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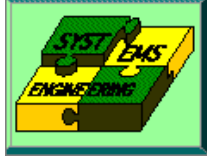


# SYST 101: Intro to Systems
# Week 1: Introduction

Jan. 21, 2002

C. Wells, SEOR Dept.

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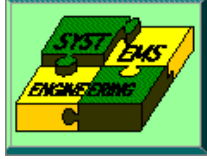


# Welcome to SYST 101

- Course Description
  - What is SYST 101?
- Course Procedures
  - Class procedures, website, lectures, homework, exams, projects, teaching assistant
- Instructor Contact Information

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# What is SYST 101?

- An introduction to systems and systems engineering
- How to think about systems and their interactions with their environments
- How to handle competing and often contradictory demands for what a system should do

# Announcements

- Class email list
  - Please subscribe to the class mailing list
  - Send an email to: listproc@gmu.edu
  - In the body of the message, put: subscribe syst101
  - Nothing in the subject line, and nothing else in the body of the message.
  - You will receive a confirmation reply if you did it correctly.

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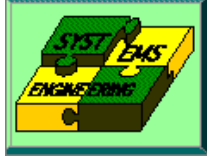


# Subscribing ...

- To: listproc@gmu.edu
- Subject:
- (body)
  subscribe syst101 *yourname*

# Agenda

- Objective for Week 1:
  - Overview of the course
  - Understand “system” and “system engineering”
  - Basic concepts of a system and its environment
  - Understand the relevance and use of SYST, OR, and department’s courses in the curriculum
  - Differences between systems engineering and other engineering disciplines

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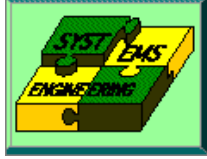
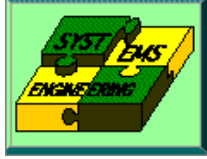



# Course Material

- Course Website:
  - ??
- Two textbooks:
  - Petroski: “To Engineer Is Human”
  - Petroski: “Invention By Design”
- Lectures:
  - Lecture slides will be posted to the course website by week (not by individual class day)
- Projects:
  - Discussed later.




# Course Website

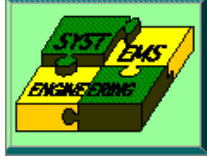
- Several pages...
- Main page: Links to other pages, instructions on subscribing to the class mailing list
- Syllabus: General course info, instructor and TA contact info, office hours, grading system
- Lectures & Assignments: Course lecture slides, homework assignments and published solutions

# Textbooks

- Two textbooks this semester
- Petroski: “To Engineer Is Human”
- Petroski: “Invention By Design”
  - Dr. Henry Petroski has written several “non-standard” books on engineering.

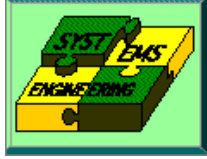
# Textbooks and Reading Assignments

- Reading assignments will be given out of both books
  - Chapter or sections, and a to-be-completed-by date (due date).
  - Pop quizzes may be given in class on the reading assignment after the assignment due date.
    - Grades are part of “Exams”
  - *Rationale*: The lectures will be much more meaningful to you if you have already read the textbook section.



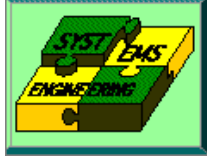

# Homework Assignments

- Usually with a 1-week due date.
  - Late homework accepted only by the following class, 20% off.
  - *Rationale*: 60 students.
- Teaching Assistant will be available for help.
  - Contact info TBD.



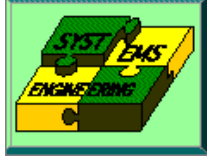

# Exams

- Pop Quizzes throughout the semester
- Midterm Exam
  - Covering the 1st half of the semester
- Final Exam
  - Covering the entire semester




# Projects

- Lego Mindstorms
- Project details will be presented later in the semester.
- Teams will build Lego Mindstorm robots that will attempt to accomplish certain goals.
- “Build a system that meets certain requirements”
- Project grade will include oral presentations.




# Grading

- Homework:  30 %
- Exams:  50% (quizzes + midterm + final)
- Project:  20%

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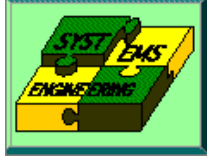


# Introduction to Systems Engineering

- What is a System?
- What's Systems Engineering?
- Are we having fun yet?

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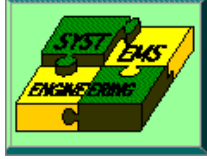
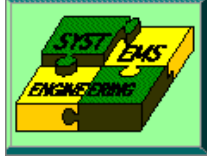


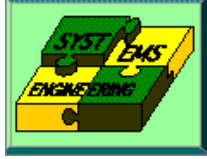

# Is this a system?

- http://www.sodaplay.com/zoo/index.htm



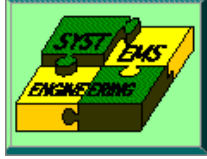

# What is a System?

- Numerous definitions everywhere
- A System is:
  - A set of interacting components that together accomplish some goal or behavior; it exists within an environment, and can interact with that environment.



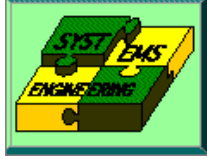

# Are These Systems?

- U.S. Interstate Highway Network
- Commercial Air Transportation System
- The Human Body
- Fairfax County Police Dept.
- GMU Registrar
- The population of rabbits and foxes in the wood



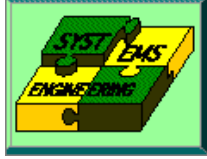

# Yes

- All the examples are systems.
- All exist within an environment.
- Not all are subject to human engineering.



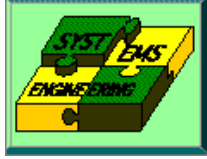

# Scope of this Course

- Systems which are designed, developed, deployed or controlled by human engineers.
- Today, software-intensive systems make up a significant fraction of what you will be dealing with in the future.
  - Not only computers and software applications, but aircraft, cars, cell phones, and next year, maybe your toaster.



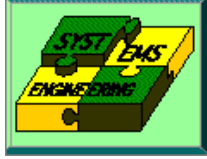

# Key Terms

- Scope of the System
- Mission or Goals
- Requirements
- Stakeholders
- Lifecycle
- Interactions
- Behavior



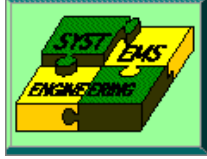

# Scope of the System

- What is included in your system, and what is not.
- The System's *Boundaries*



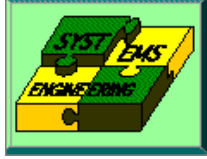

# Mission or Goals

- What is the system supposed to do?
- How well does it need to do it?
  - Performance
- Criteria for success



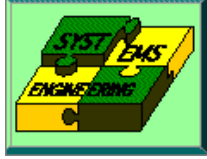

# Requirements

- Based on the Mission/Goals
- More detail
- Must be clear
- Must be *testable*
  - Someone else should be able to test whether your system satisfies the requirement or not




# Stakeholders

- All of the people or organizations that care about or are impacted by the system.
- Everyone who needs to have input into how the system will function or how it will be used.

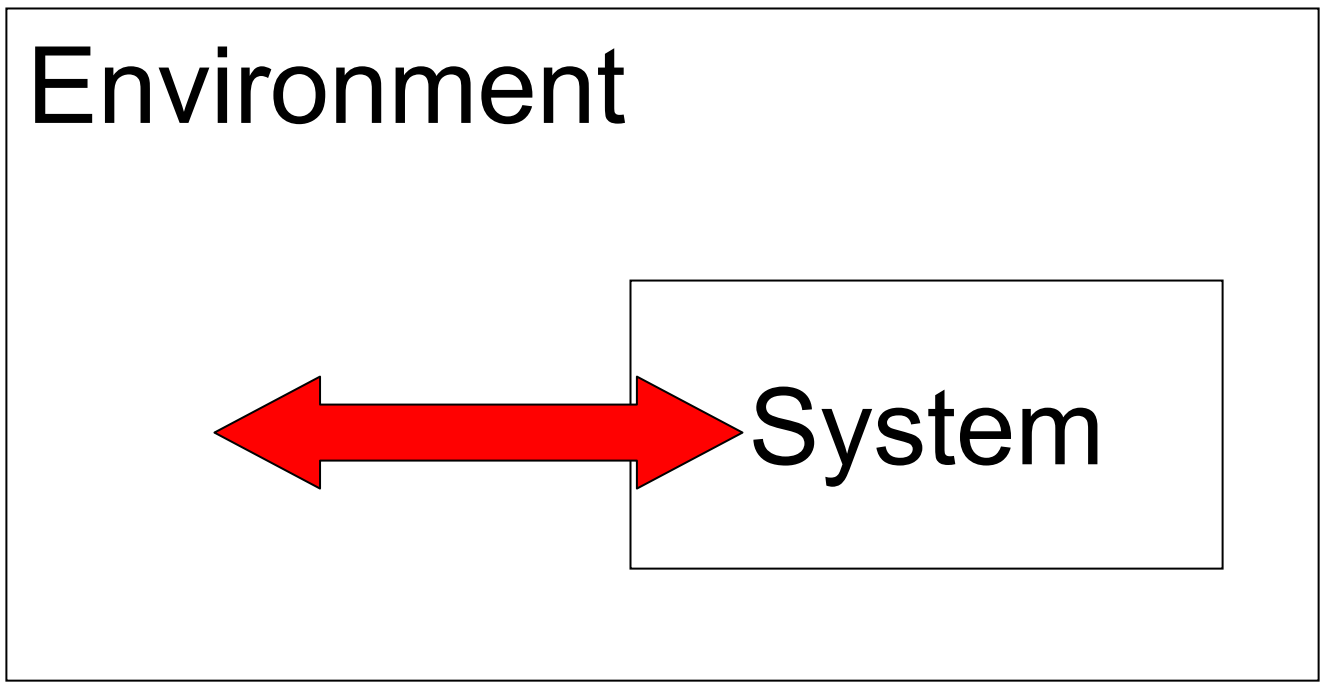



# Lifecycle

- Systems usually undergo a “life”
  - Starting with initial ideas and concepts
  - Through the design process,
  - Then they’re developed and tested,
  - Deployed in the field or commercial arena,
  - Maintained and operated,
  - Retired and removed from use.
- Examples where Lifecycle problems exist?

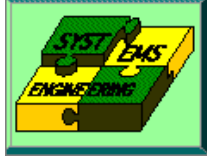
# Interactions

- Every system interacts with it's environment.



# Environment vs Context

- There are things outside of the system that
  - Can affect the system AND
  - Can be affected by the system.
  - This defines the *Environment* of the system.
- There are things outside the system which
  - Can affect the system BUT
  - Cannot be affected by the system.
  - This defines the *Context* of the system




# Behavior

- Defines what a system needs to do or does in response to stimuli
- *Stimuli* (plural, stimulus): Various events, conditions or occurences that stimulate a reaction in the system.
- Systems are usually purchased for their behavior, not their appearance.

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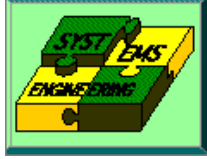
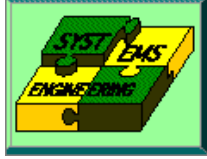



# So, Systems Engineering Is:

- Learning the mental processes, tools, and ways of thinking that help you figure out all these aspects.
- Learning to apply these tools in order to develop the best system you can with the resources you have.




# Assignments

- Reading
  –
- Homework
  – Send Me an e-mail
    - information to assess class makeup
    - information to assign project teams

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# e-mail format

to: charles.wells@cox.net

subject: SYST 101 demographics

body:

name:

major:

year:

interpersonal skills: (scale 1=low to 5=high)

artistic expertise: (scale 1=low to 5=high)

literary expertise: (scale 1=low to 5=high)

mechanical expertise: (scale 1=low to 5=high)

computer expertise: (scale 1=low to 5=high)

math courses: