MCS Resource Database 2025-04-02

collections

systems science					
	systems thinking	Sanjoy Mahajan The Art of Insight in Science and Engineering: mastering complexity	Sanjoy Mahajan Street-Fighting Mathematics: the art of educated guessing and opportunistic problem solving		
	system dynamics	Jay W. Forrester Principles of Systems.: text and workbook media: digital			
	networks	M.E.J. Newman Networks: an introduction	Judea Pearl Probabilistic Reasoning in Intelligent Systems: networks of plausible inference, rev. 2 print.		
	complexity	Melanie Mitchell Complexity: a guided tour	John H. Holland Complexity: a very short introduction		
		Allen B. Downey Think Complexity: complexity science and computational modeling, 2 ed.			
		complex systems	Robert B. Northrop Introduction to Complexity and Complex systems ch 01: Introduction to Complexity and Complex Systems ch 02: Introduction to Large Linear Systems		
			complex adaptive systems	John H. Holland Signals and Boundaries: building blocks for complex adaptive systems	John H. Holland Adaptation in Natural and Artificial Systems: an introductory analysis with applications to biology, control, and artificial intelligence
	spontaneous order	Steven Strogatz Sync: the emerging science of spontaneous order			
mathematics					
	logic	Patrick J. Hurley A Concise Introduction to Logic, 12 ed.			
	analysis				
		real analysis	Lara Alcock How to Think About Analysis		
			Jay Cummings Real Analysis: a long-form mathematics textbook, 2 ed.		
			proofs	Jay Cummings Proofs: a long-form mathematics textbook	
	linear algebra	Mike X. Cohen Linear Algebra: theory, intuition, code			
		Philip N. Klein Coding the Matrix: linear algebra through computer science applications	Gilbert Strang Introduction to Linear Algebra, 4 ed. media: digital		

			format: pdf location: gahug/LIBRARY/DIGITAL LIBRARY note: see companion lectures at media: web: https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/video_galleries/video-lectures/		
	calculus	James Stewart Calculus: early transcendentals, 8 ed.			
		differential equations	William E. Boyce Elementary Differential Equations and Boundary Value Problems		
		vector calculus	H.M. Schey div, grad, curl, and all that: an informal text on vector calculus, 4 ed.	Daniel Fleisch A Student's Guide to Vectors and tensors	
	discrete mathematics	Bernard Kolman Discrete Mathematical Structures, 6 ed.	Arthur T. Benjamin Discrete Mathematics: course guidebook media: video CD, The Great Courses		
		number theory	Marty Lewinter Elementary Number Theory with Programming note: Programming in JavaScript. Try programming in Python and Java using jShell for Java		
	probability	Joseph K. Blitzstein Introduction to Probability			
		James V. Stone Bayes' Rule: a tutorial introduction to Bayesian analysis			
	statistics	**Bayesian**	John K. Kruschke Doing Bayesian Data Analysis: a tutorial with R and Bugs	Norman Matloff The Art of R Programming: a tour of statistical software design	
		classical	Sam Kash Kachigan Statistical Analysis: an interdisciplinary introduction to univariate and multivariate methods	Lyman Ott An Introduction to Statistical Methods and Data Analysis, 1 ed.	
				Lyman Ott An Introduction to Statistical Methods and Data Analysis, 5 ed.	
		causal inference	Judea Pearl Causal Inference in Statistics: a primer		
	numerical methods	Ronald Mak The Java Programmer's Guide to Numerical Computing			
		Mark Newman Computational Physics note: Python based numerical methods			
		Steven C. Chapra	Timothy Sauer		

			Numerical Methods for Engineers, 7 ed	Numerical Analysis, 3 ed.	
	graph theory		Arthur Benjamin The Fascinating World of Graph Theory	Narsingh Deo Graph Theory with Applications to Engineering and Computer Science	
		networks	M.E.J. Newman Networks: an introduction	Narsingh Deo Graph Theory with Applications to Engineering and Computer Science	
		queueing networks		Edward D. Lazowska Quantitative System Performance: computer system analysis using queueing network models ch 01-04 media: web: https://homes.cs.washington.edu/~lazowska/qsp/	
computer science					
	python programming language		Michael Urban, Joel Murach murach's Python programming, 2 ed.		
		object oriented programming	Steven F. Lott Python Object Oriented Programming: build robust and maintainable object-oriented Python applications and libraries, 4 ed.		
		computational techniques	Jesse M. Kinder, Philip Nelson A Student's Guide to Python For Physical Modeling, 2 ed. **note:** Code samples, data sets, updates, errata, and more are available at http://physicalmodelingwithpython.blogspot.com		
			Mark Newman Computational Physics: revised and expanded ch01: Introduction ch02: Python programming for physicists ch03: Graphics and Visualization ch04: Accuracy and speed		
	java programming language		Joel Murach murach's Java programming, 6 ed.	Cay S. Horstmann Core Java for the Impatient. 3 ed.	
		network programming	Elliotte Rusty Harold Java Network Programming		
	algorithms		Robert Sedgewick Algorithms, 4 ed.		
	security		Michael T. Goodrich Introduction to Computer Security		
		network security	Richard Sharpe Wireshark User's Guide media: web https://www.wireshark.org/docs/wsug_html_chunked/		
	website development				
		HTML and CSS programming	Zak Ruvalcaba Murach's HTML and CSS, 5 ed.	Web Hypertext Application Technology Group (WHATWG)	

					HTML Living Standard media: web https://html.spec.whatwg.org/	
		JavaScript and jQuery programming		Mary Delamater Murach's JavaScript and jQuery, 4 ed.		
		HTTP protocol		David Gourley, Brian Totty HTTP: the definitive guide		
	network programming	Elliotte Rusty Harold Java Network Programming				
	program design note: You need read only the sections dealing with classes and objects	Russ Miles Learning UML 2.0	Martin Fowler UML Distilled: applying the standard object modeling language			
	graphs	Robert Sedgewick Introduction to Programming in Java pt 04: Algorithms and Data Structures sec 4.5: Case Study, Small World: graphs				
		Robert Sedgewick Algorithms, 4 ed. ch 04: Graphs	Robert Sedgewick Algorithms in Java, 3 ed. pt 05: Graph Algorithms			
		M.E.J. Newman Networks: an introduction				
	machine learning	Tom M. Mitchell Machine Learning				
		Leslie Valiant Probably Approximately Correct: nature's algorithms for learning and prospering in a complex world				
		artificial intelligence, AI	**critique**	Shannon Vallor The AI Mirror: how to reclaim our humanity in an age of machine thinking		
		large language models, LLM	Sebastian Raschka Build a large language model (from Scratch)			
		natural language processing, NLP	Hobson Lane Natural Language Processing in Action, 2 ed.			
		applied mathematics	Marc Peter Deisenroth Mathematics for Machine Learning			
			Paul Orland Math for Programmers: 3D graphics, machine learning, and simulations with Python pt 03: Machine Learning Applications			
			deep learning	Ian Goodfellow Deep Learning		
			causal inference	Alexander Molak Causal Inference and Discovery in Python: machine learning and Pearlian perspective		
information science						
	David G. Luenberger Information Science	Luciano Floridi Information: a very short				

			introduction		
	James V. Stone Information Theory: a tutorial introduction				
	ontology	Robert Arp Building ontologies with Basic Formal Ontology			
	causality	Sara Imari Walker, ed. From Matter to Life: information and causality			
		Paul Davies The Demon in the Machine: how hidden webs of information are solving the mystery of life			
	decision theory	Charles A. Holloway Decision Making Under Uncertainty: models and choices			
		Judea Pearl Probabilistic Reasoning in Intelligent Systems: networks of plausible inference, rev. 2 print.			
natural sciences					
	biology				
		cell biology	Bruce Alberts Essential Cell Biology, 6 ed.	Rob Phillips, Ron Milo, Cell Biology: by the numbers	
				Terence Allen The Cell: a very short introduction	
				Siddhartha Mukherjee The Song of the Cell	
			RNA	Thomas R. Cech The Catalyst: RNA and the quest to unlock life's deepest secrets	
			ribosome	Venki Ramakrishnan Gene machine: the race to decipher the secrets of the ribosome	
			physical biology	Rob Phillips Physical Biology of the Cell, 2 ed.	
			signaling	Friedrich Marks Cellular Signal Processing: an introduction to the molecular mechanisms of signal transduction, 2 ed.	James Ferrell Systems Biology of Cell Signaling: recurring themes and quantitative models
			genetics	David P. Clark Molecular Biology, 3 ed.	
				gene regulatory networks	Hamid Bolouri, ed. Computational Modeling of Gene Regulatory Networks
				genomics	John Archibald Genomics: a very short introduction
				epigenetics	Nessa Carey The Epigenetics Revolution: how modern biology is rewriting our understanding of genetics disease, and

					inheritance
		molecular biology		David P. Clark Molecular Biology, 3 ed.	Aysha Divan Molecular Biology: a very short introduction
				Kevin Ahern Biochemistry and Molecular Biology media: video CD: The Great Courses	
			biophysics	Philip Nelson Biological Physics: energy, information, life	
				John Kuriyan The Molecules of Life: physical and chemical principals	
				Ken A. Dill Molecular Driving forces: statistical thermodynamics in biology, chemistry, physics, and nanoscience, 2 ed.	
			proteins	Amit Kessel Introduction to Proteins: structure, function, and motion	Demis Hassabis, John Jumper AlphaFold media: web https://alphafoldserver.com
		biotechnology		David R. Clark Biotechnology: the technological applications of genetics and genomics, 3 ed.	
		microbiology		Gerard J. Tortora Microbiology: an introduction, 12 ed.	
			virology	Jane Flint Principles of Virology: volume I molecular biology, 4 ed.	Dorothy H. Crawford Viruses: a very short introduction
		human biology			
			anatomy	Frederic H. Martini Anatomy & Physiology, 9 ed	Anthony Goodman Understanding the Human Body: an introduction to anatomy an physiology Media: video CD: The Great Courses
			physiology	Frederic H. Martini Anatomy & Physiology, 9 ed	John E. Hall Guyton and Hall Textbook of Medical Physiology, 14 ed.
				Jack H. Wilmore Physiology of Sport and Exercise, 4 ed.	
			metabolism		Navdeep S. Chandel Navigating Metabolism
			aging	Roger B. McDonald Biology of Aging	
			anti-aging		Andrew Steele Ageless: the new science of getting older without getting old
			immunology	Sharon Stranford Kuby Immunology, 8 ed., Digital Edition 2023	Paul Klenerman The Immune System: a very short introduction
					William R. Clark In Defense of Self
				Jane Flint Principles of Virology, volume	

				II pathogenesis and control, 4 ed.	
	physics				
		mechanics	Anders Malthe-Sørenssen Elementary Mechanics Using Python: a modern course combining analytical and numerical techniques		
			Anders Malthe-Sørenssen Elementary Mechanics Using MATLAB: a modern course combining analytical and numerical techniques		
	chemistry				
		inorganic	Peter Atkins Chemical Principals: the quest for Insight, 5th ed.	Peter Atkins Chemistry: a very short introduction	
				Ron B. Davis, Jr. Chemistry and Our Universe: how it all works media: video CD: The Great Courses	
		organic	William Brown Introduction to Organic Chemistry, 4 ed.	Graham Philips Organic Chemistry: a very short introduction	
				Ron B. Davis Jr. Foundations of Organic Chemistry media: video CD: The Great Courses	
		biochemistry	Reginald H. Garrett Biochemistry, 6 ed.	Mark Lorch Biochemistry: a very short introduction	
				Kevin Ahern Biochemistry and Molecular Biology media: video CD: The Great Courses	
		physical chemistry	Peter Atkins Physical Chemistry: thermodynamics, structure, and change, 10 ed.	Peter Atkins Physical Chemistry: a very short introduction	
		quantum chemistry	Attila Szabo Modern Quantum Chemistry: introduction to advanced electronic structure theory		
		reaction kinetics	Michael J. Pilling Reaction Kinetics		
engineering					
	conceptualization		Richard W. Hamming The Art of Doing Science and Engineering, 4 ed.		
	signals and systems		Luis F. Chaparro Signals and Systems Using MATLAB		
		feedback control systems	Joseph J. DiStefano Feedback and Control Systems, 3 ed		
	electrical				
		electronics	Dennis f. Shaw An Introduction to Electronics		
			Jacob Millman Electronic Devices and Circuits		
		digital electronics	Jacob Millman Pulse, Digital, and Switching		

			Pulse, Digital, and Switching Waveforms	
		linear circuit theory	Steven T. Karris Circuit Analysis I with MATLAB applications	Jiri Vlach Linear Circuit Theory: matrices in computer applications	
	networks	M.E.J. Newman Networks: an introduction			
	applied mathematics	Paul Orland Math for Programmers: 3D Graphics, machine learning, and simulations with Python			
		Frank R. Giordano A First Course in Mathematical Modeling			
	systems modeling	Allen B. Downey Modeling and Simulation in Python: an introduction for scientists and engineers			
		Hiroki Sayama Introduction the Modeling and Analysis of Complex Systems			
		Robert Sedgewick Algorithms, 4 ed. ch 06: context			
		probabilistic graphical models	Daphne Koller, Nir Friedman Probabilistic Graphical Models: principles and techniques	Judea Pearl Causality: models, reasoning, and inference, 2 ed.	
				Judea Pearl Probabilistic Reasoning in Intelligent Systems: networks of plausible inference, rev. 2 print	
			system dynamics	Jay W. Forrester Principles of Systems.: text and workbook media: digital	Judea Pearl Probabilistic Reasoning in Intelligent Systems: networks of plausible inference, rev. 2 print.
				Judea Pearl Causal Inference in Statistics: a primer	
			finite element method	Daryl L. Logan A First Course in the Finite Element Method, 5 ed.	A.J.M. Ferreira MATLAB Codes for Finite Element Analysis
			causal inference		
				Alexander Molak Causal Inference and Discovery in Python: machine learning and Pearlian perspective	
biosystems					
	causality	Sara Imari Walker, ed. From Matter to Life: information and causality			
	systems biology	Eberhard O. Voit A First Course in Systems Biology	Eberhard O. Voit The Inner Workings of Life: vignettes in system biology		
	biophysics	Thomas M. Nordlund Quantitative Understanding of Biosystems: an introduction to biophysics, 2 ed.			
		Philip Nelson Biologic Physics: Energy, Information, Life			

			Charles S. Cockrell The Equations oi Life: how physics shapes evolution	
	biosystems engineering	Ahindra Nag, ed. Biosystems Engineering		
		biosystems modeling	Kim Sneppen Models of Life: dynamics and regulation in biological systems	
			Joseph DiStefano Dynamic Systems Biology Modeling and Simulation	
			Philip Nelson Physical Models of Living Systems	
			Andreas Kremling Systems Biology: mathematical modeling and model analysis	
			Uri Alon An introduction to Systems Biology: design principles of biological circuits, 2 ed.	
			Hamid Bolouri Computational Modeling of Gene Regulatory Networks	
			James Ferrell Systems Biology of Cell Signaling: recurring themes and quantitative models	
			Michael S. Waterman Introduction to Computational Biology: Maps, sequences and genomes	
human biosystem				
	health science			
		health maintenance		
			nutrition	
				foods Jonny Bowden The 150 Healthiest Foods on Earth
				Jonny Bowden The Healthiest Meals on Earth
				George Mateljan The World's Healthiest Foods, 2 ed. note: extremely comprehensive in all aspects of food, recipes, nutrition, and biochemistry
				advanced nutrition Sareen S. Gropper Advanced Nutrition and Human Metabolism, 5 ed.
			fitness	
				exercise Marilyn Moffat Age-Defying Fitness
	medical science			
		systems approach	Robert B. Northrup Introduction to Complexity and Complex Systems	
			Joseph Loscalzo, ed. Network Medicine: complex	

				systems in human disease and therapeutics	
		disorders	Anthony A. Goodman The Human Body: how we fail, how we heal Media: video CD: The Great courses		
			neuromuscular	Eva L. Feldman Atlas of Neuromuscular Diseases: a practical guideline, 2 ed.	
				sarcopenia	Kunihiro Sakuma, ed. Sarcopenia: Molecular Mechanism and Treatment Strategies
					Alfonso J. Cruz-Jentoft, ed. Sarcopenia, 2 ed.
			spinal	Fabio Galbusera, ed. Biomechanics of the Spine: basic concepts, spinal disorders, and treatments	
			rheumatic	John H. Klippel Primer on the Rheumatic Diseases, 13 ed.	
			cancer	Robert A. Weinberg The Biology of Cancer, 2 ed.	
				Lauren Pecorino Molecular Biology of Cancer: mechanisms, targets, and therapeutics	
		therapeutics	Anthony A. Goodman The Human Body: how we fail, how we heal Media: video CD: The Great courses		
			Scott Hogan Built from Broken: a science-based guide to healing painful joints, preventing injuries, and rebuilding your body		
			neuromuscular		
				sarcopenia	
					Joseph Tieri Reverse Sarcopenia: an easy to follow program to keep muscles strong and youthful while reducing your risk of developing dementia
					Marilyn Moffat Age-Defying Fitness
					Carolyn Kisner Therapeutic Exercise: foundations and techniques, 7 ed.
			cancer	Lauren Pecorino Molecular Biology of Cancer: mechanisms, targets, and therapeutics	
			nutrition		
				David L. Katz Nutrition in Clinical Practice, 3 ed.	
				George Mateljan The World's Healthiest Foods: optimize your health	

				with health -promoting superfoods and nutrient-rich cooking, 2 ed.	
				Jonny Bowden The Most Effective Natural Cures	
	biomedical engineering				
		signals and systems	Robert B. Northrup Signals and Systems Analysis in Biomedical Engineering, 2 ed.		
		mechanics			
			musculoskeletal system	Margareta Nordin Basic Biomechanics of the Musculoskeletal System, 5 ed.	Benno M. Nigg Biomechanics of the Musculo-skeletal System 3 ed.
				spine	Fabio Galbusera Biomechanics of the Spine: basic concepts, spinal disorders, and treatments
		networks	Network Medicine: Complex Systems in Human Disease and Therapeutics		
	human biosystem engineering				
		human biosystem modeling	Boris Ja. Kogan Introduction to Computational Cardiology: mathematical modeling and computer simulation		
			Vittorio Cristini Multiscale Modeling of Cancer: an integrated experimental and mathematical modeling approach		
social sciences					
	human behavior	Edward O. Wilson On Human Nature			
		B. F. Skinner Science and Human Behavior			
		Daniel Goleman Emotional Intelligence: when it can matter more than IQ			
		Daniel Goleman Social Intelligence: the new science of human relationships			
		Robert M. Sapolsky Behave: the biology of humans at our best and worst			
		Walter Mischel The Marshmallow Test: why self-control is the engine of success			
		learning	David Epstein Range: why generalists triumph in a specialized world		
			Leslie Valiant Probably Approximately Correct: nature's algorithms for learning and prospering in a complex world		
			Richard W. Hemming The Art of Doing Science and Engineering: learning to learn, 4 ed.		

			Herbert Ginsburg Piaget's Theory of Intellectual Development: an introduction		
		creativity	Mihaly Csikszentmihalyi Creativity: flow and the psychology of discovery and invention		
		intelligence	Shannon Vallor The AI Mirror: how to reclaim our humanity in an age of machine thinking		
			Leslie Valiant Probably Approximately Correct: nature's algorithms for learning and prospering in a complex world		
	persuasion	Lee Hartley Carter Persuasion: convincing others when facts don't seem to matter			
	economics	Alfred Mill Economics 101			
		finance	Javier Estrada Finance in a Nutshell: a no-nonsense companion to the tools and techniques of finance		
	policy analysis	David L. Weimer Policy Analysis, 5 ed.			