# Assignment 3

CS221: Data Structures and Algorithms

Usman Institute of Technology

Fall 2018

**Release Date: 16 December 2018**

**Submission Mode: Soft-copy**

- How to submit:
  - Create an account on http://www.turnitin.com/ as a Student
  - Use following information at time of sign-up
    - Class ID: 19412335
    - Enrollment Key: CS211FALL18
  - You can submit your assignment by **21 December 2018 11:59 pm.**
- Make sure that function names must be similar as asked in the assignment.
- **YOU HAVE TO SUBMIT ONLY ONE .CS FILE**
- **YOUR FILE NAME MUST BE IN THE FORMAT OF <YOUR ROLL NUMBER>.CS**
  - **For example, if you Roll Number is 15B-121-BS then your file name must be 15B-121-BS.cs**
- You must read Academic Integrity at the end of this document.
  - If more than one of your assignments found plagiarized then all marks of assignment will be marked Zero (0).

## Friendship Graphs

Ahmed, Basit, Waleed, Samreen, Aisha, Waleed, Nuzhat, Mashood, and Wasif are working in a company. Who is friend of who is given the below. Here, we consider friendship as mutual means if Ahemd is friend of Basit then Basit is also friend of Ahmed.

Ahmed is friend of Basit

Basit is friend of Waleed

Waleed is friend of Ahmed and Samreen

Samreen is friend of Aisha

Aisha is friend of Waleed and Nuzhat

Mashood is friend of Aisha and Wasif

Wasif is friend of Nuzhat and Aisha

**YOU TASK:**

You have to build a console application with following options:

1. Friend or not?: weather two persons are friends of each other or not
2. Number of Friends: number of friends a person has
3. Distance: minimum number friends between two persons – it should be 0 if both are friends to each other.

Your program should use graph data structure to represent these friendship and create a Graph ADT to achieve above mentioned functionalities. You have to think and decide which functionality of Graph ADT should be used for which option.

**Grading Rubric:**

| | Good (80, 100] | Fair [50,80) | Poor [0,50) |
|---|---|---|---|
| Description | All required functionalities are implemented correctly using appropriate functionality of Graph ADT. | All desired functionalities are implemented but either some of them not working correctly or some of them not implemented correctly. | Most of functionalities are not working correctly or not implemented correctly. |

**Sample output:**

```
Friendship Graph
1.  Friend or not?
2. Number of Friends
3. Find Distance
Enter your choice:
1
Give name of first friend: Ahmed
Give name of second friend: Basit
Yes, they are friends.
```

```
Friendship Graph
1.  Friend or not?
2. Number of Friends
3. Find Distance
Enter your choice:
1
Give name of first friend: Ahmed
Give name of second friend: Aisha
No, they are not friends.
```

```
Friendship Graph
1.  Friend or not?
2. Number of Friends
3. Find Distance
Enter your choice:
2
Give name of person: Ahmed
Number of friends: 2
```

```
Friendship Graph
1.  Friend or not?
2. Number of Friends
3. Find Distance
Enter your choice:
3
Give name of first person: Ahmed
Give name of second person: Wasif
Minimum number of friends between Ahmed and Wasif: 2
```

```
Friendship Graph
1.  Friend or not?
2. Number of Friends
3. Find Distance
Enter your choice:
3
Give name of first person: Ahmed
Give name of second person: Basit
Minimum number of friends between Ahmed and Basit: 0
```

# Academic Integrity

Each student in this course is expected to make sure that any work submitted by a student in this course for academic credit will be the **student's own work**. Scholastic dishonesty shall be considered a serious violation of these rules and regulations and is subject to strict disciplinary action. Scholastic dishonesty includes, but is not limited to, cheating on exams, plagiarism on assignments, and collusion.

**PLAGIARISM:** Plagiarism is the act of taking the work created by another person or entity and presenting it as one's own for the purpose of personal gain or of obtaining academic credit. Plagiarism includes the submission of or incorporation of the work of others without acknowledging its provenance or giving due credit according to established academic practices. This includes the submission of material that has been appropriated, bought, received as a gift, downloaded, or obtained by any other means. Students must not, unless they have been granted permission from all faculty members concerned, submit the same assignment or project for academic credit for different courses.

**CHEATING:** The term cheating shall refer to the use of or obtaining of unauthorized information in order to obtain personal benefit or academic credit.

**COLLUSION:** Collusion is the act of providing unauthorized assistance to one or more person or of not taking the appropriate precautions against doing so. Any student caught violating academic integrity will suffer an academic penalty. All violations of academic integrity will also be immediately reported to the Disciplinary Committee. Any student violating academic integrity a second time in this course will receive a failing grade for the course, and additional disciplinary sanctions may be administered through the Disciplinary Committee.

Conclusively, each student need to be take care of:

1. You must not share your solutions with other students. You are encouraged to discuss the problems but each student is supposed to take care of his or her own solution.
2. You must not submit solution of other students as yours.
3. You must duly cite all resources you used in development of your solution.
4. **If more than one of your assignments found plagiarized then all marks of assignment will be marked Zero (0).**