

School of Management

MGMT 315 SYSTEMS MODELLING

Trimester 2, 2016

COURSE OUTLINE

Prescription

An exploration of ways of using systems thinking and modelling approaches to understand and improve complex organisational and managed systems; an examination of the dynamic behaviour of systems and the development of policies and strategies emphasising the use of state of the art systems modelling software.

Course Learning Objectives

By the end of this course, students should be able to:

- LO1: Appreciate a range of systems thinking approaches to problem structuring;
- LO2: Understand the system dynamics approach to systems thinking and strategic analysis;
- LO3: Construct policy / strategy models using the *iThink* and/or **Vensim** simulation modelling packages;
- LO4: Critically evaluate & utilise dynamic models for policy analysis, strategy evaluation and scenario analysis; and
- LO5: Develop simplified management flight simulators for organisational learning.

Course Content

The course extends some of the systems thinking concepts and approaches introduced in MGMT 206, and provides further understanding of how situations can be better managed taking into account short term and long term factors and influences.

The main focus of this course is to provide an overview of the systems modelling approach using the system dynamics methodology for managerial decision making. This 'systems' approach involves observing and analysing any complex organisation, system or issue in a comprehensive manner: seeking to understand its structure, the interconnections between its components, and how changes in any area will affect the whole system and its constituent parts over time. A key feature of the system dynamics method is the explicit recognition of the underlying feedback loop structure that is inherent in any dynamic system.

The course will also challenge students to think critically and systemically about issues that confront managers involved in managing change and resources, and in situations where risk and uncertainty unfold over time.

Trimester Dates

Teaching Period: Monday 11th July – Friday 14th October

Study Period: Monday 17th October – Thursday 20th October

Examination Period: Friday 21st October – Saturday 12th November (inclusive)

Withdrawal from Course

1. Your fees will be refunded if you withdraw from this course on or before Friday 22nd July 2016.
2. The standard last date for withdrawal from this course is Friday 23rd September 2016. After this date, students forced to withdraw by circumstances beyond their control must apply for permission on an '*Application for Associate Dean's Permission to Withdraw Late*' including supporting documentation. The application form is available from either of the Faculty's Student Customer Service Desks or [online](#).

Names and Contact Details

COURSE COORDINATOR

A/Prof Bob Cavana

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Phone: 463 5137

Email: bob.cavana@vuw.ac.nz

Website: <http://www.victoria.ac.nz/som/about/staff/bob-cavana>

UNDERGRADUATE PROGRAMME MANAGER

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ADMINISTRATOR

Misa Ito

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Class Times and Room Numbers

Lectures: Tuesday, 2.40 – 4.30 pm, Rutherford House, Lecture Theatre LT3
Note: There is no class on Tuesday 19 July, and two extra computer workshops have been scheduled.

Computer workshops One hour per week from weeks 3 – 11, in the Railway Building computer lab RWW102

Tut A	Weds	9:30 – 10:20 am	RWW102
Tut B	Weds	10:30 – 11:20 am	RWW102
Tut C	Weds	13:40 – 14:30 pm	RWW102
Tut D	Weds	14:40 – 15:30 pm	RWW102

Course Delivery

This course will comprise formal lectures supplemented by case discussion, student presentations and practical exercises. In addition there will be a computer lab workshop/tutorial each week (from week 3 to week 11). See schedule in Annex A for more details of the course.

Readings

The textbook for the course is:

Maani KE & Cavana RY (2007). *Systems Thinking, System Dynamics: Managing Change and Complexity*, 2nd ed. Pearson Education, Auckland.
(available from VUW BookCentre)

Other readings will be distributed in class and/or on Blackboard. Other relevant books include:

- Coyle, R.G. 1996. *System Dynamics Modelling: A Practical Approach*. London: Chapman & Hall.
- Ford, A. 2009. *Modeling the Environment*. Washington, DC: Island Press.
- Forrester, J.W. 1961. *Industrial Dynamics*. Cambridge, MA: The MIT Press. Reprinted by Pegasus Communications, Waltham, MA.
- Morecroft, J. D. W. 2007. *Strategic Modeling and Business Dynamics: a Feedback Systems Approach*. Chichester: Wiley.
- Richardson, G.P. 1991/1999. *Feedback Thought in Social Science and Systems Theory*. Philadelphia: University of Pennsylvania Press; reprinted by Pegasus Communications, Waltham, MA.
- Richardson, G.P. and A.L. Pugh III. 1981. *Introduction to System Dynamics Modeling with DYNAMO*. Cambridge, MA: The MIT Press. Reprinted by Pegasus Communications, Waltham, MA.
- Roberts, E.B. 1978, ed. *Managerial Applications of System Dynamics*. Cambridge, MA: The MIT Press. Reprinted by Pegasus Communications, Waltham, MA.
- Senge, P.M. *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday/Currency.
- Sterman, J.D. 2000. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston: Irwin McGraw-Hill.
- Vennix, J. A. M. 1996. *Group Model Building: Facilitating Team Learning Using System Dynamics*. Chichester: Wiley.

Materials and Equipment

The library holds a couple of copies of the textbook and other relevant books on closed reserve loan. Also in the library are the following collected editions, which students might find useful for this course:

- Cavana, R.Y., Vennix, J.A.M., Rouwette, E.A.J.A., Stevenson-Wright, M. and Candlish, J. (eds) 1999. *Systems Thinking for the Next Millennium. Proceedings of the 17th International Conference of the System Dynamics Society and the 5th Australian & New Zealand Systems Conference*. Held in Wellington, New Zealand, 20-23 July. System Dynamics Society, Albany, USA.
- Cavana, R.Y. & Hutchinson, W.E. (eds) (2007). Special Issue on Australia and New Zealand Systems (ANZSYS). *Systems Research & Behavioural Science*. 24(2).

In addition the library contains a wide variety of management science and systems books and journals you may find relevant for this course. The international journals include:

- *System Dynamics Review* (SDR)
- *Systems Research and Behavioural Sciences* (SRBS)
- *Systems Practice and Action Research* (SPAR)
- *International Journal of Applied Systemic Studies* (IJASS)
- *European Journal of Operational Research* (EJOR)
- *Journal of the Operational Research Society* (JORS)

These journals can be accessed directly through the Library's database of electronic journals.

Previous International System Dynamics Conference proceedings are available on line from the System Dynamics Society web site:

http://conference.systemdynamics.org/past_conferences/

COMPUTER SOFTWARE

The computer package Vensim will be used on the course from week 3 to week 12. This will be available in the computer laboratories in the Railway Building. A version of this computer software is available on a CD-Rom with the text book. The computer package Vensim is produced by Ventana Systems Inc. Their web site is: <http://www.vensim.com/>

The computer package *iThink* will also be used on this course. Unfortunately models cannot be saved with 'save disabled' version of *iThink* on the CD-Rom (with the text), but the models available on the CD-Rom can be run, and small models can be constructed (but not saved). The computer package *iThink* is produced by iSee Systems Inc. Their web site is: <http://www.iseesystems.com/>

If students have private access to a home personal computer (PC), they are able to download a free copy of the Vensim PLE simulation modelling package (produced by Ventana Systems, Inc.) from the internet. The web site is: <http://www.vensim.com/freedownload.html>

Mandatory course requirements

In addition to achieving an overall pass mark of at least 50%, students must:

- a. Attend at least 6 out of 9 computer laboratories/tutorials so that they have the opportunity to develop technical, oral communication and teamwork skills using systems thinking and modelling frameworks, CLO 2-5;
- b. Obtain at least 40 % in the exam, in order to demonstrate that they have achieved the CLO's 1, 2, 3 and 4 independently of any external assistance.

Students who fail to satisfy the mandatory requirement for this course but who obtain 50% or more overall, will be awarded a "K" grade.

Standard fail grades (D or E) will be awarded when the student's overall course mark falls below the minimum pass mark, regardless of whether the mandatory course requirement has been satisfied or not.

Notice of Failure to meet Mandatory Course Requirements will be posted on Blackboard.

If you believe that exceptional circumstances may prevent you from meeting the mandatory course requirements, contact the Course Coordinator for advice as soon as possible.

If you cannot complete an assignment or sit a test or examination, refer to www.victoria.ac.nz/home/study/exams-and-assessments/aegrotat

Expected Workload

A total of 150 hours of work is expected from students in this course. This consists of 31 hours of classes & computer laboratories, eight hours per week outside classes during teaching weeks spent

reading, studying and writing assignments, and a further 23 hours preparing assignments or revising during mid-trimester break and study week.

Assessment

The Assessment Handbook will apply to all VUW courses: see

<http://www.victoria.ac.nz/documents/policy/staff-policy/assessment-handbook.pdf>.

Assessment	Description (1)	Weight	Date
Assignment 1	Individual Systems Thinking Assignment (max 2,000 words) <i>[Assesses LO 1 & 2]</i>	25%	12 noon Friday 19 Aug
Assignment 2	Group systems modelling project report (two to five/group) on a selected topic (a) Short group presentation (15-20 mins) <i>[Assesses LO 3-5]</i> (b) Management report (max 2,500 words) <i>[Assesses LO 2-5]</i> (c) An individual critical reflections essay (max 1,000 words). <i>[Assesses LO 1, 2 & 4]</i>	5% 10% 10%	In class or tutorial – Tues 4 or Weds 5 Oct (week 11) 12 noon Fri 14 Oct (group report) Noon Tues 18 Oct (reflections essay)
Final Examination	A 3 hour closed book exam <i>[Assesses LO 1-4]</i>	50%	During examination period: Fri 21 Oct – Sat 12 Nov
	TOTAL	100%	

(1) Further details of the assignments will be provided in class and made available on Blackboard.

ASSIGNMENTS

Assignments should be type-written or prepared on a Word processor. The **assignments** are briefly described as follows. Further details will be provided during the course:

1. Systems Thinking Assignment

An assignment topic will be provided in class and put on Blackboard also (2,000 words max).

2. Group Systems Modelling Project

This will involve working in a small group of 2 to 5 students. This assignment will involve developing a small system dynamics simulation model to assist with the examination of a relevant managerial issue or policy. This project will involve 3 components:

- (a) Group oral presentation (15-20 mins)
- (b) Group management report (max 2,500 words)
- (c) Individual critical reflections essay (max 1,000 words).

Note, all members of the group are expected to contribute to the group oral presentation, development & analysis of the simulation model and preparation of the group management report. Paper and electronic versions of the group oral presentation (Assignment 2a) and group management report (Assignment 2b) should be submitted on the due dates to the course coordinator. On the first page of each Assignment, the members of the group should be identified and a statement made that either all members have on balance contributed equally, or the relative contributions of the members stated (see Annex C & D). All members of the group will receive the same mark unless their contributions are unequal, in which case the lecturer will make an equitable adjustment.

If it becomes clear that the group dynamics will preclude the group from submitting an effective group presentation, group members should discuss the matter immediately with the lecturer. If necessary to ensure that no student is unfairly disadvantaged, the lecturer will permit some or all members of the group to submit an individual presentation or report of a defined subset of the project. The lecturer or tutor will work closely with each group throughout the course.

Students are recommended to read very closely the resources contained on the VBS website:
<http://www.victoria.ac.nz/vbs/teaching/group-work/studentsection>

In particular students will be encouraged to follow very closely the guidelines provided in the VBS student groupwork handbook:
<http://www.victoria.ac.nz/vbs/teaching/publications/Groupwork-Student-Handbook.pdf>

In addition, students should become familiar with the Centre for Academic Development resources on group work: www.cad.vuw.ac.nz/wiki/index.php/Groupwork

2a. Group oral presentation (5 marks)

Your group will present their results in class or the computer lab in Week 11 [a 15-20 minute presentation followed by about 5 minutes of questions and answers]. The oral presentation can be in the form of a 'progress report' as each group member will produce their final management report the following week (ie Week 12). Further details of the assignment will be presented in class, and on Blackboard.

2b. Group management report (10 marks)

The assignment outlined should be written up as a group management report, 2,500 words max, plus appendices. Further details of the assignment will be presented in class, and on Blackboard.

2c. Individual critical reflections essay (10 marks)

Each individual is required to present an essay prepared in Word, containing your critical reflections and insights related to the group project (due Tuesday 18 October). I recommend you keep a journal of diary of all your activities, thoughts and insights related to this project, as this should help with your final essay. Further information about this project will be provided in class and on Blackboard.

3. Final Examination

Students who enrol in courses with examinations are obliged to attend an examination at the University at any time during the formal examination period. The final examination for this course will be scheduled at some time during the following period:

Friday 21st October – Saturday 12th November (inclusive)

This will be a 3 hour closed book examination covering all aspects of the course. Further details will be provided later in the course.

Handing in Assignments

Your completed assignments should be put into the course **Assignment Box 23** on the 1st floor, Railway West Wing by 12 noon on the due date. Late assignments are to be handed in to the School of Management Administrator in RH 1022 and the time handed in will be noted.

All Hand-Ins should have: a Cover Sheet stating your name, the course name, assignment name and number, a word count and due date, with a signed declaration regarding freedom from plagiarism (See Annex's B, C & D). Please put page numbers on each page, and use in-text referencing and include a list of references at the end.

Students must prepare two copies of each hand-in and keep the second copy for their own reference. Students must also keep an electronic copy of their work archived in case the original assignment goes missing. Failure to do so will jeopardise any claim by you that your work was submitted in the rare cases where your work goes astray.

All assignments will also be marked for writing - that is, correctness, clarity, organisation, referencing - as well as for meeting the specific assignment objectives.

Penalties

Late assignments are to be handed in at **Level 10 Reception, RH 1022**, during Reception Desk hours, **9am till 5pm Monday to Friday during term time**. An Administrator or Duty Receptionist will stamp the assignment with the date and time. Late assignments that do not have **the time and date and signed by** the Administrator for the course or Duty Receptionist, will incur late penalties from the time the Administrator receives it. Assignments left on the Reception Counter, or slid under the door of the Reception office will also incur penalties from the time and date they are recovered. Note that there is no provision to accept assignments on weekends or public holidays.

Penalties – for Lateness

- (i) In fairness to other students, work submitted after any deadline will incur a penalty for lateness. **The penalty is 10% of the marks available (marks available means what the assignment is worth i.e. 20% or 20 marks) for an assignment submitted after the due time on the due date for each part day or day late.** (for example if an assignment is out of 20 and the assignment receives 50% then one day late means the mark will be out of 18 and the student will receive 50% of 18). **Closed University days, Saturdays, Sundays and public holidays** will be included when counting the number of days late. An assignment late day begins from the time the assignment is due. Assignments received **more than 7 days after the due date** will not be accepted.
- (ii) Course Outlines provide a signal to students of forthcoming workload, dates of submission etc, and thus student study plans should take account of course requirements across all courses. Consequently, workload issues related to other courses and employment will not be accepted as reason for dispensation from mandatory requirements or waiver of penalties. **Extensions** to submission deadlines for any assigned work will only be granted in **exceptional circumstances**.
- (iii) Students who are unable to comply with any of the mandatory requirements should make a written application for an extension to the due date for submission of assigned work or for waiver of a penalty, **in advance**, to the **Course Coordinator**, providing documentary evidence of the reasons of their circumstances.
- (iv) All such applications must be made **before** the deadline and be accompanied by documentary evidence, e.g. a medical certificate, or counsellor's report clearly stating the degree of impairment, and the dates the illness or event prevented you from undertaking your academic studies. This can be applied retrospectively.

- (iv) In the event of unusual or unforeseeable circumstances (e.g. serious illness, family bereavement or other exceptional events), that precludes an application in advance, students should make contact with the **Course Coordinator** as soon as possible, and make application for waiver of a penalty as soon as practicable.
- (v) Word limits should be adhered to, especially so when they provide a guide to limiting the student's coverage of a topic and the intended assignment work load. You are strongly advised to adhere to the word limit so as to keep your workload at a manageable level. Any material that is above the word limit may not be taken into account by the marker. Your marker will simply stop at the maximum words for the assignment and you will receive the appropriate grade.

Remarking

Application for remarks must be made within 14 days after the assignments or marks are made available.

Every attempt is made to ensure that the marking is consistent across tutors and fair to students. Students may ask for their written work to be remarked. A different tutor will do the remarking and provide comments.

For marks: If the mark differs by 10% or less the two marks are averaged. If it exceeds 10% then it is independently marked by a third marker and the average of the two closest marks is taken.

For grades: If the grade differs by one grade then the highest grade is taken. If the grade differs by more than one grade then the assignment is marked by a third marker and the average grade is taken. Experience from previous years is that almost all remarks are within 10% or one grade. Occasionally there is a significant shift in the mark or grade.

To apply for a remark, complete the request for re-examination of assessed work form (Annex E) stating which sections (criteria listed in the mark sheet) you wish re-examined. You must provide academic reasons on why you think the mark does not, in your view, fairly reflect the quality of your work. Your assignment will only be reconsidered on the points you raised. Complete remarks will not be undertaken. Hand this with your assignment into the following place:

- Pipitea Campus – the Reception Desk on Level 10 Rutherford House where your assignment will have the **time, date and signature** noted on the front cover by the person receiving it.

Allow a minimum of 5 days for remarks to be completed.

Group Work

There is group work as part of this course. It is anticipated that this work will involve one study group meeting each week of 2-4 hours duration (from weeks 7 – 11). Further details regarding group work follow under 'Assessment Requirements'.

While the course has a tradition of study group collaboration, there are important elements in the assessment process that are strictly individual. Collaboration on individual assignments is not allowed beyond general discussion as to how one might interpret the nature of the assignment question. **Please do not work together to formulate a response and do not loan out your completed assignments.** However, you will be expected and encouraged to work in groups on in-term cases and Assignment 2.

Use of Turnitin

Student work provided for assessment in this course may be checked for academic integrity by the electronic search engine <http://www.turnitin.com>. Turnitin is an on-line plagiarism prevention tool which compares submitted work with a very large database of existing material. At the discretion of the Head of School, handwritten work may be copy-typed by the School and submitted to Turnitin. A copy of submitted materials will be retained on behalf of the University for detection of future plagiarism, but access to the full text of submissions will not be made available to any other party.

Student feedback

Student feedback on University courses may be found at www.cad.vuw.ac.nz/feedback/feedback_display.php.

Class Representative

A class representative will be elected in the first class, and that person's name and contact details made available to VUWSA, the course coordinator and the class. The class representative provides a communication channel to liaise with the course coordinator on behalf of students.

Communication of Additional Information

Information on course-related matters will be announced at class and posted on the **Blackboard** website at <http://blackboard.vuw.ac.nz/>. It will be crucial for you to regularly check Blackboard for messages, announcements and materials.

Link to general information

For general information about course-related matters, go to

<http://www.victoria.ac.nz/vbs/studenthelp/general-course-information>

Note to Students

Your assessed work may also be used for quality assurance purposes, such as to assess the level of achievement of learning objectives as required for accreditation and academic audit. The findings may be used to inform changes aimed at improving the quality of VBS programmes. All material used for such processes will be treated as confidential, and the outcome will not affect your grade for the course.

ANNEX A
MGMT 315 Systems Modelling
Course Content & Schedule, 2016

WEEK (1)	LECTURES (TUESDAY)	TOPICS	READINGS (2), (3)	COMPUTER LAB
1	12 Jul	Course overview Review of systems thinking concepts	Ch 1 & 2	
2	19 Jul	No class		
3	26 Jul	Causal loop modelling Group model building	Ch 3, Cases 1&3	Lab 1
4	2 Aug	Stock flow diagrams Intro to <i>ithink</i> & Vensim simulation modelling	Ch 4	Lab 2
5	9 Aug	Constructing dynamic models	Ch 4	Lab 3
6	16 Aug	Supply chain modelling <i>[Asst 1 due Fri 19 Aug – Systems thinking]</i>	Case 4	Lab 4
<i>MID-TRIMESTER BREAK</i>				
7	6 Sep	Analysing dynamic models	Ch 4	Lab 5
8	13 Sep	Policy analysis & strategy development	Case 5	Lab 6
9	20 Sep	Scenario planning & modelling	Ch 5 Case 5	Lab 7
10	27 Sep	Management flight simulators Systems thinking in learning organisations	Ch 6 & 7	Lab 8
11	4 Oct	<i>[Asst 2a due Tues 4 or Weds 5 Oct - Group systems modelling presentations]</i>		Lab 9
12	11 Oct	Course review <i>[Asst 2b due Fri 14 Oct – Group management report]</i>		
	18 Oct	<i>[Asst 2c due Tues 18 Oct – reflections essay]</i>		

Notes:

- (1) Please bring the textbook & CD-Rom to each class and computer workshop each week.
- (2) The chapters & cases are from the course textbook *Systems Thinking, System Dynamics*, by KE Maani and RY Cavana (2007).
- (3) Additional readings each week will be available on blackboard or distributed in class.

ANNEX B



School of Management

MGMT 315 Individual Assignment Cover Sheet

Name: _____ Student ID: _____

Tutor's Name: _____ Tutorial Number: _____

Tutorial Day: _____ Tutorial Time: _____

Date Due: _____ Date Submitted: _____

*I have read and understood the university policy on Academic Integrity and Plagiarism.
I declare this assignment is free from plagiarism.*

Signed: _____

Extension of the due date (*if applicable*)

Please attach a copy of the note authorising your extension.

Date extension applied for: _____

Extension granted until: _____

Extension granted by: _____

ANNEX C

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI



School of Management

MGMT 315

Assignment 2: Group Cover Sheet

Name(s): _____ Student ID: _____ (1)

Name(s): _____ Student ID: _____ (2)

Name(s): _____ Student ID: _____ (3)

Name(s): _____ Student ID: _____ (4)

Name(s): _____ Student ID: _____ (5)

Tutor's Name: _____

Tutorial Number: _____

Tutorial Day: _____

Tutorial Time: _____

Date Due: _____

Date Submitted: _____

I/We have read and understood the university policy on Academic Integrity and Plagiarism. I declare this assignment is free from plagiarism.

Signed:

(1) _____ (2) _____

(3) _____ (4) _____

(5) _____

We agree to an equal share of the marks awarded Yes / No (Please circle)

If No, please:

- (i) attach a letter detailing your preferred split of marks, **signed by all group members; or**
- (ii) **submit**, individually to the lecturer, a **completed Annex D** on your assessment of each 'Group Member Contribution'.

Please attach a copy of the note authorising your extension.

Date extension applied for: _____

Extension granted until: _____

Extension granted by: _____

ANNEX D

School of Management
MGMT 315

GROUP MEMBER CONTRIBUTION (OPTIONAL)

This is an optional form to be used by individual group members if there is a concern about equal participation of members in the group work.

To be submitted to the lecturer by Friday 14 October 2016.

Your Name _____

Group Members Names (including your own)

1. _____
2. _____
3. _____
4. _____
5. _____

Evaluation of group member participation involves peer and self- assessment. This information will be used by the paper co-ordinator in the event of any complaints perceived by group members (unfair contribution by any one of the group member).

Scale:

- 1 = minimal contribution
- 2 = minor contribution
- 3 = satisfactory contribution
- 4 = substantial contribution
- 5 = very substantial contribution

Group Member	1	2	3	4	5
Contribution at meetings (do they attend, participate and share ideas)					
Commitment to common goal (do they keep on task and show concern for doing things right)					
Reliable completion of tasks (do they show a responsibility to the group and the tasks they have to do)					

How many hours (on average) did you spend working with this group? _____

ANNEX E



School of Management
MGMT 101

Request for re-examination of assessed work.

	Assessment affected: <i>e.g. Assignment</i>	
Student ID: _____	Name as it appears in your enrolment _____	Tutorial No: _____ Tutor's Name: _____ Tutorial Day and Time: _____
Contact Details:	Phone: _____ Email: _____	

Specify which section (criteria specified in the mark sheet) you wish to be re-examined
Note: requests to re-examine "all" criteria will not be considered.

Clearly state why you believe each of these sections should be re-examined:

Note: "I think it is worth more," is insufficient.

Signature: _____ Date: _____