

Curriculum Framework – Gateway (2015-2016)

Automation and Robotics – Lesson 2 Mechanical Systems

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.
- G5 – Demonstrate an ability to use the techniques, skills, and modern engineering tools

Transfer

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

- T1 – Apply knowledge of mathematics, science, and engineering to design and build mechanisms.
- T2 – Design a mechanical system that meets desired needs within realistic constraints.

Meaning

UNDERSTANDINGS: *Students will understand that ...*

- U1 – Energy is the capacity to do work; the use of mechanisms is necessary to transfer energy.
- U2 – Engineers and technologists design mechanisms to change energy by transferring direction, speed, type of movement, and force or torque.
- U3 – Mechanisms can be used individually, in pairs, or in systems.

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

- Q1 – Why is it important for you to learn about mechanisms?
- Q2 - What is the purpose of being able to change speed, force, torque, direction and types of motion with a mechanism?
- Q3 – Describe where you see mechanisms used in three real-life applications, explain the purpose of using a mechanism for that application.

<p>necessary for engineering practice.</p> <ul style="list-style-type: none"> • 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. 	Acquisition	
	<p>KNOWLEDGE: <i>Students will ...</i></p> <ul style="list-style-type: none"> • K1 – Use ratios to solve mechanical advantage problems. U2, U3 • K2 – Use numerical and algebraic expressions and equations to solve real-life problems, such as gear ratios. U2, U3 	<p>SKILLS: <i>Students will ...</i></p> <ul style="list-style-type: none"> • S1 – Use the characteristics of a specific mechanism to evaluate its purpose and applications. U1, U2, U3 • S2 – Apply knowledge of mechanisms to solve a unique problem for speed, torque, force, or type of motion. U1, U2, U3

Evidence (stage 2)		
Activities (A) Projects (P) Problems(B)	Assessment FOR Learning	Assessment OF Learning
A.2.2.1 Observing Mechanisms	<ul style="list-style-type: none"> • Essential Questions 	<ul style="list-style-type: none"> • Conclusion Questions
A.2.2.2 Mechanical Gears	<ul style="list-style-type: none"> • Student responses to presentation questions • Essential Questions 	<ul style="list-style-type: none"> • Conclusion Questions
P.2.2.3 Windmill Construction	<ul style="list-style-type: none"> • Essential Questions 	<ul style="list-style-type: none"> • Conclusion Questions
P.2.2.4 Pull Toy Construction	<ul style="list-style-type: none"> • Essential Questions • Pull Toy Construction Rubric 	<ul style="list-style-type: none"> • Conclusion Questions • Pull Toy Construction Rubric
P.2.2.5 Survival Challenge	<ul style="list-style-type: none"> • Essential Questions 	<ul style="list-style-type: none"> • Conclusion Questions

Learning Plan (stage 3)	
Activities (A) Projects (P) Problems(B)	Knowledge and Skills
A.2.2.1 Observing Mechanisms	K1, K2, S1
A.2.2.2 Mechanical Gears	K1, K2, S1
P.2.2.3 Windmill Construction	K1, K2, S1, S2
P.2.2.4 Pull Toy Construction	K1, K2, S1, S2
P.2.2.5 Survival Challenge	K1, K2, S1, S2