Agriculture: A Very Short Introduction
Paul Brassley and Richard Soffe

Agriculture: A Very Short Introduction explains what farmers do and why they do it. Beginning with the most basic resource, the soil, it shows why it is important, and how farmers can increase its productivity, before turning to the plants and animals that grow on it, and tracing the connections between their biology and the various ways in which farmers work with them. It concludes by looking at some of the controversial issues facing contemporary agriculture: its sustainability; its impact on wildlife and landscape; issues of animal welfare; and the effect of climate change and the development of genetically modified organisms on farmers.

Algebra: A Very Short Introduction
Peter M. Higgins

Algebra marked the beginning of modern mathematics, moving it beyond arithmetic, which involves calculations featuring given numbers, to problems in which some quantities are unknown. Now, it stands as a pillar of mathematics, underpinning the quantitative sciences. Algebra: A Very Short Introduction explains algebra from scratch. Over the course of ten chapters, it offers a step by step approach for readers keen on developing their understanding of algebra. Using theory and example, it renews the reader’s acquaintance with school mathematics, before taking them progressively further and deeper into modern algebra, including groups, rings, fields, and vector spaces.

Animal Behaviour: A Very Short Introduction
Tristram D. Wyatt

Animal Behaviour: A Very Short Introduction
How animals behave is crucial to their survival and reproduction. Animal Behaviour: A Very Short Introduction discusses how animal behaviour has evolved, how behaviours develop in each individual (considering the interplay of genes, epigenetics, and experience), how we can understand animal societies, and how we can explain collective behaviour such as swirling flocks of starlings. The application of new molecular tools, such as DNA fingerprinting and genomics, and developments in computing and image analysis are causing a revolution in the study of animal behaviour. Combining these methods with field studies, it looks at mammals, butterflies, honeybees, fish, and birds, analysing what drives behaviour, and exploring instinct, learning, and culture.

The Animal Kingdom: A Very Short Introduction
Peter Holland

The Animal Kingdom: A Very Short Introduction presents a modern tour of the animal kingdom. Beginning with the definition of animals, this VSI goes on to show the high-level groupings of animals (phyla) and new views on their evolutionary relationships based on molecular data, together with an overview of the biology of each group of animals. This phylogenetic view is central to zoology today. The animal world is immensely diverse, and our understanding of it has been greatly enhanced by analysis of DNA and the study of evolution and development.

The Antarctic: A Very Short Introduction
Klaus Dodds

Antarctic: A Very Short Introduction provides a modern account of Antarctica, highlighting the main issues facing the continent today, looks at how the Antarctic has been explored and represented, and considers the main exploratory and scientific achievements of the region. How has globalization impacted on the Antarctic's current and future status? The Antarctic is one the most hostile natural environments in the world. It is an extraordinary physical space, which changes significantly in shape and size with the passing of the seasons. Politically, it is interesting as it contains one of the few areas of continental space not claimed by any nation-state. Scientifically, the continental ice sheet has provided us with vital evidence about the Earth's past climate.

Anthropocene: A Very Short Introduction
Erle C. Ellis
Humanity’s impact on the planet has been profound. From fire, intensive hunting, and agriculture, it has accelerated into rapid climate change, widespread pollution, plastic accumulation, species invasions, and the mass extinction of species—changes that have left a permanent mark in the geological record of the rocks. Yet the proposal for a new unit of geological time—the Anthropocene Epoch—has raised debate far beyond the scientific community. The Anthropocene has emerged as a powerful new narrative of the relationship between humans and nature. Anthropocene: A Very Short Introduction draws on the work of geologists, geographers, environmental scientists, archaeologists, and humanities scholars to explain the science and wider implications of the Anthropocene.

Anxiety: A Very Short Introduction
Daniel Freeman and Jason Freeman

Anxiety: A Very Short Introduction explains what anxiety is, why it is a normal and vital part of our emotional life, and the factors that cause it. Are we born with fears or do we learn them? What purpose does anxiety serve? How can we treat anxiety disorders? What's happening in our brain when we feel fear? Insights are drawn from psychology, neuroscience, genetics, epidemiology, and clinical trials. The six main anxiety disorders are: phobias; panic disorder and agoraphobia; social anxiety; generalized anxiety disorder; obsessive-compulsive disorder; and post-traumatic stress disorder. The symptoms, prevalence, causes of each of these disorders, and the treatments for dealing with them, are covered.

Applied Mathematics: A Very Short Introduction
Alain Goriely

Mathematics is playing an increasingly important role in society and the sciences, enhancing our ability to use models and handle data. Applied Mathematics: A Very Short Introduction introduces the field of applied mathematics and explores its relationships with pure mathematics, science, and engineering. Explaining the nature of applied mathematics, it discusses its early achievements in physics and engineering, and its development as a separate field after World War II. Using historical examples, current applications, and challenges, this VSI illustrates the particular role that mathematics plays in the modern sciences today and its far-reaching potential.
The applications of Artificial Intelligence lie all around us and affect all aspects of our lives. The results of Artificial Intelligence have been invaluable to biologists, psychologists, and linguists in helping to understand the processes of memory, learning, and language from a fresh angle. As a concept, Artificial Intelligence has fuelled and sharpened the philosophical debates concerning the nature of the mind, intelligence, and the uniqueness of human beings. Artificial Intelligence: A Very Short Introduction considers the history of Artificial Intelligence, its successes, its limitations, and its future goals. It also reviews the philosophical and technological challenges raised by Artificial Intelligence, considering whether programs could ever be really intelligent, creative, or even conscious.

**Astrobiology: A Very Short Introduction**

David C. Catling

What fascinates people about astrobiology is that it seeks answers to long-standing unsolved questions: How quickly did life evolve on Earth and why did life persist here? Is there life elsewhere in the Solar System or beyond? Astrobiology: A Very Short Introduction explores some of the big unanswered questions about the universe, considers the origins of life on Earth and its evolution, and brings together the ideas of microbiologists, astronomers, planetary scientists, and geologists. It introduces the origins of astrobiology and demonstrates its impact on current astronomical research and potential future discoveries.

**Astrophysics: A Very Short Introduction**

James Binney

Astrophysics is the physics of the stars and, more widely, the Universe. It explores the structure and evolution of planetary systems, stars, galaxies, interstellar gas, and the cosmos as a whole. The field has expanded rapidly in the past century, with vast quantities of data gathered by telescopes exploiting the full electromagnetic spectrum, combined with the rapid advance of computing power, allowing increasingly effective mathematical modelling. Astrophysics: A Very Short Introduction illustrates how the application of fundamental principles of physics—the consideration of energy and mass, and momentum—along with
relativity and quantum mechanics, has provided insights into phenomena ranging from supernovae and accretion discs to pulsars and spiral galaxies.

The Atmosphere: A Very Short Introduction
Paul I. Palmer

The atmosphere is the thin, diffuse fluid that envelops the Earth’s surface. Despite its apparent fragility, the existence of this fluid is vital for human and other life on Earth. The Atmosphere: A Very Short Introduction describes the physical and chemical characteristics of different layers in the atmosphere, and shows how the atmosphere’s interactions with land, ocean, and ice affect these properties. It also looks at how movement in the atmosphere, driven by heat from the Sun, transports heat from lower latitudes to higher latitudes. Finally, it presents an overview of the types of measurements used to understand different parts of the atmosphere, and identifies future challenges in the light of climate change.

Autism: A Very Short Introduction
Uta Frith

Autism: A Very Short Introduction asks: What causes autism? Is it a genetic disorder, or due to some unknown environmental hazard? Are we facing an autism epidemic? What are the main symptoms, and how does it relate to Asperger syndrome? It explores the relevance to autism of neuroscience, psychology, brain development, and genetics. Everyone has heard of autism, but the disorder itself is little understood. It has captured the public imagination through films and novels portraying individuals with baffling combinations of disability and extraordinary talent, and yet the reality is more often that it places a heavy burden on sufferers and their families.

Bacteria: A Very Short Introduction
Sebastian G.B. Amyes

Bacteria form a fundamental branch of life. They are the oldest forms of life as we know it, and they are still the most prolific living organisms. Bacteria: A Very Short Introduction explores the nature of bacteria, their origin and evolution, bacteria in the environment, and bacteria and disease. Bacteria inhabit every part of the Earth's surface, its ocean depths, and
even terrains such as boiling hot springs. They are most familiar as agents of disease, but benign bacteria are critical to the recycling of elements and all ecology, as well as to human health. The resistance of bacteria to antibiotics is also considered.

**Big Data: A Very Short Introduction**
Dawn E. Holmes

Since long before computers were even thought of, data has been collected and organized by diverse cultures across the world. Once access to the Internet became a reality for large swaths of the world’s population, the amount of data generated each day became huge, and continues to grow exponentially. It includes all our uploaded documents, videos, and photos; all our social media traffic; our online shopping; even the GPS data from our cars. Big Data: A Very Short Introduction explains how big data works and is changing the world around us, the effect it has on our everyday lives and in the business world, and it considers the attendant security risks.

**Biometrics: A Very Short Introduction**
Michael Fairhurst

Biometrics is the scientific discipline of identifying individuals by means of the measurement of unique personal attributes, such as facial appearance, fingerprints, iris patterning, the voice, the way we write, and the way we walk. The new technologies of biometrics have a wide range of practical applications, from securing mobile phones and laptops to establishing identity in bank transactions, travel documents, and national identity cards. Biometrics: A Very Short Introduction considers the capabilities of biometrics-based identity checking and looks at the basic techniques in use today, developments in system design, and emerging technologies. It also explores the benefits and limitations of biometrics technologies, and how they can effectively support our increasingly interconnected society.

**Black Holes: A Very Short Introduction**
Katherine Blundell

Black holes are a constant source of fascination to many due to their mysterious nature. Black Holes: A Very Short Introduction addresses a variety of questions, including what a
black hole actually is, how they are characterized and discovered, and what would happen if you came too close to one. It explains how black holes form and grow—by stealing material that belongs to stars—as well as how many there may be in the Universe. It also explores the large black holes found in the centres of galaxies, and how black holes power quasars and lie behind other spectacular phenomena in the cosmos.

The Brain: A Very Short Introduction
Michael O'Shea

How does the brain work? The Brain, A Very Short Introduction provides a non-technical introduction to the main issues and findings in current brain research, and gives a sense of how neuroscience addresses questions about the relationship between the brain and the mind. Our knowledge of subjects such as brain processes, perception, memory, motor control and the causes of ‘altered mental states’ have been hugely improved by modern neurological research. These insights may pave the way for future developments, such as artificial intelligence, gene therapy, drugs by design, as well as revolutionizing transplants.

The Cell: A Very Short Introduction
Terence Allen and Graham Cowling

The Cell: A Very Short Introduction describes the nature of cells — their basic structure, their varying forms, their division, their differentiation from initially highly flexible stem cells, their signalling, and programmed death. Cells are the basic constituent of life, and understanding cells and how they work is central to all biology and medicine. A cell is the simplest unit of a self-contained living organism, and the vast majority of life on Earth consists of single-celled microbes, mostly bacteria. These consist of a simple ‘prokaryotic’ cell, with no nucleus. The bodies of more complex plants and animals consist of billions of ‘eukaryotic’ cells, of varying kinds, adapted to fill different roles.

Chaos: A Very Short Introduction
Leonard Smith

Chaos: A Very Short Introduction shows that we all have an intuitive understanding of chaotic systems. It uses accessible maths and physics (replacing complex equations with simple examples like pendulums, railway lines, and tossing coins) to explain the theory,
and points to numerous examples in philosophy and literature (Edgar Allen Poe, Chang-Tzu, and Arthur Conan Doyle) that illuminate the problems. The beauty of fractal patterns and their relation to chaos, as well as the history of chaos, and its uses in the real world and implications for the philosophy of science are all discussed in this Very Short Introduction.