



Freshman Level - Concepts of Engineering and Technology (CoET)

Synopsis

Goals: A freshman, 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 to compete in the global market.

Description: The COET 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, to mention a few. There are 15 modules that provide important information to the student through teacher-user-friendly projects and PowerPoints. The majority of the modules contain hands-on projects within the inquisitive learning curriculum to support real-world discovery of real-world solutions to real-world problems.

The first three modules introduce the students to the world of innovation, to the supporting R&D industry and how it supports innovation, and to a design and development loop, modeled upon that used within the R&D industry, which serves to document and promote solutions by the students for current problems. Beyond, 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 are instructed to author a technical paper, researched by the student, concerning the engineering discipline within the module. From these technical research papers, the students discover more about the particular engineering discipline, including but not limited to, levels of career disciplines (ie technician, apprenticeship, Master, B.S., M.S., PhD, etc.), salaries, educational requirements and pathways of aforementioned careers, analysis of two in-state and one out-of-state universities and their requirements for acceptance, what courses are offered at the student's high school to help pursue said career, self-analysis of how well the student is doing within their own courses, and what they might do to enhance their present education/grades.

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. Additional modules promote understanding and experience with life 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. The students learn that academia is more than reading books – they're important to today's society and economy.



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Scope and Sequence

Course Modules -

- Module 1- Introduction to innovation
- Module 2- Introduction to the R&D industry
- Module 3- Introduction to the R&D loop
- Module 4- Mechanical Engineering
(CDR)
- Module 5- Problem-solving skills
(Hands-on problems)
- Module 6- Structural Engineering
(Structure design, build, test, analysis; CDR)
- Module 7- Teamwork skills (Ethics)
(Hands-on problems)
- Module 8- Civil Engineering
(CDR)
- Module 9- Leadership skills (Ethics)
- Module 10- BioEngineering
(CDR)
- Module 11- Electrical Engineering
(DC series/parallel circuits' development, test, analysis; CDR)
- Module 12- Production
(CDR)
- Module 13- Fluids Engineering
(CDR)
- Module 14- Aerospace Engineering
(CDR)
- Module 15- Introduction to Manufacturing

[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 – i.e. Modules 4&6, Modules 12&13, and Modules 14&15.]