



SEVENTH FRAMEWORK PROGRAMME OF THE EUROPEAN UNION  
Support for training and career development of researchers (MARIE CURIE)  
Networks for Initial Training (ITN)  
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**INNHF**

*Innovation through human factors  
in risk analysis and management*

## **SHORT COURSE ON QUANTITATIVE METHODS IN PROBABILITY, STATISTICS AND RISK**

Trinity College Dublin  
15th – 19th July 2013

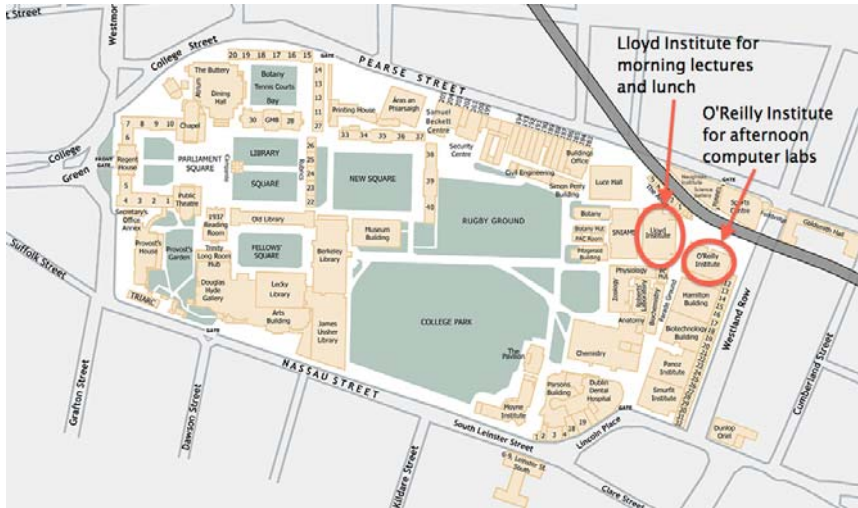
## Outline and Schedule

### Location

Morning lectures will take place in Room 120 of the Lloyd Institute.

Lunch will take place in the School of Computer Science and Statistics' Common Room, ground floor of the Lloyd Institute.

Afternoon computer labs will take place in Room LG.12 of the O'Reilly Institute.



### Lecturers

Professor Simon Wilson	<a href="mailto:simon.wilson@tcd.ie">simon.wilson@tcd.ie</a>
Professor Brett Houlding	<a href="mailto:brett.houlding@tcd.ie">brett.houlding@tcd.ie</a>
Dr. Louis Aslett	<a href="mailto:louis@maths.tcd.ie">louis@maths.tcd.ie</a>

### Reading

- Ross, S. *Introduction to probability models*, 10th edition. Academic Press.
- Grimmett, G. and Welsh, D. *Probability: an introduction*. Oxford Science Publications.
- Barlow, R. and Proschan, F. *Statistical theory of reliability and life testing*. To Begin With.
- Crowder, M., Kimber, A., Sweeting, T. and Smith, R. *Statistical analysis of reliability data*. Chapman & Hall.
- Bishop, C. *Pattern Recognition and Machine Learning*. Springer.
- Chatfield, C. and Collins, A. *Introduction to Multivariate Analysis*. Chapman & Hall.

## Schedule and syllabus

This is an ambitious schedule, particularly for the morning lectures. However it is more important that we go through this material at the right pace, rather than at the pace that allows us to complete all of the syllabus. I would prefer that we complete half of this syllabus and you understand it than complete all of it but you are left confused.

### *Monday 15th July*

10:00 - 13:00 (Simon Wilson)

Probability: recap of prerequisites, conditional probabilities and independence, multivariate distributions, covariance and correlation, law of large numbers, central limit theorem, extreme values.

13:00 - 14:00 Lunch

14:00 - 16:00 (Louis Aslett)

Introduction to R: what is R, the basics, Monte Carlo simulation.

### *Tuesday 16th July*

10:00 - 13:00 (Simon Wilson)

Statistical methods: what is statistical learning, estimation (MLE, confidence intervals), bootstrap; hypothesis tests; Bayesian methods.

13:00 - 14:00 Lunch

14:00 - 16:00 (Louis Aslett)

R tutorial: loading and formatting data; estimation and hypothesis tests in R.

### *Wednesday 17th July*

10:00 - 13:00 (Simon Wilson)

Statistical reliability: components and systems; the failure rate; non-parametric estimates (Kaplan-Meier).

13:00 - 14:00 Lunch

14:00 - 15:00 (Simon Wilson)

Simple linear regression.

### *Thursday 18th July*

10:00 - 13:00 (Simon Wilson)

Belief networks.

13:00 - 14:00 Lunch

14:00 - 16:00 (Louis Aslett)

Online tutorial on Hugin (belief network software).

### *Friday 19th July*

10:00 - 13:00 (Brett Houlding)

Multivariate statistical methods: multivariate linear regression, factor analysis.

13:00 - 14:00 Lunch

14:00 - 16:00 (Louis Aslett)

R tutorial: linear regression and factor analysis in R/