SYSTEMSGO

Principles of Applied Engineering
Introduction to Engineering
Synopsis

Goals: An introductory level, full-year curriculum, designed to meet CTE course TEKS objectives, to align with a four-year sequenced STEM endorsement, to provide knowledge of the R&D industry and its fundamentals, and to promote both application of the student's R&D knowledge base and the development of R&D work and life skills. The course aligns, and always will, with SystemsGo's mission to help develop the most valued engineers and innovators to compete in the global market.

Description: The Intro to Engineering year is designed to promote a student's understanding of innovation, the R&D industry, and work/life skills such as problem-solving, design, development, testing and analysis, leadership, and teamwork. There are 19 modules that utilize teacher-user-friendly PowerPoints and class discussions and activities to facilitate project based learning. The hands-on projects support real-world discovery of real-world solutions to real-world problems and foster 21st Century Learning Skills.

The first four modules introduce the students to the world of innovation, to the supporting R&D industry, to a design and development loop, and roles of engineers, which serves to document and promote solutions by the students for current problems. Each Engineering module begins with the statement of a problem. From there, students learn to capture accurate problem statements to express the specific, critical issues of the problem; learn to research the critical issues within the problem statement; learn to perform all calculations on all aspects of critical issues within the problem statement; learn to research available materials to solve the problems within the statement; learn to finalize a design brief capturing all the aforementioned data; and finally, learn to prepare and present Critical Design Reviews (CDRs) of their design data.

After students complete the CDRs, they complete one of four independent projects:

1) Build and test the solution to the problem, OR
2) Identify, research and describe a real-world engineering problem. The problem and solution should be discipline specific and relevant to the student if possible. Research should highlight the problem, solution, state and local agencies involved, as well as the financial and environmental challenges faced by the engineers. OR
3) Explain the education requirements for pursuing a particular engineering discipline, addressing levels (technician, apprenticeship, Master, B.S., M.S., PhD, etc.), salaries, pathways, recommended coursework, requirements for university acceptance, and self-analysis of how well the student is doing within their own career path. OR
4) Write a technical paper based on individual design.

Associated with the Engineering modules are modules focused on helping the student to understand mental skills associated with the 'art' of problem solving–critical thinking and cognitive reasoning. All modules promote understanding and experience that enhance 21st Century workforce skills involving teamwork and leadership.

Finally, though not essential, but highly recommended, are career visits. These are field trips associated with completion of the Engineering modules and help the students familiarize themselves with real-world research at the professional level. In addition, tours of academic institutions, 2-year and 4-year, allow students to witness the R&D efforts occurring at the university level; as well as learn what life is like in post-secondary education.

SYSTEMSGO Aeroscience Studies

Principles of Applied Engineering

Introduction to Engineering

Scope and Sequence

Course Modules

Module 1 - Repeatability Exercise (R) (5-7 days)

Module 2 - Introduction to Innovation (II) (1-2 days)

Module 3 - Introduction to R&D (IRD) (2-3 days)

Module 4 - Roles of Engineers (RE) (4-5 days)

Module 5 - Leadership Skills (LS) (ethics) (1-2 days)

Module 6 - Teamwork Skills (TS) (1-2 days)

Module 7 - Technical Writing and Presentation (TWR) (2-3 days)

Module 8 - Technical Drawing (TD) (5-7 days)

Module 9 - Civil and Structural Engineering (CSE) - CDR, Bridge Build and test (20 days)

Module 10 - Electrical Engineering (EE) - CDR (15-18 days)

Module 11 - Mechanical Engineering (ME) – CDR (15-18 days)

Module 12 - Biotechnology (B) – development of project (15-18 days)

Module 13 - Manufacturing and Production (MP) – CDR (15-18 days)

Module 14 - Fluids Engineering (FE) – (10-12 days)

Module 15 - Aerospace Engineering (AE) – (15-18 days)

Module 16 - Problem Solving 1 (PS1) (1-2 days)

Module 17 - Problem Solving 2 (PS2) (1 day)

Module 18 - Problem Solving 3 (PS3) (1 day)

Module 19 - Dumbing of America (DA) (2-3 days)

Please note:
Number of days is based on a 45-minute class period. Modules 1-8 are foundational and should be taught at the beginning of the fall semester. The sequencing is optional for modules 9-19 and should be tailored to best fit district schedule. The Problem Solving modules should be interspersed throughout the year.

Career visits can occur after each Engineering Module (EM); however, to help reduce cost of travel and time away from classes, EM career visits can be combined.