

DATA SCIENCE FLOW CHART, 2024-2025

THIS FLOW CHART IS ONLY A GUIDE. PLEASE REFER TO YOUR ADVISOR FOR QUESTIONS

1

DS 1100
Orientation
R Cr

Math 1650
Calculus I
(Pre-req ALEKS placement or C- in Math 1430)
4 Cr

Com S 1270
Intro to Computer Programming - Python
4 Cr

Engl 1500
(if English ACT 24 or higher, placement into English 2500)
3 Cr

Lib 1600
(take with Engl 1500/2500)
1 Cr

Social Science
3 Cr

2

Math 1660
Calculus II
(Pre-req C- in Math 1650)
4 Cr

Com S 2270
Object-oriented Programming - Java
(Pre-req Cr/E in Math 1430 or higher; Com S 1270 or Cpr E 1850 or S E 1850 or E E 2850) 4 Cr

Stat Option
Stat 2010, 1010, 1040, or 1050
(check pre-reqs)
4 Cr

Engl 2500
(Pre-req Engl 1500 or exempt from Engl 1500)
3 Cr

3

DS 2010
Introduction to Data Science
3 Cr

Math 2650
Calculus III
(Pre req C- in Math 1660 or Math 1660H)
4 Cr

Com S 2280
Introduction to Data Structures
(Pre-req C- in Com S 2270; Cr/E Math 1650)
3 Cr

Stat 3010
Intermediate Statistical Concepts & Methods
(Pre-req Stat 1010 or 1040 or 1050 or 2010)
4 Cr

Arts & Humanities/ USD
3 Cr

4

DS 2020
Data Acquisition and Exploratory Data Analysis
(Pre-req DS 2010)
3 Cr

Math 2070
Matrices and Linear Algebra
(Pre-req 2 semesters calculus)
3 Cr

Choose Option
Com S 2300 or Cpr E 3100
(check pre-reqs)
4 Cr

Social Science/ IP
3 Cr

Arts & Humanities
3 Cr

LAS 2030
1 Cr

5

DS 3030
Concepts & Applications of Machine Learning
(Pre req DS 2020; Math 2070; Math 2650; Stat 3010) - 3 Cr

Stat 3470
Probability & Statistical Theory for data Science
(Pre req Math 2070 or 3170; Math 2650; Stat 3010 or 3260) - 4 Cr

Com S 3110
Introduction to the Design & Analysis of Algorithms
(Pre req C- in Com S 2280; Math 1660; Engl 1500; Com S 2300 or Cpr E 3100) - 3 Cr

Elective or World Language
3-4 Cr

Arts & Humanities (3000+)
3 Cr

6

Com S 3630
Introduction to Database Management Systems
(Pre req C- in Com S 2280; Math 1650; Engl 2500) - 3 Cr

Stat 4770
Introduction to Categorical Data Analysis
(Pre req Stat 3010 or 3260 or 4010 or 5870)
3 Cr

Elective or World Language
3-4 Cr

Arts & Humanities
3 Cr

Natural Science
4 Cr

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Application Emphasis Area
3 Cr

Application Emphasis Area
3 Cr

Choose Option
Engl 3020, 3140 or 3320
(Pre-req Engl 2500 and junior classification) 3 Cr

Natural Science
4 Cr

8

DS 4010
Data Science Capstone
(Pre-req DS 3010 or DS 3030)
3 Cr

Cpr E 4190
Software Tools for Large Scale Data Analysis
(Pre req Com S 3630 or Com S 3520 or Cpr E 3080; Com S 2280) - 4 Cr

Application Emphasis Area
3 Cr

Social Science (3000+)
3 Cr

ALEKS Math Placement

- 39** - Math 1400 (3 cr)
College Algebra
- 51** - Math 1430 (4 cr)
Calculus Prep
- 76** - Math 1650 (4 cr)
Calculus I

Curriculum Requirements

World Language

- 1 year at college level or
- 3 years at high school

Arts and Humanities - 12 cr

- Select credits from the LAS approved list on degree audit

Social Sciences - 9 cr

- Select credits from the LAS approved list on degree audit

International Perspectives AND U.S. Diversity - 6 cr

- Select credits from the LAS approved list on degree audit

Natural Sciences - 8 cr

- Select credits from the LAS approved list on degree audit

Application Emphasis Area:

- 3 credits from approved quantitative course listings
- 6 credits of 3000+ level from any following departments:
A B E, ADVRT, AGRON, AN S, ARCH, BC BIO, COM S, C R P, CPR E, CYBSC, CYB E, E E, FIN, GIS, I E, J L MC, LING, L A, MATH, MIS, MKT, POL S, SOC, STAT, S E, TSM

Graduation Requirements

- Minimum of 120 Cr.
- All students are required to take at least 45 hours of courses at the 3000+ level or above.
- This may require taking additional electives.
- Last 32 credits must be taken at Iowa State.
- Advisor can waive 6 of the last 32 credits taken at Iowa State.

APPLICATION EMPHASIS AREA

At least 3 credits from one of the following courses:

- COM S 4240, 4260, 4350, 4540, 4610, 4740, 4210, 3420, 4130, 4400
- CPR E 3880, 4250, 4310, 4160
- DS 4900
- E E 4250
- I E 3120, 4830, 4870
- STAT 4710, 4730, 4750
- BCBIO 4010, 4060
- MATH 3730, 4070, 4240, 4810

At least 6 credits from courses at the 3000, 4000, or 5000 level from the following designations:

A B E, ADVRT, AGRON, AN S, ARCH, BCBIO, COM S, C R P, CPR E, CYB E, CYBSC, DS, E E, ECON, FIN, GIS, I E, JL MC, LA, LING, MATH, MIS, MKT, POL S, S E, SOC, STAT, TSM

EXAMPLE APPLICATION EMPHASIS AREA OPTIONS

Agriculture	A B E 3400 Functional Analysis of Soil, Crop, and Machine Systems	AGRON 4250 Crop and Soil Modeling	AGRON 4520 GIS for Geoscientists	AGRON 4880 GIS for Geoscientists II	TSM 4330 Precision Agriculture	AN S 5000 Applied Data Science and Statistics using Statistical Software
Geographic Information Systems	C R P 3510 Intermediate GIS	C R P 4540 Fundamentals of Remote Sensing and Spatial Analysis	C R P 4560 GIS Programming and Automation	NREM 3450 Natural Resource Photogrammetry and GIS	NREM 4460 Integrating GPS and GIS for Natural Resource Management	L A 5580 Web Mapping and Spatial Data Visualization
Linguistics	LING 3310 Theory of Computing	LING 5110 Introduction to Linguistic Analysis	LING 5160 Methods of Formal Linguistic Analysis	LING 5270 Discourse Analysis	LING 5370 Corpus Approaches to Grammatical Analysis	COM S 5790X Natural Language Processing
Software Engineering & Analytics	COM S 3090 Software Development Practices	COM S 3190 Construction of User Interfaces	COM S 3620 Object-Oriented Analysis and Design	COM S 4130 Foundations and Applications of Program Analysis	COM S 5610 Database Design, Management, and Research	COM S 5710X Introduction to Trustworthy Data Science
Statistics	STAT 4710 Introduction to Experimental Design	STAT 4730 Introduction to Survey Sampling	STAT 4740 Introduction to Bayesian Data Analysis	STAT 4750 Introduction to Multivariate Data Analysis	STAT 4830 Empirical Methods for the Computational Sciences	STAT 5880 Statistical Theory for Research Workers
Numerical Analysis	MATH 3730 Introduction to Scientific Computing	MATH 4070 Applied Linear Algebra	MATH 4230 Mathematical Modeling in Biology	MATH 4240 Introduction to High Performance Computing	MATH 4810 Numerical Methods for Differential Equations	COM S 4740 Introduction to Machine Learning
Computational Biology	BCBIO 3220 Introduction to Bioinformatics and Computational Biology	BCBIO 4010 Fundamentals of Bioinformatics & Computational Biology	BCBIO 4020 Fundamentals of Systems Biology and Network Science	BCBIO 4230 Mathematical Modeling in Biology	COM S 4010 Bioinformatics of Sequences	COM S 4060 Bioinformatics of OMICS