# **Project title**

MyInflation Finder

# **Project pitch**

**if you and your mentor have revised this project idea then this should be the revised version, otherwise you've already written this. It should be short and to the point.**

The calculator will create a personal inflation rate that is calculated after taking into account inputs from the user regarding their spending habits and income. In essence, we will be taking data from the Bureau of Labor Statistics which is used to calculate the national inflation rate (among other things) to calculate a more personalized inflation rate. Users can then toy with the tool as much as they would like, each time adjusting for changes made in the inputs and spitting out a new calculation.

# **Names and general skills**

**Rodrigo Guerrero -** Python/R/SQL programming,

**Ian Forsyth -** UI/UX Design, Python/R/SQL programming, Database management

**Nick Manuel -** Python/R/SQL programming, PySpark, Data engineering

**Travis Myers -** Python/R/SQL programming

# **Data Ethics Checklist**

**Please fill out the following checklist for during general use or after a data breach.**

| **#** | **Question** | **Generally** | **Data Breach** | **Example** |
| --- | --- | --- | --- | --- |
| **1** | **Could a user sell drugs or other illegal items on your platform?** | **N** | **N** | **https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1072&context=sph\_pubs** |
| **2** | **Could a user of your platform engage in sex trafficking?** | **N** | **N** | **https://stmuscholars.org/craigslist-and-backpage-sex-trafficking-at-your-fingertips/** |
| **3** | **Could a user sell class notes or cheat on their homework on your platform?** | **N** | **N** | **https://www.edsurge.com/news/2021-02-23-more-students-are-using-chegg-to-cheat-is-the-company-doing-enough-to-stop-it** |
| **4** | **Could a stalker use your project to find someone?** | **N** | **N** | **https://www.nytimes.com/2018/05/19/technology/phone-apps-stalking.html** |
| **5** | **Could your app be used to spy on or track individuals?** | **N** | **N** | **https://www.nytimes.com/2019/12/22/us/politics/totok-app-uae.html** |
| **6** | **Could your app/software access the camera or microphone and record things without users being aware?** | **N** | **N** | **https://gizmodo.com/these-academics-spent-the-last-year-testing-whether-you-1826961188** |
| **7** | **If someone uses your platform, could they be re-traumatized or have their mental health impacted in some way?** | **N** | **N** | **https://www.wsj.com/articles/facebook-knows-instagram-is-toxic-for-teen-girls-company-documents-show-11631620739** |
| **8** | **Could your algorithm promote material that would traumatize or upset individuals?** | **N** | **N** | **https://www.theguardian.com/technology/2021/oct/16/tiktok-eating-disorder-thinspo-teens** |
| **9** | **Would your users be upset if the data you collect was given to someone else?** | **M** | **M** | **https://www.businessinsider.com/stolen-data-of-533-million-facebook-users-leaked-online-2021-4** |
| **10** | **Could a data leak potentially lead to identity theft?** | **N** | **N** | **https://www.ftc.gov/enforcement/cases-proceedings/refunds/equifax-data-breach-settlement** |
| **11** | **If your site was hacked, would users of that product potentially lose their job, spouse, or family?** | **N** | **N** | **https://www.forbes.com/sites/zakdoffman/2019/08/23/ashley-madison-is-back-with-30-million-cheating-spouses-signed-since-the-hack/?sh=22f1ba5c3878** |
| **12** | **Should there be an age limitation on your product?** | **N** | **N** | **https://www.bbc.com/news/technology-48925623** |
| **13** | **Could someone use your product to find, contact, and potentially commit elder abuse?** | **N** | **N** | **https://www.nbcnews.com/health/aging/genetic-testing-scam-targets-seniors-rips-medicare-n1037186** |
| **14** | **If the data on your platform was breached, could it be used to blackmail the users?** | **M** | **M** | **https://www.wired.com/story/parler-hack-data-public-posts-images-video/** |
| **15** | **Does the existence of your project imply that a particular racial group, gender, religion or other protected category is inherently bad, gross, or unwanted?** | **N** | **N** | **https://www.distractify.com/p/pinky-gloves-dragged** |
| **16** | **Could your product be used to commit hate crimes against a specific group?** | **N** | **N** | **https://ibmandtheholocaust.com/** |
| **17** | **Does the primary content of your game or algorithm focus on something considered deeply unethical?** | **N** | **N** | **https://www.quora.com/What-is-the-most-unethical-video-game-ever-created** |
| **18** | **Does your game or software contain race, gender, or other stereotypes?** | **N** | **N** | **https://en.wikipedia.org/wiki/List\_of\_controversial\_video\_games** |
| **19** | **Could users of your app scam other individuals?** | **N** | **N** | **https://dailyiowan.com/2021/06/21/opinion-kickstarter-scams-are-on-the-rise/** |
| **20** | **Is your particular algorithm biased towards predicting correctly only for one race, gender, or other group?** | **N** | **N** | **https://www.theguardian.com/technology/2020/sep/21/twitter-apologises-for-racist-image-cropping-algorithm** |
| **21** | **Are the users of your project, players of your game, or those being surveyed for your data aware of how their data will be used?** | **Y** | **Y** | **https://www.computerweekly.com/news/252464048/Many-search-engine-users-unaware-of-personal-data-collection** |
| **22** | **What are the possible misinterpretations of your results? For example - would a white supremacist or misogynist be stoked about your results if they misinterpreted it?** | **N** | **N** | **https://www.nature.com/articles/s41467-020-19723-8** |
| **23** | **Does the use or purchase of your data potentially contribute to a dangerous group or regime?** | **N** | **N** | **https://vertpaleo.org/svp-sends-letter-to-paleontological-community-on-myanmar-amber/** |
| **24** | **Could your virtual reality environment cause injury to the user?** | **N** | **N** | **https://bonejoint.net/blog/eight-things-you-should-know-about-virtual-reality/** |
| **25** | **Are your study participants or game players aware that their data will be collected and used?** | **M** | **M** | **https://www.polygon.com/features/2019/5/9/18522937/video-game-privacy-player-data-collection** |
| **26** | **Does your game or app contain addictive design elements without benefit to the user?** | **N** | **N** | **https://searchsoftwarequality.techtarget.com/tip/5-examples-of-ethical-issues-in-software-development** |
| **27** | **Does your survey contain an aspect of compulsion or unusually large incentive, that would command users to take it even if it was to their detriment?** | **N** | **N** | **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4214066/** |
| **28** | **Could your research outcomes harm an individual or entity?** | **N** | **N** | **https://rutgersaaup.org/rutgers-budget-system-is-a-mess-what-will-president-holloway-do-about-it/** |

# **Data Ethics Responses**

**For any item where you marked Yes or Maybe, write the number and what you expect to do to mitigate that problem. See the powerpoint for examples.**

**9.** It is assumed that users would be concerned about any information provided being made available to third parties. To put users at ease when using our application, we will not be retaining information longer than the time users spend on the application, and will address this on the main page of the application in the form of a notice.

**14.** Should an attacker find their way onto the application at the same time as a user, some of their personal financial information (like annual salary, etc.) may be used as a form of blackmail. However, since the user is not entering any PII, this information is largely useless to attackers unless they are already attacking the user's home system, which is an issue that we cannot mitigate. A data breach in this case would not be possible, as we do not store any user data in the long-term.

**21.** Users will be inputting potentially sensitive financial data into the calculator, that they will likely not want shared. A disclaimer on our site will indicate to users that any information received by our application will not be stored or sold to any third party. Data should be purged as soon as the user closes the application.

**25.** Make it clear to individuals that their data is not being collected and stored anywhere. Though the data inputs could be useful in refining the tool, the data will only be used to create the calculation in the moment and not stored for any time longer after the calculation has been completed.

**Proposed Technology Stack:**

Operating System: Windows 10, MacOS, CLI/Terminal

Execution Platform: RStudio, Adobe XD

* [RStudio Download Link](https://www.rstudio.com/)

Data Management: Google Drive, Local storage, GitHub

* [How to use Google Drive](https://support.google.com/drive/answer/2424384?hl=en&ref_topic=14940)

API: Bureau of Labor Statistics, if necessary

* [BLS API](https://www.bls.gov/developers/)

Code Organization: GitHub

* [GitHub Tutorial - Beginner's Training Guide](https://www.youtube.com/watch?v=iv8rSLsi1xo)

Documentation: Google Documents, Drive

Utilities and Tools: R, RShiny, Python

* Python: [Python Tutorial](https://www.w3schools.com/python/)
* R: [R Tutorial](https://www.w3schools.com/r/default.asp)

**Project Methods:**

Primary communication channel on Discord, GitHub for collaboration, Python and R for data analysis and visualization.

**Project Organization:**

Team meetings will occur every Monday, at 10am MST via Zoom unless otherwise stated. Link is available through Rodrigo, Ian, and Nick. All deadlines can be found on D2L.

Frequent and regular communication via email and Discord keeps group members up to date on what is happening.

## Skills & Data List

This should be a thorough, bullet-point list of the things and skills you'll need to be successful. Below are examples.

· Data needed:

* Data from CPI, taken from R package with scraper or using API (Nick, Rodrigo)
  + blscrapeR package by keberwein
* 3rd party inflation trends data (Ian, Travis)
* Data from surveying students or friends and family (All)

· Skills needed:

* Application development (All)
* Data analysis (Ian, Nick, Travis)
* Web development (All)
* RShiny (Nick, Ian)
* Python (All)
* Data cleaning (Travis, Ian, Nick)

# **Literature/Market Review**

## Description

Our project will be a Personal Inflation Rate calculator, that will be made using either RShiny or Python or combination thereof.

Through the personal inflation rate, a person will be able to first, create a market basket, taking the inputs of the user to then create an inflation rate using the personalized market basket they created with the inputs they provided and then being able to compare that inflation rate to other available data points, helping to contextualize it and applying it to their everyday life and providing information that could prove vital to their financial strategies and doing so in an easy to understand way which advises the user throughout the experience of using the tool.

Users will also be able to compare how their inflation rate differs from the inflation rates of other regions/states generally according to the data from the Bureau of Labor Statistics (BLS) as well as from different years generally as well as the inflation rates of their own market basket

To expand on the functions of the calculator site, the application’s focal point will be the personal inflation rate calculator. That will be the very first thing that users will interact with, however, there are a number of other data points, data visualizations and information that the user will be able to consume and use for their own analysis once they have used the calculator.

The primary function, the personal inflation calculator will generate a personal inflation rate that is unique to inputs that the individual inputs. The two primary categories of inputs that a person can apply are geographical information and spending habit information. For example, things that the user of the calculator can input to the calculator in the geographical information category include, but are not limited to geographic location (typically regional or state, depending upon data availability) and residential community (metropolitan, suburban, exurban, rural). Within the spending habit information category, people will be able to select inputs which reflect their spending habits such vitally including the average of their monthly income that is dedicated to certain goods and services as well as any goods and services that are regularly excluded from their spending habits. This then allows us to create a market basket that is both tailored to the individual as well as different from the more general CPI’’s that are generated by the BLS to create more general, holistic inflation rates.

Throughout the selection of inputs users will be guided to explain what terms mean and how their inputs are affecting the calculations being made. These same careful aesthetic and explanatory choices will be constant throughout the use of the application. As a result, there will be a lot of information that the user will be presented with for them to have their own analysis of and they will be able to learn more about certain terms as they interact with the tool.

In addition, we want to give users the ability and option to input information about their own finances, such as bank account and investment balances as well as debt balances (credit card, mortgage) and see how changes in inflation, both traditional inflation rates and their newly calculated personal inflation rates affect their buying power and growth (and or decay) in their accounts. We also would like to create a real net worth calculator feature as well which compares how their personal inflation rate affects their net worth.

## Market/Literature Review

You will need at least 5 comparable websites or peer-reviewed papers (for data analysis). For each, discuss what it is, how it compares to your project, and how your project is different.

**1.** [**US Inflation Calculator**](https://www.usinflationcalculator.com/)

This is comparable to what we are looking to do because like our project, this website is a calculator in which people are able to calculate what an amount of money in a year between 1913 would be, adjusting for inflation to another year, also between 1913 and present day.

What our project aims to do is something a bit more complicated. We will not be doing an inflation calculator as this one does, but will taking a greater number of inputs from users, explaining to them along the way what is happening and providing explanations when need be and extrapolating the data that is generated to the calculator to real life applications for the user like mentioned in the description.

**2.** [**UMass Boston - Personal Inflation Calculator**](https://www.umb.edu/editor_uploads/calculator/personal_inflation_calculator.html)

This is likely the most comparable calculator that we were able to find. It looks to do much of the same that we do, creating a personal inflation rate based upon the inputs that are given to it by users.

However, there are two ways in which we hope to differentiate this calculator from the one our project will be creating. 1. We will be creating something that is more intuitive and aesthetically pleasing and 2. Using the personal inflation rate that is calculated by the tool to extrapolate it to practical applications such as how their personal inflation rate differs from the inflation rates that are formally calculated by the Consumer Price Index (CPI) and what some of the specific terms that are used mean in context and with examples where applicable.

This example seems to be an excellent tool that has suffered from being very in-depth but not easy to navigate as a user and does not give any real world applications. Our project aims to remedy this defect in creating our own calculator that has those aforementioned tools.

**3.** [**Generic Inflation Calculator - Forward/Backward Flat rates**](https://www.calculator.net/inflation-calculator.html)

This calculator is generic and easy to look at, so we can draw from its convenient user interface as part of our implementation in our own version. Large, simple affordances and bold text really highlight the important information on the page, something the previous PIC does not have.

Ours will be different in that there will be many more user inputs to consider and factor into our design. This is achieved through the personalization of inputs, as opposed to the simple value of whatever dollar amount the user decides. We will also not be factoring in the forward and backward flat rate calculations, since these are not as relevant for our target users. Ultimately, ours will be more user friendly, and won’t include information that the user did not ask for. The wall of text that follows the calculator in this page is also something that will not be implemented in our final design. However, historical inflation rates will likely be included in ours.

**4.** [**Personal Inflation Rate (candaceshira.com)**](http://www.candaceshira.com/learning_center/calculators/personal_inflation_rate)

This calculator, found on a financial advisor’s website, has several design features that make it much more user friendly in comparison to the other calculators we looked at. Very minimal text which minimizes the amount of clutter visible. No immediate badgering of large and terrifying percentages. An easy to use slider or one can opt for typing in the dollar amount instead. And a results screen, no live changes like the UMB calculator.

What we will be doing is more detailed than this. Similar to the other calculators, there are only a few generic inputs the user has access to. We would like to possibly expand and add more inputs to help narrow costs and inflation rate differences on a personalized level. And while the lack of information on this calculator is a major factor as to why their user interface is simple and clutter free, there needs to be a lot more information. This reports on barely half the amount of information as the UMB calculator. Our calculator will try to report on everything it can, giving detailed explanations, all with a simple and user friendly interface.

**5.** [**myCPI - Federal Reserve Bank of Atlanta**](https://www.atlantafed.org/research/inflationproject/mycpi.aspx)

This website is a sort of calculator and goes about achieving their goal in a way similar to the way that we would like to. Namely, using user inputs to create a calculation. Here, it seems to have the potential to create a CPI based upon people’s typical spending habits; however, it generalizes the user based upon identity markers of the user.

Though this could create an accurate personal inflation rate, this is too much of a generalization. Our project will be different as it will allow users to play with the tool in a more interactive way, being able to see each thing that they have selected and select and deselect items with ease. Furthermore, our project will be more expansive. Though myCPI does compare their calculated personal inflation rate with the national inflation rate and others, the inflation rate that our tool will calculate can be used in other ways, extrapolating it to other relevant information for users.

# **Timeline**

This needs to be a week by week breakdown of what every single person in your group is expected to be doing. I will use this during check-in's to determine if you are going to pass or not – being a few days behind isn't the problem, being three weeks behind means you are unlikely to pass and should take a W and not an F and try again next term.

Provided is a spreadsheet version that you should fill in. You can feel free to edit the shape and the design or whatever if it offends your sensibilities or something. Most of you will not have this many group members so feel free to delete those columns. I've put in examples for if this was the example in the syllabus of a group trying to create an interactive RockD app. I've only filled out the first two weeks as an example of the level of detail we expect. Remember that if two people are consistently doing the same task, I'm going to wonder if that shouldn't just be one person.

| **Week** | **Rodrigo** | **Ian** | **Nick** | **Travis** |
| --- | --- | --- | --- | --- |
| 5 (2/7-2/13) | Creating Pseudocode for calculations | Researching alternate (see above) calculators data sources and algorithms | Explore ‘blscrapeR’ package to determine useful datasets and functions. | Exploring R shiny inflation/commodities applications |
| 6  (2/14-2/20) | Finding and creating descriptions for terms. Creating a cohesive user experience through words. Working with Nick on finding functions to use and how to complete calculations | Lo-Fi Prototype for app with UI/UX qualities in mind, explore data storage options | Set up a skeleton foundation for the R Shiny app, start frontend development. Creating placeholder tabs/pages for the different features for our interface. Setup a database around the BLS API by data wrangling and cleaning. | Assist with R shiny app skeleton and front-end development. Work with Ian to create a rough prototype with UI/UX considered. |
| 7  (2/21-2/27) | Sketch web app design in collaboration with Ian and Nick. | Implement changes to UI/UX Design from group/mentor feedback | Modify and correct design issues on skeleton foundation. Test different options for user interaction design; sliders, buttons, text boxes. | Further work on front-end R shiny application skeleton. Commit to single design that best suits User experience. |
| 8  (2/28 - 3/4 | Outline process for how the user interacts with the application. | Hi-Fi Prototype, final design implementation | Push final UI/UX design in collaboration with Ian and Rodrigo. Finish frontend. | Finish up front-end development of app. Start thinking about backend. |
| 9  (3/7 - 3/13)  Spring Break | Spring Break | Spring Break | Spring Break | Spring Break |
| 10  (3/14 - 3/20) | Finalize UI and user interaction routes in collaboration with Ian and Nick. Finalize calculations | Explore integration into CLI and data storage requirements | Modify and start extensive frontend testing. Make sure the user experience is seamless and flows. | Research and begin planning out backend development. Make sure the backend is being designed to compliment the frontend. |
| 11  (3/21 - 3/27) | Work with Ian on testing and how to fix bugs that will come up. | Testing week. Making sure everything works and is portable/reproducible in End User environments | Begin backend development. Implement calculations into design. | Backend development, making sure front-end works with back-end design. Testing and reviewing code. |
| 12  (3/28 - 4/3) | Work with Ian on fixing bugs that came up the week before. | Explore containerization (Docker), debugging w/ Rodrigo | Determine and implement a proper client-side data storage system to store sensitive information. We do not want to keep data. | Explore containerization using Docker and creating secure data entry/storage for client-side systems. |
| 13  4/4 - 4/10 | Work on the final presentation (likely powerpoint) with Ian. Creating an outline and | Begin making final presentation materials, additional testing and stretch goals | Validate and test the backend. Ensure data leaks are not possible. | Final testing and launch, begin working on presentation. |
| 14  4/11-4/17 | Record and edit video presentation | Final touches on presentation materials, preparation for showcase | Assist with final presentation preparation. | Contribute to the final presentation and video. Wrap up the final project. |

# **Final Deliverable Product Specifications**

You should write a draft version of these but this is what your mentor will help you with especially. This is often the breakdown of what will and will not be considered a passing project so make this detailed!

## **Compatible Systems:**

**e.g. Windows, Android, or Chrome browser. You may say you're aiming for multiple versions of this, then compromise on one.**

We are aiming for this to work on as many browsers as possible, but at a minimum, Google Chrome browser.

## **Minimum Deliverable:**

**What is the minimum project and degree of functionality that is a requirement for this to be considered passing?**

A functioning RShiny web application that is reproducible client-side on the Google Chrome Browser. It should perform all functions that were stated above and satisfy the novelty aspects while still being user friendly and not overly complex.

## **Expandable Deliverable:**

**If you do happen to already meet the minimum scale standards as stated above, what could you try to add to make something fancier?**

We would like to potentially implement CLI functionality so users can run calculations with minimal inputs into their command line/terminal and see an output. Containerization is another stretch goal, that way the calculator can be available through DockerHub and be used anywhere. Potentially making the application a Chrome Extension as well. Expanding our calculations to include differing tax rates would be helpful as well. One or more of these goals achieved would be satisfactory.

## **Data Availability:**

**This is for projects with data scraping. What will you do if you can't actually scrape the data you need? What about if your software is supposed to hook up to another site but you can't get past the VPN? What is the plan for a finished project with that in mind?**

All the data that is needed is available through the Bureau of Labor Statistics API. There are also a number of R packages which scrape data from the API in a more user friendly way. As such, there probably won’t be much in the way of issues regarding data collection.