This project is to show your mastery of MatLab.  The project involves obtaining a dataset(s) related to one of the Grand Challenges of Engineering and then generating a user-friendly script file(s) for processing the data.

Deliverables include your executable script file(s), the data files in excel format and matlab format, report.

The report sections include Introduction, Procedure, Results, Discussion, Conclusion, Appendix [listing of all script files and data files with citations for each database].

**Overview:**

The National Academy of Engineers has identified 14 Grand Challenges for Engineering that will need to be addressed to ensure the 21st Century challenges are properly addressed.  The main challenges are to deal with the increasing population while still improving the quality of life.  Details regarding the Grand Challenges can be found at the following website:

[http://www.engineeringchallenges.org/cms/8996.aspx (Links to an external site.)](http://www.engineeringchallenges.org/cms/8996.aspx" \t "_blank)

The website provides a nice overview of the Grand Challenges as a general topic and also about each of the 14 individual titles.

Understanding these challenges is important for any Engineer trying to address an individual topic.  When trying to understand a challenge, it is important to quantify the problem.  Non-scientific approaches tend to just say things in general, but data is much more powerful when trying to understand why these are Grand Challenges.  To help you quantify these challenges, a website created by the UN is ideal for downloading data related to many global issues.  The website can be retrieved at:

[http://data.un.org/Explorer.aspx (Links to an external site.)](http://data.un.org/Explorer.aspx" \t "_blank)

**Procedure:**

Your project is to download a few datasets from the UN website and then generate a user-friendly script file(s) for processing the data so that the results relate to one of the Grand Challenges.  The data does not have to come from the UN website, however, you will be responsible with other datasets to understand how to download them using a MATLAB script file.  Also, some Grand Challenges are not easy to find datasets for, however, it is your job to define the problem, not solve the problem. Many of these problems can be described through the provided data (see the video for more details).

All script file(s) must include:  user input, checking of user input using a WHILE loop, user-defined functions, curve fitting and interpolation, conditional statements [if-elseif-lese-end / switch-case], FOR loop, Array operations, Handling Data Files [obtaining a dataset, getting it into Excel, then getting the dataset into Matlab], nice graphs, formatted output. The script file(s) must cover 9 out of the 10 topics from class. The topics we are referring to include:

* Input statements including user input that is checked using a WHILE loop
* User-defined functions
* Output statements nicely formatted
* Reading data from Excel into Matlab (LOAD)
* Graphing in MATLAB
  + Try to have at least two figures generated from graphing
* Curve Fitting and Interpolation
* Conditional Statements (if-elseif-else-end / switch-case)
* Loops (For / While)
* Array Operations (Array Math and Array conditional statements)
* Array Applications (Handling Data Files, this is easy since it is the project topic)

In your code, you must identify with comment lines where you actually apply the above topics.

**Deliverables:**

All script files() in .m format

Data files saved in Excel format and Matlab format

Short report of your project (minimum 2000 words)

1. Introduction: short paragraph identifying topic
2. Procedure: How to run your code with a general description of inputs and outputs
3. Results: All plots, tables, figures and pictures generated by your script file
4. Discussion: Discuss your outputs and how the results are helping define the Grand Challenge.
5. Conclusion: Paragraph discussing what was learned from this project (about Grand Challenges and about generating your own script files from scratch).
6. Appendix: List the script and data files used for the project, be sure to include citations for each database using MLA format.

**Purpose:**

There are two main purposes for this project:

* Help you define an engineering challenge by gathering data and then using the data to prepare a short report on a specific challenge.
* Provide you with the opportunity to apply your programming skills to a data set.