

Welcome to Programming for Data Science

Welcome to the course manual for CSC310 at URI with Professor Brown.

This class meets 3-3:50pm MWF in Chafee Social Sci Center 235.

This website will contain the syllabus, class notes and other reference material for the class.

[Course Calendar on BrightSpace](#)



Tip

[subscribe to that calendar](#) in your favorite calendar application

Syllabus

Welcome to CSC/DSP310: Programming For Data Science.

In this syllabus you will find an overview of the course, information about your instructor, course policies, restatements of URI policies, reminders of relevant resources, and a schedule for the course.

About

About this course

Data science exists at the intersection of computer science, statistics, and machine learning. That means writing programs to access and manipulate data so that it becomes available for analysis using statistical and machine learning techniques is at the core of data science. Data scientists use their data and analytical ability to find and interpret rich data sources; manage large amounts of data despite hardware, software, and bandwidth constraints; merge data sources; ensure consistency of datasets; create visualizations to aid in understanding data; build mathematical models using the data; and present and communicate the data insights/findings.

This course provides a survey of data science. Topics include data driven programming in Python; data sets, file formats and meta-data; descriptive statistics, data visualization, and foundations of predictive data modeling and machine learning; accessing web data and databases; distributed data management. You will work on weekly substantial programming problems such as accessing data in database and visualize it or build machine learning models of a given data set.

Basic programming skills (CSC201 or CSC211) are a prerequisite to this course. This course is a prerequisite course to machine learning, where you learn how machine learning algorithms work. In this course, we will start with a very fast review of basic programming ideas, since you've already done that before. We will learn how to *use* machine learning algorithms to do data science, but not how to *build* machine learning algorithms, we'll use packages that implement the algorithms for us.

About this semester

This semester is a lot of new things for all of us. This course will be completely online all semester, so we will get to use a single instructional format all semester, including when all campus activities move remote after Thanksgiving. I recognize that those last two weeks of the semester may change your obligations with siblings, parents, work, etc. In light of that, we will cover all of the most important topics and you will have the opportunity to achieve all of the course learning outcomes before Thanksgiving. The material in the last two weeks of the semester will be more advanced, likely interesting and definitely useful material, but if your ability to participate in class is less at that time, it will not hurt your grade.

About this syllabus

This syllabus is a *living* document and accessible from BrightSpace, as a pdf for download directly online at rhodyprog4ds.github.io/BrownFall20/syllabus. If you choose to download a copy of it, note that it is only a copy. You can get notification of changes from GitHub by “watching” the [repository](#). You can view the date of changes and exactly what changes were made on the Github [commits](#) page.

Creating an [issue on the repository](#) is also a good way to ask questions about anything in the course it will prompt additions and expand the FAQ section.

About your instructor

Name: Dr. Sarah Brown Office hours: TBA via zoom, link on BrightSpace

Dr. Brown is a new Assistant Professor of Computer Science, who does research on how social context changes machine learning. Dr. Brown earned a PhD in Electrical Engineering from Northeastern University, completed a postdoctoral fellowship at University of California Berkeley, and worked as a postdoctoral research associate at Brown University before joining URI. At Brown University, Dr. Brown taught the Data and Society course for the Master's in Data Science Program.

The best way to contact me is e-mail or by dropping into my office hours. Please include [\[CSC310\]](#) or [\[DSP310\]](#) in the subject line of your email along with the topic of your message. This is important, because your messages are important, but I also get a lot of e-mail. Consider these a cheat code to my inbox: I have setup a filter that will flag your e-mail if you use one of those in the subject to ensure that I see it. I rarely check e-mail between 6pm and 9am, on weekends or holidays. You might see me post or send things during these hours, but I will not reliably see emails that arrive during those hours.

Note

Whether you use CSC or DSP does not matter.

Tools and Resources

We will use a variety of tools to conduct class and to facilitate your programming. You will need a computer with Linux, MacOS, or Windows. It is unlikely that a tablet or Chromebook will be able to do all of the things required in this course.

All of the tools below are either: - paid for by URI or - freely available online.

```
````{margin}
```{important}

TL;DR [^tldr]

- check Brightspace
- Log in to Prismia Chat
- Make a GitHub Account
- Install Python
- Install Git
````
````
```

BrightSpace

This will be the central location from which you can access all other materials. Any links that are for private discussion among those enrolled in the course will be available only from our course [Brightspace site](#).

This is also where your grades will appear.

Note

Seeing the BrightSpace site requires logging in with your URI SSO and being enrolled in the course

Prismia chat

Our class link for Prismia chat is available on Brightspace. We will use this for chatting and in-class understanding checks.

On Prismia, all students see the instructor's messages, but only the Instructor and TA see student responses.

Course Manual

The course manual will have content including the class policies, scheduling, class notes, assignment information, and additional resources. This will be linked from Brightspace and available publicly online at rhodyprog4ds.github.io/BrownFall21/. Links to the course reference text and code documentation will also be included here in the assignments and class notes.

GitHub Classroom

You will need a [GitHub](#) Account. If you do not already have one, please [create one](#) by the first day of class. If you have one, but have not used it recently, you may need to update your password and login credentials as the [Authentication rules](#) changed over the summer. In order to use the command line, you will need to [create a Personal Access Token](#) for each device you use.

There will be a link to our class GitHub Classroom on Brightspace.

Programming Environment

This is a programming course, so you will need a programming environment. In order to complete assignments you need the items listed in the requirements list. The easiest way to meet these requirements is to follow the recommendations below. I will provide instruction assuming that you have followed the recommendations.

Requirements:

- Python with scientific computing packages (numpy, scipy, jupyter, pandas, seaborn, sklearn)
- [Git](#)
- A web browser compatible with Jupyter Notebooks

Recommendation:

- Install python via [Anaconda](#)
- if you use Windows, install Git with [GitBash \(video instructions\)](#).
- if you use MacOS, install Git with the Xcode Command Line Tools. On Mavericks (10.9) or above you can do this by trying to run git from the Terminal the very first time.`git --version`

Optional:

- Text Editor: you may want a text editor outside of the Jupyter environment. Jupyter can edit markdown files (that you'll need for your portfolio), in browser, but it is more common to use a text editor like Atom or Sublime for this purpose.

Textbook

The text for this class is a reference book and will not be a source of assignments. It will be a helpful reference and you may be directed there for answers to questions or alternate explanations of topics.

Python for Data Science is available free [online](#):

Zoom (backup only, Fall 2021 is in person)

This is where we will meet if for any reason we cannot be in person. You will find the link to class zoom sessions on Brightspace.

URI provides all faculty, staff, and students with a paid Zoom account. It *can* run in your browser or on a mobile device, but you will be able to participate in class best if you download the [Zoom client](#) on your computer. Please [log in](#) and [configure your account](#). Please add a photo of yourself to your account so that we can still see your likeness in some form when your camera is off. You may also wish to use a virtual background and you are welcome to do so.

Class will be interactive, so if you cannot be in a quiet place at class time, headphones with a built in microphone are strongly recommended.

For help, you can access the [instructions provided by IT](#).

Note

all Git instructions will be given as instructions for the command line interface and GitHub specific instructions via the web interface. You may choose to use GitHub desktop or built in IDE tools, but the instructional team may not be able to help.

Note

I use [atom](#), but I decided to use it by downloading both Atom and Sublime and trying different things in each for a week. I liked Atom better after that and I've stuck with it since. I used Atom to write all of the content in this syllabus. VScode will also work, if needed

Learning Objective, Schedule, and Rubric

Learning Outcomes

There are five learning outcomes for this course.

- 1. (process) Describe the process of data science, define each phase, and identify standard tools
- 2. (data) Access and combine data in multiple formats for analysis
- 3. (exploratory) Perform exploratory data analyses including descriptive statistics and visualization
- 4. (modeling) Select models for data by applying and evaluating mutiple models to a single dataset
- 5. (communicate) Communicate solutions to problems with data in common industry formats

We will build your skill in the **process** and **communicate** outcomes over the whole semester. The middle three skills will correspond roughly to the content taught for each of the first three portfolio checks.

Schedule

The course will meet MWF 3-3:50pm in Chafee Social Sci Center 235. Every class will include participatory live coding (instructor types, students follow along)) instruction and small exercises for you to progress toward level 1 achievements of the new skills introduced in class that day.

Programming assignments that will be due each week Tuesday by 11:59pm.

| week | topics | skills |
|------|---|---------------------------------|
| 1 | [admin, python review] | process |
| 2 | Loading data, Python review | [access, prepare, summarize] |
| 3 | Exploratory Data Analysis | [summarize, visualize] |
| 4 | Data Cleaning | [prepare, summarize, visualize] |
| 5 | Databases, Merging DataFrames | [access, construct, summarize] |
| 6 | Modeling, Naive Bayes, classification performance metrics | [classification, evaluate] |
| 7 | decision trees, cross validation | [classification, evaluate] |
| 8 | Regression | [regression, evaluate] |
| 9 | Clustering | [clustering, evaluate] |
| 10 | SVM, parameter tuning | [optimize, tools] |
| 11 | KNN, Model comparison | [compare, tools] |
| 12 | Text Analysis | [unstructured] |
| 13 | Topic Modeling | [unstructured, tools] |
| 14 | Deep Learning | [tools, compare] |

Note

On the [BrightSpace calendar](#) page you can get a feed link to add to the calendar of your choice by clicking on the subscribe (star) button on the top right of the page. Class is for 1 hour there because of Brightspace/zoom integration limitations, but that calendar includes the zoom link.

Skill Rubric

The skill rubric describes how your participation, assignments, and portfolios will be assessed to earn each achievement. The keyword for each skill is a short name that will be used to refer to skills throughout the course materials; the full description of the skill is in this table.

| | skill | Level 1 | Level 2 | Level 3 |
|-----------------------|--|---|--|--|
| keyword | | | | |
| python | pythonic code writing | python code that mostly runs, occasional pep8 adherence | python code that reliably runs, frequent pep8 adherence | reliable, efficient, pythonic code that consistently adheres to pep8 |
| process | describe data science as a process | Identify basic components of data science | Describe and define each stage of the data science process | Compare different ways that data science can facilitate decision making |
| access | access data in multiple formats | load data from at least one format; identify the most common data formats | Load data for processing from the most common formats; Compare and contrast most common formats | access data from both common and uncommon formats and identify best practices for formats in different contexts |
| construct | construct datasets from multiple sources | identify what should happen to merge datasets or when they can be merged | apply basic merges | merge data that is not automatically aligned |
| summarize | Summarize and describe data | Describe the shape and structure of a dataset in basic terms | compute summary statistics of a whole dataset and grouped data | Compute and interpret various summary statistics of subsets of data |
| visualize | Visualize data | identify plot types, generate basic plots from pandas | generate multiple plot types with complete labeling with pandas and seaborn | generate complex plots with pandas and plotting libraries and customize with matplotlib or additional parameters |
| prepare | prepare data for analysis | identify if data is or is not ready for analysis, potential problems with data | apply data reshaping, cleaning, and filtering as directed | apply data reshaping, cleaning, and filtering manipulations reliably and correctly by assessing data as received |
| classification | Apply classification | identify and describe what classification is, apply pre-fit classification models | fit preselected classification model to a dataset | fit and apply classification models and select appropriate classification models for different contexts |
| regression | Apply Regression | identify what data that can be used for regression looks like | can fit linear regression models | can fit and explain regularized or nonlinear regression |
| clustering | Clustering | describe what clustering is | apply basic clustering | apply multiple clustering techniques, and interpret results |
| evaluate | Evaluate model performance | Explain basic performance metrics for different data science tasks | Apply basic model evaluation metrics to a held out test set | Evaluate a model with multiple metrics and cross validation |
| optimize | Optimize model parameters | Identify when model parameters need to be optimized | Manually optimize basic model parameters such as model order | Select optimal parameters based of multiple quantitative criteria and automate parameter tuning |
| compare | compare models | Qualitatively compare model classes | Compare model classes in specific terms and fit models in terms of traditional model performance metrics | Evaluate tradeoffs between different model comparison types |

| | skill | Level 1 | Level 2 | Level 3 |
|--------------|---|---|--|---|
| keyword | | | | |
| unstructured | model | Identify options for representing text data and use them once data is transformed | Apply at least one representation to transform unstructured data for model fitting or summarizing | apply multiple representations and compare and contrast them for different end results |
| | unstructured data | | | |
| workflow | use industry standard data science tools and workflows to solve data science problems | Solve well structured problems with a single tool pipeline | Solve semi-structured, completely specified problems, apply common structure to learn new features of standard tools | Scope, choose an appropriate tool pipeline and solve data science problems, describe strengths and weaknesses of common tools |
| | | | | |

```
/opt/hostedtoolcache/Python/3.7.11/x64/lib/python3.7/site-packages/ipykernel_launcher.py:1: FutureWarning: Using the level keyword in DataFrame and Series aggregations is deprecated and will be removed in a future version. Use groupby instead. df.sum(level=1) should use df.groupby(level=1).sum().
"""Entry point for launching an IPython kernel.
/opt/hostedtoolcache/Python/3.7.11/x64/lib/python3.7/site-packages/ipykernel_launcher.py:6: FutureWarning: Using the level keyword in DataFrame and Series aggregations is deprecated and will be removed in a future version. Use groupby instead. df.sum(level=1) should use df.groupby(level=1).sum().
```

Assignments and Skills

Using the keywords from the table above, this table shows which assignments you will be able to demonstrate which skills and the total number of assignments that assess each skill. This is the number of opportunities you have to earn Level 2 and still preserve 2 chances to earn Level 3 for each skill.

| | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | A13 | Assignment |
|----------------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|------------|
| keyword | | | | | | | | | | | | | | |
| python | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| process | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| access | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| construct | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| summarize | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| visualize | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| prepare | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| classification | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | |
| regression | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | |
| clustering | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | |
| evaluate | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | |
| optimize | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | |
| compare | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | |
| unstructured | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| workflow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | |

Portfolios and Skills

The objective of your portfolio submissions is to earn Level 3 achievements. The following table shows what Level 3 looks like for each skill and identifies which portfolio submissions you can earn that Level 3 in that skill.

| | | Level 3 | P1 | P2 | P3 | P4 |
|----------------|---|---------|----|----|----|----|
| keyword | | | | | | |
| python | reliable, efficient, pythonic code that consistently adheres to pep8 | | 1 | 1 | 0 | 0 |
| process | Compare different ways that data science can facilitate decision making | | 0 | 1 | 1 | 0 |
| access | access data from both common and uncommon formats and identify best practices for formats in different contexts | | 1 | 1 | 0 | 0 |
| construct | merge data that is not automatically aligned | | 1 | 1 | 0 | 0 |
| summarize | Compute and interpret various summary statistics of subsets of data | | 1 | 1 | 0 | 0 |
| visualize | generate complex plots with pandas and plotting libraries and customize with matplotlib or additional parameters | | 1 | 1 | 0 | 0 |
| prepare | apply data reshaping, cleaning, and filtering manipulations reliably and correctly by assessing data as received | | 1 | 1 | 0 | 0 |
| classification | fit and apply classification models and select appropriate classification models for different contexts | | 0 | 1 | 1 | 0 |
| regression | can fit and explain regularized or nonlinear regression | | 0 | 1 | 1 | 0 |
| clustering | apply multiple clustering techniques, and interpret results | | 0 | 1 | 1 | 0 |
| evaluate | Evaluate a model with multiple metrics and cross validation | | 0 | 1 | 1 | 0 |
| optimize | Select optimal parameters based of mutiple quantiatieve criteria and automate parameter tuning | | 0 | 0 | 1 | 1 |
| compare | Evaluate tradeoffs between different model comparison types | | 0 | 0 | 1 | 1 |
| unstructured | apply multiple representations and compare and contrast them for different end results | | 0 | 0 | 1 | 1 |
| workflow | Scope, choose an appropriate tool pipeline and solve data science problems, describe strengths and weaknesses of common tools | | 0 | 0 | 1 | 1 |

Grading

This section of the syllabus describes the principles and mechanics of the grading for the course. This course will be graded on a basis of a set of *skills* (described in detail the next section of the syllabus). This is in contrast to more common grading on a basis of points earned through assignments.

Principles of Grading

Learning happens through practice and feedback. My goal as a teacher is for you to learn. The grading in this course is based on your learning of the material, rather than your completion of the activities that are assigned.

This course is designed to encourage you to work steadily at learning the material and demonstrating your new knowledge. There are no single points of failure, where you lose points that cannot be recovered. Also, you cannot cram anything one time and then forget it. The material will build and you have to demonstrate that you retained things.

- Earning a C in this class is intended to be easier than typical grading. I expect everyone to get at least a C.
- Earning a B in this class is intended to be very accessible, you can make a lot of mistakes along the way as you learn, as long as you learn by the end.
- Earning an A in this class will be challenging, but is possible even with making mistakes while you learn.

Grading this way also is more amenable to the fact that there are correct and incorrect ways to do things, but there is not always a single correct answer to a realistic data science problem. Your work will be assessed on whether or not it demonstrates your learning of the targeted skills. You will also receive feedback on how to improve.

How it works

There are 15 skills that you will be graded on in this course. While learning these skills, you will work through a progression of learning. Your grade will be based on earning 45 achievements that are organized into 15 skill groups with 3 levels for each.

These map onto letter grades roughly as follows:

- If you achieve level 1 in all of the skills, you will earn at least a C in the course.
- To earn a B, you must earn all of the level 1 and level 2 achievements.
- To earn an A, you must earn all of the achievements.

You will have at least three opportunities to earn every level 2 achievement. You will have at least two opportunities to earn every level 3 achievement. You will have three *types* of opportunities to demonstrate your current skill level: participation, assignments, and a portfolio.

Each level of achievement corresponds to a phase in your learning of the skill:

- To earn level 1 achievements, you will need to demonstrate basic awareness of the required concepts and know approximately what to do, but you may need specific instructions of which things to do or to look up examples to modify every step of the way. You can earn level 1 achievements in class, assignments, or portfolio submissions.
- To earn level 2 achievements you will need to demonstrate understanding of the concepts and the ability to apply them with instruction after earning the level 1 achievement for that skill. You can earn level 2 achievements in assignments or portfolio submissions.
- To earn level 3 achievements you will be required to consistently execute each skill and demonstrate deep understanding of the course material, after achieving level 2 in that skill. You can earn level 3 achievements only through your portfolio submissions.

Participation

While attending synchronous class sessions, there will be understanding checks and in class exercises. Completing in class exercises and correctly answering questions in class can earn level 1 achievements. In class questions will be administered through the classroom chat platform Prismia.chat; these records will be used to update your skill progression. You can also earn level 1 achievements from adding annotation to a section of the class notes.

Assignments

For your learning to progress and earn level 2 achievements, you must practice with the skills outside of class time.

Assignments will each evaluate certain skills. After your assignment is reviewed, you will get qualitative feedback on your work, and an assessment of your demonstration of the targeted skills.

Portfolio Checks

To earn level 3 achievements, you will build a portfolio consisting of reflections, challenge problems, and longer analyses over the course of the semester. You will submit your portfolio for review 4 times. The first two will cover the skills taught up until 1 week before the submission deadline.

The third and fourth portfolio checks will cover all of the skills. The fourth will be due during finals. This means that, if you have achieved mastery of all of the skills by the 3rd portfolio check, you do not need to submit the fourth one.

Portfolio prompts will be given throughout the class, some will be structured questions, others may be questions that arise in class, for which there is not time to answer.

TLDR

You *could* earn a C through in class participation alone, if you make nearly zero mistakes. To earn a B, you must complete assignments and participate in class. To earn an A you must participate, complete assignments, and build a portfolio.

Detailed mechanics

On Brightspace there are 45 Grade items that you will get a 0 or a 1 grade for. These will be revealed, so that you can view them as you have an opportunity to demonstrate each one. The table below shows the minimum number of skills at each level to earn each letter grade.

Warning

If you will skip an assignment, please accept the GitHub assignment and then close the Feedback pull request with a comment. This way we can make sure that you have support you need.

| | Level 3 | Level 2 | Level 1 |
|--------------|---------|---------|---------|
| letter grade | | | |
| A | 15 | 15 | 15 |
| A- | 10 | 15 | 15 |
| B+ | 5 | 15 | 15 |
| B | 0 | 15 | 15 |
| B- | 0 | 10 | 15 |
| C+ | 0 | 5 | 15 |
| C | 0 | 0 | 15 |
| C- | 0 | 0 | 10 |
| D+ | 0 | 0 | 5 |
| D | 0 | 0 | 3 |

For example, if you achieve level 2 on all of the skills and level 3 on 7 skills, that will be a B+.

If you achieve level 3 on 14 of the skills, but only level 1 on one of the skills, that will be a B-, because the minimum number of level 2 achievements for a B is 15. In this scenario the total number of achievements is 14 at level 3, 14 at level 2 and 15 at level 3, because you have to earn achievements within a skill in sequence.

The letter grade can be computed as follows

Note

In this example, you will have also achieved level 1 on all of the skills, because it is a prerequisite to level 2.

```
def compute_grade(num_level1,num_level2,num_level3):
    """
    Computes a grade for CSC/DSP310 from numbers of achievements at each level

    Parameters:
    -----
    num_level1 : int
        number of level 1 achievements earned
    num_level2 : int
        number of level 2 achievements earned
    num_level3 : int
        number of level 3 achievements earned

    Returns:
    -----
    letter_grade : string
        letter grade with modifier (+/-)
    """
    if num_level1 == 15:
        if num_level2 == 15:
            if num_level3 == 15:
                grade = 'A'
            elif num_level3 >= 10:
                grade = 'A-'
            elif num_level3 >= 5:
                grade = 'B+'
            else:
                grade = 'B'
        elif num_level2 >= 10:
            grade = 'B-'
        elif num_level2 >= 5:
            grade = 'C+'
        else:
            grade = 'C'
    elif num_level1 >= 10:
        grade = 'C-'
    elif num_level1 >= 5:
        grade = 'D+'
    elif num_level1 >= 3:
        grade = 'D'
    else:
        grade = 'F'

    return grade
```

```
compute_grade(15,15,15)
```

```
'A'
```

```
compute_grade(14,14,14)
```

```
'C-'
```

```
assert compute_grade(14,14,14) == 'C-'
```

```
assert compute_grade(15,15,15) == 'A'
```

```
assert compute_grade(15,15,11) == 'A-'
```

Late work

No late work will be graded. Every skill will be assessed through more than one assignment, so missing assignments occasionally *may* not hurt your grade. If you do not submit any assignments that cover a given skill, you may earn the level 2 achievement in that skill through a portfolio check, but you will not be able to earn the level 3 achievement in that skill.

Examples

Important

The following will make more sense after you read the next section of the syllabus and see the skills rubric sections.

If you always attend and get everything correct, you will earn an A and you won't need to submit the 4th portfolio check or assignment 13.

Note

You may visit office hours to discuss assignments that you did not complete on time to get feedback and check your own understanding, but they will not count toward skill demonstration.




Getting A Without Perfection

Map to an A










How Achievements were earned

| | Level 1 | Level 2 | Level 3 |
|----------------|---------|---------|---------|
| python | A1 | A3 | P1 |
| process | A1 | P1 | P2 |
| access | 2 | A2 | P1 |
| construct | 5 | A5 | P1 |
| summarize | 3 | A3 | P1 |
| visualize | 3 | A3 | P2 |
| prepare | 4 | A5 | P2 |
| classification | A10 | P2 | P3 |
| regression | 8 | A11 | P2 |
| clustering | 9 | A9 | P3 |
| evaluate | 7 | A11 | P3 |
| optimize | 10 | A11 | P4 |
| compare | 11 | A13 | P3 |
| unstructured | 12 | A13 | P4 |
| tools | 11 | A13 | P3 |

Activity Legend

| In class | Assignment | Portfolio Check |
|---|---|---|
|  |  |  |

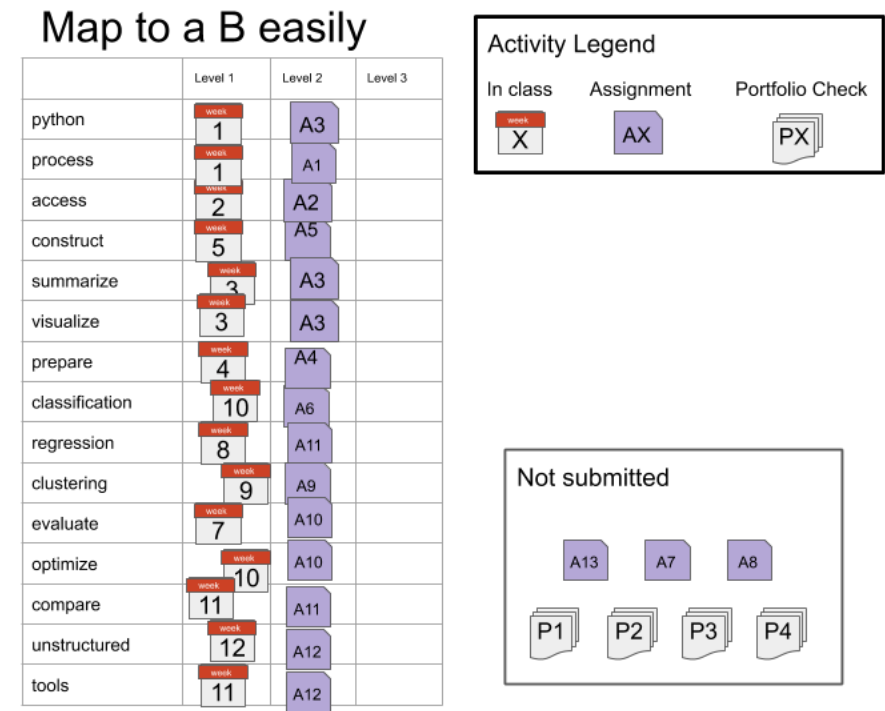
Other Activities

| | |
|---|------------------------------------|
|  | Attended, but did not understand |
|  | Submitted, but incorrect |
|  | Missed class |
|  | Not submitted |
|  | Submitted, but incorrect |
|  | Not submitted |
|  | Not submitted |
|  | Attended, but all level 1 complete |
|  | Attended, but all level 1 complete |

In this example the student made several mistakes, but still earned an A. This is the advantage to this grading scheme. For the **python**, **process**, and **classification** skills, the level 1 achievements were earned on assignments, not in class. For the **process** and **classification** skills, the level 2 achievements were not earned on assignments, only on portfolio checks, but they were earned on the first portfolio of those skills, so the level 3 achievements were earned on the second

portfolio check for that skill. This student's fourth portfolio only demonstrated two skills: *optimize* and *unstructured*. It included only 1 analysis, a text analysis with optimizing the parameters of the model. Assignments 4 and 7 were both submitted, but didn't earn any achievements, the student got feedback though, that they were able to apply in later assignments to earn the achievements. The student missed class week 6 and chose to not submit assignment 6 and use week 7 to catch up. The student had too much work in another class and chose to skip assignment 8. The student tried assignment 12, but didn't finish it on time, so it was not graded, but the student visited office hours to understand and be sure to earn the level 2 *unstructured* achievement on assignment 13.

Getting a B with minimal work

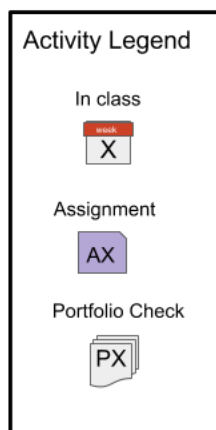


In this example, the student earned all level 1 achievements in class and all level 2 on assignments. This student was content with getting a B and chose to not submit a portfolio.

Getting a B while having trouble

Map to a B, having trouble

| | Level 1 | Level 2 | Level 3 |
|----------------|---------|---------|---------|
| python | A1 | P1 | |
| process | A1 | P2 | |
| access | A2 | P1 | |
| construct | A5 | P1 | |
| summarize | A3 | P1 | |
| visualize | A3 | P2 | |
| prepare | A5 | P2 | |
| classification | A10 | P3 | |
| regression | A11 | P2 | |
| clustering | A9 | P3 | |
| evaluate | A11 | P3 | |
| optimize | A11 | P4 | |
| compare | A13 | P3 | |
| unstructured | A13 | P4 | |
| tools | A13 | P3 | |



In this example, the student struggled to understand in class and on assignments. Assignments were submitted that showed some understanding, but all had some serious mistakes, so only level 1 achievements were earned from assignments. The student wanted to get a B and worked hard to get the level 2 achievements on the portfolio checks.

Support

Academic Enhancement Center

Academic Enhancement Center (for undergraduate courses): Located in Roosevelt Hall, the AEC offers free face-to-face and web-based services to undergraduate students seeking academic support. Peer tutoring is available for STEM-related courses by appointment online and in-person. The Writing Center offers peer tutoring focused on supporting undergraduate writers at any stage of a writing assignment. The UCS160 course and academic skills consultations offer students strategies and activities aimed at improving their studying and test-taking skills. Complete details about each of these programs, up-to-date schedules, contact information and self-service study resources are all available on the AEC website.

- **STEM Tutoring** helps students navigate 100 and 200 level math, chemistry, physics, biology, and other select STEM courses. The STEM Tutoring program offers free online and limited in-person peer-tutoring this fall. Undergraduates in introductory STEM courses have a variety of small group times to choose from and can select occasional or weekly appointments. Appointments and locations will be visible in the TutorTrac system on September 14th, 2020. The TutorTrac application is available through [URI Microsoft 365 single sign-on](#) and by visiting aec.uri.edu. More detailed information and instructions can be found on the AEC tutoring page.
- **Academic Skills Development** resources helps students plan work, manage time, and study more effectively. In Fall 2020, all Academic Skills and Strategies programming are offered both online and in-person. UCS160: Success in Higher Education is a one-credit course on developing a more effective approach to studying. Academic Consultations are 30-minute, 1 to 1 appointments that students can schedule on Starfish with Dr. David Hayes to address individual academic issues. Study Your Way to Success is a self-guided web portal connecting students to tips and strategies on studying and time management related topics. For more information on these programs, visit the Academic Skills Page or contact Dr. Hayes directly at davidhayes@uri.edu.
- The **Undergraduate Writing Center** provides free writing support to students in any class, at any stage of the writing process: from understanding an assignment and brainstorming ideas, to developing, organizing, and revising a draft. Fall 2020 services are offered through two online options: 1) real-time synchronous appointments with a peer consultant (25- and 50-minute slots, available Sunday - Friday), and 2) written asynchronous consultations with a 24-hour turn-around response time (available Monday - Friday). Synchronous appointments are video-based, with audio, chat, document-sharing, and live captioning capabilities, to meet a range of accessibility needs. View the synchronous and asynchronous schedules and book online, visit uri.mywconline.com.

Policies

Anti-Bias Statement:

We respect the rights and dignity of each individual and group. We reject prejudice and intolerance, and we work to understand differences. We believe that equity and inclusion are critical components for campus community members to thrive. If you are a target or a witness of a bias incident, you are encouraged to submit a report to the URI Bias Response Team at www.uri.edu/brt. There you will also find people and resources to help.

Disability Services for Students Statement:

Your access in this course is important. Please send me your Disability Services for Students (DSS) accommodation letter early in the semester so that we have adequate time to discuss and arrange your approved academic accommodations. If you have not yet established services through DSS, please contact them to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom. DSS can be reached by calling: 401-874-2098, visiting: web.uri.edu/disability, or emailing: dss@etal.uri.edu. We are available to meet with students enrolled in Kingston as well as Providence courses.

Academic Honesty

Students are expected to be honest in all academic work. A student's name on any written work, quiz or exam shall be regarded as assurance that the work is the result of the student's own independent thought and study. Work should be stated in the student's own words, properly attributed to its source. Students have an obligation to know how to quote, paraphrase, summarize, cite and reference the work of others with integrity. The following are examples of academic dishonesty.

- Using material, directly or paraphrasing, from published sources (print or electronic) without appropriate citation
- Claiming disproportionate credit for work not done independently
- Unauthorized possession or access to exams
- Unauthorized communication during exams
- Unauthorized use of another's work or preparing work for another student
- Taking an exam for another student
- Altering or attempting to alter grades
- The use of notes or electronic devices to gain an unauthorized advantage during exams
- Fabricating or falsifying facts, data or references
- Facilitating or aiding another's academic dishonesty
- Submitting the same paper for more than one course without prior approval from the instructors

URI COVID-19 Statement

The University is committed to delivering its educational mission while protecting the health and safety of our community. While the university has worked to create a healthy learning environment for all, it is up to all of us to ensure our campus stays that way.

As members of the URI community, students are required to comply with standards of conduct and take precautions to keep themselves and others safe. Visit web.uri.edu/coronavirus/ for the latest information about the URI COVID-19 response.

- [Universal indoor masking](#) is required by all community members, on all campuses, regardless of vaccination status. If the universal mask mandate is discontinued during the semester, students who have an approved exemption and are not fully vaccinated will need to continue to wear a mask indoors and maintain physical distance.
- Students who are experiencing symptoms of illness should not come to class. Please stay in your home/room and notify URI Health Services via phone at 401-874-2246.
- If you are already on campus and start to feel ill, go home/back to your room and self-isolate. Notify URI Health Services via phone immediately at 401-874-2246.

If you are unable to attend class, please notify me at brownsarahm@uri.edu. We will work together to ensure that course instruction and work is completed for the semester.

Class Notes

Class notes will get posted here day by day

Assignments

All assignments are due on Sunday at 11:59pm, via GitHub unless otherwise noted.

Assignment TOC:

FAQ

This section will grow as questions are asked and new content is introduced to the site. You can submit questions:

- via e-mail to Dr. Brown (brownsarahm) or Beibhinn (beibhinn)
- via Prismia.chat during class
- by creating an [issue](#)

Syllabus FAQ

How much does assignment x, class participation, or a portfolio check weigh in my grade?



Can I submit this assignment late if ...?



GitHub FAQ

My portfolio won't compile



Help! I accidentally merged the Feedback Pull Request before my assignment was graded



Common Debugging Issues

Key Error



General Tips and Resources

This section is for materials that are not specific to this course, but are likely useful. They are not generally required readings or installs, but are options or advice I provide frequently.

on email

- [how to e-mail professors](#)

References on Python

- [Course Text](#)

Data Sources

- [Kaggle](#)
- [Google Dataset Search](#)
- [UCI Data Repository](#)
- [Json Datasets](#)
- [Databases](#)

If you have others please share by creating a pull request or issue on this repo (from the GitHub logo at the top right).

Letters to Future students

This section is a place for students enrolled in Fall 2020 to write letters to future students taking this class with Professor Brown. The websites for future sections will link back here for them to read.

Contributed Notes

Reviewing notes

Especially when it comes to the difficult topics make sure you go back through the notes and try and add to them yourself. Actively using the new topics will help you learn a lot better than just copying the notes.

Attend Office Hours

Attending office hours will help you better understand course material, complete homework assignments, and learn new things that might not normally come up in class.

- David

To contribute

Via GitHub directly:

1. Use the edit button above to add a note to this file following the example that's commented out
2. create a pull request

By Professor Sarah M Brown
© Copyright 2021.