The introduction on the very first day covered in brief the major topics of this course. It involved discussion on viable project topics regarding the different ways this course output may be useful in practical purposes like: Labour scheduling and allocation, Transit scheduling, job and machine sequencing, backhaul scheduling, baggage routing, Transportation routing, Flight scheduling, etc. I got to know that this course is basically about exploring the mathematical models for networks and routings, developing the algorithms to solve them, and their useful application. Apart from these, there were some significant points to remember:

1. Optimization is the method to find the feasible solution having the lowest possible objective functions.
2. Routing: Sequencing v/s Scheduling: it assigns time to events.
3. It is very important to know the computation complexity of a problem in order to calculate the reasonable time it might take for a computer with a limited specification to, solve it. I googled to know the largest TSP solved till date and found out it consisted of n=85,900 cities and it took 1.5 years to get solved.
4. TSP (Travelling Salesperson Problem) is about finding a minimal tour among all the possible routes which covers the cities once and also ends into the origin.

In the second lecture, we were briefed about distance norms like Rectilinear (D = |x1-x2| + |y1-y2|, used for cities with grip layouts), Euclidean(D = sqrt(($x1 - x2$)^2 + ($y1 - y2$)^2)), Haversine formula(used to calculate surface distance between two points on the Earth assuming the it as a sphere).I used this knowledge in the lab to calculate the distance between Halifax and London by using their respective coordinates(Latitude and Longitude). It also intrigued me search more about it and I stumbled upon **Vincenty's Formulae**. It considers the Earth as an ellipsoid which is a better approximation to the real shape of the Earth. I calculated the distance between Halifax and London by using Vincenty's Formulae and came to know that it was 12 Km more than that of Haversine's Formulae. In the lab, I also used if function in excel to consider North and East as positive and South and West as negative as Latitudes are from 0 to 90 deg and Longitudes range from 0 to 180 deg. Ito make the whole problem a bit more user friendly I also made use of Convert_Decimal function, which I formulated in the Excel Macros to directly convert the Degree Minutes Seconds format into Degree Decimal. Besides, I also researched about the factors taken into consideration by google maps to show the best feasible way among different possible routes and found that google uses two graph algorithms to find the shortest path between our location and destination which are: Dijkstra's and A* algorithm. It uses A* algorithm due to its high accuracy and ability to deal with huge chunks of data. While, on the topic of graph algorithm, the second half of the second lecture was heavily focused on graphs and terminologies used in it. In the class, Konigsberg bridge problem was charted into node and edge graph and the reason behind why it is an unsolvable problem was known. At least two extra edges will be required to make it a solvable problem. I addition to this, terms like Eulerian Cycle, Undirected and Digraphs were also discussed. There are two types of graph representation: Node-Edge incidence matrix which is best suited for undirected graphs and Node-Node adjacency matrix best for digraphs. In the end, during the lab there was mention of API (Application Programming Interface), which intrigued me to search more about it and I used Yfinance API to create a dashboard of apple and google stocks.