Project Title: Modelling Project

40% Individual Submission

Due Oct. 20th, by 8pm ET on LEARN with a report in PDF format. Include your Vensim PLE model files in a zipped folder.

No other file formats will be accepted, unless otherwise noted in the instructions below.

Working individually, you should develop an understanding of a system of your own choice. The system should include social and environmental aspects. An example could be a food supply system, a resource extraction system, or a health system. You will only have to represent the entire system at a high-level with a diagram, but will model a component of one of its subsystems using mathematics and software. If you have questions about the suitability of your system, please speak to Prof. Borland or your TA. In a class of this size some overlap in terms of your chosen system may exist, ***but you are expected to work completely independently on this project.***

Think about the following components by doing high quality research:

- What are the basic elements, interconnections, and functions of your system and its sub-systems?
- What are the issues that exist in the current system?
- What are the root causes?
- What are the symptoms of the issues that can be observed/measured?
- What is holding the status quo in place? Why is the system behaving in this manner if these issues exist?

Create an overall, high-level system diagram using the stock and flow method, with the additional components outlined in the PPS method in W02.

Identify one sub-system from your overall system and create a second diagram focused on just this subsystem. This should be a relatively simple piece – a few flows/stocks, with appropriate feedback and information links. A correctly implemented model is preferred to a complicated model that is incorrect.

Simulate the behaviour of the sub-system using Vensim PLE as demonstrated in W03+W04:

- Show the equations, parameters, development of model for all variables and components of your sub-system diagram. Neat, hand-written solutions are acceptable.
- Provide initial values, parameters, or ranges of values, as appropriate for system variables based on high quality/appropriate research.
- Discuss the effect of how the changes in system parameters are expected to work and show how your model's behaviour align with this ***for 2 control parameters or inputs. Show how changing 2 different things will have an expected effect on system behaviour.***
- As an example, from the "Coffee Cooling" model, the thermal conductivity of the cup material could be varied to represent system behaviour when using different cup materials. Using Vensim PLE to model and output graphs of system behaviour over time is expected, along with a brief discussion of the relationships and parameter values. Use appropriate graphs and diagrams to help communicate your ideas and that your system behaves as expected.

Your submission should have the following structure:

Title Page – Include name and student ID #

Page 1 - Overall System Diagram using the stock and flow method. Include the additional components introduced in the PPS method (W02).

Page 2-3 – Discuss the following questions about your system:

- What are the issues that exist in the current system?
- What are the root causes?
- What are the symptoms of the issues that can be observed/measured?
- Why is the system behaving in this manner if these issues exist?

Page 4 - Sub-System diagram – note that you can add detail or components not shown in the overall systems diagram.

Page 5-6 - Equations, parameters, and the development of model for all variables and components of your sub-system diagram - see the example for the coffee cup cooling, but write yours up more neatly/formally.

Page 7-8 - Discussion of the effect of how changes in parameters are expected to affect system behaviour. Show how your model's simulated behaviour aligns with this ***for 2 control parameters or inputs.***

Page 9+ - References, as many pages as required, in IEEE style.

Include a zipped folder that has your Vensim files so that the evaluator can run your model themselves. Upload this to LEARN along with your report.

Grading Breakdown:

Page 1 – Overall System Diagram: /5
Page 2-3 – Discussion of the system: /10
Page 4 - Sub-System diagram: /5
Page 5-6 - Equations/Model Development: /10
Page 7-8 – Discussion of Effects: /10

Total: /40

References will be factored holistically into the grading of the sections above. High quality evidence to support your work is expected throughout.

Better submissions will:

- Include a correct overall structure that accurately represents the system.
- Include correct usage of flows, stocks, faucets, information links, feedback loops, and the general elements of a stock and flow system diagram.
- Be clearly labelled and communicate ideas professionally.
- Accurately and correctly predicts system behaviour using appropriate equations, initial conditions which are sourced or derived from high quality sources.
- Correctly and accurately communicate and explain the effects of changing a parameter on your simulation. This should be demonstrated to behave as expected through the use of modelled system behaviour.
- Properly cite information in IEEE Style.

Missing components = 0%

0-40%	U = Unsatisfactory (clearly below standard for a 3rd year level SYDE student);
50%	M = Marginal (meets minimum expectation, but not more);
60%	S = Satisfactory (demonstrates basic design and engineering competence);
70%	G = Good (demonstrates average design and engineering effort);
80%	VG = Very Good (demonstrates above average design and engineering effort);
90%	E = Excellent (exceeds expectations);
100%	O = Outstanding (I think this component is award-worthy).