



## Defining the Pieces of the Data Puzzle

### SKILLS NEEDED

### RELEVANT JOB TITLES

### # COURSES THAT ADDRESS TOPIC AREA

### # INSTRUCTORS QUALIFIED IN TOPIC AREA

**MACHINE LEARNING (ML)** involves training computers, through repeated presentation of observations and outcomes, to make predictions that are not obvious to a person.

- Expertise modeling techniques/tools
- Understanding the statistical basis of algorithms
- Programming (Python or other ML language)
- Work closely with data scientists to ensure machine learning technology delivers results for the organization

Data Scientist  
 Machine Learning Engineer  
 AI Engineer  
 Machine Learning Researcher  
 Machine Learning Developer  
 Data Engineer

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**DATA ANALYTICS** is the most common use of data, involving extracting data from relational databases (e.g., SQL Server, Oracle) and presenting findings as reports and corporate dashboards.

- Manipulate databases using SQL
- Use dashboard tools and design effective dashboards
- Utilize statistical tools to maintain data integrity
- Produce effective, clear charts that inform, rather than confuse, decision makers

Business Analyst  
 Data Analyst  
 Data Scientist  
 Data Engineer  
 Quantitative Analyst  
 Project Manager

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**BIG DATA** describes working with data that is too large to be processed using standard (e.g., workstation, single server) tools. Popular platforms include Hadoop, Spark, and Tableau.

- Operate and manage clusters of networked computers
- Maintain high availability of the cluster
- Understand how cyber security issues can affect big data
- Programming using enterprise languages, such as Java and Scala

Data Scientist  
 Data Engineer  
 Data Analyst  
 Security Engineer  
 Database Manager  
 Data Architect

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**DECISION ANALYSIS** is the process of applying a standardized and tested methodology for decision-making which helps organization make decisions more easily and transparently.

- Formalize the decision-making process
- Frame decisions, think creatively, analyze, and implement informed and justifiable decisions
- Understand uncertainty with data
- Use multi-criteria alternatives
- Leverage skills/tools like emotional intelligence, management techniques, decision trees, diagrams, and more

Relevant to anyone responsible for decision-making in an organization.

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**DATA VISUALIZATION** involves representing information visually (e.g., charts, tables, diagrams, illustrations) in order to bring data to life in a way that's easy to understand to drive better business decisions.

- Expertise modeling techniques/tools
- Understanding the statistical basis of algorithms
- Programming (Python or other ML language)
- Work closely with data scientists to ensure machine learning technology delivers results for the organization

Data Analyst  
 Database Architect  
 Data Visualization Engineer  
 Data Visualization Scientist  
 Data Engineer

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**ARTIFICIAL INTELLIGENCE (AI)** has been around since the 1950s, but today's AI researchers use cutting-edge tech like deep learning (aka, neural networks), Natural Language Processing (NLP), and image processing (used in self-driving cars).

- Highly specialized by area of research and niche expertise
- Programming and writing code for machines
- Designing and developing machines and systems that can learn and apply knowledge without specific direction.
- Research, analytical, organizational, and critical thinking skills

Machine Learning Engineer  
 Data Scientist  
 Business Intelligence Developer  
 Research Scientist  
 Big Data Engineer/Architect  
 Software Engineer

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