# CITS4403 Project Specification
# Semester 2, 2023

***Submission Due**: 16 October 2023 11:59 PM (AWST)*

**This project can be done individually or in a team of two.**

If you intend to complete the project in a team of two, you will need to find a team member by yourself. We recommend you to come to the lecture and the workshop, where you can meet others and discuss easily to form a team.

Please note, no bonus marks will be given for completing the project individually.

If you really have the difficulties in finding yourself a team member, please email me before ***EOB 19th September 2023***. I will randomly allocate the students who emailed me into a team. *But you have to be aware that this approach cannot guarantee you a team member, because there could be the chance that I only received an odd number of requests.* Then in that case, you will have to do the project individually, or find a team member from the lecture or workshop by yourself.

We strongly encourage healthy collaboration. See the University of Western Australia Working in Groups Guide. If your team member does not engage or collaborate, please contact the unit coordinator (Prof. Mark Reynolds) and the lecturer (Dr. Siwen Luo) with describing the contributions of each collaborator. We strongly recommend that you start working **early** so that you will have ample time to discover stumbling blocks and ask questions.

---

**Submission Method:**

Submission: LMS Assignment Submission Box (The submission box will be opened on 2 October 2023)

**Submission Files:**
***You MUST submit:***

- PDF file: a (maximum) 5-page report (excluding references and appendix). File name: LastName_StudentNumber.pdf (individual) or LastName1_StudentNumber1_LastName2_StudentNumber2.pdf (group)

- ipynb file: an ipynbfile that includes all your implementation. File name: LastName_StudentNumber.ipynb (individual) or LastName1_StudentNumber1_LastName2_StudentNumber2.ipynb (group)

You can **optionally** submit:

- Zip file: a zip file that contains any of the other data files, .py files etc. you used.

---

**Project Description and Relevant Marks:**

In this project, you are required to propose a model and implement the simulation for a real-world complexity case study. You can choose any cases that you are interested in, excluding the same cases that existed in the textbook (e.g. percolation, sugarscape etc.).

You can choose to use any of the models for your simulation based on either **cellular automata or agent-based models.**

You are required to write a maximum 5-page report (excluding the references and appendix), including the following four main sections:

1. **Background [5 marks]**
    a. Problem statement: describe the situation that you are going to simulate and analyze.
    b. Importance discussion: illustrate the importance of your selected case study, supported with related literature reference (e.g. published journals or books).
    c. Overview: an overview of the report, including the model you use and the conclusion you make based on the simulation results.

2. **Model Description [10 marks]**

Demonstrate clear and solid computational modeling thinking, provide a clear modeling process, including:

    a. Explain why your selected type of model is suitable for your chosen case, supported with related literature reference (e.g. published journals or books).
    b. Clearly and logically demonstrate all the assumptions and rules of your model;
    c. Describe and explain the initial configuration and the parameter choices for your model.

**Note: Your submitted .ipynb file should contain the corresponding code implementation of your described model. Detailed code comments should be given regarding your model details: rules, initial configuration, parameters etc.*

3. **Results [10 marks]**

   Describe and discuss the simulation results, including:

   a. **Results visualization and discussion [5 marks]:**
      - Visualization of the initial configuration and the visualization of the final simulation results.
      - Discuss your findings of the simulation process after experiments, including any trends and patterns.

   b. **Different parameter comparison and analysis [5 marks]:**
      - Compare the simulation results or quantitative values with at least two sets of different parameter variants of your model, e.g. different probability, different initial configuration, or any other associated parameter values of your model.
      - Display the visualization results with different parameters, and discuss the influences of different parameters to your simulation results.

**Note: Your submitted .ipynb file should contain the corresponding code implementation and the output of your results visualization. Detailed code comments should be given regarding the different chosen parameters.*

4. **Conclusion [5 marks]**

   Summarize the conclusion of your findings based on your simulation results, discuss the limitations of your model and justify your simulation results with the real-world phenomenon. Discuss about any future works.