F29DC Data Communication and Networking Coursework
Deadline: **Friday 20th November, 2020 at 3:30pm**

This coursework focuses on reflecting on the work you have done as part of the lab-sessions and extends it, demonstrating your understanding of various common networks and their features, and taking that knowledge to construct and analyse a network performance. This coursework is worth 25% of the overall course mark.

Plagiarism

Notable things to take into consideration:

- Coursework reports must be written in your own words and any code in your coursework must be your own code. If some text or code in the coursework has been taken from other sources, these sources must be properly referenced.
- Failure to reference work that has been obtained from other sources or to copy the words and/or code of another student is plagiarism and if detected, this will be reported to the School's Discipline Committee. If a student is found guilty of plagiarism, the penalty could involve voiding the course.
- Students must never give hard or soft copies of their coursework reports or code to another student. Students must always refuse any request from another student for a copy of their report and/or code.
- Sharing a coursework report and/or code with another student is collusion, and if detected, this will be reported to the School's Discipline Committee. If found guilty of collusion, the penalty could involve voiding the course.
- Remember: the consequences of taking unacceptable short cuts in coursework are much worse than getting a bad mark (or even no marks) on a piece of coursework. There has been one case where a student was awarded on Ordinary degree (rather than an Honours degree) because of the sanction imposed by the University's Discipline Committee. The offence was plagiarism of coursework.

Further information on academic misconduct can be found in: https://www.hw.ac.uk/students/doc/discguidelines.pdf
Your coursework submissions will be automatically checked for plagiarism.

Question 1 [5 marks]

Write a report on what you have learned during the lab-sessions. In particular concentrate on the various network scenarios you have explored, their topologies, the protocols used, and any noteworthy features, such as link load, traffic, queueing theory, cognition, connection-less and connection-oriented protocols, routing protocols. Furthermore, you should provide some analysis on the effect(s) of some of these features on the network, their benefits and disadvantages, etc. Your answer should be between 500 and 800 words in length, you are **encouraged to use screenshots** to aid in your descriptions.

Question 2 [7.5 marks]

Create two network topologies such that:

1. Each topology will have minimum n* nodes and Maximum m* nodes.
2. Add some communication to the network topology (e.g., pings, TCP, UDP, and FTP) and make sure nodes can reach each other.

*for GNS3 minimum 15 nodes and Maximum 150 nodes
*for Ns2 minimum 50 nodes and Maximum 150 nodes, the minimum **scenario time is 100** seconds.

For each of the topologies, split the network into two subnets (using a suitable subnet mask), check that the new subnets can ping each other.
Comment on the advantages and disadvantages of each topology and subnetting, writing 500-800 words in total.

Question 3 [7.5 marks]

Create a network with a topology of your choice. Configure the topology to use one dynamic routing protocol that is not RIP.
Report on your findings on the routing protocol (e.g. total delay, throughput, and effect of a lost link). The report should be 500-800 words long.

Question 4 [5 marks]

5 marks will be allocated for insightful extra work for Question 3. This can for example be an implementation of a second routing protocol (in addition to the one you already use in your network) and comparing it to the first, a deeper study on the effect of the topology on the routing algorithm, etc. Provide some analysis on your observations, similar to what you did in the previous question.

Submission and Deadline (only soft copies):

- You are required to submit your coursework as one report (word/PDF) and one zip folder for your code and topologies **as described in the links on vision**. Your report should be less than 2000 words. Your report (including Q1 – Q4) should be submitted via VISION no later than 3:30 pm (local time) on **Friday 20th November 2020**. This is an individual coursework which means that your submission **MUST** be your own work.

Notes:

- In all cases code should be clearly-written and should include a brief explanation (comments, for readability). Your answer must take the form of a zip file (yourname.zip), the zip file should contain, Lab sessions sorted by lab's title (e.g. Lab1, Lab2 … etc.), also, your code for Q2, Q3 and Q4.

Late submission:

The standard penalty for late submission (**actual mark x 0.7**) will be applied unless evidence of Mitigating Circumstances is provided (see the Undergraduate Programme Handbook for details https://www.macs.hw.ac.uk/students/wp-content/uploads/CS_SE_Handbook.pdf).

Additional Information:

(1) Regarding whether external references will help the mark: This is a hard question to answer, as the mark depends on the quality of the report. Obviously, by using good external citations, it will strengthen the quality of your report and support your arguments, so it is often useful to include them in your report. However, if you are able not to use any external references, but use only material provided in the course, you may also obtain fairly good marks, if you provide sufficiently good explanation.

(2) Clear description of the problem, objectives of your work and details on how you have met these objectives will be very important in obtaining a good mark.