Mit Mechanical Engineering Requirements

Fields, Forces, and Flows in Biological Systems describes the fundamental driving forces for mass transport, electric current, and fluid flow as they apply to the biology and biophysics of molecules, cells, tissues, and organs. Basic mathematical and engineering tools are presented in the context of biology and physiology.The chapters are structure

STEM meets magic in this new middle grade adventure series from an MIT graduate. Hex Allen can't do magic -- a huge problem when everything from lights to locks is powered by simple spells that everyone (save a few unfortunate "undevelopeds") can do. After years of feeling useless, Hex sees opportunity to change her future when a once-in-a-century opportunity to journey to the Wishing Wyrm, a legendary dragon that has the ability to grant a single wish opens up. Unfortunately, Hex isn't the only one after the wish, and every rival wish hunter has magic on their side. Every rival except the Clanksmiths, Cam and Fuse. Like Hex, they can't do magic, but they've learned to build clank, creations made using the mysterious, forgotten arts of science and engineering. After a fairy fiasco throws Hex and the Clanksmiths together, they agree to cooperate--for the time being. With the Clanksmiths' know-how and Hex's creativity, they outsmart monsters with everything from LEDs to electromagnets to water balloon launchers. But as they race to the Wishing Wyrm, Hex must decide between her friendship with the Clanksmiths and the wish that would give her a normal, magical life. Pages from Hex's design notebook provide step-by-step project instructions for aspiring Clanksmiths.

This volume provides an overview of tribology and a forum for diverse views on this crucial subject.

The addition of a systems engineering concentration through the MIT Mechanical Engineering Alternative (course 2A) curriculum will be shown to have the potential to increase the number of engineering degrees in comparison to non-engineering degrees, to better prepare MIT engineering graduates, and to increase the percentage of graduates that pursue careers in engineering rather than finance and consulting. Original data was collected from Careerbridge and used along with existing information available through the registrar and careers office to provide a quantitative breakdown of the trends in Mechanical Engineering department enrollment, degrees awarded, and skills demanded of graduating alumni. These results are used to suggest that the number of MIT Mechanical Engineering graduates can increase by recognizing the existence of a type of engineer defined as the Systems Engineer. Systems Engineers are currently switching out of engineering into business, finance and consulting, and this can be corrected through a concentration in 2A similar to an existing program called the Gordon Engineering Leadership Program.

Four Friends from MIT on Growing Up

Jump-Starting America

Getting Sued and Other Tales of the Engineering Life

The Work of the Future

Energy and the Environment

Scientific and Technological Principles

The purpose of this study is to understand the skills used in the professional field in order to tailor the MIT undergraduate curriculum to address those needs. Data was collected through a survey sent to the graduating classes of 1992 through 1996, 2003 through 2007, and 2009 through 2013 in order to get a range of responses. The survey focused on topics pertaining to technical knowledge, engineering skills, work environment skills, and professional attributes. The questions focused on frequency of use, expected proficiency, and source of knowledge of these topics. Results of the data were categorized by frequency, proficiency, and source, as well as by occupation and graduating year. Responses show a lower frequency of use for the technical reasoning knowledge and a high frequency of use for communication-based skills. However, this is because technical knowledge is considered valuable to a specialized group of people, whereas the work environment skills are more career-independent. One method of addressing this observation is to balance out the number of lecture-based classes and project-based classes. Additional interpretations of the data, along with their implications on the curriculum, are discussed in more detail.

This book gives Abaqus users who make use of finite-element models in academic or practitioner-based research the in-depth program knowledge that allows them to debug a structural analysis model. The book provides many methods and guidelines for different analysis types and modes, that will help readers to solve problems that can arise with Abaqus if a structural model fails to converge to a solution. The use of Abaqus affords a general checklist approach to debugging analysis models, which can also be applied to structural analysis. The author uses step-by-step methods and detailed explanations of special features in order to identify the solutions to a variety of problems with finite-element models. The book promotes: • a diagnostic mode of thinking concerning error messages; • better material definition and the writing of user material subroutines; • work with the Abaqus mesher and best practice in doing so; • the writing of user element subroutines and contact features with convergence issues; and • consideration of hardware and software issues and a Windows HPC cluster solution. The methods and information provided facilitate job diagnostics and help to obtain converged solutions for finite-element models regarding structural component assemblies in static or dynamic analysis. The troubleshooting advice ensures that these solutions are both high-quality and cost-effective according to practical experience. The book offers an in-depth guide for students learning about Abaqus, as each problem and solution are complemented by examples and straightforward explanations. It is also useful for academics and structural engineers wishing to debug Abaqus models on the basis of error and warning messages that arise during finite-element modelling processing.

Model, analyze, and solve vibration problems, using modern computer tools. Featuring clear explanations, worked examples, applications, and modern computer tools, William Palm's Mechanical Vibration provides a firm foundation in vibratory systems. You'll learn how to apply knowledge of mathematics and science to model and analyze systems ranging from a single degree of freedom to complex systems with two and more degrees of freedom. Separate MATLAB sections at the end of most chapters show how to use the most recent features of this standard engineering tool, in the context of solving vibration problems. The text introduces Simulink where solutions may be difficult to program in MATLAB, such as modeling Coulomb friction effects and simulating systems that contain non-linearities. Ample problems throughout the text provide opportunities to practice identifying, formulating, and solving vibration problems. KEY FEATURES Strong pedagogical approach, including chapter objectives and summaries Extensive worked examples illustrating applications Numerous realistic homework problems Up-to-date MATLAB coverage The first vibration textbook to cover Simulink Self-contained introduction to MATLAB in Appendix A Special section dealing with active vibration control in sports equipment Special sections devoted to obtaining parameter values from experimental data

Computer Systems Organization -- general.

Marine Hydrodynamics

Learning to Think at MIT

Study on the Careers of Massachusetts Institute of Technology Mechanical Engineering Undergraduate Alumni

The Idea Factory

Wave Propagation

A Parallel Treatment of Electrons, Molecules, Phonons, and Photons

Engineers face many challenges in systems design and research. Modeling and Approximation in Heat Transfer describes the approach to engineering solutions through simplified modeling of the most important physical features and approximating their behavior. Systematic discussion of how modeling and associated synthesis can be carried out is included - in engineering practice, these steps very often precede mathematical analysis or the need for precise results.

In "Points of You," four friends from MIT share real and unfiltered accounts of what they wish they'd known while growing up. This book is a companion for teenagers and young adults who are embarking on a new life journey. Nobody has the answers to life, but through the perspectives of four very different people you can find understanding and new points of view. Featuring fifteen chapters on everything from maintaining friendships and making tough decisions to honing life goals and dealing with hard emotions, "Points of You" is an intimate guide to getting ready for the next stage of life.

Recounts the story of how a notorious gang of MIT blackjack savants devised and received backing for a system for winning at the world's most sophisticated casinos, an endeavor that earned them more than three million dollars. Originally published as Bringing Down the House. Reissue. (A Columbia Pictures film, written by Peter Steinfeld & Allan Loeb, directed by Robert Luketic, releasing March 2008, starring Kevin Spacey, Kate Bosworth, Laurence Fishburne, Jim Sturgess, & others) (Current Affairs)

Features the Mechanical Engineering (ME) Department of the Massachusetts Institute of Technology (MIT) in Cambridge. Lists faculty and staff members. Highlights research activities and groups. Provides information on courses, admissions, and computing resources. Contains news items and a site search engine. Links to the MIT home page.

Differential Equations and Linear Algebra

Biomolecular Feedback Systems

Mechanical Vibration

Computation Structures

And The Clanksmiths

The Elements of Mechanical Design

How engineered materials and machines powered by living biological cells can tackle technological challenges in medicine, agriculture, and global security. You are a biological machine whose movement is powered by skeletal muscle, just as a car is a machine whose movement is powered by an engine. If you can be built from the bottom up with biological materials, other machines can be as well. This is the conceptual starting point for biofabrication, the act of building with living cells--building with biology in the same way we build with synthetic materials. In this volume in the MIT Press Essential Knowledge series, Ritu Raman offers an accessible introduction to biofabrication, arguing that it can address some of our greatest technological challenges. After presenting the background information needed to understand the emergence and evolution of biofabrication and describing the fundamental technology that enables building with biology, Raman takes deep dives into four biofabrication applications that have the potential to affect our daily lives: tissue engineering, organs-on-a-chip, lab-grown meat and leather, and biohybrid machines. Organs-on-a-chip (devices composed of miniature model tissues), for example, could be used to test new medicine and therapies, and lab-grown meat could alleviate environmental damage done by animal farming. She shows that biological materials have abilities synthetic materials do not, including the ability to adapt dynamically to their environments. Exploring the principles of biofabrication, Raman tells us, should help us appreciate the beauty, adaptiveness, and persistence of the biological machinery that drives our bodies and our world.

A textbook that introduces integrated, sustainable design of urban infrastructures, drawing on civil engineering, environmental engineering, urban planning, electrical engineering, mechanical engineering, and computer science. This textbook introduces urban infrastructure from an engineering perspective, with an emphasis on sustainability. Bringing together both fundamental principles and practical knowledge from civil engineering, environmental engineering, urban planning, electrical engineering, mechanical engineering, and computer science, the book transcends disciplinary boundaries by viewing urban infrastructures as integrated networks. The text devotes a chapter to each of five engineering systems–electricity, water, transportation, buildings, and solid waste–covering such topics as fundamentals, demand, management, technology, and analytical models. Other chapters present a formal definition of sustainability; discuss population forecasting techniques; offer a history of urban planning, from the Neolithic era to Kevin Lynch and Jane Jacobs; define and discuss urban metabolism and infrastructure integration, reviewing system interdependencies; and describe approaches to urban design that draw on complexity theory, algorithmic models, and machine learning. Throughout, a hypothetical city state, Civitas, is used to explain and illustrate the concepts covered. Each chapter includes working examples and problem sets. An appendix offers tables, diagrams, and conversion factors. The book can be used in advanced undergraduate and graduate courses in civil engineering and as a reference for practitioners. It can also be helpful in preparation for the Fundamentals of Engineering (FE) and Principles and Practice of Engineering (PE) exams.

This study seeks to collect rich data about Mechanical Engineering alumni's work lives using qualitative and interpretive social research methods. Semi-structured interviews were conducted with several alumni from the MIT Mechanical Engineering department. Main topics discussed in theses interviews were current work activities, career motivations, important job skills, the value of an MIT education, and potential improvements to the MIT alumni experience.

In the late 1800s India seemed to be left behind by the Industrial Revolution. Today there are many technological Indians around the world but relatively few focus on India’s problems. Ross Bassett–drawing on a database of every Indian to graduate from the Massachusetts Institute of Technology through 2000–explains the role of MIT in this outcome.

Proceedings of the International Conference on the Fundamentals of Tribology, Held at the Massachusetts Institute of Technology, Cambridge, Massachusetts, June 1978

How Breakthrough Science Can Revive Economic Growth and the American Dream

Massachusetts Institute of Technology (MIT) Mechanical Engineering (ME) Department

Building Better Jobs in an Age of Intelligent Machines

Points of You

Memorial Tributes

In this insightful and incisive essay, Eugene Ferguson demonstrates that good engineering is as much a matter of intuition and nonverbal thinking as of equations and computation. He argues that a system of engineering education that ignores nonverbal thinking will produce engineers who are dangerously ignorant of the many ways in which the real world differs from the mathematical models constructed in academic minds.

This book provides an accessible introduction to the principles and tools for modeling, analyzing, and synthesizing biomolecular systems. It begins with modeling tools such as reaction-rate equations, reduced-order models, stochastic models, and specific models of important core processes. It then describes in detail the control and dynamical systems tools used to analyze these models. These include tools for analyzing stability of equilibria, limit cycles, robustness, and parameter uncertainty. Modeling and analysis techniques are then applied to design examples from both natural systems and synthetic biomolecular circuits. In addition, this comprehensive book addresses the problem of modular composition of synthetic circuits, the tools for analyzing the extent of modularity, and the design techniques for ensuring modular behavior. It also looks at design trade-offs, focusing on perturbations due to noise and competition for shared cellular resources. Featuring numerous exercises and illustrations throughout, Biomolecular Feedback Systems is the ideal textbook for advanced undergraduates and graduate students. For researchers, it can also serve as a self-contained reference on the feedback control techniques that can be applied to biomolecular systems. Provides a user-friendly introduction to essential concepts, tools, and applications Covers the most commonly used modeling methods Addresses the modular design problem for biomolecular systems Uses design examples from both natural systems and synthetic circuits Solutions manual (available only to professors at press.princeton.edu) An online illustration package is available to professors at press.princeton.edu

The untold story of how America once created the most successful economy the world has ever seen and how we can do it again. The American economy glitters on the outside, but the reality is quite different. Job opportunities and economic growth are increasingly concentrated in a few crowded coastal enclaves. Corporations and investors are disproportionately developing technologies that benefit the wealthiest Americans in the most prosperous areas--and destroying middle class jobs elsewhere. To turn this tide, we must look to a brilliant and all-but-forgotten American success story and embark on a plan that will create the industries of the future--and the jobs that go with them. Beginning in 1940, massive public investment generated breakthroughs in science and technology that first helped win WWII and then created the most successful economy the world has ever seen. Private enterprise then built on these breakthroughs to create new industries--such as radar, jet engines, digital computers, mobile telecommunications, life-saving medicines, and the internet-- that became the catalyst for broader economic growth that generated millions of good jobs. We lifted almost all boats, not just the yachts. Jonathan Gruber and Simon Johnson tell the story of this first American growth engine and provide the blueprint for a second. It's a visionary, pragmatic, sure-to-be controversial plan that will lead to job growth and a new American economy in places now left behind.

Why the United States lags behind other industrialized countries in sharing the benefits of innovation with workers and how we can remedy the problem. The United States has too many low-quality, low-wage jobs. Every country has its share, but those in the United States are especially poorly paid and often without benefits. Meanwhile, overall productivity increases steadily and new technology has transformed large parts of the economy, enhancing the skills and paychecks of higher paid knowledge workers. What’s wrong with this picture? Why have so many workers benefited so little from decades of growth? The Work of the Future shows that technology is neither the problem nor the solution. We can build better jobs if we create institutions that leverage technological innovation and also support workers though long cycles of technological transformation. Building on findings from the multiyear MIT Task Force on the Work of the Future, the book argues that we must foster institutional innovations that complement technological change. Skills programs that emphasize work-based and hybrid learning (in person and online), for example, empower workers to become and remain productive in a continuously evolving workplace. Industries fueled by new technology that augments workers can supply good jobs, and federal investment in R&D can help make these industries worker-friendly. We must act to ensure that the labor market of the future offers benefits, opportunity, and a measure of economic security to all.

Precision Machine Design

Modeling and Approximation in Heat Transfer

Why the Undergraduate Mechanical Engineering Curriculum Needs Reform

Engineering and the Mind's Eye

Fields, Forces, and Flows in Biological Systems

Troubleshooting Finite-Element Modeling with Abaqus

An introductory engineering textbook by an award-winning MIT professor that covers the history of dynamics and the dynamical analyses of mechanical, electrical, and electromechanical systems. This introductory textbook offers a distinctive blend of the modern and the historical, seeking to encourage an appreciation for the history of dynamics while also presenting a framework for future learning. The text presents engineering mechanics as a unified field, emphasizing dynamics but integrating topics from other disciplines, including design and the humanities. The book begins

with a history of mechanics, suitable for an undergraduate overview. Subsequent chapters cover such topics as three-dimensional kinematics; the direct approach, also known as vectorial mechanics or the momentum approach; the indirect approach, also called lagrangian dynamics or variational dynamics; an expansion of the momentum and lagrangian formulations to extended bodies; lumped-parameter electrical and electromagnetic devices; and equations of motion for one-dimensional continuum models. The book is noteworthy in covering both lagrangian dynamics and vibration analysis. The principles covered are relatively few and easy to articulate; the examples are rich and broad. Summary tables, often in the form of flowcharts, appear throughout. End-of-chapter problems begin at an elementary level and become increasingly difficult. Appendixes provide theoretical and mathematical support for the main text.

Energy and the Environment Energy addresses a central problem of urban-industrial society: the interconnectedness of energy usage and environmental degradation. Intended for upper level undergraduate and first year graduate students, as well as professionals in the fields of energy and environmental sciences and technology, the text develops the scientific and technological background for understanding how the rapidly growing use of energy threatens the degradation of the natural environment at local, regional, and global scales. Fossil, nuclear and renewable energy technologies are described, and their efficiencies for transforming the source energy to useful mechanical or electrical power are explained. Special emphasis is given to the generation of electric power and the use of transportation vehicles, and their technological improvements that increase energy efficiency and reduce air pollutant emissions. The source of toxic emissions to air, water, and land that arise from energy uses, and their effects on environmental quality for urban and regional scale regions is analyzed. Special attention is given to global climate change, the contribution made to it by energy uses, and the salient technologies that are being developed to mitigate this effect. This book aims to equip engineering and science majors and professionals with the basic factual knowledge needed to develop solutions to these environmental problems.

A unified framework for analyzing urban sustainability in terms of cities' inflows and outflows of matter and energy. Urbanization and globalization have shaped the last hundred years. These two dominant trends are mutually reinforcing: globalization links countries through the networked communications of urban hubs. The urban population now generates more than eighty percent of global GDP. Cities account for enormous flows of energy and materials—inflows of goods and services and outflows of waste. Thus urban environmental management critically affects global sustainability. In this book, Paulo Ferrão and John Fernández offer a metabolic perspective on urban sustainability, viewing the city as a metabolism, in terms of its exchanges of matter and energy. Their book provides a roadmap to the strategies and tools needed for a scientifically based framework for analyzing and promoting the sustainability of urban systems. Using the concept of urban metabolism as a unifying framework, Ferrão and Fernandez describe a systems-oriented approach that establishes useful linkages among environmental, economic, social, and technical infrastructure issues. These linkages lead to an integrated information-intensive platform that enables ecologically informed urban planning. After establishing the theoretical background and describing the diversity of contributing disciplines, the authors sample sustainability approaches and tools, offer an extended study of the urban metabolism of Lisbon, and outline the challenges and opportunities in approaching urban sustainability in both developed and developing countries.

An engineer's autobiographical sketches describe some of the challenges, problems, and rewards of his career

Understanding the Careers of the Alumni of the MIT Mechanical Engineering Department

Nanoscale Energy Transport and Conversion

The Inside Story of Six M.I.T. Students Who Took Vegas for Millions

Beyond the Fundamentals

A History of Mechanical Engineering

A Study on the Work of MIT Mechanical Engineering Graduates

An engineering-oriented introduction to wave propagation by an award-winning MIT professor, with highly accessible expositions and mathematical details—many classical but others not heretofore published. A wave is a traveling disturbance or oscillation—intentional or unintentional—that usually transfers energy without a net displacement of the medium in which the energy travels. Wave propagation is any of the means by which a wave travels. This book offers an engineering-oriented introduction to wave propagation that focuses on wave propagation in one-dimensional models that are anchored by the classical wave equation. The text is written in a style that is highly accessible to undergraduates, featuring extended and repetitive expositions and displaying and explaining mathematical and physical details—many classical but others not heretofore published. The formulations are devised to provide analytical foundations for studying more advanced topics of wave propagation. After a precalculus summary of rudimentary wave propagation and an introduction of the classical wave equation, the book presents solutions for the models of systems that are dimensionally infinite, semi-infinite, and finite. Chapters typically begin with a vignette based on some aspect of wave propagation, drawing on a diverse range of topics. The book provides more than two hundred end-of-chapter problems (supplying answers to most problems requiring a numerical result or brief analytical expression). Appendixes cover equations of motion for strings, rods, and circular shafts; shear beams; and electric transmission lines.

From one of the authors of The Unwritten Laws of Engineering and The Unwritten Laws of Business, this concise and readable book is an excellent primer or refresher for any professional interested in the basic principles and practices of good mechanical design. In this handy and unique volume the author uses his own experience, along with input from other expert designers, to explicitly state design principles and practices. Readers will not have to discover these principles on their own and will be able to apply these fundamental concepts throughout their designs.

This is a personal story of the educational process at one of the world's great technological universities. This is a personal story of the educational process at one of the world's great technological universities. Pepper White entered MIT in 1981 and received his master's degree in mechanical engineering in 1984. His account of his experiences, written in diary form, offers insight into graduate school life in general—including the loneliness and even desperation that can result from the intense pressure to succeed—and the purposes of engineering education in particular. The first professor White met at MIT told him that it did not really matter what he learned there, but that MIT would teach him how to think. This, then, is the story of how one student learned how to think. There have of course been changes at MIT since 1984, but its essence is still the same. White has added a new preface and concluding chapter to this edition to bring the story of his continuing education up to date.

Differential equations and linear algebra are two central topics in the undergraduate mathematics curriculum. This innovative textbook allows the two subjects to be developed either separately or together, illuminating the connections between two fundamental topics, and giving increased flexibility to instructors. It can be used either as a semester-long course in differential equations, or as a one-year course in differential equations, linear algebra, and applications. Beginning with the basics of differential equations, it covers first and second order equations, graphical and numerical methods, and matrix equations. The book goes on to present the fundamentals of vector spaces, followed by eigenvalues and eigenvectors, positive definiteness, integral transform methods and applications to PDEs. The exposition illuminates the natural correspondence between solution methods for systems of equations in discrete and continuous settings. The topics draw on the physical sciences, engineering and economics, reflecting the author's distinguished career as an applied mathematician and expositor.

Urban Engineering for Sustainability

Social and Academic Synergies in MIT's Mechanical Engineering Department for Empowering Twentieth-century Chinese Leaders

An Introduction to Engineering Analyses

Theory and Applications

Complexity

A HEAT TRANSFER TEXTBOOK

This is the 17th Volume in the series Memorial Tributes compiled by the National Academy of Engineering as a personal remembrance of the lives and outstanding achievements of its members and foreign associates. These volumes are intended to stand as an enduring record of the many contributions of engineers and engineering to the benefit of humankind. In most cases, the authors of the tributes are contemporaries or colleagues who had personal knowledge of the interests and the engineering accomplishments of the deceased. Through its members and foreign associates, the Academy carries out the responsibilities for which it was established in 1964. Under the charter of the National Academy of Sciences, the National Academy of Engineering was formed as a parallel organization of outstanding engineers. Members are elected on the basis of significant contributions to engineering theory and practice and to the literature of engineering or on the basis of demonstrated unusual accomplishments in the pioneering of new and developing fields of technology. The National Academies share a responsibility to advise the federal government on matters of science and technology. The expertise and credibility that the National Academy of Engineering brings to that task stem directly from the abilities, interests, and achievements of our members and foreign associates, our colleagues and friends, whose special gifts we remember in this book.

Precision Machine DesignSociety of Manufacturing Engineers

A guide to making scientific photographs for presentations, journal submissions, and covers, featuring step-by-step instructions and case studies, by an award-winning science photographer; illustrated in color throughout. One of the most powerful ways for scientists to document and communicate their work is through photography. Unfortunately, most scientists have little or no training in that craft. In this book, celebrated science photographer Felice Frankel offers a guide for creating science images that are both accurate and visually stunning. Picturing Science and Engineering provides detailed instructions for making science photographs using the DSLR camera, the flatbed scanner, and the phone camera. The book includes a series of step-by-step case studies, describing how final images were designed for cover submissions and other kinds of visualizations. Lavishly illustrated in color throughout, the book encourages the reader to learn by doing, following Frankel as she recreates the stages of discovery that lead to a good science visual. Frankel shows readers how to present their work with graphics--how to tell a visual story--and considers issues of image adjustment and enhancement. She describes how developing the right visual to express a concept not only helps make science accessible to nonspecialists, but also informs the science itself, helping scientists clarify their thinking. Within the book are specific URLs where readers can view Frankel's online tutorials--visual "punctuations" of this printed edition. Additional materials, including tutorials and videos, can be found online at the book's website. Published with the help of funding from Furthermore: a program of the J. M. Kaplan fund

This book is a comprehensive engineering exploration of all the aspects of precision machine design—both component and system design considerations for precision machines. It addresses both theoretical analysis and practical implementation providing many real-world design case studies as well as numerous examples of existing components and their characteristics. Fast becoming a classic, this book includes examples of analysis techniques, along with the philosophy of the solution method. It explores the physics of errors in machines and how such knowledge can be used to build an error budget for a machine, how error budgets can be used to design more accurate machines.

Sustainable Urban Metabolism

21: Bringing Down the House - Movie Tie-In

The Technological Indian

Biofabrication

Hex Allen

Fundamentals of Applied Dynamics

This research seeks to understand the careers of MIT mechanical engineering alumni. Data was collected to determine the knowledge and skills that graduates from the classes of 1992 through 1996 make use of in their professions. Data was collected on many topics in four areas: technical knowledge and reasoning, personal and professional skills and attributes, interpersonal skills, and engineering skills. The topics were ranked in terms of expected proficiency, frequency of use, and source of knowledge. The data is presented and implications for improving the mechanical engineering curriculum are discussed.

A textbook that offers a unified treatment of the applications of hydrodynamics to marine problems. The applications of hydrodynamics to naval architecture and marine engineering expanded dramatically in the 1960s and 1970s. This classic textbook, originally published in 1977, filled the need for a single volume on the applications of hydrodynamics to marine problems. The book is solidly based on fundamentals, but it also guides the student to an understanding of engineering applications through its consideration of realistic configurations. The book takes a balanced approach between theory and empirics, providing the necessary theoretical background for an intelligent evaluation and application of empirical procedures. It also serves as an introduction to more specialized research methods. It unifies the seemingly diverse problems of marine hydrodynamics by examining them not as separate problems but as related applications of the general field of hydrodynamics. The book evolved from a first-year graduate course in MIT's Department of Ocean Engineering. A knowledge of advanced calculus is assumed. Students will find a previous introductory course in fluid dynamics helpful, but the book presents the necessary fundamentals in a self-contained manner.

The 40th anniversary of this pioneering book offers a foreword by John Grue. Contents Model Testing • The Motion of a Viscous Fluid • The Motion of an Ideal Fluid • Lifting Surfaces • Waves and Wave Effects • Hydrodynamics of Slender Bodies

Between 1854 and 1954, MIT awarded 734 degrees to students studying abroad from China, which is the third largest number among all American universities during this time period. Within the MIT Mechanical Engineering department, the number of students is well within the hundreds. While these students studied engineering topics uniquely influenced by the developments and needs of twentieth-century China, their courses of study were furthermore influenced by the tutelage they received from a small set of MIT professors willing to cross cultural gaps. These students also had support through affinity groups and made notable impacts on MIT's social landscape during their time at the Institute. Finally, they went on to play significant roles in the subsequent industrialization of China. What, then, were the academic and social environments in the twentieth-century MIT Mechanical Engineering department that led to the successful graduation of students studying abroad from China, and what lessons can be applied to present-day MIT? Based on information from the 1931 MIT Chinese Students' Directory, which provides data on Chinese students from 1877 to 1930, Chinese students' social and academic presence at MIT was quantified, and efforts were made to identify their research advisors and academic mentors, and also to delineate what interpersonal relationships and connections existed between the faculty and the students. In the first decades of the twentieth century, several Mechanical Engineering professors took on more Chinese students than others, most notably, George B. Haven. From the analysis of 20+ theses written by these students between 1877 and 1931, the Mechanical Engineering faculty certainly rallied to support these students as they faced linguistic, cultural, and other challenges during their courses of study. This cohort of Chinese mechanical engineering students was responsible for inventing the first Chinese typewriter, doing the earliest mechanical tests on China-native materials such as ramie and bamboo, and was fundamental to the development of the Mechanical Engineering department at MIT's sister school, Tsinghua University in Beijing.

This is a graduate level textbook in nanoscale heat transfer and energy conversion that can also be used as a reference for researchers in the developing field of nanoengineering. It provides a comprehensive overview of microscale heat transfer, focusing on thermal energy storage and transport. Chen broadens the readership by incorporating results from related disciplines, from the point of view of thermal energy storage and transport, and presents related topics on the transport of electrons, phonons, photons, and molecules. This book is part of the MIT-Pappalardo Series in Mechanical Engineering.

Picturing Science and Engineering

Fundamentals of Tribology

With Application in Structural Engineering Analysis

The Mayfield Handbook of Technical and Scientific Writing

Nam P. Suh focussed his axiomatic design theories on methods to understand and deal with complexity. Suh is a well-respected designer and researcher in the fields of manufacturing and composite materials. He is best known for his systems that aim to speed up and simplify the process of design for manufacturing. The 'axioms' in axiomatic design refer to a process to help engineers reduce design specifications down to their simplest components, so that the engineers can produce the simplest possible solution to a problem. Complexity, besides being a key area of burgeoning research in disciplines interested in complex systems and chaos theory (like computer science and physics), is a complicating factor in engineering design that many engineers find difficult to overcome. Suh's multidisciplinary exploration of complex systems is meant to eliminate much of the confusion and allow engineers to accommodate complexity within simple, elegant design solutions.

The Mayfield Handbook of Technical and Scientific Writing offers the ideal combination of comprehensive coverage, accessibility, and convenience. It supplies grammatical and stylistic information, provides the key format elements of common technical documents along with illustrative examples, guides authors in the effective use of visual information, and helps writers revise and edit their own work as well as review that of others. The Mayfield Electronic Handbook of Technical and Scientific Writing, which is platform-independent and can interact with several applications at once, can be used alone or accompanied by the printed version.