LIVE ONLINE COURSE

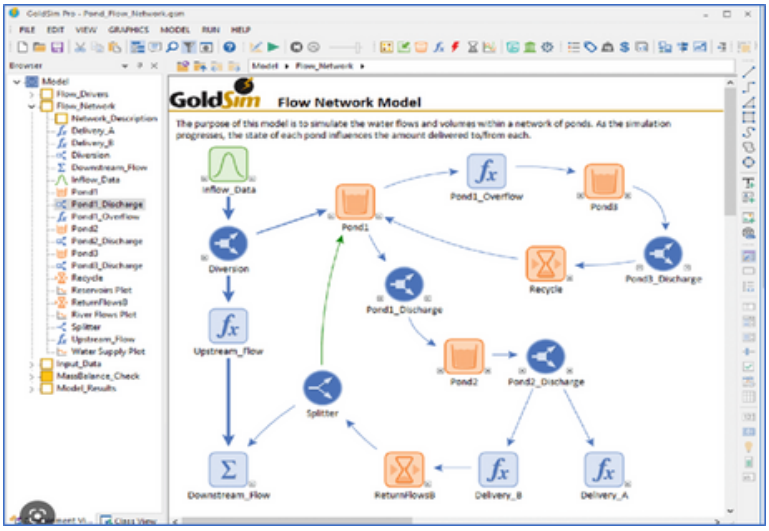
GOLDSIM® :
MINING APPLICATIONS

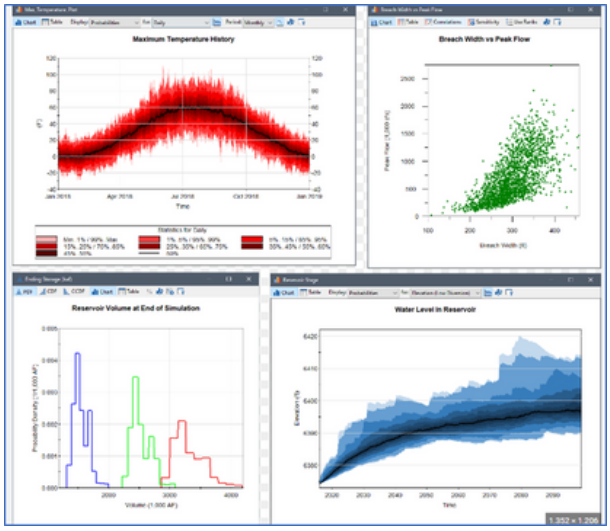
INSTRUCTOR: ENG. CARLOS DE LA TORRE

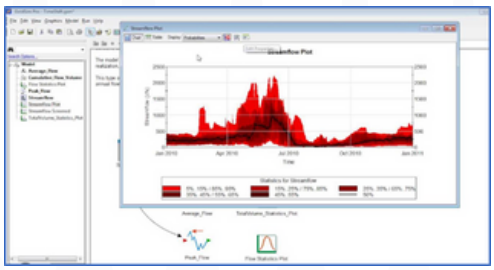
Date: March 13 - 17, 2023

Schedule: From 6:00 p.m. to 10:00 p.m. (Peruvian time)

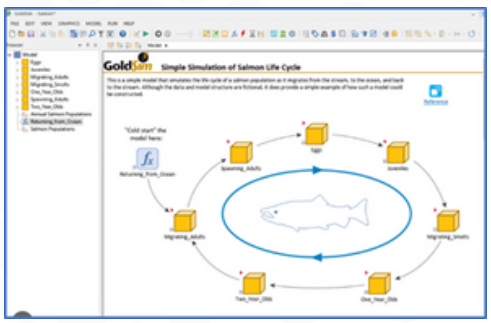
INTRODUCTION







GoldSim is a highly graphical, object-oriented computer program for performing dynamic and probabilistic simulations. In a sense, GoldSim is like a "visual spreadsheet" that allows you to create and manipulate data and equations visually.



GoldSim is a simulation program. As used here, simulation is defined as the process of creating a model (i.e., an abstract representation or facsimile) of an existing or proposed system (e.g., a business, a mine, a watershed, a forest, the organs of your body, the atmosphere) in order to identify and understand those factors that control the system and/or predict (forecast) the future behavior of the system. Almost any system that can be quantitatively described using equations and/or rules can be simulated.

Simulation is an important tool because it provides a way in which you can evaluate alternative designs, plans, and/or policies without having to experiment on a real system, which can be prohibitively expensive, time-consuming, or simply impractical. That is, simulation allows you to ask "What if?" questions about a system without having to experiment with the actual system (and thus incur the costs and delays associated with field testing, prototyping, etc.).
Because GoldSim was designed with flexibility in mind, you can use it to simulate almost any type of system. Illustrative examples from the fields of business, science and engineering include the following:

APPLICATIONS

Strategic planning:
Can simulate the implementation of a complex task (e.g., design, manufacture, and marketing of a new product) by describing the tasks involved, any prerequisites (i.e., what must be done before a particular task can be started or completed), task durations and costs, and events that might affect the process. The result of such a simulation could be the probability of successfully completing the undertaking (in a certain period of time or at a certain level of profitability). You could use the results to identify potential problems that could arise and design contingency plans. On a larger scale, such a tool could be used to evaluate and manage project and investment portfolios.

Ecology:
The growth of a group of animals could be simulated by representing in mathematical terms the initial number of animals, the birth and mortality rate, the rate at which animals migrate into or out of the group, possible catastrophic events, etc. The result of this simulation would then be the number of animals in the group as a function of time (e.g., one year from now, ten years from now, etc.). You could use the results to better manage the system to stabilize or increase the population (e.g., by limiting hunting or introducing predators).

Environment:
You can simulate the performance of a hazardous waste site by describing the initial conditions (e.g., the geometry of the system, the amount of contaminants in the system) and the processes acting on the system (e.g., degradation of the drums containing the waste degradation, migration of contaminants through the environment). The output of this type of simulation would be contaminant concentrations around the site as a function of time. You can use the results to design remediation measures that minimize environmental impacts at the site.

Reliability engineering:
The reliability of a proposed satellite system could be simulated by describing the system components and the processes and events that could compromise system integrity and cause failures or downtime. The results of this type of simulation would include the expected reliability of the system and the probability and consequences of different types of failures. You could use the results to modify the design to maximize reliability and minimize the probability and/or consequences of failure.

Manufacturing:
It can simulate the dynamics of a manufacturing supply chain by defining the "links" in the chain (retailer, distributor, manufacturer, tier 1 supplier(s), tier 2 supplier(s), etc.) and how these coupled organizations interact with each other. other. The model would simulate the movement of materials (from parts to finished product) along the supply chain and could be used to identify ways in which the system could be modified (e.g., through technology or better decision rules) to operate more efficiently.

GoldSim is easy to use and highly graphical, so you can literally draw and then present a picture (or influence diagram) of the system you want to model in an intuitive way without having to learn a lot of symbols, notation and functions.
Because simulation can be such a powerful tool for understanding and managing complex systems, a variety of graphical simulation tools are now available. However, the following combination of features makes the GoldSim approach unique:
GoldSim was specifically designed to quantitatively address the inherent uncertainty that is present in real-world systems. GoldSim provides powerful tools to represent uncertainty in processes, parameters and future events, and to evaluate such systems in a computationally efficient manner.
GoldSim provides powerful capabilities for overlaying the occurrence and consequences of discrete events on continuously varying systems. This enables realistic simulation of discrete events such as financial transactions, accidents, system failures, storms, labor strikes, and lawsuits.
GoldSim was designed to facilitate the construction of large, complex models. You can build a model of your system in a hierarchical and modular fashion, so that the model can easily evolve and add detail as more knowledge about the system is gained. Other powerful features, such as the ability to manipulate matrices, the ability to "localize" parts of your model, and the ability to assign version numbers to a model that is constantly being modified and improved, make it even easier to build and manage large models.

GoldSim is dimensionally aware. GoldSim has an extensive internal database of units and conversion factors. You can enter data and display results in any unit. You can even define your own custom units. GoldSim ensures dimensional consistency in your models and performs all unit conversions internally. As a result, when using GoldSim, you never need to perform (error-prone) unit conversions.
GoldSim is highly extensible. You can dynamically link external programs or spreadsheets directly into your GoldSim model. In addition, GoldSim was specifically designed to support the addition of custom modules (program extensions) to address specialized applications.
GoldSim allows you to create compelling presentations of your model. A model that cannot be easily explained is a model that will not be used or believed. GoldSim was specifically designed to allow you to effectively document, explain and present your model. You can add graphics, explanatory text, notes and hyperlinks to your model, and organize it hierarchically so that it can be presented at an appropriate level of detail to multiple target audiences.

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SUBJECT

THEORY (8 HOURS)

- GoldSim in a nutshell
- Understanding the simulation
- Dynamic Simulation
- Probabilistic Simulation
- Steps to perform a simulation
- The power of simulation
- What is Gold Sim?
- A powerful and flexible simulator
- The system integration tool
- The visual information management system
- GoldSim basics
- The GoldSim simulation environment
- Elements: The basic building blocks in GoldSim Linking Elements
- A simple example
- Understanding Dynamic Simulation
- GoldSim is dimension aware
- Representation of uncertainty
- Representation of feedback loops
- Simulation of delays
- Top-down hierarchical model building

GOLDSIM USER GUIDE

- Additional Feature Elements
- Advanced Features
- Array Manipulation (Vectors and Arrays)
- Discrete Event Modeling Turning parts of a model on and off
- Controlling the time step in a model
- Performing iterative (looping) calculations
- Dynamic linking to spreadsheets
- Importing entries from a database
- Creating custom elements using scripts
- Dynamically linking to external models
- Building large and complex models
- Modeling scenarios
- Optimizing a model

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DISCRETE EVENT SIMULATION

- Basic concepts of discrete event modeling
- Discrete signal propagation between elements
- Understanding event triggering
- Specifying triggering events
- Specifying a precedence condition for a trigger
- Specifying a required condition for a trigger
- Specifying a resource interaction for a trigger
- Generating discrete event signals
- Timed event elements
- Triggered event elements.
- Decision elements
- Random choice elements
- Event delay elements
- Responding to events
- Discrete change elements
- Delaying a discrete change signal
- Use of divider elements to route discrete changes as a function of their value.
- State elements
- Milestone elements
- Activating a stochastic
- Interrupting a simulation
- Generating discrete changes using time series elements
- How GoldSim inserts events into a simulation
- Determining if an event has occurred
- Controlling the Event Calculation Sequence

OPERATION OF A MODEL

- Simulation settings
- Setting the basic time options
- Advanced time interval options
- Setting Monte Carlo options
- Defining and referencing global properties
- Viewing and editing model summary information
- Understanding and referencing run properties
- Run properties: Calendar time
- Run Properties: Elapsed Time
- Run Properties: Simulation

- Save outputs as results
- Specifying the results to be saved
- Highlighting the outputs to be saved
- Save a file with results
- Running and displaying the status of a simulation
- Understanding simulation modes
- Running a simulation (Run mode)
- Viewing results (Result mode)
- Creating, running and comparing scenarios
- Introduction to scenarios
- Creating and editing scenarios with the scenario manager
- Navigating and editing the active scenario
- Running scenarios and displaying scenario results
- Creating and editing scenarios in Dashboards
- Running an optimization
- Optimization overview
- Defining optimization settings

DISPLAYING RESULTS IN GOLDSIM

- Results display: an overview
- Understanding the result mode
- Viewing the "Last Value" results in the tooltips
- Viewing the four basic result types
- Using result display windows
- Creating and using result items
- Viewing scenario results
- Sorting and screening achievements
- Creating graph styles
- Viewing time history results
- Viewing the Properties of a Time History Result
- Viewing a time history chart
- Viewing a time history table
- Viewing multiple output time histories
- Viewing time histories for matrix outputs
- Viewing time histories for multiple achievements

- Displaying Results Based on Reporting Periods in Time History Results Elements
- Using result sorting and selection in time history results... 615
- Viewing submodel results in time history results elements
- Displaying Scenario Results in Time History Results Items
- Viewing unscheduled updates in time history result items Disabling a time history result item Controlling the graph style in time history results
- Viewing distribution results
- Viewing the properties of a distribution result
- Displaying a distribution summary
- Displaying a distribution chart
- Displaying a Distribution Table
- Displaying the Distribution Results Matrix
- Displaying Multiple Output Distributions
- Displaying Distribution Results for Single Realization Runs
- Using Result Sorting and Screening in Distribution Results
- Adding a Distribution Output to a Distribution Result
- Displaying scenario results in distribution result elements
- Controlling the chart style in distribution results.

CASES TO BE DEVELOPED (12 HOURS)

1. Dynamic simulation with Euler's method of water filling in a tank.
2. Mine water management using Goldsim®.
3. Wastewater treatment using Goldsim®.
4. Water balance in a lagoon
5. Reliability of a pumping station
6. Building a simple reservoir simulation
7. Modeling of sludge consolidation: a water balance approach.
8. Events and Hybrid Simulation in GoldSim®.
9. Aqueous precipitation time series
10. Design and construction of panels in GoldSim ®.
11. Leaching heap modeling
12. Representation of discrete changes in water management models.

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INSTRUCTOR

ENG. CARLOS DE LA TORRE

Eng. Chemist with more than 20 years of experience

Graduated from the Faculties of Chemistry and Chemical Engineering of the Catholic University and Engineering (Lima, Peru) respectively. Master in Chemistry (PUCP) and Master in Chemical Engineering (UNI) and currently pursuing doctoral studies in Chemical Engineering. He has also followed different courses that complement and update his theoretical and practical knowledge in the field.
Knowledge of digital electronics and computing. Extensive knowledge of Simulation Software: Super Prodesigner, Chemcad, Metsim, Modsim, AFT Phatom, Labview, Aspen Plus, Hisys, Mathlab, Simulink, Modsim, LIMM, JKSimmet, GoldSim; Application Software: Microsoft Office XP, Auto Cad, C Language, Visual Basic, Pascal, Corel, Flash, PhotoShop, etc.

Extensive experience as Leader of mining and industrial process design, having developed and directed designs in his specialty for projects executed by mining companies: Antamina, Buenaventura, El Brocal, Shougang, Hochschild Mining and Milpo among others. Experience in chemical instrumentation and project development. Chemical analyst with experience in industrial processes for the manufacture of lime, cement, bricks, mortars, concrete; as well as metallurgical processes in aspects relevant to process design, quality control, combustion, analysis of raw materials and mixtures. Working knowledge of project management under PMP (Project Management Professional), especially in mining and metallurgical projects.
Advanced knowledge of the English language and development of quality control programs in Visual Basic. Experience in implementation, expansion and optimization of chemical process plants as well as development of software simulations in several mining, lime, brick and portland cement companies.
Exclusive InterMet instructor

EDUCATION

PONTIFICAL CATHOLIC UNIVERSITY OF PERU-PUCP
Faculty of Science and Chemical Engineering

NATIONAL UNIVERSITY OF ENGINEERING-UNI
Faculty of Science -Chemistry

PONTIFICAL CATHOLIC UNIVERSITY OF PERU-PUCP
Master's Degree in Chemistry -Faculty of Science and Engineering

NATIONAL UNIVERSITY OF ENGINEERING-UNI
Master's Degree in Chemical Engineering-Faculty of Chemical Engineering-textiles

SAN MARCOS NATIONAL UNIVERSITY
Degree in Chemistry

NATIONAL UNIVERSITY OF SAN MARCOS
D. in Chemical Engineering-Faculty of Chemical Eng.

NATIONAL UNIVERSITY OF CALLAO -UNAC
Master's Degree in Chemical Engineering - Faculty of Chemical Engineering

NATIONAL UNIVERSITY OF CALLAO -UNAC
Master in Automation and Control -Facultad de Ing. Electrónica

NATIONAL UNIVERSITY OF SAN MARCOS
Master in Computational Fluid Mechanics - Faculty of Physics

COSAPISOFT
Project Management Program (PMP) auditor BUREAU VERITAS ISO 9001 auditor

PERUVIAN INSTITUTE OF NUCLEAR ENERGY
Certified X-Ray Diffraction Equipment Operator" (Individual License 232/99).

PROFESSIONAL EXPERIENCE

INTERNATIONAL METALLURGICAL CONSULTANTS (InterMet)

July 2016 - Currently
Exclusive instructor of courses and diplomas for professionals and companies in Peru and America.

IAMEC FOSTER WEELER -WOOD
Senior Process Engineer
Mining Division
April 2018 to November 2019

HLC ENGINEERING AND CONSTRUCTION
Senior Design Engineer
Engineering Division
July 2017 to March 2018

BUENAVENTURA INGENIEROS S.A.- BISA
Process Design Manager 2008 – 2009

CALCAREOUS PRODUCTS MINING COMPANY S.A.C.
Head of Furnaces and Quality Control Laboratory Head of Process Design
2007 – 2008

CEMENT CALIZA S.A.
Quality Control Manager 2006 -2007

MINING COMPANY LUREN S.A.
Process Design Engineer Lead Process Design Engineer
Head of Furnaces and Quality Control Laboratory 2002 – 2005

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INVESTMENT:
USD 500

- Bank transfers (commissions are not included)
- Payment link
- Western Union (request data)
- Money Gram ((request data)

Bank transfers

- **Deposit at Bank:**
  BANCO DE CRÉDITO DEL PERU
- **Beneficiary:**
  INTERNATIONAL METALLURGICAL CONSULTANTS S.A.C.
- **Account Number in Dollars :**
  193-1872625-1-12
- **SWIFT code :**
  BCPLPEPL
- **Inter- bankcode:**
  00219300187262511219
- **Bank Address :**
  Jr. Lampa 499. Lima , Peru

Payment link: https://pagolink.niubiz.com.pe/pagoseguro/INTERMET/1975194/info

Email:
informes@encuentrometalurgia.com
luciana.riva@encuentrometalurgia.com

Phone:
+ 51 989 975 959
+ 51 960 995 971
(01) 489 3145

WhatsApp:
wa.me/51989975959
wa.me/51960995971