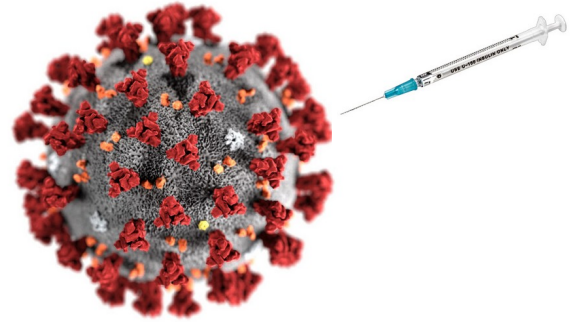


## Project 3: Classification

Due: see Canvas  
Points: UG out of 100, Grad out of 110

Please submit your report in **PDF format**. If you want to submit code, then please submit it in an additional file containing sufficient comments to make it understandable.



Source: CDC illustration of the structure of Covid-19 with added syringe.

### Introduction

Experts are talking about the possibility of a fourth Corona virus wave hitting the world and the US (see <https://www.washingtonpost.com/health/2021/04/04/covid-fourth-wave/>). Use the data that you have identified for projects 1 and 2 and, if available, new data. We would like to classify counties or states in high/low or low/medium/high risk in terms of how affected they would be by a fourth wave. These results can be used to prepare the infrastructure and plan possible interventions (e.g., mask mandates, temporarily closing businesses and schools, etc.). Early interventions based on data might dampen a severe outbreak and therefore save lives and shorten the length of necessary closings.

### Follow the CRISP-DM framework

#### 3. Data Preparation [40 points]

- Define your classes (e.g., more than x corona-related cases or fatalities per a population of 10000 per week). Explain why you defined the classes this way (maybe you want to look at the data first).
- Combine files as needed to prepare the data set for classification. You will need a single table with a class attribute to learn a model.
- Identify predictive features, create additional features, and deal with missing data (for classification models that cannot handle missing data).

#### 4. Modeling [50 points]

- Prepare the data for training, testing and hyper parameter tuning.
- Create at least 3 different classification models (different techniques or using different class variables) using the training data. Discuss each model and the advantages of each used classification method for your classification task.

- Assess how well each model performs (use training/test data, cross validation, etc. as appropriate).

**5. Evaluation** [5 points]

- How useful is your model for your stakeholder? How would you assess the model's value if it was used.

**6. Deployment** [5]

- How would your model be used in practice? What actions would be taken based on your model? How often would the model be updated? Etc.

**Graduate Students: Exceptional Work** [10 points]