



LOYOLA

UNIVERSITY MARYLAND

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**MORE THAN READY.
LOYOLA READY.**



CONTACT INFORMATION

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WHAT IS DATA SCIENCE?

- The goal of data science is to improve decision making by basing decisions on insights extracted from large data sets.
- Data science encompasses a set of principles, problem definitions, algorithms, and processes for extracting nonobvious and useful patterns from large data sets.
- Interdisciplinary program
 - Computer science, statistics, and business



WHO CAN USE DATA SCIENCE?

You can. Your organization can. Your employer can.

Data science drives decision making in nearly all parts of modern societies.

1. Data Science in Sales and Marketing

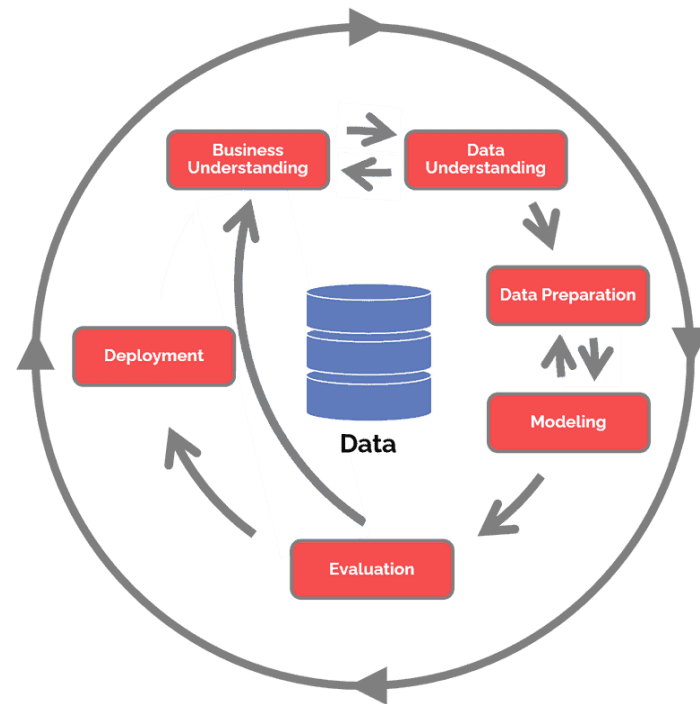
1. Walmart attributes an increase of 10 to 15 percent in online sales to data science optimizations.

2. Governments Using Data Science

1. Data science is also revolutionizing how we organize cities: it is used to track, analyze, and control environmental, energy, transport systems and to inform long-term urban planning.

3. Data Science in Professional Sports

CROSS-INDUSTRY STANDARD PROCESS FOR DATA MINING





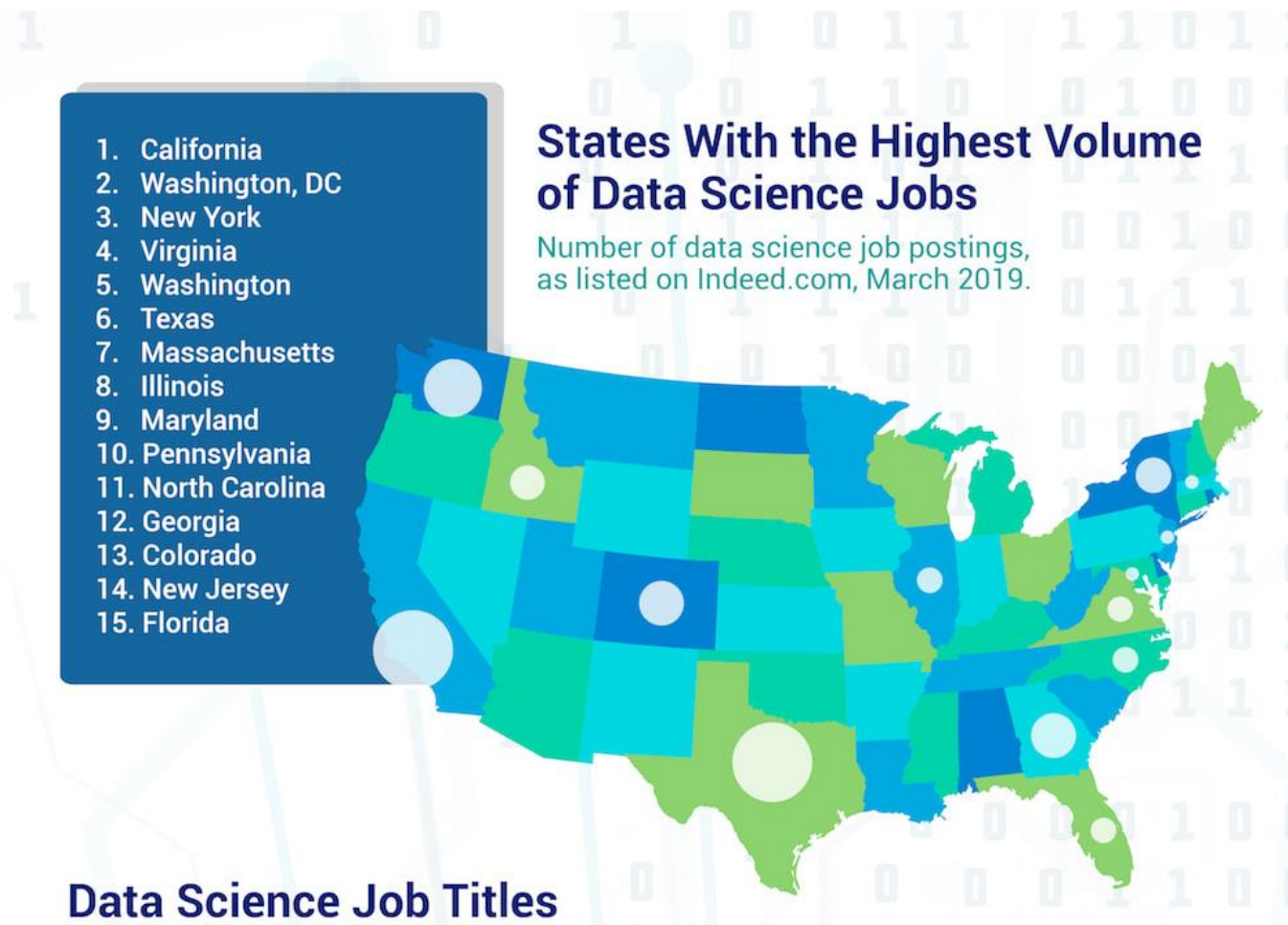
CROSS-INDUSTRY STANDARD PROCESS FOR DATA MINING

1. **Business Understanding** – What does the business need?
 1. Any good project starts with a deep understanding of the customer's needs.
2. **Data Understanding** – What data do we have / need? Is it clean?
3. **Data Preparation** – How do we organize the data for modeling?
4. **Modeling** – What modeling techniques should we apply?
5. **Evaluation** – Which model best meets the business objectives?
6. **Deployment** – How do stakeholders access the results?
 1. Depending on the requirements, the deployment phase can be as simple as generating a report of as complex as implementing a repeatable data mining process across the enterprise.



QUICK FACTS

COMPUTER AND INFORMATION RESEARCH SCIENTISTS	
2020 Median Pay	\$126,830 per Year \$60.97 per Hour
Typical Entry-level Education	Master's Degree
Work Experience In A Related Occupation	None
On-the-job Training	None
Number Of Jobs, 2020	33,000
Job Outlook, 2020-30	22% (Much Faster Than Average)
Employment Change, 2020-30	7,200

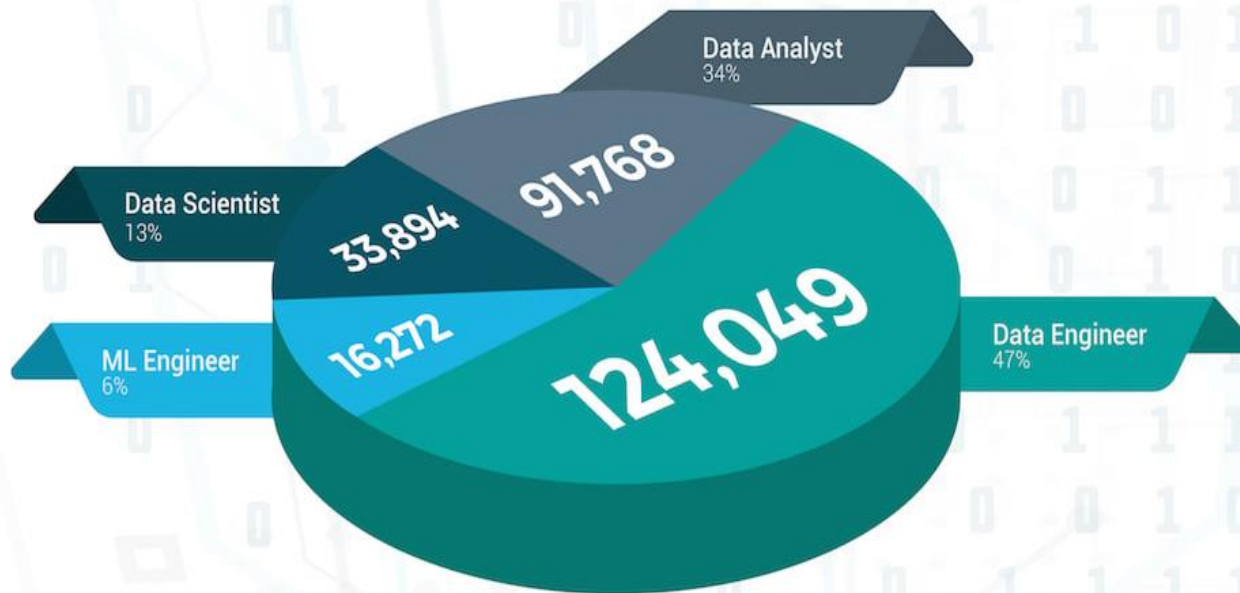


Data Science Job Titles



Data Science Job Titles

This breakdown of job titles is based on data from Indeed.com, March 2019.



Average Salaries by State and Job Title for the Top 15 Markets

State	Data Scientist	Data Analyst	Data Engineer	Machine Learning Engineer	Number of 'data science' job postings
1. California	\$142,338	\$90,562	\$138,215	\$114,826	3,521
2. Washington, DC	\$105,975	\$73,015	\$124,571	\$134,467	1,683
3. New York	\$115,815	\$71,589	\$123,070	\$117,268	1,322
4. Virginia	\$98,216	\$71,175	\$97,059	\$123,744	1,243
5. Washington	\$117,345	\$117,345	\$116,591	\$150,430	1,075
6. Texas	\$101,208	\$68,020	\$88,383	\$120,645	877
7. Massachusetts	\$112,059	\$70,529	\$104,200	\$160,110	824
8. Illinois	\$106,135	\$65,273	\$103,113	\$129,958	659
9. Maryland	\$117,345	\$67,377	\$116,591	\$128,970	509
10. Pennsylvania	\$103,995	\$63,977	\$95,332	\$115,838	455
11. North Carolina	\$117,345	\$67,377	\$116,591	\$144,444	428
12. Georgia	\$98,202	\$65,207	\$92,190	\$69,707	321
13. Colorado	\$106,025	\$67,091	\$103,633	\$128,000	313
14. New Jersey	\$117,345	\$67,377	\$116,591	\$118,522	313
15. Florida	\$99,167	\$67,377	\$116,591	\$124,464	302

Sources: Glassdoor and PayScale, March 2019.

MS PROGRAM

- Credits: 31-34
- Cost per Credit: \$895
- Delivery: 100% Online
 - All courses will be offered online. Depending on the instructor, the course may be offered either synchronously or asynchronously.
- Format: Part-time



MS PROGRAM

Specializations

- Technical
- Business Analytics

Two-semester Capstone Practicum

- A strength of the program is the required two-semester practicum, which could include a summer internship. The practicum is an independent or group project that uses the data science techniques acquired during the program in an applied manner to solve a practical problem with a local partner.
- **Fall Semester** – In the first semester, students design the project and present their plan to the program's board; this could be part of a paid internship. The program director works to develop opportunities by developing a strong advisory board, comprised of industry, government, and not-for-profit representatives.
- **Spring Semester** – In the second semester, students implement their project and present the results of the project to the board for approval.



DATA SCIENCE PROJECTS FROM SPRING 2021

- Analysis of Financial Publishing Subscriber Engagement and Trends
- Analyzing and Predicting Wildlife Incidents (Wildlife Center of Virginia)
- COVID-19 Data Analysis Using Patient EHR Data (Healthjump)
- Data Science for Small Business: Predicting Attendance for a CrossFit Affiliate (Outsiders CrossFit)
- Efficient Reverse Image Search (MasterPiece Solutions)
- Identify In-Store Cigarette Theft in Real Time (Royal Farms)
- Predicting After Repair Property Values Using Natural Language Processing (Red Cedar Real Estate)
- Story Point Estimation (Bloomberg L.P. - Marc Wintjen)
- Where the Vacants Are: Predicting Abandoned Houses in Baltimore City (Baltimore Appalachia Work Camp)



DEGREE REQUIREMENTS

TECHNICAL	BUSINESS ANALYTICS
31-34 Credits	31 Credits
The Technical specialization focuses on providing additional training in computer science and machine learning.	The Business Analytics specialization allows for greater course flexibility allowing students to focus their degree towards data analytics.
CS 701 – Introduction To Programming (<i>May Be Waived</i>)	CS 701 – Introduction To Programming Or Program Elective
CS 703 – Programming For Data Science	
ST 710 – Statistical Computing	
DS 730 – Introduction To Data Science	
DS 851 – Business Intelligence And Data Mining	
DS 795 – Data Science Project Planning	
DS 796 – Data Science Project	
ST 765 – Linear Statistical Models	
CS 737 – Machine Learning	
Computer Science Elective	Program Elective
Statistics Elective	Program Elective
Program Elective	Program Elective



ELECTIVES

- CS745 – Multimedia Data Analysis and Mining (CS737, ST710)
- CS766 – Information Retrieval and Natural Language Processing (CS737)
- ST767 – Multivariate Analysis (ST710)
- ST775 – Generalized Linear Models and Multilevel Models (ST765)
- ST778 – Time Series Analysis (ST710)
- GB712 – Law, Ethics, and Social Responsibility
- GB735 – Project Management (GB704 or GB705)
- DS736 – Data Visualization for Decision Making (DS730 or written permission of the instructor)
- DS739 – Data Management and Database Systems
- GB747 – Special Topics in Marketing: Digital Marketing and Analytics
- GB759 – Special Topics in Management Information Systems: Location Analytics (DS730 or CS703)



PROGRAM OF STUDY FIRST YEAR

Summer Term

- CS 701 – Introduction to Programming (*may be waived*)

Fall Term

- CS 703 – Programming For Data Science (CS 701)
- DS 730 – Introduction To Data Science

Spring Term

- CS 737 – Machine Learning (Only Technical Specialization) (CS 703)
- ST 710 – Statistical Computing



PROGRAM OF STUDY SECOND YEAR

Summer Term

- DS 851 – Business Intelligence And Data Mining (DS 730)
- Statistics Elective

Fall Term

- DS 795 – Data Science Project Design (CS 703, DS 851, ST 710)
- ST 765 – Linear Statical Models (ST 710)
- Computer Science Elective

Spring Term

- DS 796 – Data Science Project (DS 795)
- Computer Science Elective Or Statistics Elective Or Business Elective

ACCELERATED PROGRAM

- Credits: 22-25
- Cost per Credit: \$895
- Delivery: 100% Online
 - All courses will be offered online. Depending on the instructor, the course may be offered either synchronously or asynchronously.
- Format: Full-time



ACCELERATED PROGRAM

The Data Science program offers an accelerated BA/BS-MS program for current undergraduate students. Students should apply for the MS in Data Science program during their junior year through the Office of Graduate Admissions.

CS 703 – Programming For Data Science (In Place Of DS 303)

DS 851 – Business Intelligence And Data Mining (IS 358)

ST 710 – Statistical Computing (ST 310)

The following courses apply towards both programs: CS737 (CS 484); ST765 (ST 465); ST767 (ST 472); GB/DS736 (IS460); GB/DS739 (IS353).



ACCELERATED PROGRAM BENEFITS

The accelerated Master of Science in Data Science program streamlines and accelerates the application process for current Loyola undergraduate students while reducing the combined total tuition costs. The accelerated program is a great option for Loyola undergraduates to complete both an undergraduate and master's degree in just five years at Loyola.

Complete both an undergraduate and graduate degree in just five years

15% Double Greyhound tuition discount for Loyola alumni

Students may count a maximum of three courses (9 credits) towards both their undergraduate and graduate degrees

Application fee waiver

Transcript submission waiver



PROGRAM OF STUDY

Summer Term

- Statistics Elective

Fall Term

- DS 730 – Introduction To Data Science
- DS 795 – Data Science Project Design (CS 703, DS 851, ST 710)
- ST 765 – Linear Statical Models (ST 710)
- Computer Science Elective

Spring Term

- CS 737 – Machine Learning (Only Technical Specialization) (CS 703)
- DS 796 – Data Science Project (DS 795)
- Computer Science Elective Or Statistics Elective Or Business Elective

MICRO-CREDENTIAL PROGRAM

- Credits: 9
- Cost per Credit: \$895
- Delivery: 100% Online
 - All courses will be offered online. Depending on the instructor, the course may be offered either synchronously or asynchronously.
- Format: Part-time



DEGREE REQUIREMENTS

DATA SCIENCE	ANALYTICS
3 Credits	3 Credits
CS 703 – Programming For Data Science	CS 701 – Introduction To Programming
DS 730 – Introduction To Data Science	
ST 710 – Statistical Computing	



INDUSTRIAL COLLABORATION

- Jason Barbour – Erias Ventures, Data Works Md
- Michael Carlin – Boardroom Alpha
- Neta Ezer – Northrop Grumman
- Edward Fortunato – Exelon Corporation
- Franklin Hernandez – Synchrony Financial
- Daniel Hood – Clearedge
- Scott Jachimski – Booz Allen Hamilton
- Kevin McMahon – Department Of Defense
- Ed Mullin – Think
- Stephanie Poisson – Masterpeace Solutions
- Elizabeth Rhoades – National Cryptologic School
- Melissa Ross – Visiquate, Inc.
- Amit Kumar Singh – Asymmetrik
- Joseph Warfield – The Johns Hopkins University Applied Physics Laboratory



GRADUATE LEARNING GOALS

Graduates of Loyola University Maryland's graduate programs should:

- **Master Knowledge And Skills:**
 - Master the skills, methods and knowledge appropriate to the discipline.
 - Synthesize knowledge using interdisciplinary approaches.
 - Acquire the tools to continue professional development and life-long learning.
- **Think Critically:**
 - Access, analyze and evaluate information effectively.
 - Disseminate and communicate information effectively.
- **Manifest Leadership And Social Responsibility In The Workplace And Community:**
 - Understand and value individual differences and have the skills for working effectively in a diverse and changing world.
 - Comprehend the ethical principles appropriate to the discipline, have the ability to identify ethical dilemmas, and understand the frameworks for selecting and defending a right course of action.
 - Contribute professionally and personally to the broader community.
 - Consider issues of justice in making decisions.



LEARNING AIMS

Students will be able to:

- Perform an appropriate analysis of data in the context of a business/organizational problem.
- Apply programming languages to solve data science problems.
- Apply machine learning to data science problems.
- Effectively communicate key elements of the data science process.
- Recognize professional responsibilities and make informed judgments in practicing data science.



ADDITIONAL PROGRAM GOALS

- Students will understand the **underlying principles of data science** and be able to **keep up with this expanding field**.
- Students will be proficient in **analyzing complex data from diverse sources** by discovering key relationships within the data.
- Students will be able to **model data using machine learning techniques**.
- Students will be able to **model data using statistical models**.
- Students will be able to **predict future outcomes** that can be used to advise decision makers on their course of action.
- Students will be knowledgeable of **general ethical principles**, how these principles apply to data science, and the social context of data science.



PREREQUISITES

Statistics

- Students are expected to have taken a college-level introductory statistics course. The statistics requirement can be satisfied by taking Loyola's preparatory course, DS 510: Applied Business Statistics or another approved introductory statistics course.

Computer Programming

- Incoming students may waive the CS701: Introduction to Programming course if they have significant prior experience with computer programming. This can be demonstrated in one of the following ways:
 - An undergraduate major or minor in Computer Science or Data Science.
 - Employment in a profession where computer programming in a language such as Python or Java is a significant component of the job.
 - Successful completion of a graduate-level computer science or computer programming course in Python.
- Applicants who do not already meet one of the criteria above *must* apply for admission to the *Summer* term.



APPLICATION DEADLINES

- Summer Semester – May 1
- Fall Semester – August 1
- Spring Semester – December 1

** At the discretion of the department, applications will continue to be reviewed after the deadline on a space-available basis.*



APPLICATION REQUIREMENTS

- Application form
- Non-refundable \$60 application fee
- Official transcripts from all degree-granting institutions attended. The admission committee reserves the right to request official transcripts from universities where an applicant attended but did not complete a degree. Please note that not submitting all transcripts where courses have been completed could impact course waivers.
- Essay - In 500-1000 words: Why is data science important to you at this particular point in your life/career? How do you think the Data Science program will benefit you in your career pursuits and how will you apply what you learn in our program? What computer science/programming skills do you have and what languages are you comfortable using?
- Professional resume

** International applicants are eligible to complete this program fully online outside of the United States. Please note: a form I-20 cannot be issued for this program.*



TUITION AND FINANCIAL AID

The data science program consists of 31-34 graduate credit hours

The following rates are subject to change each academic year:

\$895 per credit



SCHOLARSHIPS AND AWARDS

Merit-based Scholarships

- Merit-based Scholarships are awarded to Master's of Science in Data Science students based on prior academic excellence.

Ignatius Grants

- Ignatius Grants are awarded to Master's of Science in Data Science students based on dedication to the Jesuit mission and potential for success in the program.

All students are eligible to receive Merit-based Scholarships and Ignatius Grants, and every student who completes an application for admission is automatically considered for funding. No separate application is required. Please submit completed program application and all supplemental documents to the Office of Graduate Admission by the application deadline to be considered.

You will be notified at the time of admission.



SCHOLARSHIPS AND AWARDS

Graduate Assistantships

- Loyola offers a number of assistantships to new and continuing graduate students in a wide range of professional areas. Each opportunity provides a stipend for which you will be remunerated bi-weekly, and a scholarship which is applied at the start of your assistantship contract. This combination of stipend and scholarship is typically split 50/50 to provide you the greatest pre-tax benefit.
- Only those graduate students who are in a degree seeking program are eligible to apply for a graduate assistantship.



WHY LOYOLA?

Experience

- A Jesuit education is an active transformation. In order to benefit fully from it, it has to be directly taught, personally experienced, deeply understood, and put into living practice.

Accessibility

- Loyola deploys its full resources to ensure that these transformative experiences are be accessible to all students—wherever their minds and hearts lead, from the day they arrive to the moment they set foot in the world. Our consistently small class sizes, 12:1 student-to-faculty ratio, zero teaching assistants, faculty mentorship, practical extensions of classroom learning, ability to design custom curricula, leadership positions, and unparalleled career resources are distinct features of a Loyola education.

Outcomes

- The outcomes bear out the promise of a Loyola University Maryland degree. More importantly, both alumni and employers have singled out the distinctive Jesuit aspects of Loyola graduates as primary engines of their enduring success, both professionally and personally.

OSEI

“I would strongly recommend Loyola's data science program to anyone who is interested in the field. It is demanding—but it is great for being able to balance work and school.”





DENISE

“Everything I've learned has enabled me to gain a better appreciation and improved understanding of the many ways data can be leveraged to solve any challenge.”





CONTACT INFORMATION

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QUESTIONS?



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