

## Applied Data Science (ADS) Pathway — Required and Recommended Courses

Specialization in Applied Data Science (ADS) emphasizes users, tools, and applications in the Data Science Lifecycles [1]. The ADS pathway prepares students for a career in Data Science with practical skills to solve real-world data problems at application levels, rather than computational level or system development level. It offers training of information science and knowledge organization principles and hands-on skills to solve data problems in application domains and use related tools and products effectively.

<b>REQUIRED MLIS CORE (16 CREDIT HOURS)</b>		
LIS 60010	The Information Landscape	3
LIS 60020	Information Organization	3
LIS 60030	People in the Information Ecology	3
LIS 60040	Information Institutions and Professions	3
LIS 60050	Research and Assessment in Library and Information Science	3
LIS 60280	Master’s Portfolio in Library and Information Science	1

<b>FOUNDATIONAL (KEY) COURSES (18 CREDIT HOURS)</b>		
LIS 60510	Digital Technologies I: Data Fundamentals	1
LIS 60511	Digital Technologies II: Internet Fundamentals	1
LIS 60512	Digital Technologies III: Systems Fundamentals	1
LIS 50645	Database Fundamentals for Information Professionals	3
DSCI 64210	Data Science	3
DSCI 64010*	Data Architecture	3
LIS 60636*	Knowledge Organization Structures, Systems and Services	3
KM 60370*	Semantic Analysis Methods	3
* Same requirements for the Data Science Concentration in Master of Digital Sciences.		

<b>RECOMMENDED ELECTIVES</b>		
LIS 60613	Information Needs, Seeking and Use	3
LIS 60631	Introduction to Digital Preservation	3
LIS 60633	Digital Curation	3
LIS 60637	Metadata Architecture and Implementation	3
LIS 60638	Digital Libraries	3
LIS 60639	Implementation of Digital Libraries	3
LIS 61095	(Special Topics) Applied Quantitative Methods for Research and Management in the Information Professions	3
KM 60312	Business Intelligence – Competitive Intelligence	3
UXD 60001	User Experience Design Principles and Concepts	3
HI 60411	Clinical Analytics 1	3
HI 60418	Clinical Analytics 2	3

**Other courses from Computer Science for Computational Data Science \***

\* Recommended for students with a computer science related undergraduate background.

- CS 63015 Data Mining Techniques (3 credits)
- CS 63016 Big Data Analytics (3 credits)
- CS 63017 Big Data Management (3 credits)
- CS 54201 Artificial Intelligence (3 credits)
- CS 64201 Advanced Artificial Intelligence (3 credits)
- CS 67101 Advanced Computer Graphics (3 credits)
- CS 67302 Information Visualization (3 credits)
- CS 59995 ST: Cognitive Processing with Text Analysis and Data Sciences (3 credits)

## Applied Data Science (ADS) Pathway — Additional Information and Resources

### **Competencies (knowledge, skills) for this pathway:**

- Leadership in the field of processes and systems to extract knowledge or insights from data, either structured or unstructured, using statistics, machine learning, data mining, semantic analysis, and predictive analytics
- Supervise/perform the creation of analytics and scientific exploration
- Develop the documentation and process to identify metrics, targets, weights and resulting performance reports for network providers
- Utilize data to translate findings into actionable information for providers and leaders
- Oversee the architecture of integration approach for disparate data systems including use of enterprise data warehouse, external vendor supplied information and any future systems
- Serve as a subject matter expert on data modeling, system architecture, data governance and business intelligence tools
- Apply multiple, federated, linked data models
- Provide data lineage, support for temporal models and streaming data
- Leadership in reimaging the intersection of data and information supporting services
- Create technical interfacing between analytics/ dashboard directly to provider portal/ websites or mobile devices for up-to-date reporting for providers
- Support of care coordination by supplying information related to registry, user information and other operational requirements to internal or external services

- Possess a Strong academic curiosity, and ability to conduct scientific research that can solve unique problems
- Provide comprehensive data services in support of the University's teaching, learning, and research needs
- Design of efficient data ingestion through ETL and messaging systems
- Develop data governance and data quality standards & tooling

### **Sample job titles:**

- Data Analyst
- Data and Information Visualization Librarian
- Data Curation Librarian
- Data Librarian
- Data Management Specialist
- Data Science Librarian
- Data Scientist
- Data Services Librarian
- Data Services Specialist
- Data Strategist
- Data Visualization/Data Analyst
- Digital Scholarship Librarian
- Digital Solutions Data Scientist
- Manager, Data Science and Analytics
- Research Data Librarian
- Research Data Manager
- The Digital Testing, Analytics & Optimization Manager

### Professional organizations:

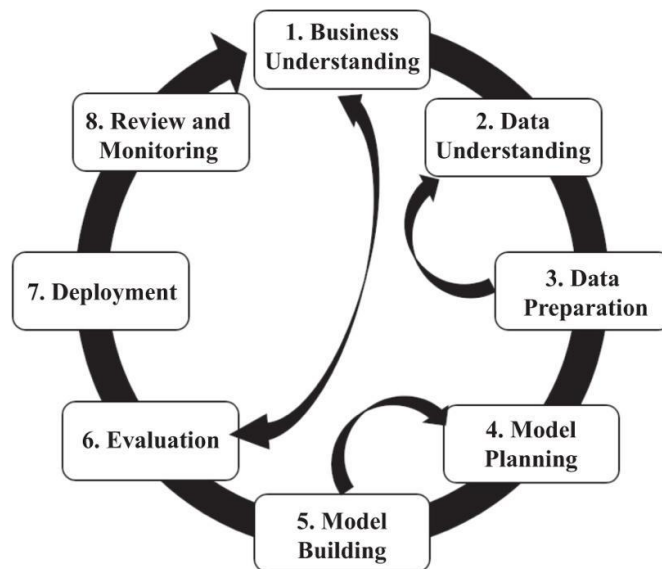
- American Society of Information Science & Technology (ASIST)
- Association of Computing Machinery (ACM):
  - Special Interest Group (SIG): Knowledge Discovery and Data Mining (KDD);
  - Special Interest Group (SIG): Artificial Intelligence (AI)
- Research Data Access & Preservation (RDAP)
- Research Data Alliance (RDA)

### Professional/disciplinary journals with related articles:

- *Big Data & Society*
- *Information Processing and Management*
- *International Journal of Digital Curation*
- *Journal of eScience Librarianship*
- *Journal of Information Science*
- *Journal of the Association for Information Science and Technology (JASIST)*

[1] "Big Data and Data Science: Opportunities and Challenges of iSchools" by Il-Yeol Song & Yongjun Zhu, College of Computing and Informatics, Drexel University (2017). [10.1515/jdis-2017-0011](https://doi.org/10.1515/jdis-2017-0011)

**Figure. A data science lifecycle**



### Eight steps of a data science lifecycle:

1. Business understanding. What is the question to solve and what metrics are to be evaluated? Generate hypothesis; Assess resources (people, data, and tools).
2. Data understanding. Identify data resources, data reuse and integration plan, datatification, and decision on tools.
3. Data preparation. Acquire data; Perform data profiling, cleanse, and transform; Explore data and verify quality.
4. Model planning. Determine the methods, techniques, and workflow; Select key variables and determine correlation between them.
5. Model building. Build models; Perform analysis and iterate.
6. Evaluation. Perform evaluation against metrics; Communicate results and recommendations.
7. Deployment. Integrate analytics procedures into management dashboards and operational systems.
8. Review and monitoring. Monitor performance; Identify parts that need to be improved.