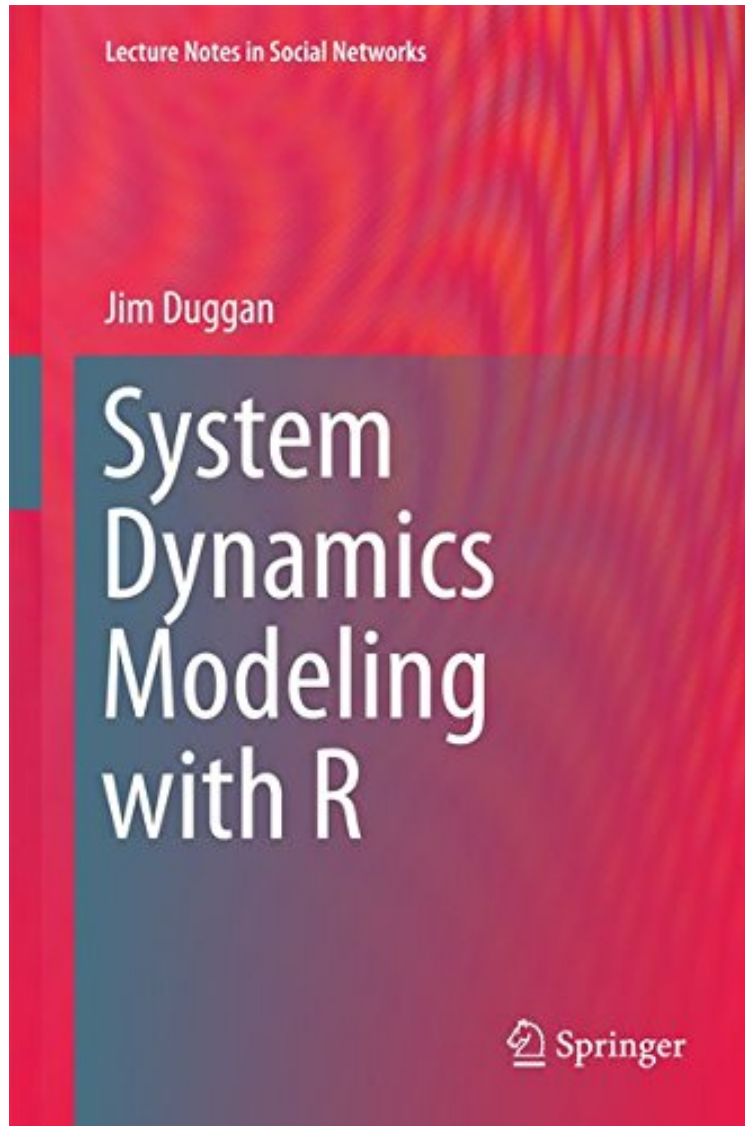


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System Dynamics Modeling with R (Lecture Notes in Social Networks)

Jim Duggan

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This new interdisciplinary work presents system dynamics as a powerful approach to enable analysts build simulation models of social systems, with a view toward enhancing decision making. Grounded in the feedback perspective of complex systems, the book provides a practical introduction to system dynamics, and covers key concepts such as stocks, flows, and feedback. Societal challenges such as predicting the impact of an emerging infectious disease, estimating population growth, and assessing the capacity of health services to cope with demographic change can all benefit from the application of computer simulation. This text explains important building blocks of the system dynamics approach, including material delays, stock management heuristics, and how to model effects between different systemic elements. Models from epidemiology, health systems, and economics are presented to illuminate important ideas, and the R programming language is used to provide an open-source and interoperable way to build system dynamics models. System Dynamics Modeling with R also describes hands-on techniques that can enhance client confidence in system dynamic models, including model testing, model analysis, and calibration. Developed from the authors course in system dynamics, this book is written for undergraduate and postgraduate students of management, operations research, computer science, and applied mathematics. Its focus is on the fundamental building blocks of system dynamics models, and its choice of R as a modeling language make it an ideal reference text for those wishing to integrate system dynamics modeling with related data analytic methods and techniques.

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About the Author Dr. Jim Duggan is a Senior Lecturer in Information Technology in the College of Engineering and Informatics at the National University of Ireland Galway. He received both his Masters and Ph.D. from University College Galway, Ireland (1987 and 1990), in the discipline of Industrial Engineering and Information Systems. He has worked as a software engineer in industry, specializing in the design and implementation of decision support systems. He has also consulted in business process analysis and quality management with multinational organizations, in order to apply modern systems engineering principles to improve process efficiency and effectiveness. He has extensive experience in system dynamics teaching and research, and collaborates on interdisciplinary projects using system dynamics to enhance decision making. Examples include: long-term health systems planning, crowdsourcing systems for public health surveillance, early-warning systems for extreme weather events, and mHealth applications to support health-changing behaviours. Dr. Duggans main research interests are in the application of system dynamics, data science, and simulation to public health policy challenges. He has published over 90 peer-reviewed papers, and is on the editorial board for the System Dynamics .