

Curriculum Framework – Gateway (2017-2018)

Introduction to Gateway Engineering – Lesson B Design Process

Desired Results (stage 1)

ESTABLISHED GOALS

It is expected that students will...

- G1 – Demonstrate an ability to identify, formulate, and solve engineering problems.
- G2 – Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- G3 – Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
- G4 – Demonstrate an ability to apply knowledge of mathematics, science, and engineering.

Transfer

TRANSFER: *Students will be able to independently use their learning to ...*

- T1 – Apply the engineering design process to design a system, component, or process to meet desired needs within realistic constraints.
- T2 – Understand the role and impact of engineering and engineering solutions within a global, economic, environmental, and societal context.

Meaning

UNDERSTANDINGS: *Students will understand that ...*

- U1 – Many different design processes are used to guide people in developing solutions to problems.
- U2 – The design brief is a tool for defining the problem; it is an agreement between the engineer and client.
- U3 – Engineers use design briefs to explain the problem, identify solution expectations, and establish project constraints.
- U4 – Design teams use brainstorming techniques to generate large numbers of ideas in a short amount of time, striving for quantity, not quality.
- U5 – A decision matrix is a tool used to compare solution ideas to the criteria so that you can select the best solution.

ESSENTIAL QUESTIONS: *Students will keep considering ...*

- Q1 – How is a design process different than how you solve problems in the past?
- Q2 – Why is brainstorming important when modifying or improving a product?
- Q3 - Why do people work in teams when solving design problems?
- Q4 - Why are design elements considered when engineers and designers invent or innovate a product?

<ul style="list-style-type: none"> • G5 – Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. • G6 – Pursue the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. • G7 – Demonstrate an understanding of professional and ethical responsibility. • G8 – Demonstrate an ability to function on multidisciplinary teams. • G9 – Demonstrate an ability to communicate effectively. • G10 – Gain knowledge of contemporary issues. • G11 – Recognize the need for, and develop an ability to engage in life-long learning. 	<p style="text-align: center;">Acquisition</p> <p>KNOWLEDGE: <i>Students will ...</i></p> <ul style="list-style-type: none"> • K1 – Describe the design process and how it is used to aid in problem solving. U1 • K2 – Describe the elements of design. U1 • K3 – Recognize design criteria and constraints. U2, U3 • K4 – Describe the purpose and importance of working in a team. U4 	<p>SKILLS: <i>Students will ...</i></p> <ul style="list-style-type: none"> • S1 – Use the design process to solve a technical problem. U1 • S2 – Apply the elements of design to the design process. U1 • S3 – Explain a design brief and apply the concept when using the design process. U2, U3 • S4 – Operate effectively as a member of a team to complete a design project. U4 • S5 – Use a decision matrix to select the best solution to a design problem. U5
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Evidence (stage 2)		
Activities (A) Projects (P) Problems(B)	Assessment FOR Learning	Assessment OF Learning
A.B.1 Design Process	<ul style="list-style-type: none"> • Essential Questions 	<ul style="list-style-type: none"> • Conclusion Questions
A.B.2 Design Elements	<ul style="list-style-type: none"> • Essential Questions 	<ul style="list-style-type: none"> • Conclusion Questions
P.B.3 Furniture (Hobby Organizer) Design	<ul style="list-style-type: none"> • Essential Questions • Hobby Organizer Design Grading Rubric • Furniture Design Grading Rubric 	<ul style="list-style-type: none"> • Conclusion Questions • Hobby Organizer Design Grading Rubric • Furniture Design Grading Rubric

Learning Plan (stage 3)	
Activities (A) Projects (P) Problems(B)	Knowledge and Skills
A.B.1 Design Process	K1, K3
A.B.2 Design Elements	K2
P.B.3 Furniture (Hobby Organizer) Design	K4, S1, S2, S3, S4, S5