**Facilitation Guide**

Data Science for Public Service Consortium

1. **Overview**

This guide outlines the steps required to adapt the **<DS4PS Course>** to your term, your institution, and the custom content you wish to teach. Complete the following fields in order to prepare your custom course.

1. **Course Introduction.** This course introduces students to the field of data science and its applications in the public and nonprofit sectors. Modern performance management and evaluation processes require strong data literacy and the ability to combine and analyze data from a variety of sources to inform managerial and policy making decisions. This course offers a practical, tools-based approach that is designed to build introductory foundations for people who want to work as analysts, data-enabled managers, data-driven journalists, etc. It will cover data programming fundamentals, visualization, text analysis, automated reporting, and interactive dashboard design.
2. **Learning Objectives.** The **<DS4PS Course>** aims to fulfill the following learning objectives, including learning:  
   1. Fundamental programmatic building blocks of the R language for object-oriented programming (OOP) and data analytic policymaking.
   2. Conditional statements using comparators and logical operators for advanced filtering and other control flow structures.
   3. Perform intermediate data manipulation tasks such as dimension reduction, conditional filtering, group-wide operations, and summary statistical operations.
   4. Merge ("join") datasets using shared variables in order to integrate multiple data sources fluidly, programmatically, and reproducibly.
   5. Visualize data using at least one major graphics library, such as base R "graphics" or "ggplot2", and a variety of plot types, including interactive data visualization with "plotly".
   6. Create an interactive reporting dashboard using the R Shiny framework and at least one of several dashboarding libraries.
   7. Combine human- and machine-readable language to develop both interactive reports and advanced tutorials on various R topics, functions, libraries, etc.
3. **Alternative Learning Objectives.** According to the original syllabus…
   1. Mastery of functions and arguments as the building blocks of R
   2. Knowledge of variable types and data structures in R, including construction and manipulation
   3. Use of logical statements to create and analyze groups within data
   4. Ability to build custom visualizations through the base R graphics package
   5. Creation of dynamic graphics and data dashboards using R shiny tools
4. **Format & Pedagogical Theory**
   1. **Incremental Progression**Mastering advanced analytical techniques and data programming is like learning a language. You start by mastering basic vocabulary that is specific to statistics and data science. Through your coursework you will become conversant in the domains of regression analysis, research design, and data science. Progress might be slow at first as you work to master core concepts, integrate the building blocks into a coherent mental model of real-world problems, learn to translate technical results into clear narratives for non-technical audiences, and become comfortable with data programming skills.  
        
      Over time you will find that your thought processes change as you approach problem-solving in a more structured and evidence-based manner, you apply counterfactual reasoning to performance problems, and you start reading the news and viewing scientific evidence differently. You begin to think and speak like a program evaluator.
   2. **Fluency**By the end of this degree you will be conversant in statistics, research design, and data programming. Fluency takes time and will be developed through professional experience. It requires you to practice these skills to develop muscle memory. You can do this through participating in evaluations on the job and gaining experience building and cleaning data sets from scratch. Understand, though, that this degree focuses on building foundations for your career.  
        
      Don't be nervous if it feels like it's impossible to master all of the material in this program – it is impossible to learn everything in this field in one lifetime.
   3. **Retention**Similar to immersion in a language, the best way to learn the material is to be consistent in doing course work each day. The more frequently you revisit concepts and practice data programming the more you will absorb. The curriculum has been designed around this approach. Lectures are split into small units, and each unit includes questions to test your understanding of the material. Weekly labs allow you to spend some time applying the material to a specific problem. The final projects at the end of the semester are designed to help you make connections between concepts and consolidate knowledge.  
        
      You will be much better off spending a small amount of time each day on the material instead of trying to cram everything into a couple of days a week.
   4. **Discussion**Online discussion boards are design for students to engage with the material together. The purpose of online discussion sessions is threefold: (1) the online discussion sessions allow students to interact with their peers and share ideas and interpretations of the assigned material, (2) such peer-to-peer discussion online helps build professional relationships with potential future colleagues in the field, and (3) the discussions permit the instructor to assess student engagement with the assigned material.  
        
      The online discussions are explicitly intended to meet the objectives stated above. They are not intended as another form of "lecture" where the instructor provides commentary and students simply react to that. Rather, the discussions are a chance for peer-to-peer interaction and proactive engagement by each individual student.
   5. **Video Lectures**Several videos are provided throughout the course. They are not mandatory viewing, however we have recently integrated them into the Course Schedule and elsewhere to provide an additional medium for audio-visual learning in demonstrating core concepts. We recommend reproducing the data analytic tasks you see while watching each in order to ensure retention. Video lectures are designed as a supplement and not intended for use in lieu of assigned reading. Take advantage of the bookmarks and timestamps to quickly navigate to topics of interest in each video and consider subscribing as new course content is published from time to time.
5. **General Setup**

General Setup customizes the look and feel of your course, as well as making it look like an official extension of your institution. Parameters include your course name, colors, institution logo, key hyperlinks, and institution icon, if available.

Colors must be provided in hexadecimal format. Consult your institution’s web style guide or Marketing & Communications department for an approved color palette.

|  |  |
| --- | --- |
| **Course Name** | e.g. "Foundations of Data Science" |
| **Primary Color** | e.g. #276FBF |
| **Secondary Color** | e.g. #FC814A |
| **Institution Logo** | e.g. "institution\_logo.png" |
| **Institution Icon** | e.g. "institution\_icon.png" |
| **Institution URL** | e.g. "https://www.institution.edu" |
| **Department URL** | e.g. "https://department.institution.edu" |

1. **Syllabus Setup**

Syllabus Setup customizes your course syllabus with critical details such as the course number, external course management website, start and end dates, instructor information, and URLs for institution guidelines.

|  |  |
| --- | --- |
| **Course Number** | e.g. "Foundations of Data Science" |
| **External Course URL** | e.g. "https://canvas.institution.edu/courses/883" |
| **External Forum URL** | e.g. "https://canvas.institution.edu/courses/883/assignments/225" |
| **Course Start Date** | e.g. "Weekday, Month Day" |
| **Course End Date** | e.g. "Weekday, Month Day" |
| **Instructor Email** | e.g. "instructor@gmail.com" |
| **Instructor GitHub** | e.g. "https://github.com/instructor" |
| **Instructor LinkedIn** | e.g. "https://www.linkedin.com/in/instructor/" |
| **Instructor Schedule** | e.g. "https://calendly.com/instructor/20min" |
| **Conduct Code URL** | e.g. "https://institution.edu/document/student-code-of-conduct" |
| **Integrity Code URL** | e.g. "https://institution.edu/document/policy-on-academic-honesty" |

Enter the desired ranges for the following grades.

|  |  |  |
| --- | --- | --- |
| **Minimum** | **Maximum** | **Grade** |
| e.g. 98% | **NA** | **A+** |
| e.g. 94% | e.g. 98% | **A** |
| e.g. 90% | e.g. 93% | **A-** |
| e.g. 87% | e.g. 89% | **B+** |
| e.g. 84% | e.g. 86% | **B** |
| e.g. 80% | e.g. 83% | **B-** |
| e.g. 77% | e.g. 79% | **C+** |
| e.g. 74% | e.g. 76% | **C** |
| e.g. 70% | e.g. 73% | **C-** |
| e.g. 67% | e.g. 69% | **D+** |
| e.g. 64% | e.g. 66% | **D** |
| e.g. 60% | e.g. 63% | **D-** |
| **NA** | e.g. Below 60% | **F** |

Enter the desired distribution for the following course assignments.

|  |  |
| --- | --- |
| **Assignment Type** | **Distribution** |
| Weekly Labs | e.g. 50% |
| Code-Through Assignment | e.g. 10% |
| Final Dashboard Project | e.g. 30% |
| Discussion Topics | e.g. 10% |

1. **Content Setup**

Content Setup corresponds directly with the Course Schedule page and primarily focuses on selected content and established deadlines.

1. **7 Week Delivery**

|  |  |  |
| --- | --- | --- |
| **Unit** 🔒 | **Topic** 🔒 | **Week** |
| Foundations | The R Environment | 1 🔒 |
| Foundations | Data Science Ecosystem | 1 🔒 |
| Foundations | Data-Driven Docs | 1 🔒 |
| Foundations | Learning Strategies | 1 🔒 |
| Building Blocks | Objects & Assignment | 2 🔒 |
| Building Blocks | Functions | 2 🔒 |
| Building Blocks | Introductory Programming | 2 🔒 |
| Building Blocks | Vectors | 2 🔒 |
| Building Blocks | Data Frames | 2 🔒 |
| Building Blocks | Matrices & Lists | 2 🔒 |
| Operators & Descriptives | Comparison Operators | 3 🔒 |
| Operators & Descriptives | Logical Operators | 3 🔒 |
| Operators & Descriptives | Subsetting | 3 🔒 |
| Operators & Descriptives | Descriptives | 3 🔒 |
| Import, Clean, & Format Data | Importing & Exporting Data | e.g. 4 |
| Import, Clean, & Format Data | Dates & Times | e.g. 4 |
| Import, Clean, & Format Data | Text Data | e.g. 4 |
| Basic Data Wrangling | Manipulation Verbs | e.g. 5 |
| Basic Data Wrangling | Piping | e.g. 5 |
| Basic Data Wrangling | Group Operations | e.g. 5 |
| Basic Data Wrangling | Data Tidying | e.g. 5 |
| Preparing Data | Merging Data | e.g. 6 |
| Preparing Data | Joins | e.g. 6 |
| Preparing Data | Binds | e.g. 6 |
| Communicating Static Data | Package 'graphics' | e.g. 7 |
| Communicating Static Data | Package 'ggplot2' | e.g. 7 |
| Communicating Static Data | Package 'plotly' |  |
| Communicating Dynamic Data | Package 'shiny' | e.g. 8 |
| Communicating Dynamic Data | Package 'shinydashboard' | e.g. 8 |
| Communicating Dynamic Data | Package 'flexdashboard' | e.g. 8 |
| Code-Through Project | Code-Throughs | e.g. 9 |

1. **15-Week Delivery**

|  |  |  |
| --- | --- | --- |
| **Unit** 🔒 | **Topic** 🔒 | **Week** |
| Foundations | The R Environment | 1 🔒 |
| Foundations | Data Science Ecosystem | 1 🔒 |
| Foundations | Data-Driven Docs | 1 🔒 |
| Foundations | Learning Strategies | 1 🔒 |
| Building Blocks | Objects & Assignment | 2 🔒 |
| Building Blocks | Functions | 2 🔒 |
| Building Blocks | Introductory Programming | 2 🔒 |
| Building Blocks | Vectors | 3 🔒 |
| Building Blocks | Data Frames | 3 🔒 |
| Building Blocks | Matrices & Lists | 3 🔒 |
| Operators & Descriptives | Comparison Operators | 4 🔒 |
| Operators & Descriptives | Logical Operators | 4 🔒 |
| Operators & Descriptives | Subsetting | 6 🔒 |
| Operators & Descriptives | Descriptives | 6 🔒 |
| Import, Clean, & Format Data | Importing & Exporting Data | e.g. 7 |
| Import, Clean, & Format Data | Dates & Times | e.g. 7 |
| Import, Clean, & Format Data | Text Data | e.g. 7 |
| Basic Data Wrangling | Manipulation Verbs | e.g. 8 |
| Basic Data Wrangling | Piping | e.g. 8 |
| Basic Data Wrangling | Group Operations | e.g. 8 |
| Basic Data Wrangling | Data Tidying | e.g. 9 |
| Preparing Data | Merging Data | e.g. 9 |
| Preparing Data | Joins | e.g. 9 |
| Preparing Data | Binds | e.g. 9 |
| Communicating Static Data | Package 'graphics' | e.g. 10 |
| Communicating Static Data | Package 'ggplot2' | e.g. 11 |
| Communicating Static Data | Package 'plotly' | e.g. 12 |
| Communicating Dynamic Data | Package 'shiny' | e.g. 13 |
| Communicating Dynamic Data | Package 'shinydashboard' |  |
| Communicating Dynamic Data | Package 'flexdashboard' | e.g. 13 |
| Code-Through Project | Code-Throughs | 14🔒 |

1. **Course Management Setup**

All external course platforms, e.g. Canvas, should include your own introduction and grading scheme in addition to the following resources. Refer to your course’s GitHub repository to download these files.

1. Link to Course Schedule
2. Link to Course Syllabus
3. Link to Course Forums
4. All Lab Assignment Templates
5. All Final Project Templates

Lastly, assignment solutions will be made available via a secure platform at a future date.