CT561 - Lecture 1

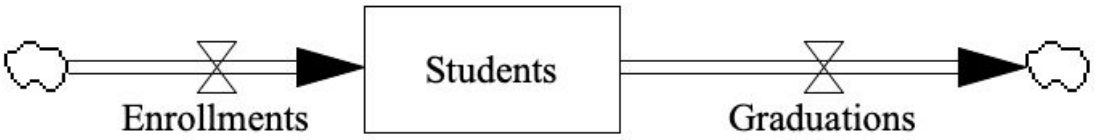
Tuesday September 29th 2020.

Model building

Flight simulator…

Stock of Students

Outflow



(1) Under what conditions will the number of students in NUIG rise?

The numbers registering exceed the number graduating

(2) Under what conditions will the number of students in NUIG fall?

The numbers registering less than the number graduating

(3) Under what conditions will the number of students in NUIG remain the same?

The numbers registering equals the number graduating

DYNAMIC EQUILIBRIUM

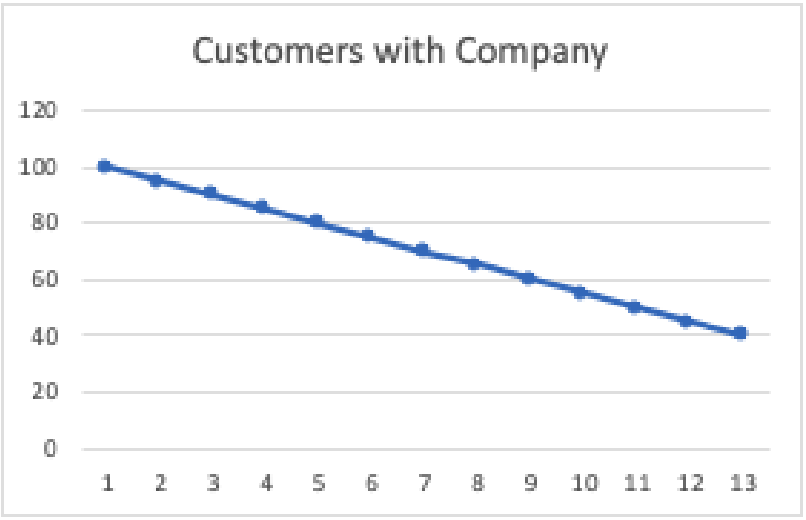
18000 2000 2000

MODE 1 - Stock 1 is in equilibrium.

	Stocks		Flows (Start to End of Month)		Net Flows	
	People	*People*	*People/Month*	*People/Month*	*People/Month*	*People/Month*
Time	Customers with Company	Customers who have left Company	Customers Joining	Customers Leaving	Net Flow CWC	Net Flow CWHLC
1	100	0	40	40	0	40
2	100	40	40	40	0	40
3	100	80	40	40	0	40
4	100	120	40	40	0	40
5	100	160	40	40	0	40
6	100	200	40	40	0	40
7	100	240	40	40	0	40
8	100	280	40	40	0	40
9	100	320	40	40	0	40
10	100	360	40	40	0	40
11	100	400	40	40	0	40
12	100	440	40	40	0	40
13	100	480	40	40	0	40

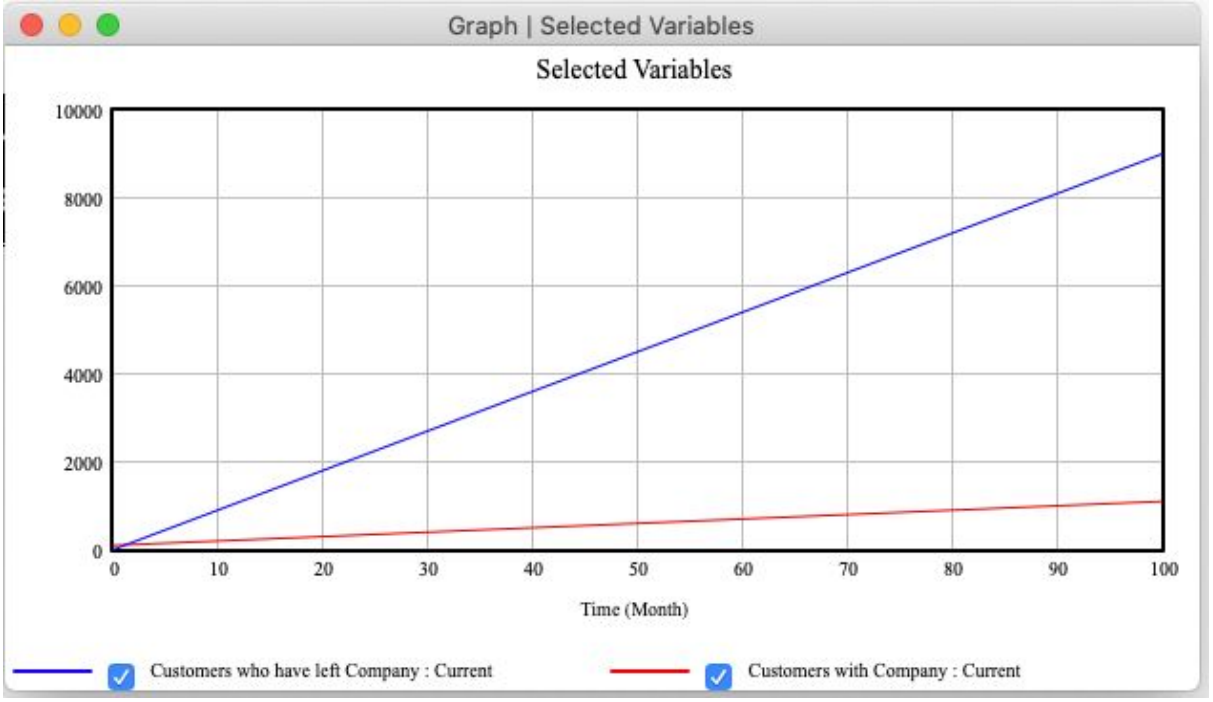
MODE 2 - Outflow > Inflow

	Stocks		Flows (Start to End of Month)		Net Flows	
	People	*People*	*People/Month*	*People/Month*	*People/Month*	*People/Month*
Time	Customers with Company	Customers who have left Company	Customers Joining	Customers Leaving	Net Flow CWC	Net Flow CWHLC
1	100	0	40	45	-5	45
2	95	45	40	45	-5	45
3	90	90	40	45	-5	45
4	85	135	40	45	-5	45
5	80	180	40	45	-5	45
6	75	225	40	45	-5	45
7	70	270	40	45	-5	45
8	65	315	40	45	-5	45
9	60	360	40	45	-5	45
10	55	405	40	45	-5	45
11	50	450	40	45	-5	45
12	45	495	40	45	-5	45
13	40	540	40	45	-5	45



MODE 3 - Outflow < Inflow

	Stocks		Flows (Start to End of Month)		Net Flows	
	People	*People*	*People/Month*	*People/Month*	*People/Month*	*People/Month*
Time	Customers with Company	Customers who have left Company	Customers Joining	Customers Leaving	Net Flow CWC	Net Flow CWHLC
1	100	0	50	45	5	45
2	105	45	50	45	5	45
3	110	90	50	45	5	45
4	115	135	50	45	5	45
5	120	180	50	45	5	45
6	125	225	50	45	5	45
7	130	270	50	45	5	45
8	135	315	50	45	5	45
9	140	360	50	45	5	45
10	145	405	50	45	5	45
11	150	450	50	45	5	45
12	155	495	50	45	5	45
13	160	540	50	45	5	45



Problem Sheet – Stock and Flow Diagrams (Using Vensim)

1. Build a stock and flow model of career progression. The main stages of a software engineering career are:

    - Graduate entry
    - Senior Software Engineer
    - Software Architect

2. The stages of an infectious disease are Susceptible – Exposed – Infected – Removed. Represent this on a Stock and Flow diagram

3. Extend (2) so that people who are infectious and asymptomatic can be modelled. Therefore, an infected person can either be (1) infectious with symptoms or (2) infectious without symptoms.

4. Build a stock and flow model of the rework cycle in software. The main stages of this cycle are:

    - Code under development
    - Code completed without bugs
    - Code with undiscovered bugs
    - Code with discovered bugs

5. Build a stock and flow model showing customers joining and leaving a company. Use a stock to keep track of the total who leave. Implement a model of this in Excel, for one year (12 months)