# DATA ANALYSIS: STATISTICS

# DESIGNING CLINICAL RESEARCH AND BIOSTATISTICS

**DATES**

Wednesday, 16 October 2019 and Thursday, 17 October 2019, 9am - 5pm

**VENUE**

Evenlode Room, IT Services, 13 Banbury Road, Oxford

**COURSE OBJECTIVES**

1. Develop core statistical skills for interpreting clinical and epidemiological data
2. Provide knowledge of statistical methods and study design used in medical research
3. Enable participants to develop the skills needed to analyse data for their own research projects

**AUDIENCE**

No prior statistical knowledge is assumed for this course. The course is designed for anyone who requires a basic understanding of clinical research and data analysis. It will enable non-statisticians to interpret medical research and undertake their own research studies.

**COURSE DIRECTORS**

Daniel Prieto-Alhambra

Maria Sanchez

**COURSE ADMINISTRATOR**

Paloma O'Dogherty Cordero (paloma.odogherty@ndorms.ox.ac.uk)

**SPEAKERS**

David Culliford (University of Southampton)

Maria Sanchez (University of Oxford)

Danielle Robinson (University of Oxford)

Samuel Hawley (University of Oxford)

Anjali Shah (University of Oxford)


**COURSE FEES***

NDORMS staff/students: free (please contact the course administrator)

Other University of Oxford staff: £140 (please follow [this link](#))

Other University of Oxford students: £70 (please follow [this link](#))

Other (NHS/Other Universities/alumni): £210 (please contact the course administrator)

Other (private): £420 (please contact the course administrator)

Other (commercial): £630 (please contact the course administrator)


*Meals and accommodation not included.*

# AGENDA

**Day 1**

| Time | Session | Content | Lead Tutor |
|---|---|---|---|
| **09.00-09.15** | **Registration** | | |
| 09.15-09.45 | Talk 1:<br><br>Research Question | • Course aims<br>• Defining the research question | Maria Sanchez |
| 09.45-10.45 | Talk 2:<br><br>Study Design | • Types of study design<br>• Strengths and limitations<br>• Assessing causality | Samuel Hawley |
| 10.45-11.00 | Talk 3:<br><br>Introduction to Statistical Software Packages | • SPSS<br>• Stata<br>• R | Samuel Hawley |
| **11.00-11.15** | **Coffee** | | |
| 11.15-11.30 | Talk 4:<br>Looking At Data | • Describing and displaying<br>• Checking and cleaning | Danielle Robinson |
| 11.30-12.00 | Practical 4 | • Describing the data<br>• Importing and Exporting Data | |
| 12.00-12.45 | Talk 5:<br><br>Reproducibility | • Coefficient of variation<br>• Bland Altman Plot<br>• Intra-class Correlation Coefficient<br>• Kappa | Danielle Robinson |
| **12.45-13.30** | **Lunch** | | |
| 13.30-14:00 | Practical 5 | • Reproducibility tests | |
| 14:00-14.45 | Talk 6:<br><br>Statistical distributions | • Introduction to distributions<br>• Normal, skewed, Poisson<br>• Kernel density plots<br>• Q-Q plots<br>• Test for normality (K-S test) | David Culliford |
| **14.45 – 15:00** | **Coffee** | | |
| 15:00-15:45 | Practical 6 | • Statistical distributions | |
| 15.45-16.15 | Talk 7:<br><br>Sample Sizes | • Sample size calculation | David Culliford |
| 16:15-17:00 | Practical 7 | • Sample size estimation | |

**Day 2**

| Time | Session | Content | Lead Tutor |
|---|---|---|---|
| 09.15-09.45 | Recap | • Q&A session | David Culliford |
| 09:45-10:30 | Talk 8:<br><br>Statistical tests | • Introduction to tests<br>• Standard Error<br>• p values and Confidence intervals<br>• t-test<br>• ANOVA (one way)<br>• chi squared test | David Culliford |
| 10.30-11.00 | Practical 8 | • Statistical tests | |
| **11.00-11.15** | **Coffee** | | |
| 11:15-11:30 | Talk 9:<br><br>Transformations | • Assumptions of tests<br>• Transforming data | Anjali Shah |
| 11:30-12:00 | Talk 10:<br><br>Regression | • Linear Regression<br>• Logistic regression | Anjali Shah |
| 12:00-12:45 | Practical 9/10 | • Transformations and regression | |
| **12.45-13.:30** | **Lunch** | | |
| 13.30-13.45 | Talk 11:<br><br>Interactions | • Recap of confounding<br>• What are interactions? | Anjali Shah |
| 13.45-14.00 | Practical 11 | • Interactions and confounding | |
| 14.00-14.15 | Talk 12:<br><br>Diagnostics | • Linearity<br>• Normality<br>• Outliers<br>• Heteroskedasticity<br>• Recap | Maria Sanchez |
| **14.15-14.30** | **Coffee** | | |
| 14.30-17.00 | Practical 12 | • Strategies of Analysis | |