It's the Final Project

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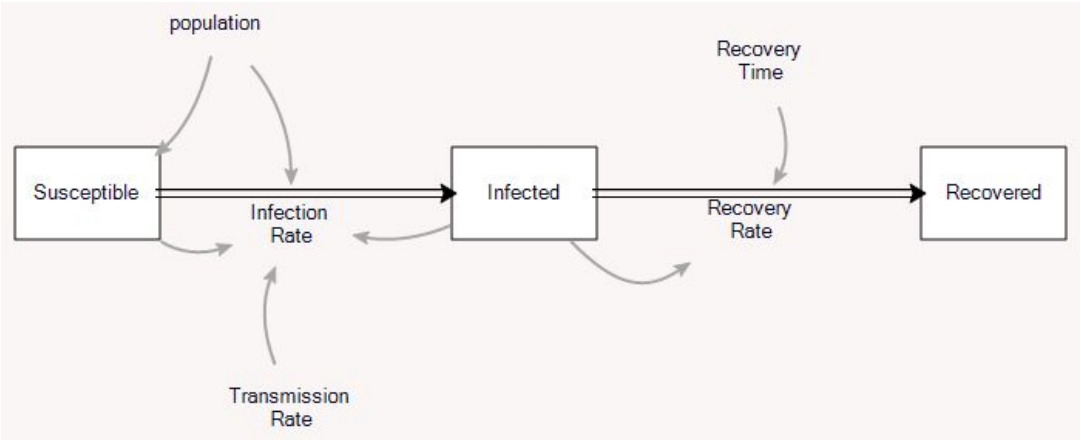
The SIR Model

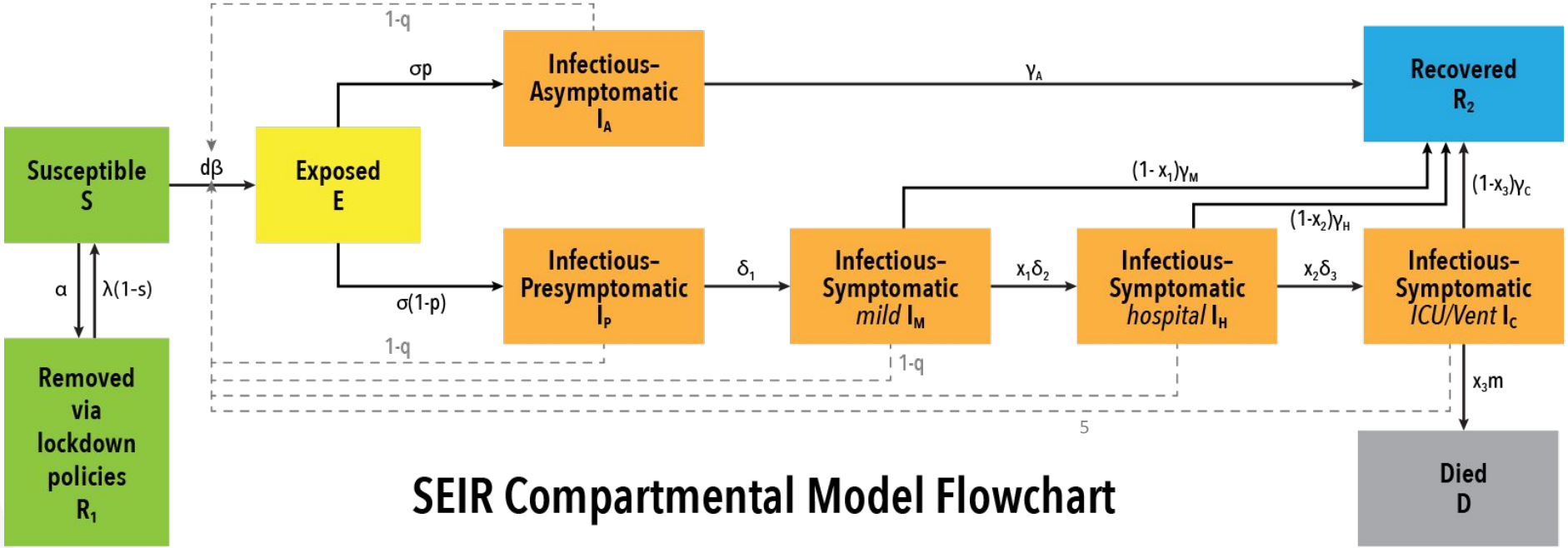


Final Project - Disease Propagation Modeling

- you will build a Population, which will be a collection People objects
- you'll then introduce a Contagion to the population
- you'll then code random interactions within the population, allowing the disease to spread
- You will be required to do some coding of things we haven't in class

further expand this code, investigate the behavior of COVID-19
how would we manage adding a asymptomatic status, or modify the interaction numbers as the status changes?

The Covid SEIR Model



SEIR Compartmental Model Flowchart

Final Project - Disease Propagation Modeling

Choose one of the following points of customization (or come up with your own)

- Introduce a Vaccine, assume the vaccine is awesome, such that it gives you 90% efficacy rate - (meaning, now a Person rolls 2 dice after exposure - one to see if they got sick, and one to see if the vaccine stopped it)
- Implement an Sick/Isolation state that a portion of the population adheres to, what percentage of the contagious population need to be isolated for this to make a difference?
- Implement an Asymptomatic state, how does this affect the transmission rate?

Choose one of the following to investigate.

- Investigate the matter of Herd Immunity: There is a percentage of our population that cannot be vaccinated (new borns, for example) if enough people are vaccinated, then some people who cannot get vaccinated will never get sick. Let's say you want to have this probability over 95 percent. **Investigate the percentage of inoculation that is needed for this as a function of the contagiousness of the disease.**
- Investigate Social Distancing. By limiting interactions with others, can the disease propagation rate slow? Imagine a new virus unleashed on a population of 40000 - roughly the amount of students enrolled at UT - with a zero percent of the population vaccinated. With a daily interaction with 40 people, what is the peak (i.e. maximum number of people sick in a single day)? What if we cut the interaction in half? in quarter? How low do the interactions have to be in order to make significant difference to the peak? How does this effect herd immunity?

Final Project - Disease Propagation Modeling

As this is a research project, you will need to do multiple runs to collect enough data.
Have a 1 to 3 page write up, describing the ‘experiments’ you have performed and the conclusions you draw from them.

- The exercises above give you a number of questions to address and think about.
- use your simulation to research the points of investigation from the previous slide
  - if you're in a group, investigate both.
- You are required to add at least one point of customization for the final project, i.e. for example, some demographics are more prone to severe illness than others, or some people created "social bubbles" during the pandemic, what happens when someone breaks the bubble? (secret zombie bite), etc…
  - if you are in a group, you must have 3 points of customization
- Include a table to report on the behaviour you found.
- Include plots, you can use Matlab or Matplotlib in Python (or even Excel or Google Sheets) that support your conclusions
- Do not include code in your write up
- Draw intelligent conclusions from your data!