CSYS5010 Introduction to Complex Systems
Assessments 2-4 – Major group project
Agent-based modelling group project

Stage 1 (Assessment 2) – Project Proposal
Due date: Sunday September 9 2018, 23:59 pm. (end of week 6)
Submit via: *TurnItIn Assignment 2* section on our Canvas site. One submission per group
Weighting: 25% of final mark
Length: 1000 to 1500 words max. (*hard limit*)
Format: Please use 1.5 line spacing, 12 point font.

Stage 2 (Assessment 3) – Project Presentation
Due date: Tuesday October 16 2018, during week 11 class
Submit via: in-class presentation. One presentation per group
Weighting: 25% of final mark
Timing: 10 to 15 minute (max) presentations, plus 5 minutes Q&A.
Format: Any presentation format you like that covers the required material.
All team members must verbally participate in some fashion.

Stage 3 (Assessment 4) – Project Report
Due date: Sunday November 4 2018, 23:59pm. (end of week 14, "Stuvac")
Submit via: *TurnItIn Assignment 4* section on our Canvas site. One submission per group
Weighting: 40% of final mark
Length: 3000 words max. (*hard limit*)
Format: Please use 1.5 line spacing, 12 point font.

We have learned in class how to build and use agent-based models.

Your task is to construct and analyse an agent-based model of a complex system:

- Form groups of 2-3 people interested in exploring the same area.
- Select a system from your field(s) of interest *that is appropriate* to study further using an agent-based modelling approach.
- Design and construct an agent-based model of the system in order to explore a hypothesis about that system. You have learned how to use NetLogo in class; you have the freedom to choose whether to use NetLogo or another programming environment.
- Be guided by the modelling loop concepts (i.e. be clear about the system you are attempting to model, assumptions and rules inferred regarding the system, your hypothesis, experiment and validation technique).
- Analyse the data produced by your model, with statistical techniques relevant to your hypothesis. You may incorporate analytic techniques we cover over the coming weeks (e.g. dynamical systems methods).
- Critically evaluate your model and analysis.

Our detailed requirements for each assessment stage are as follows:

Stage 1 (Assessment 2) – Project Proposal
For the project proposal, please include:

1. A description of the system you choose to model, including:
   i. What is your hypothesis or experimental question you seek to answer?
   ii. Provide a high-level description of your model, including what are the agents and their

properties, what is their environment and control parameters, how are they connected and interact, what are the update rules you will use, etc.

iii. Justify why agent-based modelling is appropriate for this system.

2. How will you measure and analyse the behaviour of the model? In particular, how will this relate to your hypothesis.
3. Identify existing agent-based models for this system in the literature, and discuss how your model will relate to and/or extend them.

Stage 2 (Assessment 3) – Project Presentation

For your presentation to the class, please include:

1. A description of your model, analysis and evaluation, covering the general areas required for both the proposal and final report.
2. A demonstration of your model, where possible.

Stage 3 (Assessment 4) – Project Report

For the final report, please include:

1. A brief recap of your aims and modelling design;
2. An overview of your implementation of the model and your process in developing it;
3. The results of your analysis of the data produced by the model (including model validation where possible), and an evaluation/discussion of this analysis;
4. A critical assessment of your work on the modelling and analysis:
   i. This *must* include a discussion of how your findings relate to the current state of knowledge about this system (i.e. in the literature), what this means for the impact / significance of your findings, and – if you were not able to validate your model here – how you would go about validating your model;
   ii. This should also include other factors as you see fit, e.g.: strengths/weaknesses of your approach and its suitability for your aims, limitations of your model/analysis, potential future work or other areas of application of your work, etc.;
5. You must submit your final code as an appendix to the report (not included in word count)

As the examiners, we allow resubmission of previous work from your Stage 1 proposal in your Stage 3 report, providing the extent and nature of its use is acknowledged in your assignment. (i.e. if you do reuse some material from your Stage 1 proposal, you should add an acknowledgement about that at the end of the article, and briefly point out which sections they occur in).
Validation: not necessary but bonus.

Notes on applicable policies:

This assignment will be submitted via *TurnItIn*, a text-matching tool used to help detect instances of academic dishonesty. You must have accepted the policy via the Academic Honesty Quiz in order for your assignment to be marked. For more detail about TurnItIn and the Academic Honesty Policy, please see the Canvas site.

After submission of your group assignment you will be sent an automated email that asks you to complete a *peer evaluation* of your team members using an online tool (CATME). This is a compulsory part of the assignment. For more detail about CATME please see the Canvas site.

Please see the Canvas site regarding the *late submissions policy*. Extensions for the group Project Presentation will only be granted in the case where formal Special Consideration has been applied for and approved.

We reserve the right to *modulate* the group marks for each individual: your presentation marks will be directly modulated based on individual performance, while the results of the peer evaluation may feed into a decision to modulate individual marks overall.

Assessment 2, Stage 1: Project Proposal

Criteria	Pass	Credit	Distinction	High distinction	Weight (%)
A description of the system you have chosen for the assessment, including your hypotheses and a description of the agents and their interactions	A brief summary of the model, no or inapproapriate hypotheses given, poor description of agents and their functional role in the system.	A clear description of the system, the agents, their interactions and properties and a sound description of the hypotheses	As for Credit but showing a deeper insight into the connection between the system, the hypotheses and the agent's properties.	As for Distinction plus showing clear insights into the system itself and how to model the interactions between agents in order to capture the relevant behaviours. Innovative/original approach to integrating the hypothesis with the agent paramaters and interactions.	60
A description of the analysis and measurements you will carry out	Limited understanding of the role of measurement and analysis.	Demonstrated understanding of the purpose of measurement and analysis.	A well described set of measurements and analyses that demonstrate how the measurements connect with the hypotheses and the agent's interactions.	As for Distinction, plus original insights into how to measure key properties related to the system's inputs (parameters, agent's properties etc.), interactions, and subsequent system behaviour/output. How are the inputs/dynamics/outputs related to the possible validation of your model?	20
A literature review of other studies that have looked at the same system	Limited understanding of the literature available.	Demonstrated understanding of the strengths and weaknesses of previously published models based on your system.	An integrated critique of the strengths and weaknesses of previous work and a clear understanding of their relationship to the approach you have chosen to adopt.	As for Distinction, plus original insights into how your work is better, or more thorough, or more innovative, or more ... than earlier work.	20

ASSESSMENT 2 STAGE 2 – PRESENTATION – MARKING GUIDE

		0-49%	50-64%	65-74%	75-84%	85-100%	Mark	..out of
1. Structure	10	No structure and logical sequence of information Difficult or impossible to understand or follow	Loose organisation Presentation difficult understand and/or follow	Information presented in sequence and easy to follow Well structured with an introduction, main section and conclusion	Information presented in logical, interesting sequence Very well structured with excellent introduction, clear purpose, body and conclusion	Information is highly structured, facilitating class understanding Outstanding introduction, clear and engaging purpose, well developed body and compelling conclusion		10
2. Delivery	10	Reads directly from notes or slides (if relevant) Non audience eye contact (if relevant to the presentation type) Inaudible Spoken too quickly Poorly articulated thoughts. Extreme use of vocalized pauses(uh, well uh, um) Poor readability of any visual aids Not all group members are involved	Uncomfortable in standing up in front of audience Little eye contact or audience engagement Presentation audible but with poor articulation and flow Excessive vocalized pauses (uh, well uh, um) Somewhat innapropriate or unreadable visual aids if used All group members are involved	Good posture, some eye contact, and rapport with audience Clear voice Correct pronunication Well-paced delivery Very good use of pausing Generally clear articulation of thoughts but with noticeable vocalized pauses (uh, well uh, um) All group members are involved Appropriate visual aids	Excellent interesting and well-paced delivery with good use of voice, tone, diction and pausing Excellent posture, eye contact and rapport with audience Thoughts articulated clearly with very few vocalized pauses (uh, well uh, um) Excellent use of visual aids where used All group members are involved	Informative, well paced and entertaining delivery Outstanding posture, eye contact and rapport with audience Reacts to audience feedback with ease and confidence Thoughts articulated clearly with entire audience engaged No vocalized pauses noticed Exemplary use of visual aids (where used) All group members are involved		10
3. Description and analysis of model	30	Unclear framework for what is to be modelled, nor motivation or analysis of approach detailed	Clear overview of motivation for model, and process in developing it.	As for Pass, plus clear communication of results from (or plan for) analysis of data produced by the model	As for Credit, plus clearly demonstrated understanding of the relationship between model, data acquisition, validation and data analysis.	As for distinction, plus outstanding critical assessment of the project (including e.g. impact/significance, strengths and weaknesses, path to clear future development)		30
4. Demonstration	20	No visible route to working model	High level descriptive model presented (without code)	Detailed operational description of the model, with some detail relevant to coding implementation	Demonstrated operational model implemented in code, with clear functional direction for the project	Clear demonstration of functional prototype, with preliminary analysis of computational experimental data		20
5. Response to questions	20	Failure to answer questions about subject from audience	Can answer rudimentary questions from audience	Can answer most questions with ease but fails to elaborate on some questions	Can answer all questions with ease Can elaborate on some questions	Elaborates and explains when answering all questions Responds confidently and in a friendly manner		20
6. Comments, suggestions & contributions	10	Failure to comment/question other presentations	Only makes trivial comments/questions with little substantive content	Asks some questions which give/lead to insight into the project	Makes some helpful comments, and/or insightful questions	Makes comments/suggestions which will contribute significantly to the other group's projects		10
						Total	**0**	100
						Total	**0**	20

ASSESSMENT 2 STAGE 3 – REPORT– MARKING GUIDE

		50-64%	65-74%	75-84%	85-100%	Mark	..out of
1. Aims and Design	15	Rudimentary description of the aims and design approach used in the project	As for a pass but including a list of specific testable aims of the project and how these aims are connected to the design of the approach used.	As for credit but including well thought out justification for what agent based modelling is an appropriate approach used.	As for distinction but showing an advanced level of awreness of the the connection between the model representation of the system being studied.		15
2. Implementation and developement process	15	Rudimentary overview of the model and the developement through which it arose	Adequate and specific description of the model including the agents and their properties, how they're connected and interact, and what the update rules are etc.	As per credit but demonstrating further insights into the modelling loop and its role in development.	As per distinction but at a level that demonstrates outstanding professional awareness of the task at hand.		15
3. Analysis of Results	35	A rudimentary model that produces some results with cursury data analysis	As for pass but a complete model with a reasonable set of outputs and reasonable level of data analysis	As for credit but a complete model including some discussion of, or numerical attempts at, validating the results. Solid evaluation/discussion of the results.	Outstanding: data collection from the model, analysis of this data, and discussion of these results.		35
4. Critical Assessment	35	Rudimentary discussion of how the work relates to the current state of knowledge of the system, and limited insights into impacts of findings.	As for pass but a clear awareness of how computer based experiments further our knowledge of a system's behaviour in your example. Some limited attempt to consider further factors e.g. strengths and weaknesses of approach	As for credit but a more systematic analsysi of the drivers of system behaviour that gives rise to the data analysed in criteria 3 (above) and some self-reflection on the work itself.	As for Distinction but including insights that might be expected of a research project in the filed of study chosen.		35
					Total	**0**	100
					Total	**0**	40