

Variability and Uncertainty

- Variability: "temporal, spatial, or inter-individual differences in the value of an input" (Cullen and Fry) Inherent in the system being studied.
- Uncertainty: incomplete knowledge; ignorance. A property of the relationship between the system and the analyst.

Types of uncertainty

- Model uncertainty (including extrapolation)
- Input uncertainty (quantity never measured, measure is imprecise, measuring method is biased, different observers disagree)
- Uncertainty about variability (e.g., the distribution of height in the population being studied is unknown)

Examples of variability

- Height, weight (inter-individual)
- Temperature, concentration (temporal, spatial)
- Amount of food ingested, breathing rate (inter-individual)

Modeling Variability and Uncertainty

- Frequentist (empirical) probability distributions describe variability
- Subjective probability may be used to describe uncertainty