

## **B.S. in Data Science – Foundations Track (Effective Fall 2022)**

This track emphasizes the underlying computer science, engineering, mathematics and statistics methodology and theory, and is especially recommended as preparation for graduate study in data science or related fields.

### **Preparatory Subject Matter (39 units)**

- MAT 21A-B-C Calculus (12)
- MAT 22A Linear Algebra (3)
- ECS 17 Data, Logic, and Computing (4)
- ECS 32A Introduction to Programming (4)
- ECS 32B Introduction to Data Structures (4)
- STA 35A Statistical Data Science I (4)
- STA 35B Statistical Data Science II (4)
- STA 35C Statistical Data Science III (4)

### **Depth Subject Matter (52 units)**

#### *Computer Science*

- ECS 116 Databases for Non-Majors (4)
- ECS 117 Introduction to Algorithms for Data Science (4)
- ECS 119 Data Processing Pipelines for Data Science (4)

#### *Probability & Statistics*

- STA 108 Linear Regression (4)
- MAT 135A Probability **OR** STA 131A Introduction to Probability Theory (4)
- STA 141A Fundamentals of Statistical Data Science (4)

#### *Mathematics*

- MAT 167 Applied Linear Algebra **OR** ECS 130 Scientific Computation (4)
- MAT 168 Optimization (4)

#### *Science & Technology Studies*

- STS 101 Data & Society (4)

#### *Machine Learning*

Choose one:

- ECS 111 Machine Learning for Non-Majors (4)
- MAT 170 Mathematics for Data Analytics & Decision Making (4)
- STA 142A Introduction to Statistical Learning (4)

#### *Upper Division Electives*

(12)

Three elective courses in a related discipline. A list of pre-approved electives can be found at <https://statistics.ucdavis.edu/undergrad/data-science/bs-foundations-track/electives>.

- \_\_\_\_\_ (4)
- \_\_\_\_\_ (4)
- \_\_\_\_\_ (4)

<b>Data Science-Foundations Track, B.S. Sample Schedule</b>				
<b>1<sup>st</sup> Year</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	ECS 32B	STA 35B	STA 108	ECS 130 or <b>MAT 167</b>
	STA 35A*	ECS 17*	STA 35C	
		STS 101		
<b>2<sup>nd</sup> Year</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 141A	ECS 116	Elective	
	MAT 135A or STA 131A	ECS 111 or MAT 170 or STA 142A	ECS 117	
<b>3<sup>rd</sup> Year</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	ECS 119	Elective		
	MAT 168	Elective		

**This plan assumes ECS 32A & MAT 21A-C & MAT 22A are complete.**

\*STA 35A can be waived if STA 13 is completed.

\*ECS 17 can be waived if ECS 20 is completed.

## A.B. in Statistics - Applied Statistics Track (Effective Fall 2020)

This major is recommended for students who are interested in applications of statistical techniques to various disciplines, especially the social sciences.

### **Preparatory Subject Matter (20-23 units)**

- MAT 16A-B-C or 17A-B-C or 21A-B-C (21 series preferred) (9-12)
- MAT 22A Linear Algebra (3)
- ECS 32A or 36A Programming (4)
- STA 13 or 32 or 100 Statistics (32 or 100 preferred) (4)

### **Depth Subject Matter (45-48 units)**

#### *Core Coursework*

- STA 106 Analysis of Variance (4)
- STA 108 Regression Analysis (4)
- STA 130A Mathematical Statistics: Brief Course (4)
- STA 130B Mathematical Statistics: Brief Course (4)
- STA 137 Applied Time Series Analysis *or* STA 141A Fundamentals of Statistical Data Science (4)
- STA 138 Analysis of Categorical Data (4)

#### *Restricted Electives*

Choose three: (12)

- STA 104 Nonparametric Statistics (4)
- STA 135 Multivariate Data Analysis (4)
- STA 137 Applied Time Series Analysis (4)
- STA 141A Fundamentals of Statistical Data Science (4)
- STA 141B Data & Web Technologies for Data Analysis *or* STA 141C Big Data & High Performance Statistical Computing (4)
- STA 144 Sampling Theory of Surveys (4)
- STA 145 Bayesian Statistical Inference (4)
- STA 160 Practice in Statistical Data Science (4)
- MAT 168 Optimization (4)
- One approved 4 unit course from STA 199, 194HA, or 194HB (4)

#### *Cluster Electives*

Choose three upper division elective courses outside of Statistics. (9-12)

- \_\_\_\_\_ (3-4)
- \_\_\_\_\_ (3-4)
- \_\_\_\_\_ (3-4)

A list of pre-approved elective courses can be found at <https://statistics.ucdavis.edu/undergrad/ab-applied-track/electives>.

<b>Applied Track, A.B. Sample Schedule</b>				
<b>Junior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	Approved Elective	STA 130A	STA 137 or 141A	
	STA 106/108	STA 106/108	STA130B	
<b>Senior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 138	STA/MAT 1XX	STA 1XX	
	Approved Elective	STA 1XX	Approved Elective	

**This plan assumes all preparatory subject matter coursework is complete.**

## B.S. in Statistics - Applied Statistics Track (Effective Fall 2020)

This major is recommended for students who are interested in applications of statistical techniques to various disciplines including the biological, physical and social sciences.

### **Preparatory Subject Matter (20-23 units)**

- MAT 16A-B-C or 17A-B-C or 21A-B-C (21 series preferred) (9-12)
- MAT 22A Linear Algebra (3)
- ECS 32A or 36A Programming (4)
- STA 13 or 32 or 100 Statistics (32 or 100 preferred) (4)

### **Cluster Elective Prerequisites**

(7-8)

Two introductory courses serving as the prerequisites to the chosen Cluster Electives (see **Cluster Electives** section below).

- \_\_\_\_\_ (3-4)
- \_\_\_\_\_ (4)

### **Depth Subject Matter (45-48 units)**

#### *Core Coursework*

- STA 106 Analysis of Variance (4)
- STA 108 Regression Analysis (4)
- STA 130A Mathematical Statistics: Brief Course (4)
- STA 130B Mathematical Statistics: Brief Course (4)
- STA 138 Analysis of Categorical Data (4)
- STA 141A Fundamentals of Statistical Data Science (4)

#### *Restricted Electives*

Choose three:

(12)

- STA 104 Nonparametric Statistics (4)
- STA 135 Multivariate Data Analysis (4)
- STA 137 Applied Time Series Analysis (4)
- STA 141B Data & Web Technologies for Data Analysis *or* STA 141C Big Data & High Performance Statistical Computing (4)
- STA 144 Sampling Theory of Surveys (4)
- STA 145 Bayesian Statistical Inference (4)
- STA 160 Practice in Statistical Data Science (4)
- MAT 168 Optimization (4)
- One approved 4 unit course from STA 199, 194HA, or 194HB (4)

#### *Cluster Electives*

Choose four upper division elective courses outside of Statistics.

(12-16)

- \_\_\_\_\_ (3-4)
- \_\_\_\_\_ (3-4)
- \_\_\_\_\_ (3-4)
- \_\_\_\_\_ (3-4)

A list of pre-approved elective courses can be found at <https://statistics.ucdavis.edu/undergrad/ab-applied-track/electives>.

<b>Applied Track, B.S. Sample Schedule</b>				
<b>Junior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 106/108	STA 130A	STA 141A	
	Approved Elective	STA 106/108	STA130B	
<b>Senior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 138	STA/MAT 1XX	STA 1XX	
	Approved Elective	STA 1XX	Approved Elective	
	Approved Elective			

**This plan assumes all preparatory subject matter coursework is complete.**

## **B.S. in Statistics - General Statistics Track** (Effective Fall 2020)

Emphasizes statistical theory and is especially recommended as preparation for graduate study in statistics.

### **Preparatory Subject Matter (27-28 units)**

- MAT 21A-B-C Calculus (12)
- MAT 21D Vector Analysis (4)
- MAT 22A or 67 Linear Algebra (4)
- ECS 32A or 36A Programming (4)
- STA 13 or 32 or 100 Statistics (32 or 100 preferred) (4)

### **Depth Subject Matter (55-56 units)**

#### *Core Coursework*

##### *Statistics*

- STA 106 Analysis of Variance (4)
- STA 108 Regression Analysis (4)
- STA 131A Intro to Probability Theory (4)
- STA 131B Intro to Mathematical Statistics (4)
- STA 131C Intro to Mathematical Statistics (4)
- STA 138 Analysis of Categorical Data (4)

##### *Mathematics*

(16)

- MAT 127A Real Analysis (4)
- MAT 127B Real Analysis (4)
- MAT 108 Abstract Math *or* MAT 127C Real Analysis (4)
- MAT 167 Applied Linear Algebra (4)

### **Restricted Electives**

Choose three:

(12)

- STA 104 Nonparametric Statistics (4)
- STA 135 Multivariate Data Analysis (4)
- STA 137 Applied Time Series Analysis (4)
- STA 141A Fundamentals of Statistical Data Science (4)
- STA 141B Data & Web Technologies for Data Analysis *or* STA 141C Big Data & High Performance Statistical Computing (4)
- STA 142A Statistical Learning I (4)
- STA 142B Statistical Learning II (4)
- STA 144 Sampling Theory of Surveys (4)
- STA 145 Bayesian Statistical Inference (4)
- STA 160 Practice in Statistical Data Science (4)
- MAT 168 Optimization (4)
- One approved 4 unit course from STA 199, 194HA, or 194HB (4)

### **Related Elective Course**

(3-4)

One upper division course approved by faculty advisor. A list of pre-approved electives can be found at

<https://statistics.ucdavis.edu/undergrad/bs-general-track/electives>.

- \_\_\_\_\_

<b>General Track, B.S. Sample Schedule</b>				
<b>Junior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 131A	STA 131B	STA 131C	Approved Elective
	STA 106/108	STA 106/108	MAT 108*	MAT 167
<b>Senior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 138	STA/MAT 1XX	STA 1XX	
	MAT 127A	MAT 127B	STA 1XX	
			MAT 127C*	

\*Choose 1 of: MAT 108 and 127C

**This plan assumes all preparatory subject matter coursework is complete.**



## **B.S. in Statistics – Statistical Data Science Track** (Effective Fall 2020)

This track emphasizes data handling skills and statistical computation. It is recommended for students interested in statistical learning methodology, advanced data handling techniques and computational aspects of statistical analysis.

### **Preparatory Subject Matter (27 units)**

- MAT 21A-B-C Calculus (12)
  - MAT 21D Vector Analysis (4)
  - MAT 22A Linear Algebra (3)
  - ECS 32A or 36A Programming (4)
- (Note: Additional coursework in Python is strongly recommended (e.g. ECS 32B))
- STA 13 or 32 or 100 Statistics (32 or 100 preferred) (4)

### **Depth Subject Matter (52 units)**

#### *Core Coursework*

##### *Statistics*

- STA 106 Analysis of Variance (4)
- STA 108 Regression Analysis (4)
- STA 131A Intro to Probability Theory *or* STA 130A Mathematical Statistics: Brief Course (4)
- STA 131B Intro to Mathematical Statistics *or* STA 130B Mathematical Statistics: Brief Course (4)
- STA 135 Multivariate Data Analysis (4)
- STA 141A Fundamentals of Statistical Data Science (4)
- STA 141B Data & Web Technologies for Data Analysis (4)
- STA 141C Big Data & High Performance Statistical Computing (4)
- STA 160 Practice in Statistical Data Science (4)

##### *Machine Learning*

- STA 142A Statistical Learning I or ECS 171 Machine Learning (4)

##### *Mathematics*

- MAT 167 Applied Linear Algebra or MAT 168 Optimization (4)

### ***Restricted Electives***

Choose two: (8)

- STA 104 Applied Statistical Methods: Nonparametric Statistics (4)
- STA 137 Applied Time Series Analysis (4)
- STA 138 Analysis of Categorical Data (4)
- STA 142A Statistical Learning I\* (4)
- STA 142B Statistical Learning II (4)
- STA 144 Sampling Theory of Surveys (4)
- STA 145 Bayesian Statistical Inference (4)
- STA 141C Big Data & High Performance Statistical Computing (4)
- STA 160 Practice in Statistical Data Science (4)
- One approved 4 unit course from STA 199, 194HA, or 194HB (4)
- MAT 128A Numerical Analysis (4)
- MAT 170 Mathematics for Data Analytics & Decision Making (4)
- ECS 122A Algorithm Design & Analysis (4)
- ECS 158 Programming on Parallel Architectures (4)
- ECS 163 Information Interfaces (4)
- ECS 165A Database Systems (4)

\*Note: A course used to fulfill the core requirement cannot be used as an elective.

<b>Statistical Data Science Track, B.S. Sample Schedule</b>				
<b>Junior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 131A or 130A	STA 131B or 130B	STA/MAT/ECS 1XX	MAT 167 or 168
	STA 106/108	STA 106/108	STA 141A	
<b>Senior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA/MAT/ECS 1XX	STA 142A or ECS 171	STA 135	
	STA 141B	STA 141C	STA 160	

**This plan assumes all preparatory subject matter coursework is complete.**

## **B.S. in Statistics – Machine Learning Track** (Effective Fall 2020)

This track emphasizes algorithmic and theoretical aspects of statistical learning methodologies that are geared towards building predictive and explanatory models for large and complex data. It is recommended for students interested in pursuing graduate programs in statistics, machine learning, or data science, as well as for students interested in learning statistical techniques for industry.

### **Preparatory Subject Matter (27 units)**

- MAT 21A-B-C Calculus (12)
- MAT 21D Vector Analysis (4)
- MAT 22A Linear Algebra (4)
- ECS 32A or 36A Programming (4)
- (Note: Additional coursework in Python is strongly recommended (e.g. ECS 32B))
- STA 13 or 32 or 100 Statistics (32 or 100 preferred) (4)

### **Depth Subject Matter (52 units)**

#### *Core Coursework*

##### *Statistics*

- STA 106 Analysis of Variance (4)
- STA 108 Regression Analysis (4)
- STA 131A Intro to Probability Theory (4)
- STA 131B Intro to Mathematical Statistics (4)
- STA 131C Intro to Mathematical Statistics (4)
- STA 141A Fundamentals of Statistical Data Science (4)
- STA 142A Statistical Learning I (4)
- STA 142B Statistical Learning II (4)
- STA 144 Sampling Theory of Surveys or STA 145 Bayesian Statistical Inference (4)

##### *Mathematics*

- MAT 167 Applied Linear Algebra or MAT 168 Optimization (4)

#### *Restricted Electives*

Choose three: (12)

- STA 104 Applied Statistical Methods: Nonparametric Statistics (4)
- STA 135 Multivariate Data Analysis (4)
- STA 137 Applied Time Series Analysis (4)
- STA 138 Analysis of Categorical Data (4)
- STA 141B Data & Web Technologies for Data Analysis (4)
- STA 141C Big Data & High Performance Statistical Computing (4)
- STA 144 Sampling Theory of Surveys\* (4)
- STA 145 Bayesian Statistical Inference\* (4)
- One approved 4 unit course from STA 199, 194HA, or 194HB (4)
- MAT 127A Real Analysis (4)
- MAT 128A Numerical Analysis (4)
- MAT 170 Mathematics for Data Analytics & Decision Making (4)
- ECS 122A Algorithm Design & Analysis (4)
- ECS 158 Programming on Parallel Architectures (4)
- ECS 163 Information Interfaces (4)

- ECS 160 Software Engineering (4)
- ECS 170 Introduction to Artificial Intelligence (4)
- ECS 174 Computer Vision (4)

\*Note: A course used to fulfill the core requirement cannot be used as an elective.

<b>Machine Learning Track, B.S. Sample Schedule</b>				
<b>Junior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 131A	STA 131B	STA 131C	MAT 167 or 168
	STA 106/108	STA 106/108	STA 141A	
<b>Senior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA/MAT/ECS 1XX	STA/MAT/ECS 1XX	STA 144 or 145	
	STA/MAT/ECS 1XX	STA 142A	STA 142B	

**This plan assumes all preparatory subject matter coursework is complete.**

## **B.S. in Statistics – Computational Statistics Track (Effective Fall 2020)**

Recommended for students interested in the computational and data management aspects of statistical analysis.

### **Preparatory Subject Matter (27 units)**

- MAT 21A-B-C Calculus (12)
- MAT 21D Vector Analysis (4)
- MAT 22A Linear Algebra (4)
- ECS 34 or 36C Programming (4)
- STA 13 or 32 or 100 Statistics (32 or 100 preferred) (4)

### **Depth Subject Matter (52 units)**

#### *Statistics*

- STA 106 Analysis of Variance (4)
- STA 108 Regression Analysis (4)
- STA 131A Intro to Probability Theory (4)
- STA 131B Intro to Mathematical Statistics (4)
- STA 141A Fundamentals of Statistical Data Science (4)

Choose two: (8)

- STA 104 Applied Statistical Methods: Nonparametric Statistics (4)
- STA 135 Multivariate Data Analysis (4)
- STA 137 Applied Time Series Analysis (4)
- STA 138 Analysis of Categorical Data (4)
- STA 142A Statistical Learning I (4)
- STA 142B Statistical Learning II (4)
- STA 144 Sampling Theory of Surveys (4)
- STA 145 Bayesian Statistical Inference (4)
- STA 160 Practice in Statistical Data Science (4)
- One approved 4 unit course on STA 199, STA 194HA, or STA 194HB (4)

*Programming, Data Management & Data Technologies* (8)

- ECS 130 Scientific Computation or ECS 145 Scripting Languages & Their Applications (4)
- ECS 165A Database Systems (4)

*Scientific Computational Algorithm & Visualization*

Choose two: (8)

- ECS 122A Algorithm Design & Analysis (4)
- ECS 129 Computational Structural Bioinformatics (4)
- ECS 140A Programming Languages (4)
- ECS 158 Programming on Parallel Architectures (4)
- ECS 163 Information Interfaces (4)
- STA 141B Data & Web Technologies for Data Analysis (4)
- STA 141C Big Data & High Performance Statistical Computing (4)

#### *Mathematics*

Choose two: (8)

- MAT 124 Mathematical Biology (4)

- MAT 128A Numerical Analysis (4)
- MAT 128B Numerical Analysis in Solution of Equations (4)
- MAT 129 Fourier Analysis (4)
- MAT 145 Combinatorics (4)
- MAT 148 Discrete Mathematics (4)
- MAT 170 Mathematics for Data Analytics & Decision Making (4)
- MAT 165 Mathematics & Computers (4)
- MAT 167 Applied Linear Algebra (4)
- MAT 168 Optimization (4)

<b>Computational Statistics, B.S. Sample Schedule</b>				
<b>Junior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 131A	STA 131B	STA 141A	MAT 1XX
	STA 106/108	STA 106/108	MAT 1XX	
<b>Senior</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer I &amp; II</b>
	STA 1XX	ECS 165A	STA 1XX	
	STA 141B or ECS 1XX	ECS 130 or 145	STA 141C or ECS 1XX	

**This plan assumes all preparatory subject matter coursework is complete.**