PBT 382 1.0	PBT 122 2.0	CHE 204/211	ZOO 340 1.0	MAT 101 2.0	CHE 209 2.0	PBT 381 2.0
	ZOO 118/120	EMF 201 1.0	PHY 325	PHY 104/105	CSC 203 1.0	CSC 314 2.0		CSC 201 2.0	
		STA 214 1.0			ECN 201 2.0			ECN 202 2.0	
		MAT 201 1.0							
01.00 - 02.00	BIO 101 1.0	PBT 231 1.0	PBT 383 2.0	CHE 112 1.0	MAT 204 2.0	BIO 304 1.0	ARM 104 1.0	ARM203 2.0	BIO 301 2.0
	MAN 101 2.0	PHY 222 2.0	PHY 326 1.0		ZOO 215 2.0	EMF 312 1.0	FSC 191 1.0	EMF 220 1.0	MAN 327 2.0
	PST 102 1.0					STA 324 1.5	EMF 101 1.0	ICT 203 2.0	STA 322 1.5
	STA 113 2.0						ICT 104 1.0	FST 256 1.0	PST 307 1.0
02.00 - 03.00	BIO 101 1.0	PBT 231 1.0	PBT 383 2.0	PBT104 1.0	MAT 204 2.0	ARM308 2.0	ZOO 128 1.0	ARM203 2.0	BIO 301 2.0
	MAN 101 2.0	PHY 222 2.0	PHY 326 1.0	PHY 131 1.0	ZOO 215 2.0	FSC 361 1.0		EMF 220 1.0	MAN 327 2.0
	PST 102 1.0					EMF 317 1.0		ICT 203 2.0	STA 322 1.5
	STA 113 2.0					ICT 326 2.0		FST 256 1.0	PST 307 1.0
03.00 - 04.00		BIO221 1.0	CHE 319 1.0			ARM308 2.0		BIO 201 1.0	ARM 307 1.0
		MAN 203 1.0	CSC 319 2.0			FSC 361 1.0		MAN 201 2.0	FSC 332 1.0
		PST 216 1.0				EMF 317 1.0		STA 213 2.0	EMF 316 1.0
		STA 214 1.0				ICT 326 2.0		PST 206 1.0	ICT 327 1.5
04.00 - 05.00			CHE 319 1.0			BIO 302 1.0		BIO 201 1.0	PBT 380 1.0
			CSC 319 2.0			MAN 326 1.0		MAN 201 2.0	PHY 381 1.0
						STA 321 1.5		STA 213 2.0	
						PST 301 1.0		PST 206 1.0	
05.00 - 05.45			ARM 306 1.0						
			FSC 361 1.0						
			EMF 315 1.0						
			ICT 328 1.5						

THU			FRI		
1	2	3	1	2	3
ARM 101 1.0	ARM 207 2.0	PBT 384 2.0	CHE 108 /110	CHE 205 1.0	CHE 312 1.0
FSC 122 2.0	EMF 221 1.0	PHY 321/322	CSC 106 1.5		
EMF 103 1.0	MAT 202 2.0				
ICT102 2.0	FST 281 2.0				
PST 102 2.0					
ARM 101 1.0	ARM 207 2.0	PBT 384 2.0	CHE 108 /110	MAT 205 1.0	ARM 311 1.0
FSC 122 2.0	EMF 221 1.0	PHY 321/322	CSC 106 1.5	ZOO 217 1.0	FSC 353 1.0
EMF 103 1.0	MAT 202 2.0				EMF 319 1.0
ICT102 2.0	FST 281 2.0				ICT 329 1.5
PST 102 2.0					
ARM 107 1.0	ZOO 220 1.0	CSC 312 2.0	ARM 102 1.0	CSC 207 1.0	BIO 303 1.0
PBT 121 2.0		ECN 202 2.0	FSC111 1.0	CHE 208 1.0	EMF 311 1.0
PHY 103 2.0		CHE309/340	EMF 106 1.0		STA 323 1.5
			ICT 101 1.0		PST 313 1.0
			PST 101 1.0		
ARM 107 1.0	ZOO 218 1.0	CSC 312 2.0	CHE 102 1.0		MAT 303 1 .0
PBT 121 2.0		ECN 202 2.0	CSC 105 1.0		ZOO 323 1.0
PHY 103 2.0		CHE309 /340	ECN 101 1.0		
BIO 102 2.0	PBT 221 1.0	BIO 305 1.0	ZOO 126 1.0	PST 217 1.0	CHE 302 1.0
MAN 102 2.0	PHY 221 2.0	EMF 314 1.0		ARM 203 2.0	CSC 314 2.0
STA 114 2.0	FST 278/283	MAT 3012.0		EMF213 1.0	
PST 101 2.0				ICT 201 2.0	
				FST 252 1.0	
BIO 102 2.0	PBT 221 1.0	BIO 305 1.0		PST 217 1.0	CHE 302 1.0
MAN 102 2.0	PHY 221 2.0	EMF 314 1.0		ARM 2032.0	CSC 314 2.0
STA 114 2.0	FST 278/283	MAT 301 2.0		EMF213 1.0	
PST 101 2.0				ICT 201 2.0	
				FST 252 1.0	

Time Slots for Student Activities