

Probability and Statistics

Kristel Van Steen, PhD²

Montefiore Institute - Systems and Modeling

GIGA - Bioinformatics

ULg

kristel.vansteen@ulg.ac.be

INTRODUCTION

Course contents

- CH1: Probability theory
- CH2: Random variables
- CH3: Parametric families of univariate distributions
- CH4: Distributions in the presence of multi-dimensionality and functions of random variables
- CH5: Sampling to approximate the true world
- CH6: A gentle introduction to everyday statistics
- CH7: Introduction to statistical inference
- CH8: Relationships

Course objective

- To understand present-day applications of Probability and Statistics.
- To provide pointers to more advanced literature so as to be able to find material to deal with more sophisticated problems

Workshops

- As the instructors are shared with the Calculus professor, practical sessions are given before the theory sessions :
 - Recapitulation of previous class – hence, this is your chance to ask for clarifications!
 - Exercises about last week's course chapters

Organization

- 15h of Theory lessons by the Professor (in English) +
- 15h of Practical works by Instructors (in French) in smaller groups for better follow-up
- Contact addresses:
 - Theory: Prof Dr Dr K Van Steen
 - kristel.vansteen@ulg.ac.be
 - www.montefiore.ulg.ac.be/~kvansteen
 - Practicals + Theory:
 - Mr Darmont (Marcel): Marcel.Darmont@ulg.ac.be
 - Mrs Huaux (Hélène):
H.Huaux@ulg.ac.be
 - Mr Lousberg (Pierre):
plousberg@ulg.ac.be

Partition of the workshop groups

3^{ème} B. Ing Cvl [A → G]

Mr Darmont

R52(B4 - Europe)

3^{ème} B. Ing Cvl [H → R]

Mr Lousberg

R53(B4 - Europe)

3^{ème} B. Ing Cvl [S → Z]

3^{ème} B. Ing Archi.

2^{ème} B. en Sc. Info.

Mme Huaux

R54(B4 - Europe)

le 16/11 : S74 (B4)

Organization

PROB and STATS					
	Theory			# slides (*)	
Tu 21/09	2hrs	intro + CH1	CH1	92	Probability theory
Tu 28/09	2hrs	CH2 + CH3	CH2	90	Random variables
Tu 05/10	2hrs	CH3 + CH4	CH3	127	Parametric families of univariate distributions
Tu 12/10			CH4	151	Distributions in the presence of multi-dimensionality and functions of random variables
Tu 19/10	2hrs	CH5	CH5	119	Sampling to approximate the true world
Tu 26/10	2hrs	CH6	CH6	145	A gentle introduction to everyday statistics
Tu 02/11			CH7	280	Introduction to statistical inference
Tu 09/11	2hrs	CH7	CH8	175	Relationships
Tu 16/11	2hrs	CH8			
Tu 23/11					
Tu 30/11					

- The slides are comprehensive and provide sufficient background info
- Some of the course notes are part of self-study time: ask questions during workshops as well!
- Practicals start on Tu 28 September
- Ch8 exercises + course: 16 or 17 December?

Course website

(www.montefiore.ulg.ac.be/~kvansteen)



Kristel Van Steen, PhD²

Home
List of Publications
Curriculum Vitae Short
Curriculum Vitae Long
NEW: [Consultancy Charter](#)

Links to affiliations

- [ULg homepage](#)
- [Institut Montefiore](#)
- [Center for Medical Genetics Ghent \(at UG\)](#)
- [Center for Statistics \(at UHasselt\)](#)
- [Center for Human Genetics \(at K.U.Leuven\)](#)
- [Global Allergy and Asthma European Network](#)

Teaching 2010-2011

- [MATH0008-2: Introduction to Probability and Statistics](#)
- [GBIO0009-1: Bioinformatique](#)

Teaching 2009-2010

- [GBIO0001-1: Introduction to Biomedical Engineering](#)
- [GBIO0015-1: Genetic Epidemiology for Engineering / Stats](#)

Contact Information

Dépt / Unité : Dép. d'électric., électron. et informat. (Inst.Montefiore) / Bioinformatique

Mail Adresse : BAT. B28 Bioinformatique
Grande Traverse, 10
4000 Liège 1
Belgium

Office: 0.15 (BAT 37)
Tel: +32 4 366 2692

Email : Kristel.VanSteen@ulg.ac.be

Research Interests

Statistical Genetics

- Components analysis
- FBAT testing
- Gene-environment interactions
- Gene-gene interactions and interaction graphs
- Genetic heterogeneity
- Genetic imprinting
- Genome-wide association analysis
- Kinship and genomic background
- Multifactor dimensionality reduction strategies
- Multi-locus or combined group approaches
- Noisy or erroneous data handling
- Omics integrated analysis
- Phenocopies
- Population stratification



Course website

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Introduction to Probability and Statistics 2010-2011 (Preliminary Version - Check for Final Version)

MATH0008-2: Introduction to Probability and Statistics

SOME PRACTICAL ARRANGEMENTS:

- When are the classes given?
 - [Complete Course Schedule \(Updated\)](#)
- Where do the classes take place?
 - Theory: B7b - Room 142
- How can I pass the exam?
 - More information? [Click here](#)
- What if I have questions?
 - Consult Kristel Van Steen (kristel.vansteen@ulg.ac.be) for any questions about theory or homeworks, preferably on
 - Tuesdays before/after class
 - Wednesdays or Fridays (check availability)

CLASS MATERIAL (use [7-Zip](#) to unpack zipped files):

- Preview on the course notes chapters (versions in progress) :
 - [Chapter 1](#)
 - [Chapter 2](#)
 - [Chapter 3](#)
 - [Chapter 4](#)
 - [Chapter 5](#)
 - [Chapter 6](#)
 - [Chapter 7](#)
 - [Chapter 8](#)
 - [Corresponding reference list for chapters - to be completed](#)

First class: 21 September 2010 ;
10h30-12h30

- [Introductory Notes](#)
- Course notes: [Chapter 1](#)
 - Downloading instructions R and Bioconductor: [Follow this link](#)
 - Information on using R:
 - [Part 1: R manuals](#)
 - [Part 2: R in C++/C/Java/...](#)

Written notes

- Slides in English = course notes, exercise book in French
- Reference books and publications - Recommended:

- **In English:**

"Probability and Statistical Inference - 8th edition",

Hogg R.V., Tanis E.A. Pearson Education International, Prentice Hall 2010.

ISBN : 10:0-321-63635-X

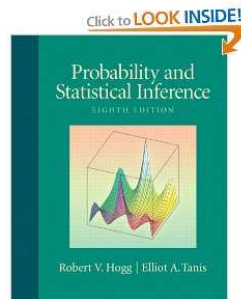
- **In French:**

"Probabilités analyse des données et statistique - 2e

édition révisée et augmentée", Saporta G., Editions

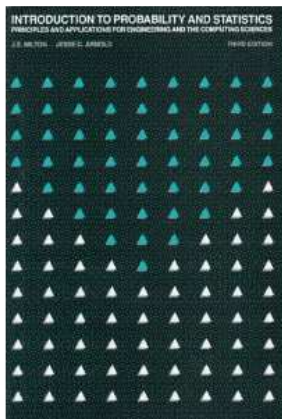
TECHNIP 2006, Paris, France

ISBN : 978-2-7108-0814-5

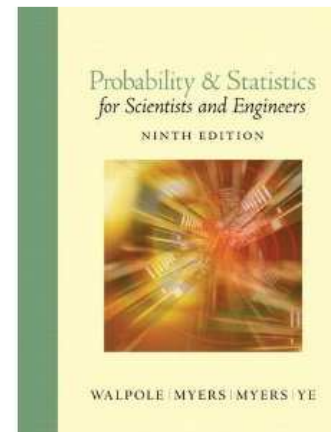


- Other references:

"Introduction to Probability and Statistics. Principles and Applications For Engineering and the Computing Sciences - Third Edition", Milton J.S.; Arnold Jesse C.
McGraw-Hill Inc., 1998.
ISBN : 0-07-113535-9

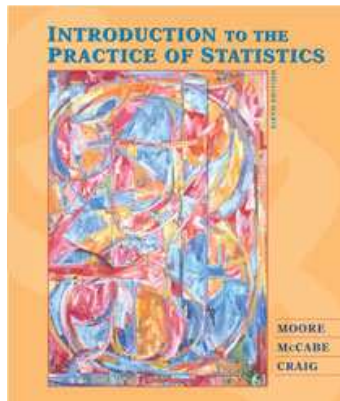


"Probability and Statistics for Engineers and Scientists - 6th Edition", Ronald E. Walpole; Raymond H. Meyers; Sharon L. Meyers; Keying Ye; Prentice Hall, 1998.
ISBN : 0-13-840208-6.



“Introduction to the practice of statistics – 6th edition”, David S. Moore; George P. McCabe; Bruce Craig; W.H. Freeman 2009.

ISBN : 1-4292-1622-0



“Introduction to the theory of statistics – 3rd edition”, Alexander M Mood; Franklin A Graybill; and Duane C Boes, McGraw-Hill series in probability and statistics 1974.

ISBN : 0-07-042864-6



Assessment

- June:
 - Open book written exam
 - Involves solving several exercises based on the theory and practical classes
 - Total score: 20

- August:
 - Closed book oral
 - Involves explaining several important concepts, while completing your story by making references to as many course note sections that are applicable
 - Total score: 20

Assessment

- Note:
 - From next year onwards, also the workshop part will be re-organized, and hence the exam system will change
 - e.g.,
 - June: open book multiple choice questions with some exercises/
 - August: open book oral examination)

UNLESS you would like to have this system already implemented from this year onwards ...

Questions?