

Due 7 December 2006 — Project will not be accepted after this date!

Choose your fate. The other option may be completed as extra credit, however you must clearly label which is being submitted as your project and which is being submitted as extra credit. **Remember that these are writing projects! All background information should be included in your solution as a part of your introduction. Projects should be typed, well written, and solutions should be completely explained. Graphs and diagrams should be drawn in by hand but must be done neatly.**

Option 1: Course Scheduling

Bob wants to plan out his college career. He requires the following courses to graduate with a degree in Basket Weaving with a minor in Rodeo Clowning.

General Requirements

Course	Prerequisites
A111	
E101	
G101	
G102	G101
H101	
H201	H101
M174	
P103	
P125	
W131	
W231	W131

Minor Requirements

Course	Prerequisites
R221	B215
R222	R221, B216
C101	
C201	C101
C243	C201
C311	C243, C335
C335	C201
C431	C311

Major Requirements

Course	Prerequisites
B215	
B216	B215
B301	B215
B311	B216
B343	B216
B347	B216
B403	B347
B413	B347
B420	B347
B447	B301
B463	B311
B466	B463
B471	B301, B311, C101, B343

Draw the order-requirement directed graph of Bob's course requirements. Develop a rule for comparing the relative priority of a group of courses. Using your priority rule and the order-requirement graph, schedule Bob's courses using both the list-processing algorithm and the critical path algorithm. Assume that Bob can take up to 4 courses each semester, that each course lasts a single semester, and that Bob does not need to worry about whether a given course will be offered in any particular semester.

If any of Bob's schedules require that he stay in college for more than 5 years modify your priority rule so that both algorithms produce a schedule that allows Bob to graduate in at most 5 years. In your report compare the schedules derived from each of the algorithms. Explain how your priority rule affected Bob's schedule as well as the strengths and weaknesses of your priority rule.

Option 2: Delivery Routes

You have been hired by Martin's Super Market to optimize their delivery route. They would like for a single truck to be able to make deliveries to the following stores¹:

1302 Elwood Ave, South Bend, IN
2081 S Bend Ave, South Bend, IN
306 N Bittersweet Rd, Mishawaka, IN
314 N Ironwood Dr, Mishawaka, IN
424 W McKinley Ave, Mishawaka, IN
4401 W Western Ave, South Bend, IN
760 Cotter St, South Bend, IN
926 Erskine plz, South Bend, IN

Make realistic estimates² for the distance (or time if you prefer) between each of these locations. Using your values, draw a weighted graph and try to compute a minimal cost Hamiltonian circuit using the sorted edges algorithm as well as the nearest neighbor algorithm starting from each of the locations. In your report include an explanation of the algorithms used and your estimate for the minimal time and distance required for a full delivery route (assume that it takes 20 minutes to unload the truck at each stop).

¹Performing a google maps search for "Martin's Super Market near Mishawaka, IN" gave me a nice map of the region.

²Follow roads that actually appear on the map.