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| **ENGI 1331: Project 1 General Description** | **1** |



**National Academy of Engineers Grand Challenges:**

In this project you will investigate an engineering challenge. The National Academy of Engineers has listed 14 Grand Challenges facing our world that need to be understood and solved. These challenges are listed and described at http://www.engineeringchallenges.org/challenges.aspx. The first step in solving one of these problems is understanding and being able to identify the problem.



**Project Overview:**

In this project you will work in teams on a common topic then effectively communicate the logic, results, and improvements made to solve the problem. You will investigate one of the grand challenges using the data acquired by you and your team.

**Project Deliverables & DUE Dates**



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| **Deliverable** | **Percent** | **DUE Date** |
| **Project 1A:**  **Summary + Data Set** | 20% | Wednesday, Feb. 8th, 2017 @ 8 am |
| **Project 1B:**  **Algorithm with Test Cases + Group Code** | 20% | Wednesday, March 8th, 2017 @ 8 am |
| **Project 1C:**  **Modified Algorithm + Group Code**  **Individual Component** | 45% | Wednesday, March 29th, 2017 @ 8 am |
| **Project 1D:**  **Discussion Board Posts** | 15% | Friday, March 31st, 2017 @ 5 pm |



**Group and Individual Roles:**

Groups will be made up of 2-3 students. Each person will be a lead on one individual component and a reviewer for a different individual component. The lead person is ultimately responsible for the grade for that component of the project. A group evaluation will be completed at the end of the project and used as a multiplier on the group grades for the project. Your group evaluation grade will be determined from peer reviews based on your contribution on the topic selection, code development and review process.

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| **ENGI 1331: Project 1 General Description** | **2** |



**Project 1A (Team Submission and Group Grade) - 20% (Due Feb. 8th, by 8 am)**

**Deliverable Descriptions (Rubrics provided for all components):**

**Summary:**

As a group, you will submit a one-paragraph summary of the challenge you have chosen. Your summary should include the following points:

* What are the challenges of the topic chosen?
* What do we need to know more about this challenge?
* What role do engineers have in solving this challenge?

**Data Set:**

Briefly describe the data you are using and include the reference (source) of your data. Include URL or publication citations. Your response should answer the following questions:

* How does this data relate to the NAE Grand Challenge you chose?
* Where did you obtain this data from? What agency or source?
* Is this data specific to a certain region or place?
* What do you hypothesize to find from your acquired data set?

Your submission should be a single .zip folder containing the following files: *Summary (PDF), Data Set description (PDF), and the Data Set (.xlsx or .csv).* Only one group member needs to submit the files for the entire group.

**Project 1B (Team Submission and Group Grade) - 20% (Due March 8th, by 8 am)**

**Deliverable Descriptions (Rubrics provided for all components):**

**Algorithm with Test Cases:**

As a group, you must present a completed algorithm on how you will be investigating the data with test cases that will evaluate the functionality of your code. It is not required that this algorithm be completed on the given template, but you should include all sections from the algorithm template (i.e. what is known, unknown, etc.). Remember, a test case needs to be given for each branch of your algorithm; each conditional statement you reach should have a test case for the “yes” and the “no” answers.

**Group Code:**

Your MATLAB script must incorporate the use of Matrix functions and Conditional statements as discussed in class and exercised in your homework assignments. The script must read in your data set from an **.xlsx** or **.csv** file, and hard coding of anything (other than conversion factors or other numerical constants) should be avoided. This code should be based on the provided algorithm such that they can be evaluated simultaneously.

Your submission should be a single .zip folder containing the following files: *Algorithm and test cases (PDF), Group code (.m), and the Data set used with the code (.xlsx or .csv).*  Only one group member needs to submit the files for the entire group.

**Project 1C (Team Submission and Group Grade + Individual Contribution and Individual Grade) - 45% (Due March 29th, by 8 am)**

**Deliverable Descriptions (Rubrics provided for all components):**

**Modified Algorithm with Test Cases + Modified Group Code (Team Submission and Group Grade) – 20%:**

As a group, you must modify your algorithm by including the use of loops (as discussed in class as well as exercised in your homework assignments). Make sure to emphasize where loops were used in your algorithm and also explain if any other modifications were made. Your MATLAB script must incorporate these modifications and clearly reflect the use of loops. Don’t forget to include any additional or new test cases for your algorithm.

Your group submission should be a single .zip folder containing the following files: *Algorithm and test cases (PDF), Group code (.m), and the Data set used with the code (.xlsx or .csv)*. Only one group member needs to submit the files for the entire group.

**Individual Component (Individual Contribution and Individual Grade) – 25%:**

In addition to the group work, each person will be a lead on one individual component. Please note, you may NOT repeat a component within your team. Each member is expected to complete a component DIFFERENT from that of their other team mates. The choices for the individual component are as follows:

* **Project Summary Paper**

A written, 2 page (12 font, single spaced) document that describes the background equations, derivation, logic (algorithm), iterations in project development, results, and additional considerations or questions. It should not exceed 2 pages.

* **Tutorial Video**

A video of the code should walk through the entire development and final code. You should run the code with different scenarios to show the capability and functionality of your code. It will be uploaded to youtube and you will provide the link.

* **Academic Poster**

Using the provided poster template, you must explain the background equations, derivation, algorithm, results, and future steps. The poster template is in PPT but you will be required to save your submission as a PDF file.

**Project 1D (Individual Grade) – 15% (Due March 31st, by 5 pm)**

**Discussion Board Posts (rubric provided):**

As part of your individual project component you are required to comment on and evaluate the work done by other students. You must provide commentary on the projects of TWO other groups, and at least one of these groups must have a different topic than your group. Comments on other groups’ work should include:

* Clearly note at least one specific aspect of their code or approach which you thought was strong or interesting
* Relate this to what you did in your project OR talk about something you learned about their topic