Honours in Statistics

- Statistics is fundamentally about signal-noise separation: distinguishing meaningful patterns from random variation, confounding factors, and measurement error

- This core skill enables both understanding (explaining past phenomena through causal inference, regression and hypothesis testing) and foresight (making reliable predictions about future or unobserved outcomes)

- Should I choose Data Science or Statistics?

    - Statistics… 🤓

    - Data science is primarily about the "how" - developing computational methods to extract information from complex, large-scale data

    - Statistics is fundamentally about the "why" and "should we believe it" - providing the theoretical framework to assess reliability, causation, and the strength of evidence

    - Look at the lists of courses and projects (a fair amount of overlap)

- Under the umbrella of signal-to-noise separation stats spans a wide range of subjects from applied through computational to theoretical;

    - accordingly, our mandatory core includes one course in theory (Probability and Mathematical Statistics or Probability and Martingale Theory) and one in more applied area (Statistical Consulting or Advanced Statistical Modelling)

- Try to find a project or more generally a direction that feels right for you from:

    - Statistical Bioinformatics

        - Shila Ghazanfar: Assessing continuous changes in correlation structure for replicated single cell data

        - Ellis Patrick: Data-driven decision making for precision medicine

        - Jean Yang: Methods towards precision medicine

        - Pengyi Yang: Developing deep-learning based methods for integrative analysis of single-cell and spatial omics data

- Areas and projects (continued)
    - Time series
        - Jennifer Chan: Modelling covariance matrix time series using Wishart distribution
        - Shelton Peiris: Vector Autoregressive Fractionally Integrated Moving Average (VARFIMA) Processes and Applications
    - Statistical learning
        - Tiangang Cui: Motion tracking and uncertainty estimation during radiotherapy via Rosenblatt transports (with Nicholas Hindley)
        - Rachel Wang: Mini-batch Gibbs sampling for large-scale inference
- Bayesian analysis
    - Clara Grazian: Approximate Bayesian Computation via composite likelihood
    - John Ormerod: Bayesian Moment Propagation

- Areas and projects (continued…)
  - Mathematical statistics
    - Michael Stewart: Mixture model selection near the boundary
    - Qiying Wang: Threshold effects in nonlinear cointegrating regression
  - Other projects in statistics
    - Uri Keich: Competition-based approach to False Discovery Rate (FDR) control
    - Linh Nghiem: Sparse sufficient dimension reduction via distance covariance (with Andi Han)
    - Garth Tarr : Stable feature selection in high dimensional models