

CE740 (3 0 1 8) - Traffic Engineering

Home Work

November 1, 2018

Excel Assignments

Instructions These assignments has to be done on any spread sheet (Excel/Open office etc.). Each student has to create his/her assignment from scratch. Each student has to create a drop-box account and create a public folder with name **rollno_name** and share ONLY with the instructor. Each assignment will be uploaded on or before the deadline. You have to follow the strict file name convention. Each file will start with your roll no, followed by the assignment no, followed by an experiment name, followed by version no (starting with 1). Dropbox folder will show the upload date and will be used to check late submission. If you made a mistake in a file and and would like to correct, the corrected file should be uploaded with same name but with version 2 and so on. Each excel file should have only one sheet.

1. Write a program to compute the time mean and space mean speed from a frequency table and verify their relationship. File name **rollno_01_meanspeed_v_x.xlsx** where rollno is your roll number, and x is the version no (1,2,3, etc.). (Deadline **Sep 15**)
2. Write a program to calibrate Greenshield's model given several speed density values. The program should calculate all the parameters and boundary conditions. Also plot the fundamental diagram. File name **rollno_02_stream_v_x.xlsx** where rollno is your roll number, and x is the version no (1,2,3, etc.). (Deadline **Sep 15**)
3. Write a program to compute the following speed statistics: mean, median, Nth percentile (N should be any value between 0 and 100), quartiles, SD, and standard error of the mean from a frequency table. The program should also plot the speed histogram, frequency distribution curve, and cumulative frequency distribution curve. File name **rollno_03_speedstat_v_x.xlsx** where rollno is your roll number, and x is the version no (1,2,3, etc.). (Deadline **Sep 15**)
4. Illustrate the performance of traffic stream models (v-k relation) such as Greenberg, Greenshield, Underwood, Pipes, Forbes for some arbitrary boundary conditions. File name **rollno_04_streammodels_v_x.xlsx** where rollno is your roll number, and x is the version no (1,2,3, etc.). (Deadline **Sep 15**)
5. Write a program in excel (sheet 1) to generate random head ways given any flow rate between 500 and 3000 vehicle per hour (generate at least 1000 samples). In sheet 2, translate the data into a frequency table (0.5 second range) and fit exponential, normal and Person distribution. Program should take alpha (for normal and person) and K value (for person) as user input. Sheet 3, should evaluate all the distribution by computing mean, SD, Chi-square value, and comparative plot. File name **rollno_05_distributions_v_x.xlsx** where rollno is your roll number, and x is the version no (1,2,3, etc.). (Deadline **Sep 15**)

6. Write a program to demonstrate the General motors car-following model (GM5). The program should work for any acceptable values of sensitivity coefficient, speed exponent, and spacing exponent. Assume an update interval of 0.1, 0.2, 0.3 or 0.4 and a reaction time of 0.8, 0.9, or 1.2 The program should also plot the velocity and acceleration profile of the lead and following vehicles. File name **rollno_06_carfollowing_v_x.xlsx** where rollno is your roll number, and x is the version no (1,2,3, etc.). (Deadline **Sep 30**)
7. Write an excel code for signal design and evaluation. Assume four arm junction, with your own assumed geometry and phase plan. Make a drawing in word or ppt for showing the geometry and phase plan and embed in the excel. The user input includes: all flows, saturation headway for each phase, lost time for each phase, and amber time for each phase, degree of saturation, for each phase. The program should compute critical flow, cycle time, yellow time, and delays for each movement and for the intersection. The file should have several sheets, each corresponding to one strategy (phase plan) and there will be a summary sheet which will give all the user inputs and below that cycle time, magenta time, delay (intersection delay for each strategy). The program should be as user friendly as possible, with good layout and aesthetics. File name **rollno_07_trafficsignal_v_x.xlsx** where rollno is your roll number, and x is the version no (1,2,3, etc.). (Deadline **Oct 31**)
8. Write a program to do two way signal coordination. (i) First sheet for two way coordination of two junctions. User input include the link length, platoon speed, volume on each direction, cycle, and split. Assume two phase signal. (ii) Second sheet for two way coordination of multiple junctions preferably five or more. User input include the length of each link, split on each junction, the common cycle length, common platoon speed, volume on forward and reverse direction. File name **rollno_08_coordination_v_x.xlsx** where rollno is your roll number, and x is the version no (1,2,3, etc.). (Deadline **Oct 31**)