

### Data Science Certificate Application Electives

| <u>Course #</u>                 | <u>Course Name</u>                               | <u>Credits</u> | <u>Semester</u> | <u>Required Pre-Reqs (C minimum grade needed)</u>                                                                                                                                                                                           |
|---------------------------------|--------------------------------------------------|----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Data Science Certificate</i> |                                                  |                |                 |                                                                                                                                                                                                                                             |
| ANTH 5234                       | Population Issues in Anthropology                | 3              | Fall            | MATH 1030 OR higher AND (ANTH 1010 OR ANTH 1020 OR ANTH 1030 OR ANTH 1050)                                                                                                                                                                  |
| ASTR 3850                       | Lightsapes                                       | 3              | Fall            |                                                                                                                                                                                                                                             |
| ASTR 4060                       | Observational Astronomy                          | 3              | Fall            | Prerequisites: "C-" or better in (MATH 1210 OR MATH 1250 OR MATH 1311 OR MATH 1310 OR AP Calculus AB score of 4+ OR AP Calculus BC score of 3+) AND (PHYS 2010/2210/3210) AND (ASTR/PHYS 1060 OR PHYS 2020/2220/3220) OR instructor consent |
| ATMOS 3000                      | Professional Development in Atmospheric Sciences | 2              | Fall            |                                                                                                                                                                                                                                             |
| ATMOS 5340                      | Environmental Programming AND Statistics         | 3              | Varies          | MATH 1210                                                                                                                                                                                                                                   |
| ATMOS 5400                      | The Climate System                               | 3              | Fall            | Math 1050                                                                                                                                                                                                                                   |
| BIOL 3150                       | Genomics and Bioinfo                             | 3              | Spring          | C-' or better in BIOL 1210 OR BIOL 1610. Corequisites: BIOL 2020.                                                                                                                                                                           |
| BIOL 3515                       | Biological Chemistry Laboratory                  | 3              | Spring          | Co-Req: C- or better BIOL 3510 OR CHEM 3510                                                                                                                                                                                                 |
| BME 3101                        | Biosignals Analysis                              | 3              | Spring          | "C" or better in ((MATH 2250 OR (MATH 2270 and 2280)) AND PHYS 2220) AND BME Upper-Division Ready (see Program Admission Requirements). Corequisites: "C" or better in (BME 3301 OR CS 1400 OR CS 1420).                                    |
| BME 3202                        | Physiol for Engineers                            | 4              | Fall            | "C" or better in (BME 3301 OR CS 1400 OR CS 1420) AND (BIOL 2020 OR BIOL 2021) AND BME Upper-Division Ready (see Program Admission Requirements).                                                                                           |
| BME 6005                        | Computational Neuroscience                       | 3              | Spring          | Prerequisites: Graduate status OR Instructor Consent.                                                                                                                                                                                       |

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| BME 6770  | Genomic Signal Processing                                                | 3 | Spring             | Graduate Status or instructor consent          |
| BME 6780  | Data Science for Bioengineers                                            | 3 | Fall               | BME 3301 OR equivalent (Instructor permission) |
| BMI 5010  | Foundations of Health Informatics                                        | 2 | Fall               |                                                |
| BMI 5018  | Intro to Prof for Biomedical Data Science                                | 3 | Fall               |                                                |
| BMI 5030  | Foundations of Bioinformatics                                            | 2 | Fall               |                                                |
| BMI 6015  | Applied Machine Learning in BMI                                          | 3 | Fall               |                                                |
| BMI 6060  | Applied Computational Genomics                                           | 3 | Spring             | Knowledge of Molecular Biology                 |
| CS 3540   | Human/Computer Interaction                                               | 3 | Fall/Spring        | CS 2420 AND Full Major Status in CS            |
| CS 5140   | Data Mining                                                              | 3 | Fall               | CS 3190 AND Full Major Status in CS            |
| CS 5530   | Database Systems                                                         | 3 | Spring             | CS 3500 AND Full Major Status in CS            |
| ECON 3100 | Labor Economics                                                          | 3 | Fall/Spring/Summer |                                                |
| ECON 3200 | Money and Banking                                                        | 3 | Fall/Spring/Summer |                                                |
| ECON 3500 | International Economics                                                  | 3 | Fall/Spring        |                                                |
| ECON 3540 | Current Economic Problems                                                | 3 |                    |                                                |
| ECON 4010 | Intermediate Microeconomic Analysis                                      | 3 | Fall/Spring/Summer | SEE CATALOG FOR PREREQS                        |
| ECON 4011 | Intermediate Microeconomic Analysis for Business Economics and Analytics | 3 | Fall/Spring        | SEE CATALOG FOR PREREQS                        |

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| ECON 4020  | Intermediate Macroeconomic Analysis      | 3 | Fall/Spring/Summer | SEE CATALOG FOR PREREQS                                                                                                                                                      |
| ECON 4650  | Principles of Econometrics               | 3 | Fall/Spring/Summer | SEE CATALOG FOR PREREQS                                                                                                                                                      |
| ECON 5190  | Health Economics                         | 3 | Fall/Spring        |                                                                                                                                                                              |
| FINAN 3000 | Fund of Investing and Business Finance   | 3 | Fall/Spring/Summer | SEE CATALOG FOR PREREQS                                                                                                                                                      |
| FINAN 3140 | Intro to Bank & Fintech                  | 3 | Fall/Spring        |                                                                                                                                                                              |
| FINAN 4070 | Investments                              | 3 | Fall/Spring/Summer | SEE CATALOG FOR PREREQS                                                                                                                                                      |
| FINAN 5050 | Financial Management                     | 3 | Fall/Spring/Summer | Prerequisites: 'C-' or better in MATH 1050 OR MATH 1080 OR MATH 1090 OR MATH 1100 OR MATH 1105 OR MATH 1210 OR MATH 1310 OR AP Calc AB score of 3+ OR AP Calc BC score of 3+ |
| FINAN 5115 | Fintech Workshop                         | 3 | Spring             | C+ or better in BCOR 3020 OR FINAN 3020 OR FINAN 5050                                                                                                                        |
| FINAN 5140 | Fintech Trading Lab                      | 3 | Fall               | C-' or better in BCOR 3020 OR FINAN 3020 OR FINAN 5050                                                                                                                       |
| GEO 3070   | Mineralogy and Petrology for Engineers   | 2 | Every other Fall   | GEO 1110 AND GEO 1115                                                                                                                                                        |
| GEOG 3020  | Geographic Analysis                      | 4 | Spring             | SEE CATALOG FOR PREREQS                                                                                                                                                      |
| GEOG 3110  | Introduction to Remote Sensing           | 3 | Fall               |                                                                                                                                                                              |
| GEOG 4140  | ADV Methods in Geographic Info Systems   | 4 | Fall/Spring        | GEOG 3100 OR GEOG 3140                                                                                                                                                       |
| GEOG 5110  | Environ. Analysis through Remote Sensing | 3 | Spring             | GEOG 3110                                                                                                                                                                    |
| GEOG 4150  | Geospatial Big Data                      | 4 | Fall               | GEOG 4140                                                                                                                                                                    |

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| GEOG 5160  | Spatial Modelling and Geocomputation    | 4 | Spring             | GEOG 4140                                                                              |
| GNDR 3635  | The Price of Gender                     | 3 | Fall/Spring        |                                                                                        |
| IS 4420    | Database Fundamentals                   | 3 | Fall/Spring/Summer | SEE CATALOG FOR PREREQS                                                                |
| IS 4482    | Data Mining for Business Applications   | 3 | Fall               | SEE CATALOG FOR PREREQS                                                                |
| LING 2475  | Language Myths                          | 3 | Fall/Spring        |                                                                                        |
| LING 3020  | Introduction to Syntax                  | 3 | Fall/Spring        | C-' or better in LING 2200                                                             |
| LING 3340  | Introduction to Computation Linguistics | 3 | Every other Spring | LING 2200 AND (LING 2300 OR CS 1420)                                                   |
| MATH 3080  | Applied Statistics II                   | 3 | Spring             | MATH 3070                                                                              |
| MATH 5010  | Introduction to Probability             | 3 | Fall/Spring/Summer | C' or better in (MATH 1260 OR MATH 1321 OR MATH 2210 OR MATH 2310 OR MATH 3140)        |
| ME EN 3310 | Mechanics of Materials                  | 3 | Fall/Spring        | SEE CATALOG FOR PREREQS                                                                |
| ME EN 3315 | Mechanics of Materials Lab              | 1 | Fall/Spring        | Full Major status in Mechanical Engineering. Corequisites: 'C' or better in ME EN 3310 |
| ME EN 4650 | Thermal Fluid and Energy Systems Lab    | 3 | Fall/Spring        | ME EN 2550, 3400, (2300, OR 3600 OR 3610) AND (37100 3710); Co Req: 4610 OR 3650       |
| ME EN 5035 | Design of Experiments                   | 3 | Spring             | C' or better in (ME EN 2550 OR MATH 3070)                                              |
| PHIL 3200  | Deductive Logic                         | 3 | Fall/Spring        |                                                                                        |
| PHIL 3210  | Inductive Logic                         | 3 | Fall/Spring        |                                                                                        |
| PHIL 3440  | Cognitive Science                       | 3 | Fall/Spring        |                                                                                        |

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| PHIL 5200  | Advanced Deductive Logic                                         | 3 | Fall               | PHIL 3200 OR PHIL 3210                                                                                                                |
| PHIL 5210  | Advanced Inductive Logic                                         | 3 | Fall/Spring        | PHIL 3200 OR PHIL 3210                                                                                                                |
| PHIL 5220  | Rational Choice Theory                                           | 3 | Fall/Spring        | PHIL 3200 OR PHIL 3210.                                                                                                               |
| POLS 3001  | Political Analysis                                               | 3 | Fall/Spring/Summer |                                                                                                                                       |
| POLS 6001  | Quant Analysis-Pol S                                             | 3 | Fall/Spring        | Recommended Prerequisite: POLS 3001 or instructor consent.                                                                            |
| PRT 3780   | Evidence-based Decision Making in Parks, Recreation, and Tourism | 3 | Fall/Summer        | Complete 2 classes that fulfill a QA and WR2                                                                                          |
| PSY 3000   | Statistical Methods in Psychology                                | 4 | Fall/Spring/Summer | SEE CATALOG FOR PREREQS                                                                                                               |
| QAMO 2011  | Honors Intro QuantBusEc                                          | 3 | Fall               | Department Consent                                                                                                                    |
| QAMO 3010  | Buesinss Economics                                               | 3 | Fall               | SEE CATALOG FOR PREREQS                                                                                                               |
| QAMO 3201  | Money and Banking BEA                                            | 3 | Fall/Spring        | Prerequisites: ('B' or better in MATH 1220 OR MATH 1320 OR MATH 1321) OR AP Calculus BC score of 4+.                                  |
| QAMO 4651  | Econometrics for BEA                                             | 3 | Fall               | Prerequisites: ('B' or better in MATH 1220 OR MATH 1320 OR MATH 1321 OR AP Calculus BC score of 4+) AND ('B' or better in QAMO 3100). |
| ROBOT 6400 | Neural Engineering and NeuroRobotics                             | 4 | Fall               | Graduate status OR Instructor Consent                                                                                                 |
| SOC 3673   | Social Epidemiolgy                                               | 3 | Fall/Spring/Summer |                                                                                                                                       |
| STAT 5003  | Survey of Statistical Computer Packages                          | 3 | Fall/Spring        | Knowledge of spreadsheets and applied statistics through regression                                                                   |
| WRTG 4030  | Visual Rhetoric                                                  | 3 | Fall/Spring/Summer | WRTG 2009 OR 2010 OR WR2 Equivalent                                                                                                   |

## Data Science Certificate Application Electives

Other comparable courses may also be eligible to fulfill elective requirements. To request approval, please email [ds-ugshelp@cs.utah.edu](mailto:ds-ugshelp@cs.utah.edu) with the course name and number, a brief description of the course content (such as from the syllabus), and a short explanation of why you believe the course is appropriate for elective credit.