Building System Dynamics Simulation Models

Online Course with Vensim

Official Vensim Distributor

ATC-Innova

'As the complexity of our world increases systems thinking is emerging as a critical factor for success, and even survival. How then can people become skilled systems thinkers? The most effective learning experiences combine experience with reflection, theory with practice. Traditionally, theory was taught in school and university, and experience was gained in life outside those walls. But in the world of complex dynamic systems such as a business, society, or ecosystem, everyday experience fails because the time horizon and scope of the systems is so vast-we never experience the majority of the effects of our decisions. And without relevant experience, theory is uninteresting to students. The old ways of learning fail. When experiments in the real world are impossible, simulation becomes the main way we can learn effectively about the dynamics of complex systems.'

John Sterman
Preface of the book
System Dynamics - Exercises

Applications

- In the business world, these topics are mainly used to address issues related to Strategic Planning, Business Planning, Leadership Development, Strategic Marketing and Sales, Organization Redesign, Process Improvement, Implementation of operational plans. In general to build and sustain high performance over the long term, and ensure successful implementation of changes.

- In the academic world, these topics may be used to develop final projects, doctorate, and theses on diverse subjects.

At the end of the course, the student is able to:

1. Describe the components of a complex system.
2. Diagnose the natural evolution of the system under analysis.
3. Create a model of the system and present it.
4. Carry out simulations with the model, to analyze the behavior of the system.

Students' admission requirements

This course is intended for undergraduate and graduate students with or without professional experience. Only basic computer skills are needed. No statistical or specific mathematical education is required.

Syllabus

Many times, the models are performed with minimal current data and very few historical data. The simulation models that the student will design in this course accommodate these analyses, with the construction of realistic hypotheses and elaborate behavior models. That's done with the help of software that facilitates the construction of the models as well as performing model simulations.

This course allows the student to acquire, in a time-efficient and uncomplicated manner, knowledge in the formation and construction of dynamic models. First, the basic structures of the systems and more common dynamics are presented. Next, the phases in the construction of a model are studied. Last, using study cases, the student is taught how to model with the software and simulate different alternatives.

1. SYSTEM DYNAMICS
    - Causal diagrams
    - Stable, unstable and oscillating systems
    - Medium term dynamics

2. CONSTRUCTION OF A MODEL
    - Diagramming the flows
    - Phases in the construction of a model
    - Computer simulations

3. STUDY CASES
    - 3.1. MODELING A BASIC SYSTEM
        - Using the software
    - 3.2. DYNAMICS OF A TANK
        - Foreseen behavior and behavior in the model
    - 3.3. PRODUCTION AND INVENTORY
        - From the text description to the model
        - Using Tables in non-linear relations
        - Using Delays in the models
    - 3.4. PROJECT DYNAMICS
        - Building a model in phases
        - The measurement units help us
        - Using Logical Functions
    - 3.5. SHORT TERM vs. LONG TERM POLICIES
        - Studies in soft defined environments. To extract the data
        - Importance of the horizon of the simulation
        - Simulating different management styles
    - 3.6. COMMODITY CYCLE
        - To integrate several sub-models in a bigger one
        - The cause of the oscillations
        - Explanation of the results

Software

Vensim PLE gets start in system dynamics modeling and is ideal for classroom use of system dynamics.

Main Features of Vensim PLE:

Causal Loop Diagrams	X
Stock and Flow Diagrams	X
Tree Diagrams	X
Document Tool	X
Loop Identification	X
Equation Editor	X
Built-in Functions	X
Units Check	X
Sketch Editor with Undo/Redo	X
Simulation	X
Graphs	X
Tabular Output (Tables)	X
Set up a simulation	X
Run Comparison (between two simulations)	X
Multiple Views (pages or sectors of a model)	X
SyntheSim	X

Teacher

Juan Martin Garcia, Ph.D.

Ph.D. Industrial Engineer by UPC (Spain). Worldwide recognized expert in System Dynamics, with more than 30 years of experience in this field. Postgraduate studies of System Dynamics at Massachusetts Institute of Technology MIT Sloan School of Management. Director of ATC, a management consulting firm that develops strategic plans for corporate executives. Collaborator of the Sustainable Development Department at Universitat Politecnica de Catalunya in Barcelona, Spain, and several other Spanish and Latin-American universities. Author of books about modeling with System Dynamics, with preface of John Sterman (MIT).

Materials

The materials of the course are available in the Stundent's Web which contains all the theoretical explanations and the study cases around which the course is based. Additionally, the student receives a CD which contains the software for building and simulating models Vensim PLE.

Cost

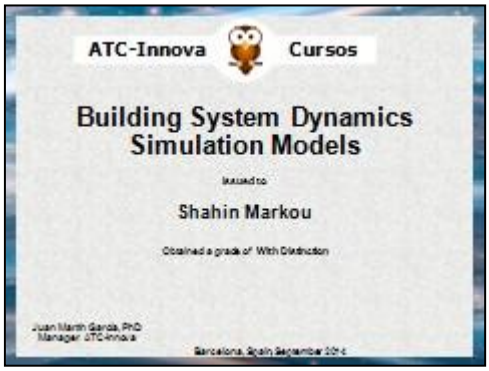
150 euros.

Dates and deadline

Each student begins the course and **is coached independently**, on his own schedule. Learning effort: 50 hours. The duration is four weeks from the start date. Some pauses are possible if the student justifies it for professional reasons.

Certificate

The certificate is issued by ATC Innova, Official Distributor of Vensim. Students need to complete the 50% of the exercises to obtain the certificate.



Registration / information

info@atc-innova.com

http://atc-innova.com/cursod.htm

The students' opinion

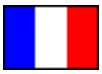
'I really enjoyed your course a lot. I liked how you presented the exercises in a progressive manner that made it really easy to pick up on using system dynamics.' Ron Van Buskirk. ***USA.***

'It was a pleasure working with you and having you available almost 24 hours a day. For me this was a new experience and it is true that it makes you to start thinking on many details in different way, to observe the problem from completely different point of view, with a new approach in finding a solution for it. There were many questions that were coming in my mind during building models in this course, but most of them were very soon clarified through the modeling work and researching the available literature that was given on the CD.' Suzana Andonova. ***Rep. Macedonia****.*

'1. The course was quite interesting. It built up slowly until the computer software simulation. 2. Excellent email facilities. 3. Excellent availability of tutor.' M.Mifsud. ***Malta.***

'I am happy that I finished the course successfully but sad that my course is finished. I have to admit that it was the most interesting course I have participate in my life!. I am so excited that in such a little time I have learned how a model works and it's possibilities in life. Everything I did was something new, and as I learned more, the more interesting the course became! I've learned how to think globally and to relate the variables until I will have the result that I want. Malamati Nikolaos Vernadaki. ***Greece.***

*'Congratulations to you and your team about the SD course. The texts, specially your books, are very well written and the selected exercises progressively allow to understand how to do SD modeling, as well as to know how to work with Vensim software. And your immediate answer to all my emails, some of them late at night or on Sundays!, encouraged me to work more. Thanks!.' João Ferreira Dias****. Portugal.***



'I think the main interest of this method is that it leads to consider real problems in a different way (at least for me), to understand the behavior even if we miss some aspects and to be able to draw the key points which are influential. Especially when we come from a scientific activity in the industry, we like to play with obvious and real items, like measurements, statistical data and so on. Most of the time we focus on this and try to find a solution by using classical methods. And sometimes it doesn't work! Because we forgot or we miss something. Now, very often, when I'm thinking about something I find oneself considering it using system dynamics method, and I'm surprised to see how we can handle the problem differently and better understand it, even without building a model.' Christian Longet. ***France.***

'Now, I feel able to model real world problems within my field of interest (strategic management) on my own. Your course gave me tools and insights at hands to use "System Dynamics" for decision making in a complex and constantly changing environment. As this wasn't my first online course I can say this course ranks under the three best online courses I've taken. The main reasons are the homework in form of exercises which forced me to think deeply about SD and your extraordinary assistance. But what's more important and which shows that a course is really good is when the learned things can be used shortly after the completion of the course. Needless to say I'll use the learned things immediately within the following weeks.' Joachim Block. ***Germany****.*