

Design Nature

EL 1302

Tuesday and Thursday 3:00 pm – 4:50 pm

Room C101

In this course, we will take nature, an important source of inspiration and understanding, as a theme and develop bio-inspired ideas into functional prototypes. Our focus is on the general principles and methods that shape the practice of engineering design. Students complete individual and team projects in a studio environment where we seek to develop a shared practice and understanding of engineering design. Students also gain experience in visualization, experimentation, estimation, fabrication, and presentation as they relate to designing. **Please note that this class is fast paced, thus it requires time management and organization in order to stay on top of assignments.**

1. Learn elements of and management of an engineering design process with an emphasis on taking ideas through to functional prototypes.
2. Experience the excitement, breadth and power of engineering design.
3. Learn methods supporting common design activities such as generation, evaluation and selection.

Course Materials

Required Software:

- Google Documents
- Autodesk Inventor or Fusion 360

Required Texts

- Good to Great, Jim Collins
- Leadership: Theory and Practice 8th Edition, Peter G. Northouse
- Overcoming The Five Dysfunctions of a Team, Patrick Lencioni
- The Complete Guide to Capital Markets for Quantitative Professionals (McGraw-Hill Library of Investment and Finance)



Instructor Information

Roger Gonzalez, PhD

rvgonzalez@utep.edu

Peter Golding, PhD

pgolding@utep.edu

Maximo Gamez

mgamez@miners.utep.edu

Christopher Edens

cdedens2@miners.utep.edu

Elijah Riefenberg

ejriefenberg@miners.utep.edu

Grading Criteria

Homework	15%
Notebook	20%
Quizzes	15%
Class Participation	10%
Project 1	20%
Project 2	20%

Additional Materials:

In addition to the materials described above, you must allocate \$15 dollars for use in the second half of the semester. We will also be providing you with academic papers to read as well as additional instructional materials.

Attendance

Attendance is mandatory in this course. If you are tardy or absent for a total of three unexcused times you will be dropped from the course.

Disability

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

Academic Integrity

The instructors expect a commitment to truthfulness, honor and responsibility, without which you cannot earn the trust and respect of others. Therefore, we will not tolerate plagiarism, lying, cheating, or stealing in any form. Collaboration is encouraged, however, representing other's work as your own will not be tolerated.

Grading Rubrics

Engineering Notebook (Will be graded twice during semester each time is worth 10% of your final grade)

	Excellent (3)	Competent (2)	Needs Work (1)	Not Present (0)
Project 1				
Project 2				
Notes/Homework				
Organization				

Homework

0	0-60	70-80	90+	100
Assignment was not turned in	Assignment did not meet standards	Assignment met standards	Assignment exceeded standards	Assignment became the standard

Mimic– Project 1 Grading Rubric:

	Not Present (0)	Needs Work (1)	Competent (2)	Excellent (3)
Design Process and Bio-Inspiration (BI)				
CAD Model and Simulation				
Mimic Functionality, Trigger, and Creativity				
Communication, Visual Aids, and Presentation Style				

Group – Project 2 Game Play (30%) - Grading Rubric:

Rate the game on a scale of 1-5 (5 being the highest) on the following components. Circle a number and then total your scores. 1 -Severely lacking, 2-Needs work, 3- Met requirements, 4 - Well done, 5– Exceeded requirements.

Aesthetics	1	2	3	4	5
Instructions	1	2	3	4	5
Playability	1	2	3	4	5
Fun	1	2	3	4	5
Met Expectations	1	2	3	4	5

Group –Project 2 Final Presentation (70%) - Grading Rubric:

	Poor 1 Points	Needs Work 2 Points	Met Standards 3 Points	Good 4 Points	Excellent 5 Points
Game Idea					
Business Model All categories covered in class					
Finance Income Statement and Balance sheet					
Lessons Learned					
Communication, Visual Aids, and Presentation Style					

Course *Tentative* Calendar

	Concept	Date	Due before class	Class Content	Due in class	Homework
Week 1	Biomimicry	1/21/2020	Biomimicry Homework	<ul style="list-style-type: none"> •Syllabus Review •Course Introduction •Project Descriptions 	Class and Personal Goals	<ul style="list-style-type: none"> •Good to Great Chapter One •Course Contract (HW) •Student Goals (HW)
		1/23/2020	Good to Great Chapter 1 Course Contract Student Goals	<ul style="list-style-type: none"> •Good to Great Chapter 1 (Quiz) •Basic Engineering Design Process •Journaling and Documentation •Hopper Examples 	Group Design Activity Share Google Document w/ TAs	<ul style="list-style-type: none"> •Google Document •Case Study 12.1 (HW)
Week 2	Prototyping	1/28/2020	Leadership Case Study 12.1	<ul style="list-style-type: none"> •Leadership Case Study 12.1 •The physics of motion, propulsion, and examples in nature •Intro to 3D animation 	1 sketch of method of motion/propulsion in notebooks and mechanical representation Project Goal Contract	<ul style="list-style-type: none"> •Good to Great Chapter Two •5 methods of motion/propulsion in notebooks and mechanical representations
		1/30/2020	Good to Great Chapter Two Project Goals 5 Sketches	<ul style="list-style-type: none"> •Good to Great Chapter Two (Quiz) •Energy and energy transferred explained •Sketches peer reviewed 	Goals for Project Reviewed Peer review of at least 3 peer designs	<ul style="list-style-type: none"> •Leadership Case Study 12.2 •3 revised sketches (HW)
Week 3	Simulation	2/4/2020	Leadership Case Study 12.2	•Leadership Case Study 12.2	25% of 3D model complete	•Good to Great Chapter Three

			3 Revised Sketchs Turned in on BB (HW)	<ul style="list-style-type: none"> •Rapid Prototype Review •Intro to 3D Printing 		<ul style="list-style-type: none"> •3D Model •Rapid Prototypes
		2/6/2020	Good to Great Chapter 3	<ul style="list-style-type: none"> •Good to Great Chapter 3 •Intro to Simulation •Energy and Energy Transferred Explained 	Practice Simulation Project goals revised	<ul style="list-style-type: none"> •Simulation of Rocket (HW) •Case Study 12.3 •Rapid Prototypes
Week 4	Rapid Prototypes	2/11/2020	Leadership Case Study 12.3 3 Rapid Prototyping on YouTube Simulation	<ul style="list-style-type: none"> •Leadership Case Study 12.3 •Sketch Model Presentation •TA review 	Revised Prototype Peer Review of Sketch Models CAD model and Simulation	<ul style="list-style-type: none"> •Simulation of 3D Inventor model •1 Revised Sketch Model Video on YouTube •Good to Great Chapter Four
		2/13/2020	Good to Great Quiz Chapter 4 Sketch Model Video Review on YouTube (HW)	<ul style="list-style-type: none"> •Good to Great Chapter 4 •Studio time •Sketch Model Video Reviews 	80% of Inventor Simulation Complete	<ul style="list-style-type: none"> •Leadership Case Study 14.1 •Inventor Simulation on YouTube Channel (HW)
Week 5	Design Iteration	2/18/2020	Leadership Case study Inventor Simulation on YouTube (HW)	<ul style="list-style-type: none"> •Leadership Case Study 14.1 •Studio time 	Functioning Prototype	<ul style="list-style-type: none"> •Good to Great Chapter Five
		2/20/2020	Good to Great Chapter Five	<ul style="list-style-type: none"> •Good to Great Chapter 5 •Studio time 		<ul style="list-style-type: none"> •Leadership Case Study 14.2
Week 6	Design Iteration Refinement	2/25/2020	Leadership Case Study 14.2	<ul style="list-style-type: none"> •Leadership Case Study 14.2 •Studio Time 		<ul style="list-style-type: none"> •Good to Great Chapter 6

		2/27/2020	Good to Great Quiz Chapter 6	•Good to Great Chapter 6 •Studio Time		
Week 7	Technical Presentations	3/3/2020				
		3/5/2020				

	Concept	Date	Due before class	Class Content	Due in class	Homework
Week 8	Target Audience Research	3/10/2020	Physics	•Physics		•Good to Great Chapter Seven
		3/12/2020	Good to Great Chapter 7 3 Game Ideas	•Good to Great Chapter Seven Quiz •Assign Teams	Studio Time	•Research Behind Target Audience •Case Study on Engineering Design (Counts as 3 Homework grades) •Case Study 14.3 •Read Chapter One of What Every Engineer Should Know About Finance and Accounting
Week 9	Spring Break					
Week 10	Brainstorming	3/24/2020	Research Behind Target Audience Case Study 14.3 Case Study on Engineering Design	•Target Audience Presentations •Case Study 14.3	3 Game Ideas	•Good to Great Chapter Eight

			Read Chapter One of What Every Engineer Should Know About Finance and Accounting	•Chapter One of What Every Engineer Should Know About Finance and Accounting QUIZ		
		3/26/2020	•Good to Great Chapter 8	•Good to Great Chapter Eight (Quiz) •Bio-Inspiration	•How will Bioinspiration be included in your game	•Leadership Assignment Self-Assessment 12 (HW) Finalized Game Idea •Read Chapter Two of What Every Engineer Should Know About Finance and Accounting
Week 11	Company Image/Physics	3/31/2020	Finalized Game Idea and How it Will Be Bio-Inspired (Participation) Leadership Assignment	•Team Presentations Finalized Game Idea and How it Will Be Bio-Inspired •Leadership Chapter 12 Self Assessments	Company Logo	•Good to Great Chapter Nine •Company Logo •Game Slogan •Team Name
		4/2/2020	Logo, Name and Slogan Due on BB (HW)	•Good to Great Chapter Nine (Quiz) •Physics	Hopper Physics Mapped Out	•Physics
Week 12	Packaging/Game Instructions	4/7/2020	Game Physics (Participation)	•Team Presentations on Game Physics •Packaging Presentation given by TAs	Sketch of Packaging	•Good to Great Essay •Packaging

				<ul style="list-style-type: none"> •Chapter Two of What Every Engineer Should Know About Finance and Accounting QUIZ 		<ul style="list-style-type: none"> •Commercial
		4/9/2020	Packaging Presentation (Participation)	<ul style="list-style-type: none"> •Team Presentations on Packaging •Instructions Activity 	Group Activity	<ul style="list-style-type: none"> •Game Instructions •Leadership Assignment Self-Assessment 14 (HW)
Week 13	Marketing Plan	4/14/2020	Game Instructions (Presentation) and due on BB (HW)	<ul style="list-style-type: none"> •Teams Presentations on Game Instructions •Leadership Chapter 14 Self Assessments •Marketing Plan Presentation Given By TAs 		<ul style="list-style-type: none"> •Marketing Plan
		4/16/2020		<ul style="list-style-type: none"> •Finance over their game presentations 		
Week 14	Game Building	4/21/2020	Good to Great Essay	<ul style="list-style-type: none"> •Teams Presentations on Marketing Plans 	Work on editing commercials	
		4/23/2020		<ul style="list-style-type: none"> Finance assignment due 		
Week 15	Final Stretch	4/28/2020	Commercials Uploaded to YouTube	<ul style="list-style-type: none"> •Commercials Watched in Class 		Final Presentation

		4/30/2020	No Class
Week 16	Game Play	5/5/2020	Games of bottom three teams will be played (ALL Games Due)
		5/7/2020	Games of top three teams will be played
Final Presentation will take place on time and date of the final			

Office Hours:

Maximo Gamez

12-1:30 T & TH

Christopher Edens

2:00-3:00 T & TH

Elijah Riefenberg

5:00-6:00 T & TH

Peter Golding, Phd

By appointment

Roger Gonzalez, Phd

By appointment