This book provides readers with a design approach to the automatic flight control systems (AFCS). The AFCS is the primary on-board tool for long flight operations, and is the foundation for the airspace modernization initiatives. In this text, AFCS and autopilot are employed interchangeably. It presents fundamentals of AFCS/autopilot, including primary subsystems, dynamic modeling, AFCS categories/functions/modes, servos/actuators, measurement devices, requirements, functional block diagrams, design techniques, and control laws. The book consists of six chapters. The first two chapters cover the fundamentals of AFCS and closed-loop control systems in manned and unmanned aircraft. The last four chapters present features of Attitude control systems (Hold functions), Flight path control systems (Navigation functions), Stability augmentation systems, and Command augmentation systems, respectively.

The new European Joint Aviation Requirements (JARs) lay down rules governing the minimum levels of performance which must be attained by every type of public transport aeroplane. These rules cover matters such as weight, altitude and temperature, take-off and landing distance, cruise flight level and speed, and descent angle and rate. The subject of aircraft performance forms an important part of all JAR Flight Crew Licensing examinations for commercial and airline transport pilot licences, and this book provides a clear but authoritative text on a difficult topic. It will also be of interest to commercial pilots needing to upgrade their annual ground test to JAR standards, and to flight planners, operations controllers and airport operators.

The behaviour of helicopters and tiltrotor aircraft is so complex that understanding the physical mechanisms at work in trim, stability and response, and thus the prediction of Flying Qualities, requires a framework of analytical and numerical modelling and simulation. Good Flying Qualities are vital for ensuring that mission performance is achievable with safety and, in the first and second editions of Helicopter Flight Dynamics, a comprehensive treatment of design criteria was presented, relating to both normal and degraded Flying Qualities. Fully embracing the consequences of Degraded Flying Qualities during the design phase will contribute positively to safety. In this third edition, two new Chapters are included. Chapter 9 takes the reader on a journey from the origins of the story of Flying Qualities, tracing key contributions to the developing maturity and to the current position. Chapter 10 provides a comprehensive treatment of the Flight Dynamics of tiltrotor aircraft; informed by research activities and the limited data on operational aircraft. Many of the unique behavioural characteristics of tiltrotors are revealed for the first time in this book. The accurate prediction and assessment of Flying Qualities draws on the modelling and simulation discipline on the one hand and testing practice on the other. Checking predictions in flight requires clearly defined mission tasks, derived from realistic performance requirements. High fidelity simulations also form the basis for the design of stability and control augmentation systems, essential for conferring Level 1 Flying Qualities. The integrated description of flight dynamic modelling, simulation and flying qualities of rotorcraft forms the subject of this book, which will be of interest to engineers practising and honing their skills in research laboratories, academia and manufacturing industries, test pilots and flight test engineers, and as a reference for graduate and postgraduate students in aerospace engineering.

Space agencies are now realizing that much of what has previously been achieved using hugely complex and costly single platform projects—large unmanned and
into two categories: those that are straightforward management decision making texts that do not delve into more sophisticated techniques and concepts and also analyzes decision making and risk management processes to better understand and improve decision making systems. Most books on decision analysis fall division undergraduate and beginning graduate levels. This book details decision analysis techniques with applications in engineering design and management and problems for readers to practice. Design of Unmanned Aerial Systems is an excellent text for courses in the design of unmanned aerial vehicles at both the upper techniques/processes such that the designer has freedom and flexibility to satisfy the design requirements in several ways. Features many end-of-chapter numerous UAV figures/images to emphasize the application of the concepts. Describes real stories that stress the significance of safety in UAV design. Offers autopilots. Provides design steps and procedures for each major component. Includes design challenges, flight software, microcontroller, and design examples. In addition, the book places major emphasis on the automatic flight control systems and control systems, guidance systems, navigation systems, and launch and recovery systems. Students will also learn about payloads, manufacturing considerations, design, detail design, and design procedures. It provides them with in-depth knowledge of ground stations, power systems, propulsion systems, automatic flight science concepts to their design. Design of Unmanned Aerial Systems covers the design of UAVs in three sections—vehicle design, autopilot design, and ground.
The book discusses the multiple systems that make commercial jet travel safe and convenient. The author starts by tracing the evolution of commercial aviation, explaining the importance of understanding the individual technologies involved in a UAS. This book is a useful overview for practicing engineers, researchers, managers, and consultants interested in UAV technology. As well as being a primary text for an introductory course on UAS, it provides a comprehensive introduction to all of the elements of a complete Unmanned Aircraft System (UAS). It addresses the air vehicle, propulsion, flight controls, navigation, communication, mission planning and control, several types of mission payloads, data links and how they interact with mission performance, and launch and recovery concepts. This book is written both for newcomers to the subject and for experienced members of the UAV community who desire a comprehensive overview at the system level.

Key features of this book include:

- Comprehensive overview of all elements of a UAS and of how they interact.
- Introduction to UAV terminology and concepts.
- Practical discussion of issues informed by lessons learned in UAV programs.
- Emphasis on system-integration and the importance of understanding the interactions between different parts of the system.
- Guidance on how to design and operate aircraft to meet performance specifications.
- Accessibility to advanced topics, allowing readers to gain a thorough understanding of the performance issues involved in operating an aircraft.

The book provides enough information to encourage a student to learn more; to provide a specialist with a basic appreciation of the technical issues that drive other specializations; and to provide an overview for those who already have a high level of expertise in the field. It also serves as a reference for design engineers in both military and industrial sectors who want a set of clear and reliable methods to calculate and optimize aircraft performance.
application for flight data have been illustrated from several aspects, such as data filtering, data extension, feature optimization, similarity search, trend monitoring, methods, and implementation techniques. As mass flight data possesses the typical characteristics of time series, the time series analysis methods and their solutions manual to sample questions on the book's companion website. Companion website - solved design examples at component level • Includes fundamental explanations for aeronautical engineering students and practicing engineers • Features a comprehensive and flexible content that can be selected as appropriate for different courses and formats, including undergraduate, graduate, and executive operations management and shows the interesting, realistic and practical applications to service and manufacturing operations. Stevenson offers both...
Aircraft performance analysis is crucial for engineers and designers in the initial concepts to final detail design of landing gear. This book, by Mohammad Sadraey, is essential for understanding landing gear technology and design. It is the only comprehensive text covering military and commercial aircraft landing gear design. This book is valuable for aircraft designers, practicing engineers, pilots, and companies in the aviation industry. It includes topics such as max speed, absolute ceiling, rate of climb, and maximum range for both jet and prop-driven aircraft, making it relevant for people interested in heavier-than-aircraft. It is a guide for flight performance analysis and rocket propulsion design. The second edition includes expanded coverage of classical control theory, autopilot designs, and modern control theory. It covers the operation of aircraft, the measurement of performance, and the certification of flight stability and control. The book is designed for undergraduate and graduate students and includes topics such as electrical propulsion. It also discusses environmental performance and carbon emissions. The book is intended to be accessible to students, researchers, and professionals interested in evolutionary algorithms at a graduate level. A companion website is available for the book.
Although the overall appearance of modern airliners has not changed a lot since the introduction of jetliners in the 1950s, their safety, efficiency and environmental friendliness have improved considerably. Main contributors to this have been gas turbine engine technology, advanced materials, computational aerodynamics, advanced structural analysis and on-board systems. Since aircraft design became a highly multidisciplinary activity, the development of multidisciplinary optimization (MDO) has become a popular new discipline. Despite this, the application of MDO during the conceptual design phase is not yet widespread. Advanced Aircraft Design: Conceptual Design, Analysis and Optimization of Subsonic Civil Airplanes presents a quasi-analytical optimization approach based on a concise set of sizing equations. Objectives are aerodynamic efficiency, mission fuel, empty weight and maximum takeoff weight. Independent design variables studied include design cruise altitude, wing area and span and thrust or power loading. Principal features of integrated concepts such as the blended wing and body and highly non-planar wings are also covered. The quasi-analytical approach enables designers to compare the results of high-fidelity MDO optimization with lower-fidelity methods which need far less computational effort. Another advantage to this approach is that it can provide answers to "what if" questions rapidly and with little computational cost. Key features: Presents a new fundamental vision on conceptual airplane design optimization Provides an overview of advanced technologies for propulsion and reducing aerodynamic drag Offers insight into the derivation of design sensitivity information Emphasizes design based on first principles Considers pros and cons of innovative configurations Reconsiders optimum cruise performance at transonic Mach numbers Advanced Aircraft Design: Conceptual Design, Analysis and Optimization of Subsonic Civil Airplanes advances understanding of the initial optimization of civil airplanes and is a must-have reference for aerospace engineering students, applied researchers, aircraft design engineers and analysts.

This book provides fundamental principles, design procedures, and design tools for unmanned aerial vehicles (UAVs) with three sections focusing on vehicle design, autopilot design, and ground system design. The design of manned aircraft and the design of UAVs have some similarities and some differences. They include the design process, constraints (e.g., g-load, pressurization), and UAV main components (autopilot, ground station, communication, sensors, and payload). A UAV designer must be aware of the latest UAV developments; current technologies; know lessons learned from past failures; and they should appreciate the breadth of UAV design options. The contribution of unmanned aircraft continues to expand every day and over 20 countries are developing and employing UAVs for both military and scientific purposes. A UAV system is much more than a reusable air vehicle or vehicles. UAVs are air vehicles, they fly like airplanes and operate in an airplane environment. They are designed like air vehicles; they have to meet flight critical air vehicle requirements. A designer needs to know how to integrate complex, multi-disciplinary systems, and to understand the environment, the requirements and the design challenges and this book is an excellent overview of the fundamentals from an engineering perspective. This book is meant to meet the needs of newcomers into the world of UAVs. The materials are intended to provide enough information in each area and illustrate how they all play together to support the design of a complete UAV. Therefore, this book can be used both as a reference for engineers entering the field or as a supplementary text for a UAV design course to provide system-level context for each specialized topic.

This detailed book describes a procedure for the design and analysis of subsonic airfoils. Contains 116 new airfoils for a wide range of Reynolds numbers and application requirements, including the input data for the computer code.