

IFN501 - System Modeling and Simulation

Session 1: Course Overview

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Department of Electrical Engineering
Faculty of Engineering
Universitas Sam Ratulangi

Outline

Course Details

Introduction to Computer Simulation

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References

Acknowledgement

When not specifically defined, the contents of this presentation are adapted from [1].

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The Rules

Scoring System

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The Rules of the Game

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7. You are college students, please behave with the appropriate attitude.

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The Rules

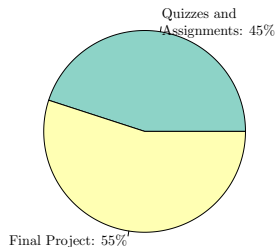
Scoring System

Introduction to Computer Simulation

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Scoring Components



- Grading system follows faculty regulation:

Figure 1 : Scoring components

Scoring Components

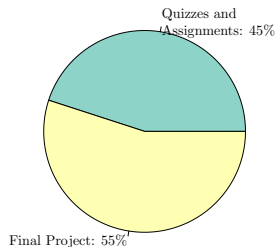


Figure 1 : Scoring components

- ▶ Grading system follows faculty regulation:
 - ▶ $n \geq 80$ Grade = A

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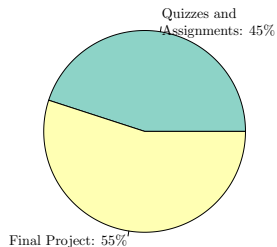


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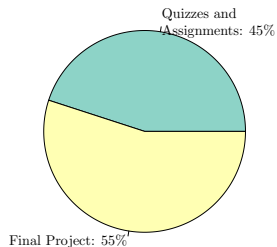


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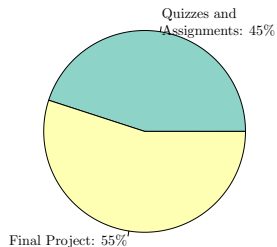


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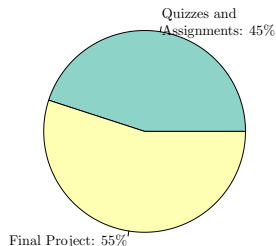


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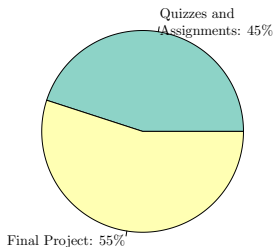


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- $35 \leq n < 55$ Grade = D

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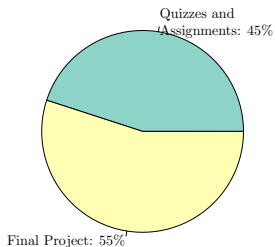


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 - ▶ $n < 35$ Grade = E

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Introduction to Computer Simulation
Simulation Defined

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Why it is important?

- ▶ Reduce the risk associated with creating new systems or with making alteration to the existing ones.

Introduction to Computer Simulation

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- ▶ Reduce the risk associated with creating new systems or with making alteration to the existing ones.
- ▶ Investment assurance
- ▶ Decreasing margin of error while increasing precision

Outline

Course Details

Introduction to Computer Simulation

Simulation Defined

- Basic Nature

- Usages

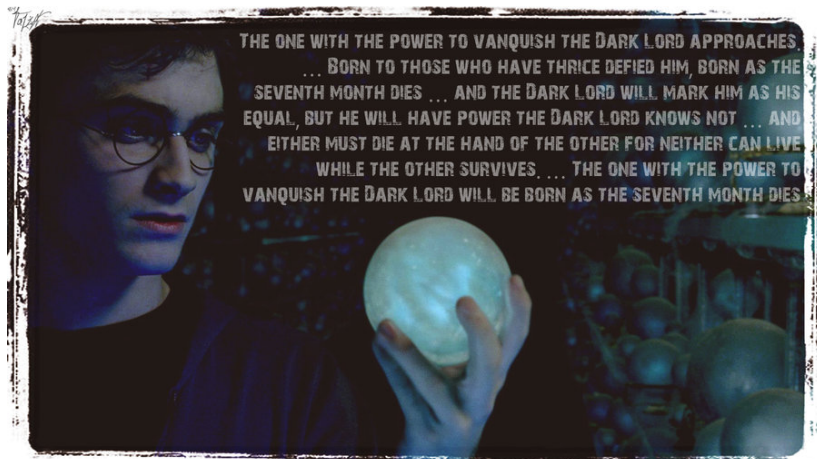
- Pros and Cons

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Introduction to Computer Simulation

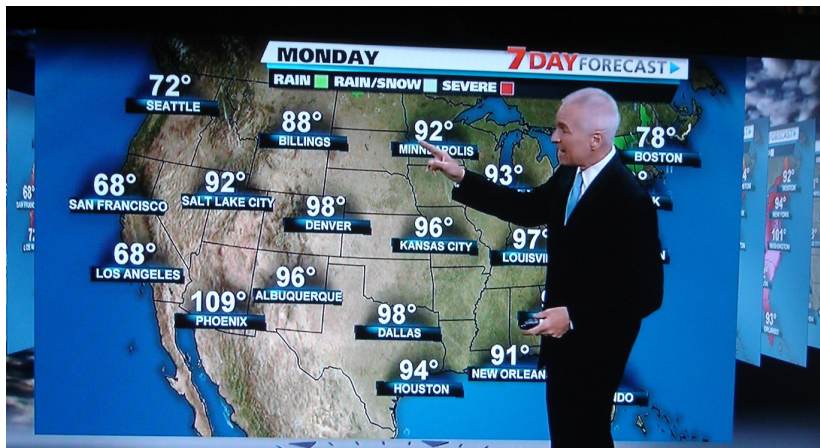
Simulation Defined



THE ONE WITH THE POWER TO VANQUISH THE DARK LORD APPROACHES.
... BORN TO THOSE WHO HAVE THRICE DEFIED HIM, BORN AS THE
SEVENTH MONTH DIES ... AND THE DARK LORD WILL MARK HIM AS HIS
EQUAL, BUT HE WILL HAVE POWER THE DARK LORD KNOWS NOT ... AND
EITHER MUST DIE AT THE HAND OF THE OTHER FOR NEITHER CAN LIVE
WHILE THE OTHER SURVIVES. ... THE ONE WITH THE POWER TO
VANQUISH THE DARK LORD WILL BE BORN AS THE SEVENTH MONTH DIES

Introduction to Computer Simulation

Simulation Defined



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Introduction to Computer Simulation

Simulation Defined- Basic Nature

- ▶ Branch of applied mathematics

Introduction to Computer Simulation

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- ▶ Exploits computing power and improvements in programming languages to solve complex real world system that modeled as analytical or purely mathematical models

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- ▶ Exploits computing power and improvements in programming languages to solve complex real world system that modeled as analytical or purely mathematical models
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Introduction to Computer Simulation

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Definition

Using a computer to imitate the operation of a real world process or facility according to appropriately developed assumptions taking the form of logical, statistical, or mathematical relationships which are developed and shaped into a model.

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Simulation Defined- Usages

Table 1 : Situations warranting computer simulations

General Situation	Examples
Real system does not yet exist and building a prototype is cost prohibitive, time-consuming or hazardous.	Aircraft, production system, nuclear reactor
System is impossible to build.	National economy, biological system
Real system exists but experimentation is too expensive, hazardous or disruptive to conduct.	Proposed Changes to a Materials Handling System, Military Unit, Transportation System, Airport Baggage Handling System
Forecasting is required to analyze long time periods in a compressed format.	Population growth forest fire spread, urbanization studies, pandemic flu spread
Mathematical modeling has no practical analytical or numeric solution.	Stochastic problems, nonlinear differential equations

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Simulation Defined- Pros and Cons

Pros

Introduction to Computer Simulation

Simulation Defined- Pros and Cons

Pros

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Introduction to Computer Simulation

Simulation Defined- Pros and Cons

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Introduction to Computer Simulation

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Introduction to Computer Simulation

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Introduction to Computer Simulation

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Pros

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Introduction to Computer Simulation

Simulation Defined- Pros and Cons

Pros

1. Allows experimentation without disruptions to the existing systems.
2. Concept can be evaluated before installation.
3. Detection of unforeseen problems or bugs.
4. Gain in knowledge on system
5. Speed in analysis
6. Force system definition
7. Enhances creativity

Introduction to Computer Simulation

Simulation Defined- Pros and Cons

Cons

Introduction to Computer Simulation

Simulation Defined- Pros and Cons

Cons

1. Expensive

Introduction to Computer Simulation

Simulation Defined- Pros and Cons

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1. Expensive
2. Time consuming

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5. Accepted as gospel

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Next session: Assignment 1 – Paper and Presentation

- ▶ Topic: Cases Around Us and The Needs for Computer Simulation.

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- ▶ Each group has 5-7 minutes to present the case and the findings.
- ▶ The presentation contains only the important points. DO NOT copy-paste the text in your paper to the slides. Such presentation will be REJECTED!

Next session: Assignment 1 – Paper and Presentation

Paper Outline

- ▶ Abstract

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Presentation Outline¹

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- [1] R. McHaney, [Understanding Computer Simulation](#). Ventus Publishing, 2009.