

Strategic Modeling and Business Dynamics

Strategy 842 - Fall 1, 2023

Professor: Scott F. Rockart (<u>srockart@duke.edu</u>) Office A204; Phone 919.660.7760

Course Objectives

In Foundations of Strategy we saw that profits came from favorable industry conditions and from the superior resources and capabilities held by a few firms. We only began, however, to delve into how industry conditions and firms change over time and how we can manage these changes. What change patterns are common? Why do these patterns occur? How do managers influence changing industry conditions and create new resources and capabilities for their firms?

This course prepares you to take advantage of the changes that commonly occur in industries over time and to develop your firms' resources and capabilities. We review common patterns of industry and firm development so that you can recognize these patterns and match them to basic guidelines for successful action. We develop the skills to map and model industries and firms so that you (a) develop a deep understanding of these patterns of change in both industries and firms and (b) are able to analyze the merits of alternative policy responses. By the end of the course you will have new analytical skills and a better sense of how to identify, foster, and benefit from changes you can expect to encounter in firms and industries.

Systems Perspective and Systems Modeling

All business dynamics – the changes we observe in firms and industries over time – are generated by interactions among smaller parts within those firms and industries. For example, interactions between consumers who become habituated to products and firms who become increasingly efficient at production drive industry growth. To understand these interactions, and how they lead to change in industries and firms over time, we learn to map and model these systems (i.e., these collections of interacting parts). We then use these systems maps and models to evaluate managerial policies and strategies.

The modeling tools require no more than a mathematical background in algebra. All Fuqua students already have the necessary math skills for this course and those skills will be refreshed in class. The mathematically inclined will see new ways to apply their mathematical skills in a managerial setting. The mathematically disinclined will find a few new mathematical tools to apply when decisions need to be informed and supported by numbers.

We will look at problems and draw examples from a wide variety of industries and functional areas. At the end of the course, everyone should have a clearer understanding of how both firm features (resources and capabilities) and industry features (buyers, competition, suppliers, entrants, substitutes, and complements)

develop over time as well as how we can better manage those development processes.

We will see that there are common dynamic patterns that reoccur reliably in firms and industries and that these are generated by quite simple interactions within systems. Once we have learned the basic tools (causal loop diagrams, stock and flow diagrams, simulation models) to understand the nature of the interactions within the systems we care about (e.g., our firms and their industries), we can identify the drivers of business dynamics and determine where and when to intervene to turn those drivers in our favor (e.g., know when to invest or sell resources, know which customers to target, know when to change pricing policies or production policies or both simultaneously).

We will see that opportunities and solutions become clearer when we see how changes and problems result from broader system interactions. A broader focus identifies opportunities in the ways that pricing, production, client development, hiring, and product design are interconnected. Identifying and managing these broader connections among functional decisions is the defining purpose of general managers and a central concern of strategy consultants. Managing these connections not only means making the parts of the overall system complement one another, it also means focusing change efforts where they will be most effective. Systems concepts and tools reveal these connections and help us identify where change efforts are most likely to produce the desired results.

In summary, across a wide variety of settings, we can benefit from tools that allow us to analyze firms and industries as systems. These tools help us to understand the drivers of change in firms and industries, help us to influence those industry changes, and enable us to develop the resources and capabilities our firms require.

Readings, Class Preparation, and Class Discussion

Almost every class meeting has one or more preparation readings. The readings provide the background knowledge for us to practice moving from complex managerial issues to insightful analyses. All members of the class are expected to have read the pages (not the entire chapters) indicated, cases, and articles. Preparation for most sessions includes a focused exercise to encourage hands-on learning, stimulate reflection on key issues, and facilitate more advanced discussion in class. These exercises should be submitted online at least one hour before your assigned class time (one *exercise* during the term may be turned in late and still receive full credit). Links to the online submission system are on the sessions pages of the course web site. Students will be called on during class to discuss their exercises.

Broad involvement in class discussion is strongly encouraged. To support that, I will cold-call during class. I will do so randomly early in the term, and later will increasingly direct cold calls toward those who have contributed less often. I use cold calls in order to give more people an opportunity to contribute and to hear a wider range of views. Cold-calls are intended to improve the learning experience of the class as a whole and of every member of the class individually. If the stress of cold calls is great enough to detract from your learning experience, please let me know and we will find a way to get you involved in discussion that will benefit you and your classmates. If expressing your views on demand is a skill you would like additional help in developing for other reasons, please let me know. If you would like to talk to me about class participation please do so as early as possible, ideally before the term begins.

While the class sessions are designed to address all of the concepts and techniques needed for the course, the indicated pages from the required text are *extremely* helpful. This is particularly true at the beginning and near the end of the term where specific chapters from the text are assigned. The chapters come from *Business Dynamics: Systems Thinking and Modeling for a Complex World* (BD), John D. Sterman, McGraw-Hill Publishing Company, 2000; ISBN: 007238915X. This is now the definitive text for the system dynamics field. It covers a very broad range of issues that the good model builder and consumer should be aware of including conceptual, technical, and social considerations. For those interested in reading further in the text, used copies are generally available on Ebay and copies are on reserve in the library.

Our daily routine will generally begin with a brief review of the most recent analysis or assignment. This is quickly followed by a broader discussion of the day's case or articles leading to the development and analysis of a model of one or more key issues in the case or articles. Over the course of the term we will use the modeling portions of the class to develop technical skills and broader skills for model construction, analysis, and policy formulation. Slides will be handed out during class and slides, models, and other materials will be posted on the course web site at the end of the day.

Assignments, Contributions, and Grading

The team assignments build individual and team skills in framing problems and opportunities, identifying key issues, and constructing and analyzing systems models to develop policies. All three assignments are team assignments.

The contribution component of the grade will depend on your contributions in class to your team. High quality in-class contributions reflect both critical thinking and a clear understanding of the day's readings *on a regular basis* as well as provide particularly insightful ideas and analyses *on occasion*. The standard end-of-term team survey will be used to help evaluate contributions to your team.

Grade Component	Team Pts	Individual Pts	Session Due
Assignment 1	10		4
Assignment 2	10		6
Assignment 3	10		8
Assignment 4	15		12
Exercises (5 points each)		40	
Contribution		15	
TOTALS	45	55	

The final distribution of grades will closely follow the Fuqua elective norms unless there is an extremely compelling reason otherwise (30% SP, 45% HP, at least 25% P and below).

Late Policy

Hands-on work prior to class greatly improves the quality of class discussion and individual learning. Scores for unexcused late exercises and assignments will not exceed the median score of all on-time submissions for those exercises and assignments. Given the complexity of your schedules, one of the exercises may be turned in late (prior to the final session) for full credit. Please submit exercises and assignments online whenever feasible.

Honor Code

All work must be completed in a manner consistent with the FSB honor code. You are always welcome to speak with me for assistance. Feel free to consult anyone or any source for software problems. However, model formulation, analysis and write-ups should reflect only the work of the individuals whose names are on an assignment or exercise. If you are concerned that you, or your team, may have received assistance violating these guidelines, please disclose that assistance when you submit the assignment or exercise. Assistance that is disclosed may affect grading, but will not be considered an honor code violation.

Teamwork

You may **select your own teams.** All teams will have 3 members, with one or two exceptions made (teams of 2 or 4) if the class roster is not a multiple of 3. If you would like me to assign you to a team, or help you find a third member for a team of two, please let me know via email.

I strongly recommend that when you build models you do so with all your team members present. This reduces the time spent fixing technical bugs and arguing over competing formulations, leaving more time to think about business policy and strategy issues.

Attendance

Students are expected to attend all classes in person and register their attendance using the Fuqua Check-In App. If you are sick, you should not attend class. In such a case, you can note that you are sick as the reason for your absence in the Fuqua Check-In App.

All courses in Fuqua degree programs that hold classes in Fuqua classrooms have the Fuqua Check-In app as part of the course's Canvas website and must require enrolled students to use the software. In this course, attendance data will be an input to the contribution grade noted above.

Fuqua Check-In usage is covered by the Honor Code. A student who checks in to a class session must attend the entire session in person or report leaving early in Canvas. Intentional misreporting of information about attendance in Canvas/ Absences is an Honor Code violation.

Use of Artificial Intelligence (AI)

This class allows AI use with attribution. Specifically, all work submitted in this course must be your own. Contributions from anyone or anything else—including AI

sources—must be properly quoted and cited every time they are used. (This last sentence is from <u>https://learninginnovation.duke.edu/ai-and-teaching-at-duke/#policies</u>)

I encourage you to first attempt to complete any part of an assignment on your own.

Session	Day	Date	Торіс	Readings*	Analysis/Assignment		
Model Conceptualization with Causal Loop Diagrams							
1	Thu	9/7	Mental Models	See Pre-assignment	Exercise: Capturing Mental Models		
2	Mon	9/11	Archetypes	Tighter Borders, Leverage Points BD (pages 137-147)	Exercise: Leveraging Archetypes		
Model Formulation with Stocks and Flows							
3	Thu	9/14	Aging Chains	Escaping the Feast or Famine Cycle BD (pages 114-117 & 191-206)	Exercise: Modeling Aging Chains		
4	Mon	9/18	Learning Curves	Analog Devices Case	Assignment 1: Analog Model		
5	Thu	9/21	Non-Linearity	Analog Devices Case (continued)	Exercise: Extending a Model		
6	Mon	9/25	Growth & Allocation	People Express (A) Case	Assignment 2: PE Model		
Model Parameterization and Testing							
7	Thu	9/28	Calibration & Testing	Note on calibration and testing	Exercise: Calibration and Testing		
8	Mon	10/2	Parameterization	People Express (A) Case (revisited)	Assignment 3: Parameterization		
9	Thu	10/5	Behavior Tests	Note on behavior tests	Exercise: Behavior Tests		
Modeling in Organizations: Process, Influence, and Action							
10	Mon	10/9	Decision Support	The GM OnStar Project	Exercise: Building Confidence		
11	Thu	10/12	Modeling for Learning	To be Announced (Guest Speaker Warren Farr)	Exercise: Questions about Practice		
12	Mon	10/16	Gaming	Fishbanks	Assignment 4: Final Report		

* BD refers to pages from <u>Business Dynamics: Systems Thinking and Modeling for a Complex World</u>. Readings in italics will be linked, or available for download, from the course page. All readings not in italics are available in the course pack.