

Question:

Course Scheduling System: Priya is a member from the training department of a company who has to prepare a training plan that has different courses. Few of these courses need some prerequisite courses to be completed. The goal is to prepare a training plan such that all the courses are included in the correct order and the learning is on track.

Solution:

As the prerequisite courses are important before starting some courses we first think of a Depth **First Search** Algorithm to solve these types of problems as we need to completely explore a course before starting any new courses.

Also we can use **Topological Sorting** with DFS

Topological Sorting: It is linear ordering of vertices $E=(u,v)$ u comes before v in the ordering
In our case prerequisites come before courses every time.

Algorithm:

Step 1: Create a class "CourseScheduler" for maintaining the course, prerequisites and for creating a training plan

Step 2: Store all_courses in a Set using `self.add_courses=Set()`

Step 3: Create methods to add courses, detecting cycles and topological sorting .

Step 4: To generate a Learning Plan it recursively checks if there are no Cyclic dependencies such as A is dependent on C

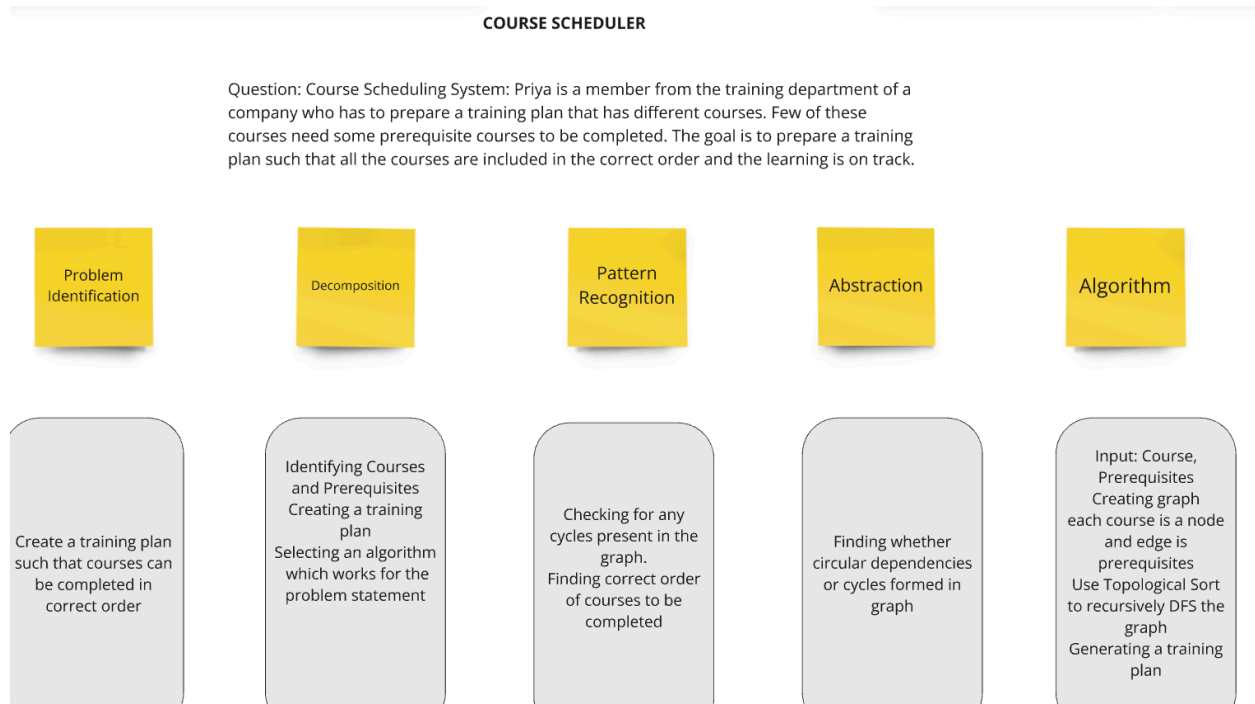
C is dependent on B

B is dependent on A (Cycle is formed) It is impossible to create a plan for these courses, So we print Error and exit the program.

Step 5: If no cyclic dependencies we print in order of completion of courses such that the training is run smoothly

Screenshots:

Breaking down problem statement with help of Computational Thinking Foundations



OUTPUT : If no circular dependencies are formed we get a Recommended Training Plan based on Course Prerequisites.

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
9045.4780]
(c) Microsoft Corporation. All rights reserved.

(gymenv) C:\Users\tarun\OneDrive\Desktop\zemoso_ldp\zemoso>D:/anaconda/envs/gymenv/python.exe c:/Users/tarun/OneDrive/Desktop/zemoso_ldp/zemoso/problem_solving/assignment/sol.py
Training Plan (course Order):
1. CourseA
2. CourseB
3. CourseC
4. CourseD

(gymenv) C:\Users\tarun\OneDrive\Desktop\zemoso_ldp\zemoso>
```

OUTPUT: If cyclic dependencies are formed, it is impossible to create a schedule .



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS Python + - [ ] [X] ... ^ X

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(gymenv) C:\Users\tarun\OneDrive\Desktop\zemoso_ldp\zemoso>D:/anaconda/envs/gymenv/python.exe c:/Users/tarun/OneDrive/Desktop/zemoso_ldp/zemoso/problem_solving/assignment/sol.py
Cycle detected in course prerequisites. Scheduling not possible.

(gymenv) C:\Users\tarun\OneDrive\Desktop\zemoso_ldp\zemoso>
```