



# Department Master Syllabus

**Camden County College**

**Blackwood, New Jersey**

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| **Course Number:**  DSC-101 | | **Course Title:**  Data Science I | | | |
| **Department/Program:** Mathematics | | | | | |
| **Date of Review:** | |  | | | |
| (This Department Master Syllabus has been examined by the program/department faculty members and it is decided that no revision is necessary at this time.) | | | | | |
| **Date of Revision:** April | | | | 2024 | |
| (This Department Master Syllabus has been examined by the program/department faculty members and it is decided a change requiring a revision is necessary at this time.) | | | | | |
| N.B. A change to the course materials alone (textbooks and/or supplementary materials) may not constitute a revision. Any other change to the items listed below on this form is considered a revision and requires approval by the department/program faculty at a department/program meeting and by the division at a Chairs and Coordinator meeting. | | | | | |
| **Credits:**3 | | | | | |
| **Contact Hours** | **Lecture:** 2 | | **Lab:** 2 | | **Other:** 0 |
| Prerequisites: ENG-013 AND ENG-023 OR ENG-046 AND MTH-100 | | | | | |
| Co-requisites: N/A | | | | | |
| Course Description: This course offers an overview of all stages of the data life cycle through which students will gain knowledge of foundational topics in data science and analytics. Topics include problem formulation, data collection and cleansing, data analysis, visualization, and communication of findings.  In both lecture and lab, students will examine different types of data, storage formats, and some of the tools available today for performing data science tasks. Data science software tools, programming languages, and techniques will be integrated into all topics. Tools include Excel, Python, R, SQL, Tableau, and other trending technologies. | | | | | |
| **Student Learning Outcomes (SLOs)**  Course specific student learning outcomes  Upon completion of this course the student will be able to:   * Explain the data life cycle and ethical practices from problem formulation to communication of results as assessed by tests, projects and labs. * Collect, clean and prepare the data for analysis and identify problems that might arise from assumptions made during this process as assessed by tests, projects and labs. * Apply exploratory data analysis to identify problems and patterns in the data, including problems associated with missing data as assessed by tests, projects and labs. * Solve problems, including introductory statistical applications, basic modeling for prediction and statistical inference, using basic data science procedures, programming languages, and software tools utilized in data science as assessed by tests, projects and labs. * Produce and interpret data visualizations and summaries, including dashboards, graphs and charts to describe and gain insights into the data and communicate findings as assessed by tests, projects and labs.   As assessed by:  Homework, tests, quizzes, and projects | | | | | |
| **General Education Student Learning Outcomes**  If this course has applied for General Education Elective Status the general education student learning outcomes listed below must exactly match those the sponsor has identified on the General Education Request form.  General Education SLOs:  N/A  As assessed by:  N/A | | | | | |
| **Program Learning Outcomes**  List all course level student learning outcomes that interconnect to a particular program learning outcome.   1. All CSLOs are connected to DSC.AAS PSLO 2 (Develop solid analytical reasoning, critical thinking and technical skills in order to extract, mangle, analyze and present data for multiple disciplines to broad audiences that follow professional standards to enhance understanding and decision-making.) and PSLO 3 (Demonstrate the ability to work independently and as a member of a team with modern technical tools to accomplish data life cycle projects goals and meet deadlines.) 2. CSLO 5 is connected to DSC.AAS PSLO 4 (Communicate technical knowledge effectively for a broad range of persons that include customers, managers, and peers.)   Describe the assessment of the interconnected program learning outcome(s).  Various course level assessment instruments will be used to target specific program learning outcomes. | | | | | |
| **Course Outline:**  I.             The Data Science Model                 A.           The need for data science and analytics                 B.           Data Science Workflow                 C.           Data Everywhere                 D.           Problem Solving                 E.            Forming the right questions    II.           Problem Identification and Approach                 A.           Define the problem                 B.           Available data resources                 C.           Problem plan                 D.           Workflow: Order of events    III.          Data Collection                 A.           Data types and formats  1.            Structured and unstructured data  2.            Examining and obtaining:                  text, csv, and spreadsheet data, XML, NoSQL, and JSON data, GPS and multi-  media data                 B.           Data collection                                1.            Data collection planning                                2.            Methods of collection                                3.            Importing, retrieving, and storing data                                4.            Data governance                                5.            Data quality    IV.          Data cleansing and pre-processing                 A.           Data preparation methods and tools                 B.           Data extraction and mining                 C.           Data wrangling                                1.            Blending data from multiple sources and formats                                2.            Transforming the data for analysis                                3.            Querying and summarizing data                                4.            Data munging    V.           Exploratory Data Analysis                 A.           Formulate questions                 B.           Data analysis best practices                 C.           Data decision making tools and techniques                 D.           Functions for calculating basic probability and statistics                 E.            Organizing data to formulate solutions                 F.            Description, prediction and inference                                1.      Issues and challenges of making inferences from data                 G.           Case studies   VI. Data Visualization  A. Data visualization best practices  B. Communicating through different types of graphical presentations  C. Exploring tools, packages, and technologies for graphs and data representations  D. Multivariate visualizations  E. Formatting of visualization  F. Dashboards  G. Communicating the results and recommendations    VII.         Additional topics at the instructor’s discretion:                 A.           Big data                 B.           Project management                 C.           Artificial intelligence                 D.           Emerging trends in data science | | | | | |
| **Course Activities:**    The classroom activities will include formal and informal lectures and structured, supervised active learning laboratory sessions. During lectures, new material and assigned problems will be explained. Students are encouraged to contribute to the discussion and to ask questions about the material. Active laboratory learning sessions will include individual and team projects that use individual and collaborative modern software tools to examine, develop and report on data science case studies. | | | | | |
| **Course Materials:**  Textbook(s): OER  Supplemental Materials: OER  Software Licenses: Free software tools  Computers: Students will need access to computers for homework and projects. | | | | | |
| **Course Assessment Plan**  How often and by what means will the effectiveness of this course as part of the curriculum be assessed?    Assessment cycle to be determined by the members of the Mathematics department. Students will be evaluated on the degree to which student learning outcomes are achieved. Assessment instruments may be in the form of tests and/or projects. | | | | | |