

EGS 2310 Engineering Analysis – Statics

Instructor: Dr. Kwabena Ofori, P.E.

Homework Project

Objectives:

The purpose of this component of your semester work in this course is to provide students the opportunity to apply some of the methods and concepts learned in this class to a real-life Statics problem.

Rules and requirements:

You may choose **any** topic that interests you. You may work individually or in groups of up to four (4), however group efforts shall be commensurate with the size of the group and each group member shall clearly identify their contribution to the group's overall output.

Reports shall be turned in according to the schedule be posted on the class website which includes details of the requirements for each submittal. You may change your topic over the course of the semester if new course material we cover garners your interest in something else. However homework's shall still be turned in on time according to the current topic you have declared to the instructor. Towards the end of the semester, a final report shall be turned in and students shall prepare a short *PowerPoint* presentation for the class.

Scope of Projects:

The project is not intended to be an original research, so you may present a topic that has been researched by others or has been widely reported elsewhere. Alternately, you may review and vet a published academic paper, journal article, or official technical report.

Any topic chosen must be approved by the instructor to ensure it is substantial and relevant to the course material, and can be completed within our schedule. You are not required to conduct a detailed review of previous relevant studies, though it may be informative in your specific case. The project shall have a computational component and you should be able to explain the details of your calculations. It is recommended you avoid topics that will require substantial analysis from other fields beyond the scope of Statics.

Resources:

If relevant, you may apply computational tools learned in other classes for example *Mathcad*, *Matlab*, or any computer programming tools that will enable you to work rapidly and thoroughly through your calculations. Please note however that this is not required, and the focus of the exercise is the Statics concepts and how they are applied, not the programming or computational skills.

Assistance and difficulties:

As with any effort to conduct some sort of research, especially if you are doing this for the first time, you may run into difficulties, hit a dead end or simply get lost. It is important you talk to the instructor as soon as possible if you find yourself in this situation. Although this instructor may not be an expert in the particular topic you are pursuing, we may be able to share ideas or direct you into a more amenable path to a worthwhile project.

Possible Projects:

The following topics rolled off the top of my head and are by no means an exhaustive list of possible topics:

Architecture and Buildings

Analysis of the Statics in a world landmark building e.g. the Empire State Building, The Leaning, Tower of Pisa etc

Analysis of a hurricane-resistant roof

Analysis of a decorative staircase

Types of Building Foundations

Structural Engineering

Analysis of the chassis of your favorite vehicle

The truss axle of an auto racing vehicle

Analysis of a crane or hoist

Traffic signal mast arms versus span wires

Airplane fuselage and landing gear

Infrastructure

Analysis of a dam

The structural components of a highway bridge

Retaining walls, sea walls, Sound Barrier walls

Reinforced concrete

Electrical transmission towers

Earthquake and tsunami events, lessons learned

Oil rig

Nuclear power plant

Overhead electrical transformer

Culverts

Construction and Mining

Analysis of a recent high-profile structural collapse

Mining accident

Construction site accident

Space and Rocketry

The launch pad of your favorite space vehicle

Mechanical Engineering

Bolts, Welds and Connections in machines

Friction considerations in design of tires

Biomedical Engineering

Prosthetic limbs

Surgical joints

Neck and spinal injuries

Military

Basic statics of naval vessels

Airfield elements

Body armor