

Chance-Informed Decisions

with Stochastic Data and AI

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National security decisions involve significant uncertainties. Averages mask chances, leading to the Flaw of Averages. AI and Stochastic data quantify uncertainty and enable chance-informed decisions.

This MORs Probability Management Community of Practice sponsored course is a virtual 10 hour CEU course that will be offered in three days.

This course is built around class projects by individuals or groups of two, ideally based on actual work decisions involving uncertainties. Students will learn how to explicitly address chance using stochastic data and AI. Participants are encouraged to submit simplified examples from the workplace in advance.

Each project will address:

- Basic Principles
- Analytical Methodologies
- Stochastic Data for Representing Uncertainty
- Cross-Platform Interoperability
- Interactive Applications to Communicate Experiential Understanding

AI will be applied at multiple levels.

1. Principles (how uncertainty behaves)

- The Flaw of Averages
- Five Mindles
- Why expected values mislead
- Chance vs. average thinking
- Uncertainty as a data type

2. Methodologies (decision methods)

- Decision analysis
- Threshold decisions
- Nonlinear systems
- Portfolio/diversification effects
- Risk-informed optimization
- Monte Carlo and stochastic simulation

3. Stochastic Data

- CSV limitations
- Open SIPmath 2 Excel files with Metadata

- Open SIPmath 3
 - Metalogs
 - HDR
 - Coherence
 - Copula Layer
 - Factor Models
- AI in SIP Library Creation

4. **Platforms**

- Excel
- Python
- JavaScript
- AI systems

5. **Applications**

- Application Areas
 - Budgeting
 - Scheduling
 - Cyber
 - Logistics
 - Reliability
 - Military planning
 - Finance
- AI to Generate Applications

6. **Group Project teamwork**

- Group project work and instructor guidance (course time each day)
- Group project presentations (last day)

7. **Course Evaluation**

- Students will complete course evaluation and share key takeaways

Data Standards: The most common formats for stochastic data are CSV, and the open SIPmath standards, which are all compatible with all existing government systems.

Course Software: ChanceCalc is used in this course for the following reasons:

1. It is free and Open-source
2. It is Excel add-in and runs on Mac and PC
3. Interactive, ChanceCalc models run thousands of trials per keystroke as opposed to requiring a Run command.
4. Models built with ChanceCalc are pure Excel without macros and can be run as a Dashboard without the add-ins installed.
5. ChatGPT can write code to convert such applications to Python or web application.