University of Cyprus
MSc in Data Science

>>>**Master**
... in Data Science

Shape the future in our ever-changing,
data-driven world.

Data Science - a big buzzword

- *"The sexiest job of the 21st century"*

  Harvard Business Review

- *"Tell your kids to be Data Scientists, not Doctors"*

  Wired

Data Science - a big buzzword

University of Cyprus
MSc in Data Science

Glassdoor Economic Research, 50 Best Jobs in America 2019 Report

	Job Title	Median Base Salary	Job Satisfaction	Job Openings
#1	Data Scientist	$108,000	4.3/5	6,510
#2	Nursing Manager	$83,000	4/5	13,931
#3	Marketing Manager	$82,000	4.2/5	7,395
#4	Occupational Therapist	$74,000	4/5	17,701
#5	Product Manager	$115,000	3.8/5	11,884

Data Science - a big buzzword

Glassdoor Economic Research, 50 Best Jobs in America 2020 Report

	Job Title	Median Base Salary	Job Satisfaction	Job Openings
#1	Front End Engineer	$105,240	3.9/5	13,122
#2	Java Developer	$83,589	3.9/5	16,136
#3	Data Scientist	$107,801	4.0/5	6,542
#4	Product Manager	$117,713	3.8/5	12,173
#5	DevOps Engineer	$107,310	3.9/5	6,603

Data Science - a big buzzword

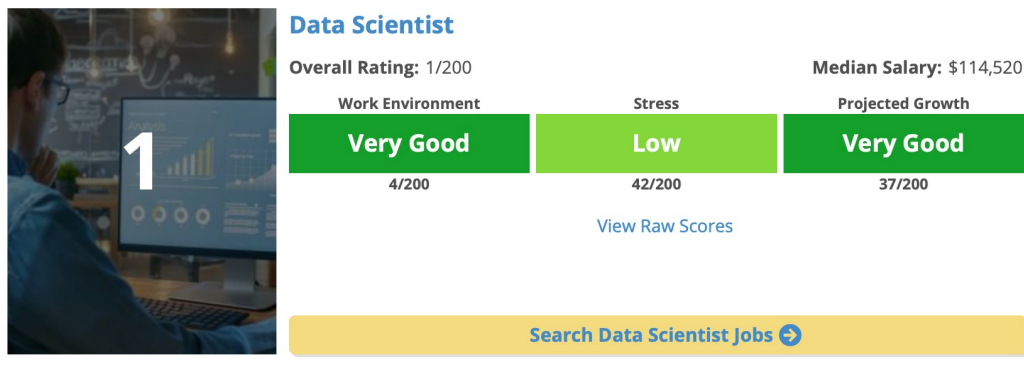## Glassdoor Economic Research, 50 Best Jobs in America 2021 Report

	Job Title	Median Base Salary	Job Satisfaction	Job Openings
#1	Java Developer	$90,830	4.2/5	10,103
#2	Data Scientist	$113,736	4.1/5	5,971
#3	Product Manager	$121,107	3.9/5	14,515
#4	Enterprise Architect	$131,361	4.0/5	10,069
#5	Devops Engineer	$110,003	4.0/5	6,904

Data Science - a big buzzword

Careercast Best Job 2019 Report

Ranks	Job	Annual Median Salary	Growth Outlook to 2026
1	Data Scientist	$118k	19%
2	Statistician	$88k	33%
3	University Professor	$78k	15%
4	Occupational Therapist	$84k	24%
5	Genetic Counselor	$80k	29%
6	Medical Services Manager	$99k	20%
7	Information Security Analyst	$98k	28%
8	Mathematician	$88k	33%
9	Operations Research Analyst	$83k	27%
10	Actuary	$103k	22%

Data Scientist

Overall Rating: 1/200   **Median Salary:** $114,520

Work Environment	Stress	Projected Growth
Very Good	**Low**	**Very Good**
4/200	42/200	37/200

View Raw Scores

Search Data Scientist Jobs ➡

1st position maintained for 2021!

1. Data Scientist

Median Salary: $98,230   **Projected Growth:** 33.00%

What is Data Science?

- What Data Science is <u>not</u>:

  - Fancy name for Statistics, computer-age Statistics, …

  - Machine Learning, Artificial Intelligence, Coding, …

  - Business Analytics, Data Analysis, …

What is Data Science?

"More than anything, what data scientists do is make discoveries while swimming in data. It's their preferred method of navigating the world around them. At ease in the digital realm, they are able to bring structure to large quantities of formless data and make analysis possible. They identify rich data sources, join them with other, potentially incomplete data sources, and clean the resulting set. In a competitive landscape where challenges keep changing and data never stop flowing, data scientists help decision makers shift from ad hoc analysis to an ongoing conversation with data."

Data Scientist: the sexiest job of the 21st century, Harvard Business Review

What is Data Science?

*"Data science is using data to make better decisions with **analysis** for insight, **statistics** for causality, and **machine learning** for prediction. It's possible to be solely a data analyst, statistician, or machine learning engineer. However, a data scientist is a person who can do all three."*
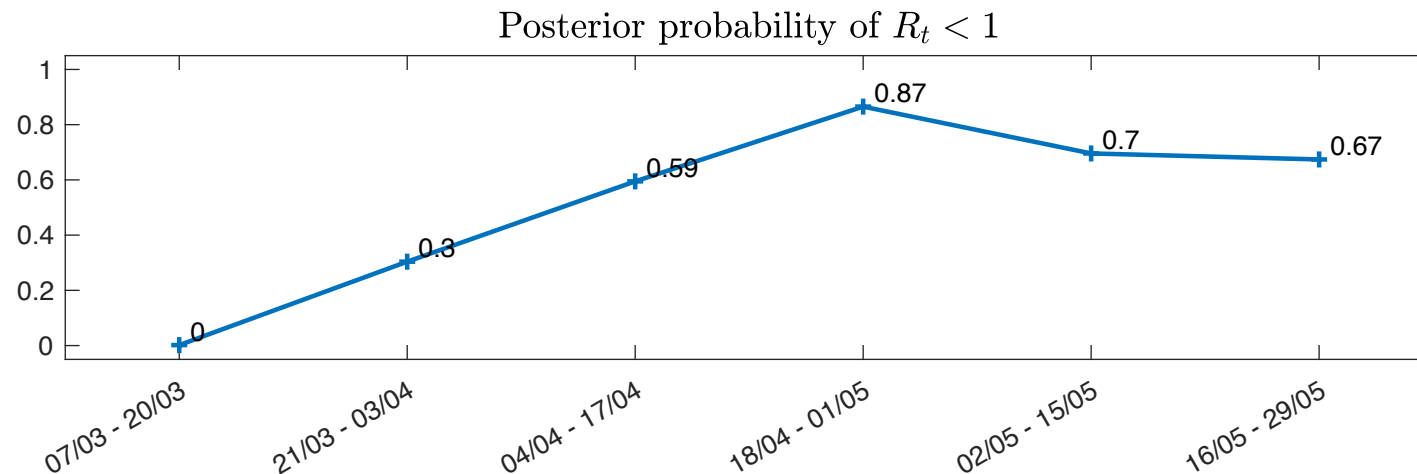
What is Data Science, Towards Data Science

Examples

- **Data Analysis**: find insights in existing data

  "What caused the sales drop last month?"

- **Statistics**: apply rigorous mathematical ideas to make causal claims

  "Which version of our website results in more sales?"

- **Machine Learning**: prediction dominates

  "How many customers will leave next month?"

What is Data Science, Towards Data Science

Examples – COVID19

- Bayesian Analysis of Effective Reproduction Number
  - analyse incidence data
  - use mathematical model
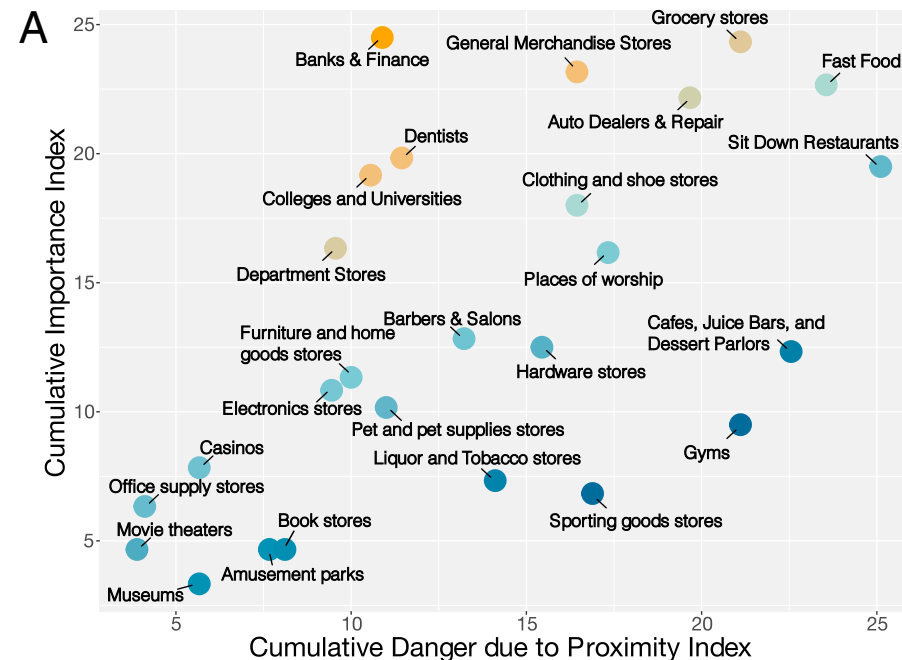 - use statistics to quantify uncertainty
  - advise policy makers

Posterior probability of $R_t < 1$

S. Agapiou, A. Anastasiou, A. Baxevani, T. Christofides, E. Constantinou, G. Hadjigeorgiou, C. Nicolaides, G. Nikolopoulos and K. Fokianos, Modeling the First Wave of Covid-19 pandemic in Cyprus, 2021.

Examples – COVID19

- Measure relative transmission reduction benefit and social cost of closing different categories of shops, entertainments, and service providers
  - Insight to ask the question, build appropriate metrics of danger and importance
  - Big data: mobility data from smartphones, consumer preference surveys, and economic statistics
  - Basic statistics

A — Scatter plot: Cumulative Danger due to Proximity Index (x-axis) vs Cumulative Importance Index (y-axis), with categories including Grocery stores, General Merchandise Stores, Banks & Finance, Fast Food, Auto Dealers & Repair, Dentists, Sit Down Restaurants, Clothing and shoe stores, Colleges and Universities, Department Stores, Places of worship, Barbers & Salons, Furniture and home goods stores, Cafes, Juice Bars, and Dessert Parlors, Hardware stores, Electronics stores, Pet and pet supplies stores, Gyms, Casinos, Liquor and Tobacco stores, Office supply stores, Sporting goods stores, Movie theaters, Book stores, Amusement parks, Museums.

SG Benzell, A Collis, C Nicolaides, Rationing social contact du... ...efits of US locations, Proc. of National Academy of Sciences, 2020
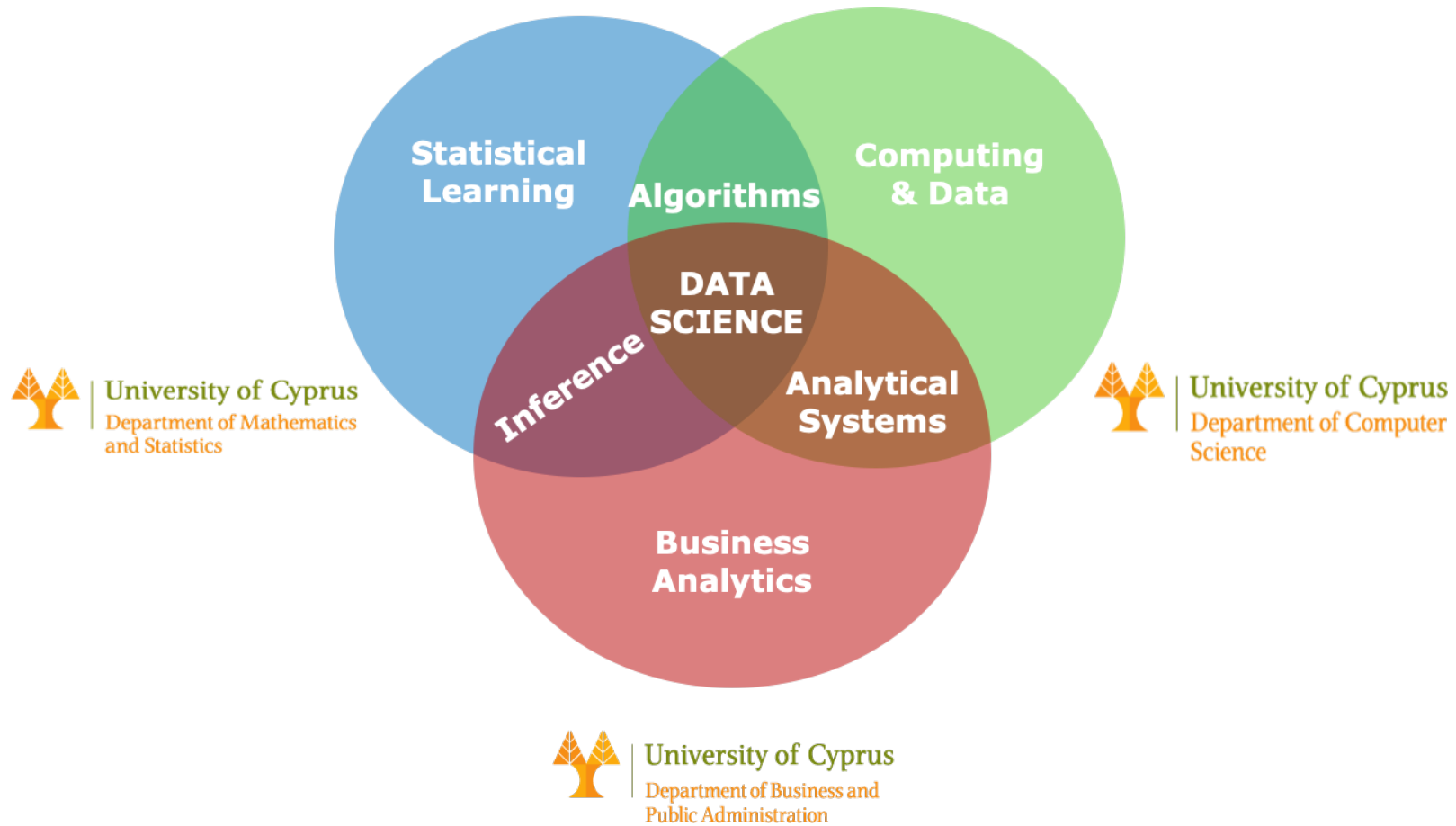
Career Prospects in Cyprus

Main Sectors:

- Consulting (including consulting services of the Big Four)
- Banking & Finance (including Forex)
- Technology & Telecoms
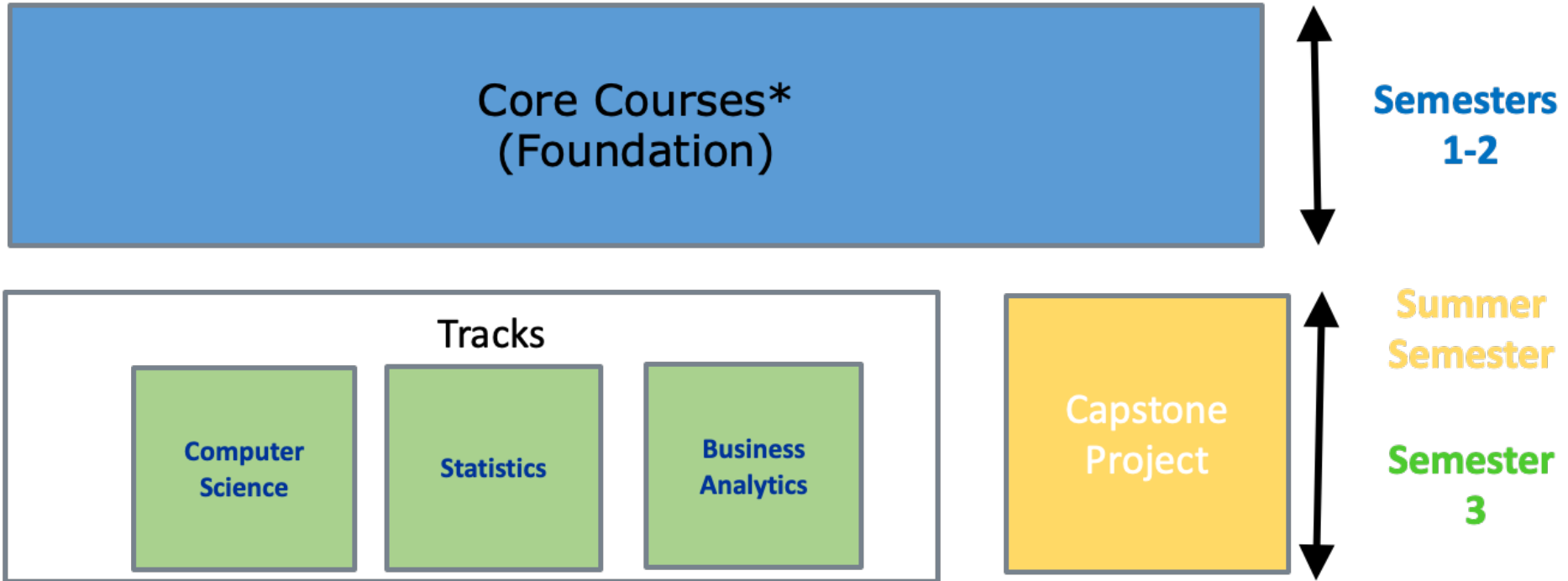- Health
- Retail
- Research and Innovation
- …

Main Functions:

- Marketing & Customer Insights
- Forecasting & Planning
- Optimization and Risk Management
- Decision Support

Our Curriculum

Our Curriculum

First Semester	CS Introduction to Data Science and Analytics	8
	MAS Probability and Statistics for Data Science	8
	MAS Statistical Simulation and Data Analysis	8
	One Elective Course (offered by other entities of the University of Cyprus, e.g. Department of Law, Center for Entrepreneurship etc.)	4
Second Semester	CS Big Data Analytics	8
	BUS Business Analytics Applications	8
	MAS Statistical Learning	8
	One Elective Course (offered by other entities of the University of Cyprus, e.g. Department of Law, Center for Entrepreneurship etc.)	4

University of Cyprus
MSc in Data Science

Second Semester	MAS Statistical Learning	8
	One Elective Course (offered by other entities of the University of Cyprus, e.g. Department of Law, Center for Entrepreneurship etc.)	4

Summer Semester	Capstone Project in Data Science (1st Phase)	5
Third Semester	Computer Science Track/ Statistics Track/Business Analytics Track Course	8
	Computer Science Track/ Statistics Track/Business Analytics Track Course	8
	Computer Science Track/ Statistics Track/Business Analytics Track Course	8
	Capstone Project in Data Science (2nd Phase)	5

Our Curriculum

Elective Courses **

- **Statistics Track**
  - Survey Sampling
  - Time Series Analysis
  - Multivariate Analysis
  - Bayesian Statistics
  - Computational Statistics

- **Computational Science Track**
  - Information Retrieval and Search Engines
  - Advanced Topics in Data Management
  - Natural Language Processing
  - Deep Learning
  - Data Visualization
  - Cloud Computing

- **Business Analytics Track**
  - Managing Business Processes with Information Systems & Analytics
  - Project Management using Analytical Tools
  - Information Networks
  - Quantitative and Qualitative Decision-Making
  - Web Analytics for Business
  - Data Mining for Business Analytics
  - Data Visualization
  - Investment
  - Financial Theory

** The availability of the electives depends on demand

Our Curriculum

Capstone Project

- Over 30 MoUs with local companies, including
  - General Health System
  - Central Bank of Cyprus
  - Bank of Cyprus
  - IBM Italia S.p.A. Cyprus Branch
  - NetU Consultants Ltd
  - SignalGenerix
  - Impact Tech Ltd
  - Huawei Technologies
  - CS Circles Technologies Ltd
  - NETinfo
  - Nicosia Municipality
  - Frogsy Ltd
  - Primetel PLC
  - Cablenet
  - Cyprus Telecommunications Authority
  - Cyprus Statistical Service

Practical Matters

- Start: September 2022

- Duration: 3 semesters + summer semester

- Language of instruction: English

- Tuition fees: €5.125

- Lecture times: core courses grouped in two mornings each week

- Application procedure: via regular University channels

  - https://ucy.ac.cy/graduateschool/en/

- Academic requirements: introductory course in Calculus and Linear Algebra, Probability and Statistics, Programming principles

Further Reading

University of Cyprus
MSc in Data Science

- https://datascience.cy/

- https://hbr.org/2012/10/data-scientist-the-sexiest-job-of-the-21st-century

- https://towardsdatascience.com/what-is-data-science-8c8fbaef1d37

- https://www.wired.com/insights/2014/06/tell-kids-data-scientists-doctors/

- https://www.careercast.com/jobs-rated/best-jobs-2021

- https://www.glassdoor.com/List/Best-Jobs-in-America-LST_KQ0,20.htm

- https://365datascience.com/blog/

- https://fivethirtyeight.com/