

Synthetic Biology Springer

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Synthetic biology is becoming one of the most dynamic new fields of biology, with the potential to revolutionize the way we do biotechnology today. By applying the toolbox of engineering disciplines to biology, a whole set of potential applications become possible ranging very widely across scientific and engineering disciplines.

Introduction. The emerging field of synthetic biology employs biotechnological approaches to recreate and enhance basic biological structures, intracellular processes and whole organisms. This book provides a comprehensive, up-to-date overview of the opportunities and challenges of this complex field of biotechnology, which combines various scientific disciplines.

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Introduction. In Synthetic Biology, expert researchers in the field provide the latest developments in molecular biology techniques used in Synthetic Biology. Focusing on computational tools that will aid in systematising the design and construction of parts and systems. Written in the highly successful Methods in Molecular Biology™ series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible ...

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Synthetic biology offers powerful remedies for some of the world's most intractable problems, but these solutions are clouded by uncertainty and risk that few strategies are available to address.

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The emerging field of synthetic biology employs biotechnological approaches to recreate and enhance basic biological structures, intracellular processes and whole organisms. The book addresses a broad range of topics, including redesigning complex metabolic pathways, DNA/RNA and protein engineering, as well as novel synthetic biomaterials.

~~Synthetic Biology | Anton Glieder | Springer~~

Synthetic Biology - Character and Impact | Bernd M. Giese | Springer. Risk Engineering. Inside view, comprehensive analysis and description of this new field of science and technology. Written by authors with an exceptional reputation in Synthetic Biology as well as science and technology assessment and policy.

~~Synthetic Biology—Springer~~

It further discusses how synthetic biology gathers the information about various systems, in order to either devise an entirely new system, or, to modulate existing systems. The book also tackles the concept of modularity, where biological systems are visualized in terms of their parts.

~~Synthetic Biology—Springer~~

Synthetic biology is an emerging technology that aims to design and engineer DNA and molecular structures of single cell organisms. Existing organisms can be altered, novel organisms can be created. In doing so, synthetic biology makes use of specific technoscientific understandings of living beings. This volume sets out to explore and assess synthetic biology and its notions of life from philosophical, ethical, social, and legal perspectives.

~~Synthetic Biology—Springer~~

Synthetic Biology - the technoscience and its societal consequences | Markus Schmidt | Springer. Offers comprehensive coverage of the societal aspects of a new and very powerful technology. Serves as an authoritative resource to the

opportunities and risks of synthetic biology.

~~Synthetic Biology – Springer~~

Synthetic biology also incorporates a specific technoscientific understanding of its research agenda and its research objects that has philosophical and ethical implications. This edited volume sets out to explore and evaluate these synthetic biology worldviews and it proposes appropriate governance measures.

~~Synthetic Biology – Springer~~

Visions of a synthetic engineering-based approach to biology have been a prominent and recurring theme in the history of biology in the twentieth century. Several major moments in this earlier history of attempts to redesign life are discussed: the turn-of-the-century prominence of experimental evolution and the coining of “synthetic biology” in 1912; early synthetic approaches to experimentally investigating the historical origin of life on the early earth; the goal of developing a ...

~~That Was the Synthetic Biology That Was | SpringerLink~~

This book addresses the design of emerging conceptual tools, technologies and systems including novel synthetic parts, devices, circuits, oscillators, biological gates, and small regulatory RNAs (riboregulators and riboswitches), which serve as versatile control elements for regulating gene expression. Synthetic biology, a rapidly growing field that involves the application of engineering principles in biology, is now being used to develop novel systems for a wide range of applications ...

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SpringerBriefs in Applied Sciences and Technology. Presents the principles of the emerging topic of cell-free synthetic biology and bioengineering. Reveals how cell-free synthetic biology is transforming life-sciences research. Discusses how cell-free synthetic biology can revolutionize the environmental, biochemical, bioenergy, and human health industries.

~~Cell-Free Synthetic Biology | Yuan Lu | Springer~~

Introduction This volume highlights recent breakthroughs in the interdisciplinary areas of synthetic biology, metabolic engineering and bioprocess engineering for the production of green chemicals. It also presents practical experimental and computational tools for the design, construction and manipulation of cyanobacteria cell factories.

~~Synthetic Biology of Cyanobacteria | SpringerLink~~

Synthetic biology is a techno-scientific discipline with the declared goal of rationally engineering biological systems. Despite its considerable promise – regarding applications in medicine, energy, environmental remediation, and agriculture – synthetic biology raises numerous ethical issues pertaining to intellectual property, the creation of novel life forms, biosafety, and biosecurity.

~~Synthetic Biology | SpringerLink~~

Synthetic biology started with an emphasis in experimental molecular biology through the demonstration that characterized DNA sequences which can be taken

out of their native context and re-implemented in novel ways. The scope of synthetic biology research has rapidly increased with the improvement and development of tools for direct DNA ...

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Synthetic biology is a biological study, in scientific and engineering fields, depending on the construction of biological systems. A living organism is a system containing multilayers such as cells, biomacromolecules (proteins, RNAs, and DNAs), and monomers (amino acids and nucleotides).

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Correction to: Synthetic biology, combinatorial biosynthesis, and chemo-enzymatic synthesis of isoprenoids

~~Correction to: Synthetic biology, combinatorial ...~~

Synthetic biology is a rapidly evolving field which potentially can change how we live in and understand the world. Given its potential impact it is important to inform and involve the public so that...

This textbook has been conceptualized to provide a detailed description of the various aspects of Systems and Synthetic Biology, keeping the requirements of M.Sc. and Ph.D. students in mind. Also, it is hoped that this book will mentor young scientists who are willing to contribute to this area but do not know from where to begin. The book has been divided into two sections. The first section will deal with systems biology - in terms of the foundational understanding, highlighting issues in biological complexity, methods of analysis and various aspects of modelling. The second section deals with the engineering concepts, design strategies of the biological systems ranging from simple DNA/RNA fragments, switches and oscillators, molecular pathways to a complete synthetic cell will be described. Finally, the book will offer expert opinions in legal, safety, security and social issues to present a well-balanced information both for students and scientists.

This book provides a comprehensive, up-to-date overview of the opportunities and challenges of the complex field of synthetic biology, which combines various scientific disciplines. The emerging field of synthetic biology employs biotechnological approaches to recreate and enhance basic biological structures, intracellular processes and whole organisms. The book addresses a broad range of topics, including redesigning complex metabolic pathways, DNA/RNA and protein engineering, as well as novel synthetic biomaterials. It discusses both "bottom up" and "top down" approaches and presents the latest genome engineering tools with predictions about how these could change our way of thinking and working. Since

the use of synthetic biology raises a number of ethical questions, a chapter is devoted to public awareness and risk management. The book is of interest to scientists from both academia and industry, as well as PhD students and postdocs working in the field

This book addresses the design of emerging conceptual tools, technologies and systems including novel synthetic parts, devices, circuits, oscillators, biological gates, and small regulatory RNAs (ribo regulators and riboswitches), which serve as versatile control elements for regulating gene expression. Synthetic biology, a rapidly growing field that involves the application of engineering principles in biology, is now being used to develop novel systems for a wide range of applications including diagnostics, cell reprogramming, therapeutics, enzymes, vaccines, biomaterials, biofuels, fine chemicals and many more. The book subsequently summarizes recent developments in technologies for assembling synthetic genomes, minimal genomes, synthetic biology toolboxes, CRISPR-Cas systems, cell-free protein synthesis systems and microfluidics. Accordingly, it offers a valuable resource not only for beginners in synthetic biology, but also for researchers, students, scientists, clinicians, stakeholders and policymakers interested in the potential held by synthetic biology.

Synthetic biology is becoming one of the most dynamic new fields of biology, with the potential to revolutionize the way we do biotechnology today. By applying the toolbox of engineering disciplines to biology, a whole set of potential applications become possible ranging very widely across scientific and engineering disciplines. Some of the potential benefits of synthetic biology, such as the development of low-cost drugs or the production of chemicals and energy by engineered bacteria are enormous. There are, however, also potential and perceived risks due to deliberate or accidental damage. Also, ethical issues of synthetic biology just start being explored, with hardly any ethicists specifically focusing on the area of synthetic biology. This book will be the first of its kind focusing particularly on the safety, security and ethical concerns and other relevant societal aspects of this new emerging field. The foreseen impact of this book will be to stimulate a debate on these societal issues at an early stage. Past experiences, especially in the field of GM-crops and stem cells, have shown the importance of an early societal debate. The community and informed stakeholders recognize this need, but up to now discussions are fragmentary. This book will be the first comprehensive overview on relevant societal issues of synthetic biology, setting the scene for further important discussions within the scientific community and with civil society.

This book review series presents current trends in modern biotechnology. The aim is to cover all aspects of this interdisciplinary technology where knowledge, methods and expertise are required from chemistry, biochemistry, microbiology, genetics, chemical engineering and computer science. Volumes are organized topically and provide a comprehensive discussion of developments in the respective field over the past 3-5 years. The series also discusses new discoveries and applications. Special volumes are dedicated to selected topics which focus on new biotechnological products and new processes for their synthesis and purification. In general, special volumes are edited by well-known guest editors.

The series editor and publisher will however always be pleased to receive suggestions and supplementary information. Manuscripts are accepted in English.

Synthetic Biology (SB) is a revolutionary discipline with a vast range of practical applications, but is SB research really based on engineering principles? Does it contribute to the artificial synthesis of life or does it utilise approaches sufficiently advanced to fall outside the scope of biotechnology or metabolic engineering? This volume reviews the development of SB and includes the major milestones of the discipline, the 'top-down' and 'bottom-up' approaches towards the construction of an artificial cell and the development of the "iGEM" competition. We conclude that SB is an emerging field with extraordinary technological potential, but that most research projects actually are an extension of metabolic engineering since the complexity of living organisms, their tight dependence on evolution and our limited knowledge of the interactions between the molecules, actually make life difficult to engineer.

Synthetic biology offers powerful remedies for some of the world's most intractable problems, but these solutions are clouded by uncertainty and risk that few strategies are available to address. The incentives for continued development of this emerging technology are prodigious and obvious, and the public deserves assurances that all potential downsides are duly considered and minimized accordingly. Incorporating social science analysis within the innovation process may impose constraints, but its simultaneous support in making the end products more acceptable to society at large should be considered a worthy trade-off. Contributing authors in this volume represent diverse perspectives related to synthetic biology's social sciences, and reflect on different areas of risk analysis and governance that have developed for the field. Such perspectives include leading scholarly discussion pertaining to risk assessment, governance, ethics, and communication. The chapters of this volume note that while the first twenty years of synthetic biology development have focused strongly on technological innovation and product development, the next twenty should emphasize the synergy between developers, policymakers, and publics to generate the most beneficial, well governed, and transparent technologies and products possible. Many chapters in this volume provide new data and approaches that demonstrate the feasibility for multi-stakeholder efforts involving policymakers, regulators, industrial developers, workers, experts, and societal representatives to share responsibilities in the production of effective and acceptable governance in the face of uncertain risk probabilities. A full consideration of such perspectives may prevent a world of draconian regulations based on an insufficient or incomplete understanding of the science that underpins synthetic biology, as well as any hesitancy or fear by the public to adopt its eventual products.

Synthetic biology is a field of biotechnology that is rapidly growing in various applications, such as in medicine, environmental sustainability, and energy production. However these technologies also have unforeseen risks and applications to humans and the environment. This open access book presents discussions on risks and mitigation strategies for these technologies including biosecurity, or the potential of synthetic biology technologies and processes to be deliberately misused for nefarious purposes. The book presents strategies to prevent, mitigate, and recover from 'dual-use concern' biosecurity challenges that

may be raised by individuals, rogue states, or non-state actors. Several key topics are explored including opportunities to develop more coherent and scalable approaches to govern biosecurity from a laboratory perspective up to the international scale and strategies to prevent potential health and environmental hazards posed by deliberate misuse of synthetic biology without stifling innovation. The book brings together the expertise of top scholars in synthetic biology and biotechnology risk assessment, management, and communication to discuss potential biosecurity governing strategies and offer perspectives for collaboration in oversight and future regulatory guidance.

The International Society for Systems Biology (ISSB) is a society aimed at advancing world-wide systems biology research by providing a forum for scientific discussions and various academic services. The ISSB helps coordinate researchers to form alliances for meeting the unique needs of multidisciplinary and international systems biology research. The annual International Conference on Systems Biology (ICSB) serves as the main meeting for the society and is one of the largest academic and commercial gatherings under the broad heading of 'Systems Biology'.

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