Kingsborough Community College
The City University of New York
Department of Physical Sciences
EGR 2100 - Engineering Design
Syllabus

EGR 2100 – ENGINEERING DESIGN (3 crs. 5 hrs.)
For a beginning engineering students, hand-on investigations and an appreciation of the importance of engineering in our society. In the laboratory, students will investigate problems relevant to the study of engineering, including mechanical, electrical and bridge design. Computers will be utilized for all relevant laboratory sessions. Lecture discussions will include preparation for the labs and discussions of approaches engineers have used to solve difficult problems. Prerequisite: Passing scores on the CUNY Reading and Writing exams and MAT 900 Co-requisite: MAT1400

Section: SECTION NUMBER
Time: LECTURE AND LABORATORY SCHEDULE FOR SECTION
Room: ROOM (S) FOR SECTION
Instructor: INSTRUCTOR FOR SECTION
Email: EMAIL ADDRESS FOR INSTRUCTOR FOR SECTION
Office Hours: OFFICE HOURS FOR INSTRUCTOR FOR SECTION

Source materials: Students are required to obtain an *original* copy of the Science Section of the Tuesday *New York Times* every week of the semester (DATE through DATE). An *original* copy of the Science Section is required, neither photocopied nor electronic copies are permitted. Scientific calculator – You may not use a cell phone as a calculator!

Course Learning Outcomes:

- Students will understand the basic principles and concepts of modern engineering and be able to use this knowledge to design, construct and compete engineering projects.
- Student will identify, formulate, and solve engineering problems; conceptually design a system to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability; and develop skills in concept generation and innovation.
- Students will apply knowledge of basic science and mathematics to engineering, conduct basic experiments, analyze and interpret data, use software design tools, spreadsheet, and internet application tools relevant to engineering practice, including text, spreadsheet, presenter, draw, forms, simulation applets.
- Students will understand what accounts for the success and failure of design projects and designs in use.
- Students will learn design ethics, project management skills: planning, teamwork, task management, knowledge management, timeline management, decision-making, and project risk assessment

Topical Outline: (Approximate and subject to change upon notification)

Lecture & Laboratory

Meeting	Topics	Deadlines
1	Mouse Trap Racer Introduction & Design – Engineering Lab	
2	Mouse Trap Racer Design & Construction – Engineering Lab	
3	Mouse Trap Racer Design & Construction – Engineering Lab	The first NY Times writing assignment is due by 11:59:59PM on the last day of the first month of the semester
4	Bridge Introduction & Computer Design – Computer Lab	
5	Mouse Trap Racer Design & Construction – Engineering Lab	
6	Mouse Trap Racer ***Competition*** – Engineering Lab	Competition
7	Bridge Computer Design – Computer Lab	A first draft of the research project is due by 11:59:59PM of the first Sunday after the first Tuesday of the second month of the semester.
8	Bridge Computer Design – Computer Lab	
9	Bridge Computer Design ***Competition*** – Computer Lab	Competition

10	Bridge Construction – Engineering Lab	
11	Bridge Construction – Engineering Lab	The second NY Times writing assignment is due before 11:59:59PM on the last day of the second month of the semester
12	Bridge Construction – Engineering Lab	
13	Bridge Construction – Engineering Lab	
14	Electric Circuits Introduction – Computer Lab	A second draft of the research project is due by 11:59:59PM of the first Sunday after the first Tuesday of the third month of the semester.
15	Electric Circuit I Computer Design – Computer Lab	
16	Bridge Construction – Engineering Lab	Competition
17	Bridge Construction ***Competition*** – Engineering Lab	The third NY Times writing assignment is due before 11:59:59PM on the last day of the third month of the semester
18	Electric Circuit II Computer Design – Computer Lab	
19	Electric Circuit III Computer Design– Computer Lab	
20	Electric Circuit IV Computer Design – Computer Lab	The final version of research project is due 72 hours before the 23rd meeting of the course
21	Electric Circuits Computer Design – Computer Lab	
22	Electric Circuits Computer Design ***Competitions*** – Computer Lab	Competition
23	Research Project Oral Presentation	
24	Research Project Oral Presentation	
25	Final Exam	Final Exam Date/Time/Place as per the Official Final Exam Schedule

Attendance and Deadlines: Engineers must meet deadlines. Your professional work is of no value if it is not accepted because of a missed deadline or an incorrect format. Students are required to attend all classes. Students that miss a class will find that they are behind schedule in the construction and design of their projects. Students must be present on competition days and ready to present their Project in order to receive any credit. Student must submit their written assigned by the deadline date/times. Students absent from more than one-sixth of the course hours (10 class hours) will receive the grade of WU.

Grading Evaluation: Grades are calculated from a weighted average of competitions and writing assignments.

Laboratory Design/Construction Competitions	35% (17.5% each)	A 88% - 100%
Computer Design/Performance Competitions	35% (17.5% each)	B 75% - 87%
Term Research Project	10%	C 63% - 74%
Times Tuesday Science Writing & Reflective Writing	10%	D 50% - 62%
Final Exam	10%	F 0% - 49%

Conduct: Students are required to follow *The Student Code of Conduct* as stated in the *Student Handbook*.

Competitions

Mousetrap Race Car Design & Construction: Each student will design and assemble a balsa wood car powered by a standard mouse trap mounted in the body of the car. Performance is measured on a speedway monitored with photo-gate detectors.

Bridge Computer Design: Bridges are designed using a three dimensional computer model and tested to break load. A specific design format will be provided.

Bridge Construction: Each student will construct from balsa wood and test to break load the bridge he designed using the computer model.

Electrical Engineering Circuit Design**:** Circuits are designed using a circuit simulator applet using sources, resistors, capacitor, inductors, LEDs, seven-segment LEDs, logic gates and various integrated circuit chips. . A specific design format for 4 different circuits will be provided.

The New York Times Tuesday Science Section Writing Component

Students are required to obtain an *original* copy of the Science Section of the Tuesday New York Times every week (10 Sep. through 3 Dec.). An *original* copy of the Science Section is required, neither photocopied nor electronic copies are permitted.

On-going writing component:

Each month, March, April and May, the student shall select an article of interest from that month's Science Section and critically write about it. The writing is due before 11:59:59 PM on the last day of the month. It be submitted electronically to following email address(egr21_s13@yahoo.com). The subject line must be "Your Name" (First Last), "Science Times" and "September / October / November" (as is appropriate).

Your work must be less than 3000 characters (spaces included). [Brevity in reporting is one measure of the ability to perceive and understand.] The format of the writing is as follows:

1) State: The title of the article; The date of publication of the article; and The author of the article.
2) Describe the structure, machine, apparatus, device, system or manufacturing processes.
3) State the purpose of the structure, machine, apparatus, device, system or manufacturing processes. (What problem is solved or what improvement is made.)
4) State how the structure, machine, apparatus, device, system or manufacturing processes resolves a problem or makes an improvements to an already existing solution.
5) Identify the constraints or limitations on the design. (Constraints may include available resources, physical, imaginative or technical limitations, flexibility for future modifications and additions, and other factors, such as requirements for cost, safety, marketability, productibility, and serviceability.)
6) What is your opinion of the structure, machine, apparatus, device, system or manufacturing processes?

Final Exam writing component:

At the end of the semester the final exam will be based solely on material appearing in the Science Section. For the final exam the student may bring with her **only an *original* copy** of the of the Science Section.

Term Research Project

Each student will choose an engineering project that in some major aspect failed. Each student will submit a five page report (plus appendix) and make a 10 minute oral presentation on their project.

The written term project is due 72 hours before the 23rd meeting of the course as per the Official Academic Calendar. A first draft is due before midnight on the first Sunday after the first Tuesday in the second month. A second draft is due before midnight on the first Sunday after the first Tuesday in third month of the semester. Both the final project and the drafts must be submitted electronically to following email address (egr21_s13@yahoo.com). The subject line must be "Your Last Name", "Research Project" and "Draft1/Draft2/Final" (as is appropriate). The oral presentations will occur on the last Wednesday meeting of the semester. No report, draft nor presentation will be accepted after these date. A report or presentation that does not adhere to the format stated below will receive the grade of zero. Failure to turn in draft will result in grade of zero. (Engineers must meet deadlines. Your professional work is of no value if it is not accepted because of a missed deadline or an incorrect format.)

Examples of engineering projects that went awry (in some cases disastrously) include: Tacoma Narrows Bridge; Titanic; Hindenberg; DC 10; DDT; Love Canal; Asbestos; Aswan Dam; Bhopal; Kansas City Hyatt; Harder Hall; Denver Airport Baggage System; Breast Implants; California Mud Slides; Chernobyl; 3 Mile Island; Challenger, Apollo 13; Thalidomide; Hancock Building; Pinto; GM Trucks; Samari; Waste Management; Amtrak Train Off Bridge; California Freeways; Hubble Space Telescope; Pentium Chip; Biosphere; Edsel; Internal Combustion Engine. It is interesting to note that many of the projects listed above are considered partial triumphs. For example, is it possible to argue that the safe return

of the Apollo 13 astronauts was an engineering triumph. Thalidomide which caused serious human birth defects is now used successfully to treat cancer and leprosy.

You must select an engineering disaster from an episode of "Modern Marvels – Engineering Disasters". At least two dozen of episodes and a hundred examples of engineering disasters are available on You Tube. No two students may use the same example. Two or more students using the same example will all receive zero. How you work that out, your problem to solve.

The format of the five page report is as follows:
Page-1) Title page (Student Name; Engineering Project; Season and Episode of Modern Marvels – Engineering Disasters; and the Blamed Engineer, Politician, Manager, or Other Person.);
Page-2) Description of the engineering project;
Page-3) Description of the failed aspect of project;
Page-4) Opinion assigning blame for the failure on a specific engineer, politician, manager, social scientist, or someone else; and
Page-5) Bibliography. The appendix should contain appropriate graphics (more than zero, and less than three. The report must be typed double spaced, 12 point Times font.

The format of the presentation is a follows:
Minute 1) Title;
Minutes 2 through 4) Description of Project and Failure;
Minutes 5 through 8) Opinion Assigning Blame;
Minutes 9 and 10) Questions and Answers.

Conduct: Student are expected to follow the Student Code of Conduct.

Accessibility: Access-Ability Services (AAS) serves as a liaison and resource to the KCC community regarding disability issues, promotes equal access to all KCC programs and activities, and makes every reasonable effort to provide appropriate accommodations and assistance to students with disabilities. Your instructor will make the accommodations you need once you provide documentation from the Access-Ability office (D205). Please contact AAS for assistance.