Arkansas - Outreach and Workforce Development in Data Science

Stephen R. Addison

September 19, 2019

Arkansas - Outreach and Workforce Development in Data Science

Stephen R. Addison

September 19, 2019

Workforce – Job Titles

- Data Science Central survey of Data Science Job Titles

https://www.datasciencecentral.com/profiles/blogs/400-categorized-job-titles-for-data-scientists

- 4,900 Unique Job Titles in June 2013
- 7000+, 2 years later

Job Title	Number of People	Level	Category
business analyst	45	Analyst	Business Analytics
business development manager	28	Manager	Business Analytics
director analytics	17	Manager	Business Analytics
business intelligence analyst	17	Analyst	Business Analytics
senior business analyst	17	Analyst	Business Analytics
business development	16	Other	Business Analytics
analytics manager	12	Manager	Business Analytics
marketing manager	11	Manager	Business Analytics
director business development	10	Manager	Business Analytics
business manager	8	Manager	Business Analytics
chief analytics officer	8	Executive	Business Analytics
vp marketing	8	Executive	Business Analytics
business intelligence developer	7	Other	Business Analytics
digital marketing manager	6	Manager	Business Analytics
director marketing	6	Manager	Business Analytics
vp business development	6	Executive	Business Analytics
chief marketing officer	5	Executive	Business Analytics
business intelligence engineer	4	Other	Business Analytics
head analytics	4	Other	Business Analytics
marketing specialist	4	Other	Business Analytics
analytics lead	4	Manager	Business Analytics

Job Title	Number of People	Level	Category
data scientist	148	Other	Data Science
senior data scientist	35	Other	Data Science
chief data scientist	21	Executive	Data Science
chief scientist	16	Executive	Data Science
principal data scientist	14	Consultant	Data Science
lead data scientist	11	Manager	Data Science
senior scientist	9	Other	Data Science
director data science	8	Manager	Data Science
scientist	7	Other	Data Science
principal scientist	7	Consultant	Data Science
data science intern	3	Other	Data Science
decision scientist	3	Other	Data Science

Types of Data Science Jobs

- The Data Analyst
- The Data Engineer
- The Machine Learning Engineer
- The Data Science Generalist

Data Analyst

Critical Knowledge/Skills:

Programing Tools, Data Visualization and Communication

Useful Knowledge/Skills:

Statistics, Data Intuition

Data Analyst

Critical Knowledge/Skills:

Programing Tools (R and Python), Data Visualization and Communication

Useful Knowledge/Skills:

Statistics, Data Intuition

Machine Learning Engineer

Critical Knowledge/Skills:

Programing Tools, Data Intuition, Statistics, Machine learning, Calculus, Linear Algebra

Useful Knowledge/Skills:

Data Visualization and communication, Software Engineering

Data Engineer

Critical Knowledge/Skills:

Programing Tools, Data Wrangling, Software Engineering

Useful Knowledge/Skills:

Data Visualization and Communication, Data Intuition,

Statistics

Data Scientist

Critical Knowledge/Skills:

Programing Tools, Data Visualization and Communication, Data Intuition, Statistics, Data Wrangling, Machine Learning

Useful Knowledge/Skills:

Software Engineering, Calculus, Linear Algebra

Data Science Jobs

- The Data Analyst
- The Data Engineer
- The Machine Learning Engineer
- The Data Science Generalist

Needs for Workforce Development

- Technical Certificates
- Associate's Degrees
- Bachelor's Degrees
- Coding Academies
- Graduate Certificates
- Master's Degrees
- Doctoral Degrees

UNIVERSITY OF CENTRAL ARKANSAS™

NSF EPSCoR – Track 1

Submitted in July

NSF EPSCoR – Track 1

Submitted in July

Data Analytics that are Robust and Trusted (DART)

Transfer Agreements

Clear. Easy to Use. Cost Effective.

The goals for the UCA 2+2 Transfer Agreement program are simple: provide ***clarity*** about degree requirements in a format that is ***easy to use*** and allows for optimal ***degree completion efficiency***.

In short, we're removing the guesswork! On each 2+2 checklist, you will know exactly which courses to take at your current institution and how these courses will apply toward your intended major at UCA.

Want to get started? Select your school from our list of partner institutions, indicate your academic year of entry, and choose your intended major. It's that easy!

Please click on any academic logo below in order to view Transfer Agreements:

ASU-Mountain Home 2019-2020

Select UCA major to view Checklist:

Show 100 entries Search:

Program Title	Degree	UCA Online	UCA Department
Accounting	BBA		Accounting
Business Administration	BBA	Yes	Management Information Systems
Cybersecurity - Cyberphysical Security	BS		Computer Science
Cybersecurity - Cybersecurity Strategic Policy	BS		Computer Science
Cybersecurity - Management of Cybersecurity	BS		Computer Science
Economics - International Trade	BBA		Economics, Finance, and Insurance & Risk Management
Elementary Education K-6	BSE		Elementary, Literacy, and Special Education
Finance	BBA		Economics, Finance, and Insurance & Risk Management
Innovation and Entrepreneurship	BBA		Marketing & Management
Insurance & Risk Management	BBA	Yes	Economics, Finance, and Insurance & Risk Management
Insurance & Risk Management - Personal Financial Planning	BBA		Economics, Finance, and Insurance & Risk Management

UNIVERSITY OF CENTRAL ARKANSAS™

2+2 Degree Plan Checklist
Associate of Science in Liberal Arts and Sciences
BS in Cybersecurity (Cyberphysical Security)

Arkansas State University MOUNTAIN HOME

Arkansas State University - Mountain Home[1]

Associate of Science in Liberal Arts and Sciences[2]

Possible Prerequisites			Semester	Hours	Grade
CPT	0053	Basic Math		N/C	
CPT	0103	College Writing		N/C	
CPT	0123	College Reading		N/C	
CPT	0243	Foundations of Reading and Writing		N/C	
MATH	0003	Beginning Algebra		N/C	
MATH	1003	Intermediate Algebra		N/C	

General Education Requirements (35 credit hours)

General Education Requirements (35 credit hours)

English/Communication (9 credit hours)			UCA[3]	Semester	Hours	Grade
ENG	1003	Composition I	WRTG 1310		3	
ENG	1013	Composition II	WRTG 1320		3	
BUS	2563	Business Communications	MGMT 2301		3	
Mathematics (3 credit hours)			**UCA**	**Semester**	**Hours**	**Grade**
MATH	1023	College Algebra	MATH 1390		3	
Lab Sciences (8 credit hours)			**UCA**	**Semester**	**Hours**	**Grade**
BIOL	1004	Biological Science and Lab *(or other ASLAS Life Science with Lab)*	BIOL 1400		4	
PHYS	1204	Physical Science with Lab *(or other ASLAS Physical Science with Lab)*	PHYS 1400		4	
Fine Arts/Humanities (6 credit hours)			**UCA**	**Semester**	**Hours**	**Grade**
		Choose one:				
ART	2503	Fine Arts - Visual	ART 2300		3	
MUS	2503	Fine Arts - Musical	MUS 2300			
THEA	2503	Fine Arts - Theatre	THEA 2300			
		Choose one:				
ENG	2003	World Literature I	ENGL 2305		3	
ENG	2013	World Literature II	ENGL 2306			
Social Sciences (9 credit hours)			**UCA**	**Semester**	**Hours**	**Grade**
POSC	2103	Introduction to United States Government	PSCI 1330		3	
POSC	XXXX	Introduction to International Relations	PSCI 2300		3	
		Choose one:				
GEOG	2703	World Geography	GEOG 1300		3	
PSY	2513	Introduction to Psychology	PSYC 1300			
SOC	2213	Principles of Sociology *(or other ASLAS Social Science)*	SOC 1300			

Cybersecurity Foundation (25 credit hours)

			UCA	Semester	Hours	Grade
CIS	1106	CISCO Networking I	CSCI 3335		6	
CIS	1206	CISCO Networking II	CSCI 4315		6	
CIS	1023	Programming Fundamentals/Logic	CSCI 1470		3	
CIS	1513	Object Oriented Programming	CSCI 1480		3	
CIS	2683	Computer Forensics	CSEC 3320		3	
CIS	2723	Cybersecurity Essentials	CSEC 2300		3	
		ASLAS Approved Elective			1	

Total Hours: 60[4]

2+2 Degree Plan Checklist
Associate of Science in Liberal Arts and Sciences
BS in Cybersecurity (Cyberphysical Security)

University of Central Arkansas
Bachelor of Science in Cybersecurity (Cyberphysical Security)
UCA Courses (60 credit hours)[5]

Major Requirements (47 credit hours)			Semester	Hours	Grade
CSCI	2320	Data Structures		3	
CSCI	3360	Database Systems (UD UCA Core: C)		3	
CSEC	3300	Number Theory and Cryptography		3	
CSCI	3380	Computer Architecture		3	
CSCI	3330	Algorithms		3	
CSCI	4300	Operating Systems		3	
CSEC	4490	Cybersecurity Capstone (UD UCA Core: Z)		4	
		Choose one:		3	
PHIL	3320	Ethics (UD UCA Core: I, R)			
PHIL	3325	Political Philosophy (UD UCA Core: I, R)			
PHIL	4320	Applied Ethics (UD UCA Core: D, R)			
		Choose one:		3	
MATH	2311	Elementary Statistics			
QMTH	2330	Business Statistics			
PSCI	2312	Statistical Methods for Political Analysis			
MATH	2330	Discrete Structures I		3	
MIS	4355	Project Management (UD UCA Core: Z)		3	
MIS	4361	Cybersecurity Governance and Policy		3	
MATH	1491	Applied Calculus for the Life Sciences		4	
PSCI	3316	Cybersecurity Law & Policy (UD UCA Core: C)		3	
		Upper-Division Core Requirement (D or I)		3	

Cyberphysical Security Concentration (12 credit hours) | Semester | Hours | Grade

Cyberphysical Security Concentration (12 credit hours)			Semester	Hours	Grade
CSCI	3V75	Internship		3	
CSEC	4320	Ethical Hacking		3	
CSEC	4335	Network Security		3	
CSEC	4345	Cyber-Physical Security		3	

Elective (1 credit hour)			Semester	Hours	Grade
		General Elective		1	
			Total Hours:	**120**[6]	

[1] See your ASUMH advisor for degree and graduation information.

[2] Agreement requirements are guaranteed in accordance with the academic year of initial enrollment at ASUMH, not to precede the academic year during which the agreement first took effect. A period of non-enrollment of 12 months or more requires that the student adhere to the agreement revision corresponding with the academic year of re-enrollment.

[3] UCA course is either guaranteed by ACTS (acts.adhe.edu) or by UCA Department Chair approval (if blank, elective credit will be awarded).

[4] Students completing the AS in Liberal Arts and Sciences degree, as shown above, will have satisfied the UCA Lower-Division Core and will be admitted to the BS in Cybersecurity (Cyberphysical Security) degree program as a junior.

[5] In order to receive important communications about transferring to UCA, students are encouraged to create a UCA student account at gopurple.uca.edu. For more information about the 2+2 program, students may also send email inquiries to ucatransfer@uca.edu

[6] This agreement requires 120 credit hours as follows: maximum 60 at ASUMH and remaining 60 at UCA (40 of which must be upper-division).

B.S. Data Science Track

Core Courses (18 hours)

Course No	Course	Credit Hrs	Prerequisite	Semester Offered
MATH 1496	Calculus I	4	C or better in MATH 1390 and MATH 1392; or C or better in MATH 1580; or equivalent	Fall, Spring, & Summer
MATH 1497	Calculus II	4	C or better in MATH 1496.	Fall, Spring, & Summer
MATH 2471	Calculus III	4	C or better in MATH 1497	Fall, Spring, & Summer
MATH 3320	Linear Algebra [Upper Core : I]	3	MATH 1497 or MATH 2330	Fall, Spring, & Summer
MATH 4371	Intro to Probability [Upper Core : R]	3	MATH 1497	Fall, Spring, & Summer

Required Courses (21 hours)				
MATH 2441	Mathematical Computation	4	MATH 1497	Fall
MATH 3311	Statistical Methods	3	MATH 2441 or equivalent or consent of instructor	Spring
MATH 4373	Regression Analysis	3	MATH 3311 or consent of instructor	Fall
MATH 3391	Non-parametric Statistics	3	MATH 3311 or consent of instructor	Fall
MATH 3392	Multivariate Analysis	3	(MATH 3311 and MATH 3320) or consent of instructor	Fall
MATH 4391	Machine Learning	3	MATH 4373 or consent of instructor	Spring
MATH 4395	Practicum in Data Science [Future Upper Core: Z]	3	MATH 4391	Spring

Elective Courses (6 hours)				
MATH 4372	Intro to Statistical Inference	3	MATH 4371 or consent of instructor	Spring
MATH 4374	Intro to Stochastic Processes	3	MATH 4371 or consent of instructor	Spring
MATH 4392	Time Series and Forecasting	3	MATH 4373 or consent of instructor	Spring
MATH 4381	Special Topics (e.g. Experimental Design, Social Network Analysis, etc) (May be taken multiple times if topics differ)	3	Consent of instructor	Fall, Spring

Other Requirements

- Minor required (Computer Science recommended)
- Must complete 120 semester hours including 38 hours of General Education.
- GPA of 2.0 or better in each of the major and minor fields
- Must have 40 hours of upper level (3000 or 4000) courses.
- At least 15 hours of the major must be earned in residence.
- Ancillary Requirements (6 hours):

MIS 4355 – Project Management
MIS 4380 – Business Intelligence

- Completion of all university requirements including the UCA Core.

Moving Forward

- Faculty from industry
- Shared faculty
- Online enhancements
- Distributed departments
- Mentoring
- Partnering
- Shared Courses