Special Characteristics of a Successful ENGINEERING Student

ABET Student Learning Outcomes

Profile of a Quality Collegiate Learner Characteristics

Solution Producer

Finds acceptable results that meet the needs of the situation at hand

Innovator

Moves beyond state-of-theart and finding ways around constraints ("can-do" attitude)

Engineering Mindset

The way of being of an engineer that differentiates the engineering profession from all other disciplines (PQCL: Confident, Leverages failures, persists)

Safety Protector

Minimizes the overall longterm risk of implemented solution as well as during its realization

Concept Developer

Optimizer

Constantly seeks greater productivity by reducing costs and increasing efficiency

Tool User

Identifies tools to improve effectiveness and efficiency, quickly becoming adept at using them

Design

An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.

Specifier

Defines design outcomes as measurable process or product features, characteristics or tolerances

Identifies/constructs novel ideas or approaches

or synthesizing and refining existing solutions

Solution Reuser Employs tried and true methods or extends them as needed) to solve problems

Decision Maker Uses a rational process for selecting & integrating alternatives to obtain the best solution

Prototyper Explores Engineering ideas through building prototypes or examples of the ideas

Analytical Thinker

Breaks apart entities into constituent parts in order to understand the relationship between the parts

Data Analyst

Collects, organizes, and transforms data to produce insights through effective data analysis with appropriate statistical tools

Engineering Analysis/ Problem Solving

An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (PQCL: problem solving, use resources effectively, validate)

Visualizer

Uses pictures, diagrams, and graphs to explore Engineering ideas, structures, or models

Reverse Engineer

Deconstructs existing products/ processes to determine how something functions or is constructed

Unit Analyst

Uses physical dimensions in mathematical operations to contextual phenomena

Experimentation

An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Technician

Selects and systematic uses research methods and instrumentation to best pursue the inquiry questions

Scientist Observes phenomena to identify patterns leading to hypothesis formulation

Researcher Develops the set of compelling and relevant inquiry questions



Client Advocate

Identifies and addresses the needs of the client, deferring own interest in lieu of client interests

Quality Specialist

Constantly assessing process and products to find ways for improvement in current and/or next iteration

Engineering **Professionalism**

An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. (PQCL: committed to success, manage frustrations, plans, work hard)

Ethical Reasoner

Understands professional code of conduct and acts on its underlying values with societal norms



Documenter

Documents information, results, processes, and reflections for future use by different stakeholders

Project Leader Steps up to organize teams that move projects/initiatives forward

Process Engineering

An ability to see details of how processes are used to produce products/ results, correct errors, eliminate waste in order to ensure consistent quality.

Algorithmic Thinker

Represents processes in a step by step manner along with appropriate logic statements

Debugger Identifies and corrects root causes of unexpected results and undesirable outcomes

Operations Manager Monitors implementation activities to elevate process quality and eliminate waste

Product Tester Validates solutions to ensure that quality meets target specifications

Mathematical Modeler

Develops coherent models that quantitatively describe real-world phenomena based on governing equations

System Thinker

Reduces real world physical/ social situations into simplified representations that promote thinking about system behavior

Systems Modeling

An ability to synthesize a situation, environment or problem area by building a systems representation with effective mathematical modeling.

> **Systems Integrator** Combines and interfaces subcomponents to ensure larger system integrity

Issue Clarifier

Parses a contextual situation to identify all the significant factors influencing that situation to understand inputs and outputs

Simulator

Varies parameters in system models to discern relative significance of different configurations/inputs

Additional ABET Student Learning Outcomes from Profile of a Quality Collegiate Learner

Engineering Learning Performance

An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge. (PQCL: clarifies expectations, master learner, self-assess)

Communicator (from PQCL)

An ability to communicate effectively with a range of audiences.

Team Player An ability to function effectively as a member or leader of a team that establishes goals, (from PQCL) plans tasks, meets deadlines, and creates a collaborative and inclusive environment.