IE 1104/2104

FRUGAL ENGINEERING & VALUE ANALYSIS

Fall 20xx
3 credits – Engineering Topics

Instructors: Bopaya Bidanda
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Distinguished Guest Lecturer: Prof. John Camillus, Beall Endowed Chair of Strategy, Katz
Workshop by Mr. Jim Bolton, former President of SAVE International & former Chair of the Miles Value Foundation (MVF)

Textbook: VM Guide: A guide to Value Methodology Body of Knowledge, SAVE International, ISBN 9781735088013. https://www.value-eng.org/

This course will focus on developing project management skills that allow students to apply value-based principles of **frugal design of products and processes for a sustainable environment, and applicable to the circular economy**.

Foundational skills in Value Engineering/Analysis including tools such as Functional Analysis will be detailed. Additionally, topics such as Customer Needs Identification, Quality Engineering, Operational Excellence and Lean Process Engineering will be integrated into developing frugal product and process designs.

Foundational skills in Project Management will include tools to help manage and implement complex projects with multiple constraints. These include studying and utilizing project implementation and monitoring tools including a work breakdown structure, the RACI matrix, balanced score card, pareto models, cost models, SWOT analysis, etc. An integral part of the course will be for students to initiate and implement a real-life project with engineering constraints and standards, with a value analysis methodology framework.

LE*AR*NING OUTCOMES:
This course will provide students with:

a. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors, *(EAC criterion 3.2)*
b. an ability to communicate effectively with a range of audiences, *(EAC criterion 3.3)*
c. an ability to recognize professional responsibilities in engineering situations and make informed judgments, which consider the impact of engineering solutions in global, economic, and societal contexts, *(EAC criterion 3.4 – partial)*
d. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives, *(EAC criterion 3.5)*
e. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions, and *(EAC criterion 3.6)*
f. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. *(EAC criterion 3.7)*

GRADING:

Final/ Certification Exam: : 40%
Project : 40%
Class participation/attendance: 20%

Course Schedule - FALL 20xx

TOPIC

Introduction & Overview: Class Logistics
Frugal Engineering
The Business of Humanity: The rationale for Frugal Engineering
Wicked Problems as a Strategy for Design
Value Based Project Planning
Value Engineering (VE) Project/Job Plan: A Systematic Approach
Balanced Scorecard, cost model, Pareto model, PM plan, Quality Plan
RACI matrix, Resource Model, Risk model, Risk Register, WBS, Process flow charts
Function Analysis
Conducting a VM Project/Study: Creativity/Evaluation/Development Phase
VOC, SWOT Analysis, Convergent/Divergent thinking, Freewheeling, Hitchhiking.
Framing problems, the creative process, Brainstorming, Brainwriting,
Evaluation using Economic Analyses, Coarse/fine filtering
Conducting a VE Project/Study: Presentation & Implementation - Visual presentations,
Effective Reporting, change management
No Lecture
No lecture
Friday PM/Sat AM - Project Workshop (9 hours) with Jim Bolton -
Initiate and implement a value-based project
Project work
Project presentations /sample exam
Thanksgiving
Certification Exam

PROJECT GUIDELINES:

For the final project, you are expected to work in teams of three. The project will be informally initiated and formally initiated during the Jim Bolton workshop. The hands-on project is similar to a corporate project, where your work will be intense - You will meet as a group and work on the first phases of the Value Analysis. You will then continue the project during the workshop by Mr. Jim Bolton. At the end of the workshop, you are expected to present your initial results. After the workshop, each team is permitted to continue to work on the case/project and present the final version of the report along with a presentation.

Written Project Requirements:
Project reports must be of professional quality. Your report is limited to 8 pages but exhibits up to 10 additional pages may be appended. The project report is expected to follow the SAVE VM methodology format.

Oral Presentation Requirement:
Each project team is expected to make a presentation of 10 minutes. Reports will be collected after the final presentation is completed. Each group member must be actively involved in the oral presentation. The presentations will be graded for clarity, content, and smoothness.