

Programming – Genomics

May 27, 2025

A Python class DGraph

Write a Python class named `DGraph` (in a file named *DGraph.py*) that implements a directed graph. The internal graph structure should be private to the class and can be represented using any data structure of your choice. Try and choose the one that suits the best. The class should contain a constructor of an empty directed graph and the following methods:

```
newNode(n)      # creates a node with label 'n' in the graph
newEdge(s,d)    # creates a directed edge from node 's' to node 'd'
                # in the graph
getNodes()      # returns the list of all the nodes of the graph
getOut(n)       # returns the list of the nodes having an edge from
                # the node 'n' in the graph
```

Main Program

Write a program in another Python file by adhering to the following instructions. Add a comment with the corresponding number on top of the corresponding piece of code.

1. Define a function named `allIn(n,g)` that, given a node `n` and a directed graph `g`, returns a list of the nodes that are the source of the edges directed to the given node in the graph. For instance, given the node `'d'` and the graph shown in the example, the function would return the list `['a','b','c']`.
2. Create a directed graph as shown in the example.
3. Print the list of the nodes directing from the node `'a'` in the graph. Following the example, it is `['b','c','d']`.
4. Print all the nodes of the graph. In the example, it is `['a','b','c','d']`.
5. Print all the nodes directing to the node `'d'` in the graph. In the example, it is `['a','b','c']`.

Note that, since those lists represent set, the order of the nodes is irrelevant.

Submission

1. Assign your *FamilynamePersonalname* to your main Python program (e.g., *KiziltanZeynep.py* or *AmorosoAlessandro.py*).
2. Submit both your main program and your *DGraph.py* in EOL under *Exam 2025-05-27*, by the deadline.

Score

Check on *AlmaEsami* your score, if you passed the written part you need to subscribe for the oral part, using *AlmaEsami* again.

Example

