Analysis, Synthesis, and Design of Chemical Processes, , Pearson Prentice Hall Computin, 2012, 0132940299, 9780132940290, . The leading integrated chemical process design guide: Now with extensive new coverage and more process designs More than ever, effective design is the focal point of sound chemical engineering. Analysis, Synthesis, and Design of Chemical Processes, Fourth Edition, presents design as a creative process that integrates both the big picture and the small details and knows which to stress when, and why. Realistic from start to finish, this updated edition moves readers beyond classroom exercises into open-ended, real-world process problem solving. The authors introduce integrated techniques for every facet of the discipline, from finance to operations, new plant design to existing process optimization. This fourth edition adds new chapters introducing dynamic process simulation; advanced concepts in steady-state simulation; extensive coverage of thermodynamics packages for modeling processes containing electrolyte solutions and solids; and a concise introduction to logic control. "What You Have Learned" summaries have been added to each chapter, and the text's organization has been refined for greater clarity. Coverage IncludesConceptualization and analysis: flow diagrams, batch processing, tracing, process conditions, and product design strategies Economic analysis: capital and manufacturing costs, financial calculations, and profitability analysis Synthesis and optimization: principles, PFD synthesis, simulation techniques, top-down and bottom-up optimization, pinch technology, and software-based control Advanced steady-state simulation: goals, models, solution strategies, and sensitivity and optimization studies Dynamic simulation: goals, development, solution methods, algorithms, and solvers Performance analysis: I/O models, performance curves, reactor performance, troubleshooting, and "debottlenecking" Societal impact: ethics, professionalism, health, safety, environmental issues, and green engineering Interpersonal and communication skills: improving teamwork and group effectiveness This title draws on more than fifty years of innovative chemical engineering instruction at West Virginia University and the University of Nevada, Reno. It includes suggested curricula for single-semester and year-long design courses, case studies and practical design projects, current equipment cost data, and extensive preliminary design information that can be used as the starting point for more detailed analyses. About the CD-Rom and Web SiteThe CD contains the newest version of CAPCOST, a powerful tool for evaluating fixed capital investment, full process economics, and profitability. The heat exchanger network software, HENSAD, is also included. The CD also contains an additional appendix presenting preliminary design information for fifteen key chemical processes, including four new to this edition: shift reaction; acid-gas removal via physical solvent; H2S removal from a gas stream using the Claus process; and coal gasification. The CD also includes six additional projects, plus chapters on outcomes assessment, written and oral communications, and a written report case study. Sixty additional projects and twenty-four more problems are available at www.che.cemr.wvu.edu/publications/projects..

Industrial Organic Chemistry , Klaus Weissermel, Hans-Jörgen Arpe, 2003, Science, 491 pages. This best-selling standard, now in its fourth, completely revised English edition, is an excellent source of technological and economic information on the most important ....
Time dependent chemical processes with special reference to their simulation and optimisation, Eric Robert Robinson, Jan 1, 1975, 370 pages.

Elementary principles of chemical processes, Richard M. Felder, Ronald W. Rousseau, 2000, Technology & Engineering, 675 pages. This best-selling book prepares readers to formulate and solve material and energy balances in chemical process systems. It provides a realistic, informative, and positive.

Chemical process synthesis and engineering design, Anil Kumar, 1982, Technology & Engineering, 471 pages.


Conceptual design of chemical processes, James Merrill Douglas, 1988, Technology & Engineering, 601 pages. This text explains the concepts behind process design. It uses a case study approach, guiding readers through realistic design problems, and referring back to these cases.


Plant Design and Economics for Chemical Engineers, Max Peters, Klaus Timmerhaus, Ronald West, 2003, Technology & Engineering, 988 pages. This new edition contains chapters on process synthesis, computer-aided design and design of chemical reactors. The economic analysis has been updated. Numerous real examples.


Process design and engineering practice, Donald R. Woods, 1995, 448 pages. Offering practical methods and data, this comprehensive guide to process and plant design is based on rules and practices of industry, not theory. It describes the factors and.


Chemical process design, Robin Smith, 1995, Technology & Engineering, 459 pages. This book is intended to provide a practical guide to chemical process design fo advanced undergraduate and postgraduate students of chemical engineering, practicing process.

Process technology and flowsheets, Volume 1, Vincent Cavaseno, 1979, Technology & Engineering, 369 pages.
Introduction to chemical processes principles, analysis, synthesis, Regina M. Murphy, 2007, Technology & Engineering, 684 pages. Introduction to Chemical Processes: Principles, Analysis, Synthesis enhances student understanding of the connection between the chemistry and the process. Users will find ....


More than ever, effective design is the focal point of sound chemical engineering. Analysis, Synthesis, and Design of Chemical Processes, Third Edition, presents design as a creative process that integrates both the big picture and the small details; and knows which to stress when, and why. Realistic from start to finish, this book moves readers beyond classroom exercises into open-ended, real-world process problem solving. The authors introduce integrated techniques for every facet of the discipline, from finance to operations, new plant design to existing process optimization.

This fully updated Third Edition presents entirely new problems at the end of every chapter. It also adds extensive coverage of batch process design, including realistic examples of equipment sizing for batch sequencing; batch scheduling for multi-product plants; improving production via intermediate storage and parallel equipment; and new optimization techniques specifically for batch processes.

Analysis, Synthesis, and Design of Chemical Processes, Third Edition, draws on nearly 35 years of innovative chemical engineering instruction at West Virginia University. It includes suggested curricula for both single-semester and year-long design courses; case studies and design projects with practical applications; and appendixes with current equipment cost data and preliminary design information for eleven chemical processes; including seven brand new to this edition.

The CD-ROM contains the latest version of CAPCOST, a powerful tool for evaluating fixed capital investment, full process economics, and profitability; now expanded with cost data for conveyors, crystallizers, dryers, dust collectors, filters, mixers, reactors, and screens. It also contains the HENSAD tool for constructing temperature interval, cascade, and temperature enthalpy diagrams; estimating optimal approach temperatures; and designing heat exchanger networks. Also provided: additional chapters on outcomes assessment, written and oral communications, and a written report case study, as well as six complete student design projects.

This book represents the culmination of many years of teaching experience in the design program at West Virginia University. Although this program has evolved over more than thirty years and is still evolving, it is fair to say that the current program has gelled over the last ten years through the concerted effort of the authors to integrate design throughout the undergraduate curriculum in chemical engineering. We view design as the focal point of chemical engineering practice. Far more than the development of a set of specifications for a new chemical plant, design is that creative activity through which engineers continuously improve the operation of facilities to create products that enhance the quality of life. Whether developing the grass roots plant, proposing and guiding process modifications, or troubleshooting and implementing operational strategies for existing equipment, engineering design requires a broad spectrum of knowledge and intellectual skills to be able to analyze the big picture and the minute details and, most importantly, to know when to concentrate on each.

Our vehicle for helping students develop and hone their design skills is process design rather than plant design, covering synthesis of the entire chemical process through topics relating to the preliminary sizing of equipment, flowsheet optimization, economic evaluation of projects, and the operation of chemical processes. The purpose of this text is to assist chemical engineering students in making the transition from solving well-posed problems in a specific subject to integrating all the knowledge that they have gained in their undergraduate education and applying it to solving
open-ended process problems. Many of the nuts and bolts issues regarding plant design (for example, what schedule pipe to use for a given stream or what corrosion allowance to use for a vessel in a certain service) are not covered. Although such issues are clearly important to the practicing engineer, several excellent handbooks and textbooks are available to address such problems, and these are cited in the text where they apply.

As a result of our integrated approach to design, we have divided this book into six sections. Section 0, the first chapter in the book, covers the principal diagrams used by chemical engineers. In particular, details of the most important diagram for the analysis of chemical processes are given, namely the Process Flow Diagram (PFD). Section 1 covers the engineering economic aspects of a process, including the material needed for the Fundamentals of Engineering (FE or EIT) exam required as the first step toward professional registration.

Section 3 focuses on the performance of existing processes and equipment. This material is substantially different from that found in most textbooks. We consider equipment that is already built and operating and show how to analyze, evaluate, and modify the performance of the system, including process troubleshooting to determine the cause of a process upset.

Section 5 addresses the role of the professional engineer in society. Separate chapters on ethics and professionalism; health, safety, and the environment; and oral and written communication cover topics crucial to an engineer's success but sometimes overlooked in design courses. An entire chapter is devoted to addressing some of the common mistakes that students make in written reports.

Finally, three appendices are included. Appendix A gives a series of cost charts for equipment. This cost information is also included in the CAPCOST© program for evaluating fixed capital investment introduced in Chapter 2. Appendix B gives the preliminary design information for four chemical processes: dimethyl ether, acrylic acid, acetone, and heptenes production. This information is used in many of the end-of-chapter problems in the book. These processes can also be used as the starting point for more detailed analyses, for example, optimization studies. Appendix C gives six case study problems suitable for individual or group design projects. For a one-term design course, we recommend including the following core:

For programs in which engineering economics is not a prerequisite to the design course, Chapters 2 through 5 should also be included. If students have previously covered engineering economics, Chapter 19 (Optimization) could be substituted. For the second term of a two-term sequence, we recommend Chapters 10 through 14 (and Chapter 19 if not included in the first design course) plus design projects. If time permits, we strongly recommend Chapter 15 (Regulating Process Conditions) and Chapter 16 (Process Troubleshooting), as these tend to solidify as well as to extend the concepts of Chapters 10 through 14. Section 3 (Chapters 10-16) addresses the analysis of existing processes and mirrors the type of work that an entry-level process engineer will encounter in the first few years of employment at a chemical process facility.

The chapters, however, can be covered in many different sequences, depending on the background of the students entering the design course. At West Virginia University, for example, we cover Chapters 1, 10-16, 2-5, 19, 21, and 20 (in that order) because the students have covered the material of Chapters 6-9, 17, 18, much of 19, 22, and 23 in prerequisite courses. The second semester is devoted almost entirely to a large-group design project. In addition, during the two-semester sequence, we give our students a sequence of individual design projects. Some examples of these projects are given in Appendix C. Additional projects are available from the authors. Projects C.1, C.3, and C.5 cover the analysis of existing processes and should not be assigned without some coverage of Section 3. The other projects (C.2, C.4, and C.6) are open-ended design projects for new processes. These can be given as individual or small-group projects (3-4 students).

As design is at its essence a creative, dynamic, challenging, and iterative activity, we welcome feedback on and encourage experimentation with this design textbook. We hope that students and
faculty will find the excitement in teaching and learning engineering design that has sustained us over the years.

Finally, we would like to thank those people who have been instrumental to the successful completion of this book. First, thanks are given to all the undergraduate chemical engineering students at West Virginia University over the years, particularly during the period 1987-1997. Their feedback and criticism have been a constant source of ideas and stimulation. Second, we would like to thank those people who have read, criticized, and used parts of this text in the course of its preparation. In particular, we would like to recognize Dr. Mark Stadtherr of the University of Notre Dame and Dr. Susan Montgomery of the University of Michigan for their helpful criticism and support. Finally, on a personal note we (RT, RCB, and WBW) would like to thank our long suffering wives (Becky, Judy, and Patricia) for their continued support, love, and patience throughout this prolonged endeavor. --This text refers to an out of print or unavailable edition of this title.

Good engineering design is a creative, dynamic, and iterative process. It demands an understanding of the big picture, the minute details, and the skills to balance them. Analysis, Synthesis, and Design of Chemical Processes presents a holistic approach to process design, walking through each step from initial process cost estimation to final process optimization.

The emphasis on solving open-ended problems gives students a taste of real-life engineering in place of artificial classroom exercises. By stressing macro-level analysis, Analysis, Synthesis, and Design of Chemical Processes concentrates on the elements that are common to all engineering projects, rather than specific nuts and bolts issues that change from one application to another.

Analysis, Synthesis, and Design of Chemical Processes grows out of thirty years of experience in engineering design at West Virginia University. The authors include suggestions for using it in both single-semester and year-long courses. Four case studies and six design projects offer practical applications. Extensive reference materials include design heuristics, flow diagrams, and cost equations.

CAPCOST, a Windows-based program for estimating the fixed capital cost of a process, is included with the text. By entering capacity, operating pressure, and materials of construction data for all major process equipment, the total installed cost of a chemical process can be estimated. --This text refers to an out of print or unavailable edition of this title.

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Turton's book provides a good overview of process design and includes both CAPCOST, Turton's estimation program, and more than a dozen chemical unit examples. The book covers flowsheet layout, simulation, estimation of operating and capital costs and profitability analysis (ROI or NPV). It then delves into advanced topics like process optimization, dynamic simulation, process trouble shooting and debottlenecking. A great book for CAPCOST alone.

Richard Turton, P.E., has taught the senior design course at WVU for the past 20 years. Prior to this, he spent 5 years in the design and construction industry. Richard C. Bailie is a professor emeritus at WVU, having taught chemical engineering design for more than 20 years. He also ran his own chemical company. Wallace B. Whiting, P.E., is professor emeritus at the University of Nevada, Reno. Joseph A. Shaeiwitz has been involved in the senior design sequence and his interests include design education and outcomes assessment.