Master Program in Data Science and Analytics

Department of Statistics
Lund University School of Economics and
Management

August 27, 2018

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Motto

In God we trust, all others bring data

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In God we trust, all others bring data

attributed to

William Edwards Deming∗ **(1900-1993)**

∗American statistician, known, in particular, for promotion
statistical methods in industrial production
and management

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Why Data Science and Analytics?

- artificial intelligence,
- data analytics,
- data science,
- cognitive computing,
- Big Data,
- machine learning,
- deep learning,

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Why Data Science and Analytics?

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Why not Master Program in Statistics?

- number crunching,
- estimators,
- hypothesis testing,
- consistency and asymptotic normality,
- generalized linear models,
- nonparametric statistics,

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Why not Master Program in Statistics?

To be in a good company

MSc in Data Sciences and Business Analytics with ESSEC Business School, Paris, France

- **Big data analytics:**
  This course will develop your analytical problem-solving skills and present you with the statistical methods needed to analyze and leverage multidimensional data.

- **Continuous & Discrete Optimization:**
  Programming exercises are covered in this course as well as the basic theory and methods for the solution of optimization problems, and linear and non-linear programming.

- **Forecasting & Predictive Analytics:**
  This course develops your judgment and critical sense in order to be able to produce and evaluate operational forecasts, and understand how it all can go wrong.

- **Big Data Algorithms, Techniques & Platforms:**
  This course will teach you all about big data management - algorithms, techniques and tools needed to support big data processing.

- **Strategic Business Analytics:**
  This course will teach you to design, assess and manage business strategies and how to use quantitative techniques in a strategic consulting approach through real life case studies.

- **Machine learning:**
  This course will give the opportunity to apply the course theory to real-world problems through group lab projects with a particular focus on statistical risk and its minimization with respect to prediction function.

To be in a good company

MSc in Data Science, Graduate School of Economics, Barcelona, Spain

- Statistics and Machine Learning
- Optimization and Operational Research
- Data Warehousing, Business Intelligence, and Big Data Analytics
- Economics, Finance, and Policy-Making

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To be in a good company

MSc Data Science the London School of Economics and Political Science, UK

○ **Computer Programming:**
Introduces students to the fundamentals of computer programming as students design, write, and debug computer programs using the programming language Python. The course will also cover the foundations of computer languages, algorithms, functions, variables, object-orientation, scoping, and assignment.

○ **Managing and Visualising Data:**
Focuses on data structures and databases, covering methods for storing and structuring data, relational and non-relational databases and query languages. The second part focuses on visualising data, including best practices for visualising univariate, bivariate, graph and other types of data as well as visualising various statistics for predictive analytics and other tasks.

○ **Data Analysis and Statistical Methods:**
This course will provide an introduction to methods of statistics and data analysis. The statistical software R will constitute an integral part of the course, providing hands-on experience of data analysis.

○ **Machine Learning and Data Mining:**
Begins with the classical statistical methodology of linear regression and then build on this framework to provide an introduction to machine learning and data mining methods from a statistical perspective This course will give the opportunity to apply the course theory to real-world problems through group lab projects with a particular focus on statistical risk and its minimization with respect to prediction function.

To be in a good company

The Master of Science in Analytics, the University of Chicago, Graham School

- Statistical Analysis
- Leadership Skills: Teams, Strategies, and Communications
- Linear and Nonlinear Models for Business Applications
- Data Mining Principles
- Time Series Analysis and Forecasting
- Machine Learning and Predictive Analytics
- Data Engineering Platforms for Analytics
- Big Data Platforms

To be in a good company

The Master of Business Analytics, the MIT Sloan School of Management, Boston, Massachusetts

- The Analytics Edge
- Applied Probability and Stochastic Models
- Analytics Capstone
- Optimization Methods
- Analytics Lab
- Machine Learning
- Data Engineering Platforms for Analytics
- From Analytics to Action

Or in a bad company

Or in a bad company

VIEW ALL MSC PROGRAMS IN STATISTICS IN RUSSIA 2018

An MSc, or Master of Science, is an academic distinction bestowed upon those who effectively complete a predetermined set of coursework in what is often a science-based discipline. The MSc often enhances career opportunities as well as earning potential.

The MSc in Statistics allows students to learn about the statistics applicable to the social sciences, econometrics and finance. The program prepares students for careers in industries that demand statistical skills.

Russia (Russian: Россия) is by far the largest country in the world, covering more than one-eighth of the Earth's inhabited land area. The former State Committee for Higher Education in Russia financed 240 universities, academies and institutes, making Russia a solid country to study in.

Top Masters of Science in Statistics in Russia 2018

1 Results in Statistics, Russia

Other options within this field of study

Degrees

All (3)

Master Degrees (2)

Masters of Science (1)

Location

✕ Russia

Select State ▾

Select City ▾

Study type

☑ All
☐ Campus

Pace

Programs | 🟦 Read more about studying in Russia | Bachelors ☑

MSc / Statistics

Master in Applied Statistics with Network Analysis
HIGHER SCHOOL OF ECONOMICS

Campus | Full time | 2 years | September 2018 | Russia | Moscow

The Master of Applied Statistics with Network Analysis is implemented by the NRU HSE International Laboratory for Applied Network Research. The Academic Supervisor of the program is Stanley Wasserman, PhD (Harvard University), a professor at Indiana University, who is also the Academic Supervisor of the Lab. He is one of the leading figures of Social Network Analysis and has launched a similar educational program on statistics and network analysis in Indiana University and the University of Illinois. [+]

Read More

Various shades of data science

- There are different angles at which one can look at the data science.

- Two are dominant: engineering (AI) and statistical (Data Mining).

- Harvard – non-engineering

- Harvard-engineering

- MIT-business

- MIT-professional

- MIT-engineering

- MIT-online

Lund University

Lund University

has no dedicated program do data science

- There are elements of data science for engineering applications at LTH.
- There are no data science program from the statistical perspective except courses run in our department.

Our proposal

Department of Statistics, LUSEM

Master Program in Data Science and Analytics

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Premises:

○ A **Degree of Master** is awarded after gaining **60 credits**.

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- Stresses modern **algorithmic methods in statistical framework**, the interpretation of results from empirical 'big data' studies.
- Careers in any professional environment to face challenges of **analyzing, interpreting and organizing vast information** collected by means of modern technologies, including research institutes, universities, government agencies, private industries and businesses.

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- The formal coursework consists of **30 credit hours in required courses** and **15 credit hours in elective courses** in the area of broadly understood as data science.
- These additional courses can be taken from the **list of elective courses** or, in exceptional cases, from other master level courses approved by academic advisor.

List of courses – Core courses

Suggested course code for the program **DSC xx**

- DSC 21 Computational Analytics (7.5 credits)
- DSC 22 Big Data Mining and Visualization (7.5 credits)
- DSC 23 Machine Learning (7.5 credits)
- DSC 24 Artificial Intelligence for Data Science (7.5 credits)
- DSC 25 Deep Learning Methods (5 credits)

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List of elective courses

- DSC 31 Advanced Database Systems (5 credits)
- DSC 32 Analytics for Finance and Investment (7.5 credits)
- DSC 33 Multivariate and high dimensional analysis (7.5 credits)
- DSC 34 Bayesian Computing (7.5 credits)
- DSC 35 Applied Functional Data Analysis (7.5 credits)

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Schedule of courses

DSC 21 Comput. (7.5HP)	DSC 23 Mach. L. (7.5HP)	DSC 25 Deep L. (5HP)	DSC 40 Dissertation (10HP)
DSC 22 Big Data (7.5HP)	DSC 24 AI (7.5HP)	DSC 40 Dissertation (5HP)	DSC 35 FDA (7.5HP)
DSC 31 - Database (5HP)	DSC 32 Finance (7.5HP)	DSC 34 Bayes C. (7.5HP)	
	DSC 33 Multivar. (7.5HP)		

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Suggested admission requirements

- A suitable **Bachelor's degree** from an accredited institution of at least 180 credits or a corresponding qualification from abroad.

- The minimal **mathematics background** consists of equivalent to:
  - an undergraduate course in **calculus**
  - a course in linear algebra that covers **matrix theory**
  - an undergraduate level course in **probability or statistics**.
  - evidence of **computing competence** that is equivalent to an undergraduate course on numerical computing or programming in modern software packages that introduces to algorithmic problem solving.

- Prospective applicants who do not have this background must acquire it prior to commencing the program with these showing greater promise granted **conditional admission**.

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Course development

For the course development, there is a need to use existing courses at our Department and across the university. Here is (overoptimistic) account of the current stage

Required Courses

Course Number	Title	C.H.	Existing Course	Comment
DSC 21	Computational Analytics	7.5	Yes	Offered
DSC 22	Big Data Mining and Visualization	7.5	Yes/No	To be modified
DSC 23	Machine Learning	7.5	Yes/No	To be modified
DSC 24	Artificial Intelligence for Data Science	7.5	No	At LTH
DSC 25	Deep learning methods	5	No	At LTH

Elective Courses

Course Number	Title	C.H.	Existing Course	Comment
DSC 31	Advanced Database Systems	5	Yes	Informatics
DSC 32	Data Analytics for Finance and Investment	7.5	Yes	Offered
DSC 33	Multivariate and High Dimensional Analysis	7.5	Yes	Offered
DSC 34	Bayesian Computing	7.5	Yes	Offered
DSC 35	Applied Functional Data Analysis	7.5	Yes	Offered

Where are we now?

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- The process involves writing the proposal meeting strict the LUSEM guidelines.
- The proposal will be reviewed by a panel involving external evaluators, who have to be proposed and approved.
- After the recommendations from the panel and from the school, the proposal needs to be approved at the university level.

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What do we hope for?

- Our resources are limited and using them will result in a very patched program, to say, at least.
- Some resources from the school, the university, or even external support may help and has not been ruled out.
- The program could increase our role within LUSEM.

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What will happen now?

- We will actively collaborate with **Kristina Eneroth** on the proposal.
- Seeking the resources to support the project - **WASP–initiative**
- In the coming weeks some meetings to explore collaboration with informatics department on big data analysis/databases course:
  - **Heddy Bellout** will present his account of the courses he took on the effective handling statistical analyses of massive data
  - Discussion with **Björn Svensson**, informatics department of some joint collaboration along INFC20, Advanced Database Systems
- Hoping for inspiration from other centers:
  - draw on expertise of our new visiting professor **Małgorzata Bogdan**, the University of Wrocław, Poland,
  - getting an insight to a success from our friend and visiting professor **Marie Kratz**, ESSEC Business School, Paris, France,
  - visit at the University of Warsaw, where a highly **popular program in data science** has been recently launched,

> We are drowning in information and starving for knowledge
>
> **Rutherford D. Roger**

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Thank you!