

Housing *and* Interior Design

12th
Edition

Evelyn L. Lewis, Ed.D.

Professor Emerita, Home Economics
Northern Arizona University
Flagstaff, Arizona

Carolyn Turner Smith, Ph.D., CFCS

Professor Emerita, Department of Family and Consumer Sciences
North Carolina Agricultural and Technical State University
Greensboro, North Carolina



Publisher

Goodheart-Willcox Company, Inc.

Tinley Park, Illinois

www.g-w.com

Copyright © 2023
by
The Goodheart-Willcox Company, Inc.

Previously Published as *Housing Decisions* by Evelyn L. Lewis and Carolyn S. Turner.
Previous editions copyright 2018, 2012, 2006, 2004, 2000, 1994, 1990, 1987, 1984, 1980, 1978

All rights reserved. No part of this work may be reproduced, stored, or transmitted
in any form or by any electronic or mechanical means, including information storage
and retrieval systems, without the prior written permission of
The Goodheart-Willcox Company, Inc.

ISBN 978-1-64925-940-0

1 2 3 4 5 6 7 8 9 – 23 – 26 25 24 23 22 21

The Goodheart-Willcox Company, Inc. Brand Disclaimer: Brand names, company names, and illustrations for products and services included in this text are provided for educational purposes only and do not represent or imply endorsement or recommendation by the authors or the publisher.

The Goodheart-Willcox Company, Inc. Safety Notice: The reader is expressly advised to carefully read, understand, and apply all safety precautions and warnings described in this book or that might also be indicated in undertaking the activities and exercises described herein to minimize risk of personal injury or injury to others. Common sense and good judgment should also be exercised and applied to help avoid all potential hazards. The reader should always refer to the appropriate manufacturer's technical information, directions, and recommendations; then proceed with care to follow specific equipment operating instructions. The reader should understand these notices and cautions are not exhaustive.

The publisher makes no warranty or representation whatsoever, either expressed or implied, including but not limited to equipment, procedures, and applications described or referred to herein, their quality, performance, merchantability, or fitness for a particular purpose. The publisher assumes no responsibility for any changes, errors, or omissions in this book. The publisher specifically disclaims any liability whatsoever, including any direct, indirect, incidental, consequential, special, or exemplary damages resulting, in whole or in part, from the reader's use or reliance upon the information, instructions, procedures, warnings, cautions, applications, or other matter contained in this book. The publisher assumes no responsibility for the activities of the reader.

The Goodheart-Willcox Company, Inc. Internet Disclaimer: The internet resources and listings in this Goodheart-Willcox Publisher product are provided solely as a convenience to you. These resources and listings were reviewed at the time of publication to provide you with accurate, safe, and appropriate information. Goodheart-Willcox Publisher has no control over the referenced websites and, due to the dynamic nature of the internet, is not responsible or liable for the content, products, or performance of links to other websites or resources. Goodheart-Willcox Publisher makes no representation, either expressed or implied, regarding the content of these websites, and such references do not constitute an endorsement or recommendation of the information or content presented. It is your responsibility to take all protective measures to guard against inappropriate content, viruses, or other destructive elements.

Image Credits. Front cover: zhu difeng/Shutterstock.com. Back cover: zhu difeng/Shutterstock.com.

About the Authors

Dr. Evelyn L. Lewis, Professor Emerita, taught 37 years in primary, secondary, and higher education. She developed curricula for the Arizona Department of Education and prepared training programs for Coconino County career education. Lewis also served Flagstaff's Habitat for Humanity as a volunteer.

Dr. Carolyn Turner Smith is Professor Emerita, Department of Family and Consumer Sciences, North Carolina Agricultural and Technical State University, Greensboro. She also served as an Adjunct Professor in Interior Design at High Point University, High Point, North Carolina, where she taught a global issues course in international housing. Dr. Smith has taught housing and resource management at the college level, particularly for preparing students to teach courses in high school housing and interior design. Also, she has conducted research on housing for populations with special needs, residential energy efficiency, and renewable energy applications. Smith served on the board of directors as a national officer for the American Association of Family and Consumer Sciences (AAFCS). She is past president of the North Carolina Association of Family and Consumer Sciences and the national Housing Education and Research Association. Dr. Smith has served on the State Energy Advisory Board for the U. S. Department of Energy and on the Executive Advisory Board for the U. S. Department of Homeland Security. She serves on housing boards at the local, state, and national levels.

Acknowledgments

Goodheart-Willcox Publisher and the authors would like to thank the following professionals who reviewed selected chapters and provided valuable input into the development of this textbook program.

Contributing Writers

Jennifer Blanchard Belk,
MAE, LEED AP, IIDA
NCIDQ Certified Designer at Belk Construction
Management Group
Director and Programming Coordinator
at LOOM Coworking
Fort Mill, South Carolina

Judith Brinkley-Berry, ASID
Judith Brinkley-Berry Interior Design
Hilton Head Island, South Carolina

Madge Megliola, ASID
Megliola Beal Interior Design
Greensboro, North Carolina

Instructor Reviewers

Denise Bourdeau
Family and Consumer Sciences Teacher
North Colonie Central School District
Shaker High School
Latham, New York

Anne Emery
Family and Consumer Sciences Teacher
Crab Orchard High School
Marion, Illinois

Leah Bratcher
FCS/CTE High School Teacher
Marina High School
Huntington Beach, California

Barbara Grenga
Family and Consumer Sciences Instructor
North Syracuse Central School District
North Syracuse, New York

Christina Davis
Architecture and Design Teacher
Sulphur Springs High School
Sulphur Springs, Texas

Joyce Harrison
Family and Consumer Sciences Instructor
James Bowie High School
Arlington, Texas

Anne Dewalt
Family and Consumer Sciences Educator
Manassas Park High School
Manassas Park, Virginia

Daphne Hedgecock
Vocational Family and Consumer Sciences Instructor
Central Crossing High School
Grove City, Ohio

Jana Din
Interior Design Teacher
Galt High School
Galt, California

Jacqueline Jordan
Family and Consumer Sciences Teacher
Delavan-Darien School District
Delavan, Wisconsin

Kerry Doll
Instructor
Fountain Valley High School
Fountain Valley, California

Amanda K. Lucero
Family and Consumer Sciences Instructor
Sharyland High School
Mission, Texas

Kari McDermott

Family and Consumer Sciences Teacher
Austin High School
Austin, Minnesota

Janel Simmons

Family and Consumer Sciences Teacher
St. Francis High School
St. Francis, Minnesota

Blair Turner

Family and Consumer Sciences Teacher
Naaman Forest High School, Garland ISD
Garland, Texas

Paula L. Wallace

Family and Consumer Sciences/CTE Teacher
Wylie High School
Wylie, Texas

Rhonda Yommer

Family and Consumer Sciences Teacher
York Comprehensive High School
Floyd D. Johnson Technology Center
York, South Carolina

Industry Reviewers

Kathy Andersson

Staging and Interior Design Services
Greensboro, North Carolina

Dr. JoAnn Emmel

Associate Professor Emerita
Virginia Tech
Blacksburg, Virginia

Catherine Cauthen Turner

Realtor/Broker
Cottingham Chalk Haynes
Charlotte, North Carolina

Dr. Jane Walker

Professor, Retired
Department of Family and Consumer Sciences
North Carolina Agricultural and Technical State
University
Greensboro, North Carolina

Steve Windham

Root and Branch Gardens
Landscape Design and Services
Greensboro, North Carolina

Precision Exams by YouScience Certification

Goodheart-Willcox is pleased to partner with YouScience to correlate *Housing and Interior Design* with their Interior Design I (330) and Interior Design II (333) certification standards. Students who pass the exam and performance portion of the exam can earn a Career Skills certification. Precision Exams by YouScience and Career Skills Exams were created in partnership with industry and subject matter experts to align real-world job skills with marketplace demands. Students can showcase their skills and knowledge with industry-recognized certifications—and build outstanding resumes to stand out from the crowd!

For teachers, Precision Exams by YouScience provides:

- Access to a library of Career Skills Exams, including pre- and post-assessments for all 16 National Career Clusters
- Suite of on-demand reporting to measure program and student academic growth
- Easy-to-use, 100% online administration

To see how *Housing and Interior Design* correlates to Precision Exams by YouScience standards, visit the Correlations tab at www.g-w.com/housing-interior-design-2023. For more information about Precision Exams by YouScience, visit www.youscience.com/precision-exams.

I earned a CAREER SKILLS™ Certificate
in INTERIOR DESIGN. You can earn one too!



Ask your instructor how you can earn a
CAREER SKILLS™ Certificate for your résumé.

800.470.1215

PRECISION EXAMS

precisionexams.com

El Nariz/Shutterstock.com

TOOLS FOR STUDENT AND INSTRUCTOR SUCCESS

Student Tools

Student Text

Housing and Interior Design introduces students to foundational principles and skills characteristic to housing and interiors professions. Aimed at high school students and courses, the text addresses both interior and exterior design and introduces students to the phases of the design process. Concepts include the historical, cultural, governmental, and technological factors that influence housing, along with a discussion of various architectural styles, reading floor plans and architectural documents, and space planning. Students learn about the design process, materials and finishes, construction basics, interior systems, and much more. The text emphasizes the knowledge and skills students need for housing and interiors careers through the *Architecture & Construction* and the *Arts, A/V Technology & Communications* career clusters and pathways.



Workbook

The Workbook that accompanies *Housing and Interior Design* includes activities to help students recall, review, and apply concepts introduced in the book.

Online Learning Suite

The Online Learning Suite provides the foundation of instruction and learning for digital and blended classrooms. An easy-to-manage shared classroom subscription makes it a hassle-free solution for both students and instructors. An online student text and workbook, along with rich supplemental content, brings digital learning to the classroom. All instructional materials are found on a convenient online bookshelf and accessible at home, at school, or on the go.

G-W Digital Companion

The G-W Digital Companion is a study reference that contains e-flash cards and vocabulary exercises. It is accessible from any digital device.

Online Learning Suite/Student Text Bundle

Looking for a blended solution? Goodheart-Willcox offers the Online Learning Suite bundled with the printed text in one easy-to-access package. Students have the flexibility to use the printed text, the Online Learning Suite, or a combination of both components to meet their individual learning styles. The convenient packaging makes managing and accessing content easy and efficient.

Instructor Tools

LMS Integration

Integrate Goodheart-Willcox content within your Learning Management System for a seamless user experience for both you and your students. LMS-ready content in Common Cartridge® format facilitates single sign-on integration and gives you control of student enrollment and data. With a Common Cartridge integration, you can access the LMS features and tools you are accustomed to using and G-W course resources in one convenient location—your LMS.

To provide a complete learning package for you and your students, G-W Common Cartridge includes the Online Learning Suite and Online Instructor Resources. When you incorporate G-W content into your courses via Common Cartridge, you have the flexibility to customize and structure the content to meet the educational needs of your students. You may also choose to add your own content to the course.

QTI® question banks are available within the Online Instructor Resources for import into your LMS. These prebuilt assessments help you measure student knowledge and track results in your LMS gradebook. Questions and tests can be customized to meet your assessment needs.



Online Instructor Resources (OIR)

Online Instructor Resources provide all the support needed to make preparation and classroom instruction easier than ever. Available in one accessible location, the OIR includes Instructor Resources, Instructor's Presentations for PowerPoint®, and Assessment Software with Question Banks. The OIR is available as a subscription and can be accessed at school, at home, or on the go.

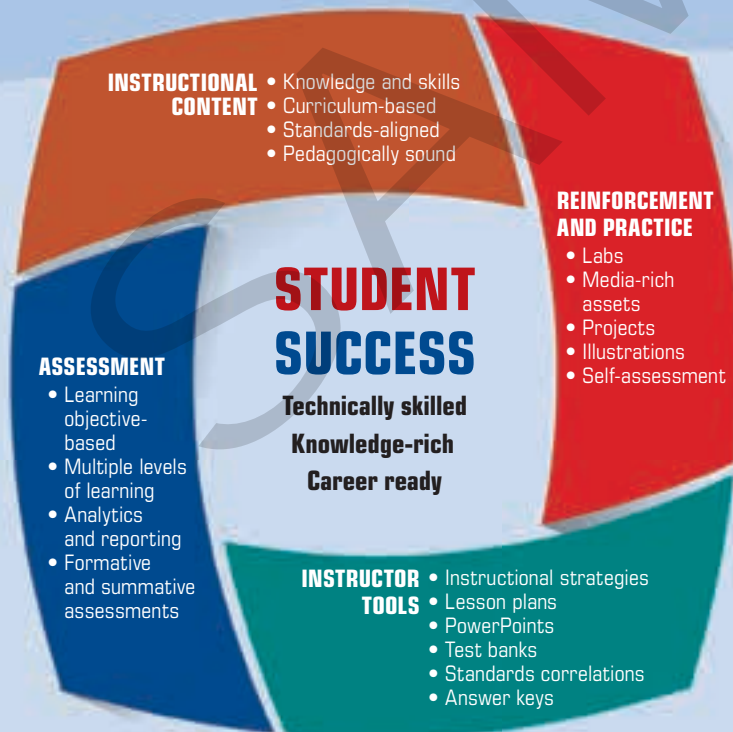
Instructor Resources One resource provides instructors with time-saving preparation tools such as answer keys, editable lesson plans, and other teaching aids.

Instructor's Presentations for PowerPoint® These fully customizable, richly illustrated slides help you teach and visually reinforce the key concepts from each chapter.

Assessment Software with Question Banks Administer and manage assessments to meet your classroom needs. The question banks that accompany this textbook include hundreds of matching, true/false, multiple choice, and short answer questions to assess student knowledge of the content in each chapter. Using the assessment software simplifies the process of creating, managing, administering, and grading tests. You can have the software generate a test for you with randomly selected questions. You may also choose specific questions from the question banks and, if you wish, add your own questions to create customized tests to meet your classroom needs.



G-W Integrated Learning Solution



The G-W Integrated Learning Solution offers easy-to-use resources that help students and instructors achieve success.

- ▶ **EXPERT AUTHORS**
- ▶ **TRUSTED REVIEWERS**
- ▶ **100 YEARS OF EXPERIENCE**

Spotlights Diverse Careers

As you prepare for your future education and a career in the housing and interior design professions, the knowledge and skills you gain from this text will ignite your passion for the path you choose. **Housing and Interior Design** presents an introduction to various careers in the housing and interior design fields, including more than 30 careers in the *Architecture & Construction* and the *Arts, A/V Technology & Communications* career clusters and pathways.

- **Career Focus** features give you a closer look at housing and interior design careers, including needed interests and skills, details about day-to-day job activities, education and training, licensing and necessary examinations, career outlook, and more.

Career Focus Security and Fire Alarm Systems Installers

Do you have an interest in helping people and keeping them safe? Are you a hands-on person who likes to work with systems and tools? Do you have an interest in electricity and electronics? If you have these interests and can imagine yourself in a career in public safety, perhaps a job as a security management specialist or a security and fire alarm systems installer is for you.



Interests/Skills: Security and fire alarm systems installers must have knowledge and skills about equipment, wiring, computer program applications, and ability to monitor such systems and those who design and install them. They must also have excellent communication skills to work with clients and industry professionals and understand their security needs. Effective problem-solving, verbal clarity, and precision are also key skills. They must also understand building and construction and the tools involved in repair or construction of houses and buildings. Installers of security equipment need to think critically and solve complex problems.

Career Snapshot: Security and fire alarm systems installers work with individuals of private homes to estimate installer costs, install equipment, and maintain those systems. They read blueprints to prepare an estimate and effectively demonstrate how the system functions. They may also return to a client to help fix any electrical issues or expand the system as needed. In addition, installers must determine whether certain systems comply with laws, regulations, and standards.

Education/Training: Most positions require a postsecondary certificate, high school diploma or equivalent, or training in career and technical education programs. Security installers of security equipment may also receive on-the-job training with experienced workers or participate in an apprenticeship program.

Licensing/Examinations: Most states require licensing for any firm or individual that installs, monitors, or maintains fire and burglar alarm systems.

Professional Associations: Central Station Alarm Association (CSAA), Electronic Security Association (ESA)

Job Outlook: Jobs in this area are expected to grow 8 percent from 2014 to 2020, much faster than the average for all occupations.

Source: The Occupational Outlook Handbook (OQH), the Occupational Information Network (O*NET)

Career Focus In-House Commercial Designer

Have you ever wondered what goes into building huge facilities like malls, high-rise offices, and hospitals? If so, a career as an in-house interior designer or facilities manager might be for you!



Interests/Skills: Facility design and management requires an appreciation for the balance of beauty and function, often to a very large scale! These professionals must be able to analyze situations, visualize creative solutions to seemingly intricate space planning problems and document those creations for use by a wide variety of stakeholders. Those who have an ability to work under pressure with efficiency, while maintaining an attention to detail, good time management, and organizational skills would be a good fit for the industry. Facilities personnel must be able to communicate and collaborate with large groups of architects, engineers, landscape vendors, department managers, and contractors.

Career Snapshot: Designers who work directly for the public and private clients they serve (rather than independently or for a design firm) are considered in-house or facilities designers. Interior design graduates can serve as in-house facility designers for:

- Large corporation and commercial office developers
- Colleges and universities
- Federal, state, and local government institutions (school systems, military bases)
- Health-care facilities (hospitals, clinics, senior care)
- Hospitality companies (hotel and restaurant chains, conference centers, cruise ships)
- Retail companies (store chains, shopping malls)

Facility designers handle a wide range of projects from auxiliary building designs to the replacement of a single ergonomic office chair. These designers often have the power to impact the furniture, space planning, and finish materials for their company's buildings around the world, which can lead to interesting travel opportunities. Managers may also handle security, property losses, and contracts.

Education/Training: The completion of a bachelor's degree in interior design or architecture is typically sufficient for a designer but a business owner is beneficial to those seeking management positions. Students should seek exposure to a variety of courses including electrical and mechanical systems, accounting, space planning, energy management and property development.

Licensing/Examinations: Due to the inaccessibility and nature of this segment of the industry, facility designers and managers have many choices when it comes to voluntary licensing. In addition to the National Council for Interior Design Qualification (NCIDQ), The National Association of Industrial and Office Properties (NAIOP), a commercial real estate development association, Certified Global and the International Facility Management Association (IFMA) administer certification exams. These certifications ensure companies that a designer is sufficiently trained in dealing with issues particular to large corporations or organizations. Many professionals will also become LEED Accredited Professionals for their particular area of specialization.

Professional Associations: In addition to more general organizations such as The American Society of Interior Designers (ASID) and the International Interior Design Association (IIDA), involvement in The National Association of Industrial and Office Properties (NAIOP), the International Facility Management Association (IFMA), the U.S. Green Building Council (USGBC), Certified Global, and Commercial Real Estate Women (CREW) are beneficial.

Job Outlook: Employment for facilities managers is projected to grow 8 percent from 2014 to 2020, which is faster than average for all occupations. Facility designers may benefit by aligning themselves with high-growth segments such as environments for aging and sustainable projects.

Source: The Occupational Outlook Handbook, the Occupational Information Network (O*NET), International Facility Management Association (IFMA), U.S. Green Building Council (USGBC).

Career Focus Universal Design and Aging-in-Place Specialist

Do you notice when someone with a disability has trouble entering or using it? Do you see improvements you could make to allow everyone equal accommodations? Do you remember ever having to help an aging family member perform tasks in their home? If you do, a career in universal design might be for you!



Interests/Skills: Designers specializing in universal accessible design and modifications should be critical thinkers and creative problem solvers. They should also be empathetic to clients' needs, understanding the difficulty many occupants of an environment may have, and have excellent communication and customer service skills. These designers should be able to see the big picture and see into the future. Being able to identify universal design themes in an environment that might impact not only the elderly and those in wheelchairs but also those who are visually, audibly, or cognitively impaired, children, and those of short or tall stature. Seeing into the future means a designer can anticipate the needs of the changing or aging occupants.

Career Snapshot: All interior designers, architects, builders, and engineers must be well-versed in mandatory accessibility guidelines, especially those relative to commercial interiors. However, the goal ultimately is to not only meet government regulations for access but to also ensure full and equal access to amenities, activities, products, and services for all. A designer specializing in universal design might work as a consultant or within a larger firm evaluating built environments, accessible technologies, and proposed plans for compliance and usability. Those who practice aging-in-place design work specifically with residential projects helping older adults maintain independent living and allowing their families to adapt to their needs as they age. They not only meet with clients but also create plans for construction and renovation and may oversee construction. A designer more interested in the technical aspects might serve as an accessibility compliance officer for a design or large corporation, or a service living community.

Education/Training: The completion of a bachelor's degree in interior design, architecture, or building science is typically sufficient. Someone looking to specialize might also select related coursework in gerontology (the science of aging) and special education or pursue a master's degree.

Licensing/Examinations: All interior design graduates who pass the licensing examination through The National Council for Interior Design Qualification (NCIDQ) are thoroughly prepared to deal with accessible design issues, especially for commercial interiors. For those who want a more concentrated certification in residential design, The Certified Aging-in-Place Specialist (CAPS) designation was developed by the National Association of Home Builders (NAHB) Remodelers' Council, in collaboration with the NAHB Aging Research Center and NAHB Seniors Housing Council.

Professional Associations: The American Society of Interior Designers (ASID), International Interior Design Association (IIDA), National Association of Home Builders (NAHB), International Association of Accessibility Professionals (IAAP).

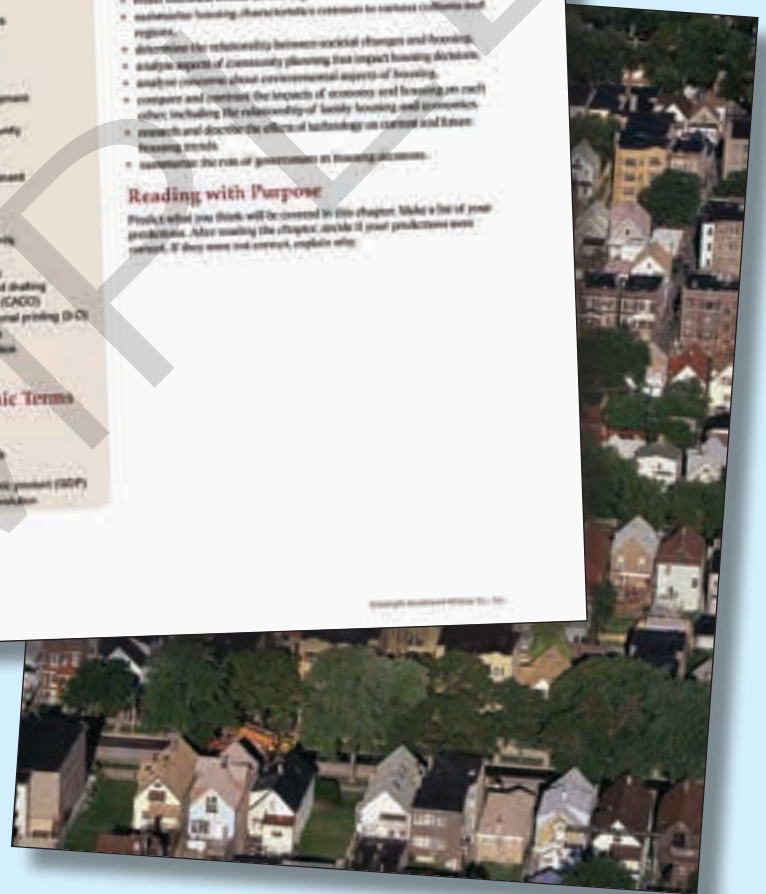
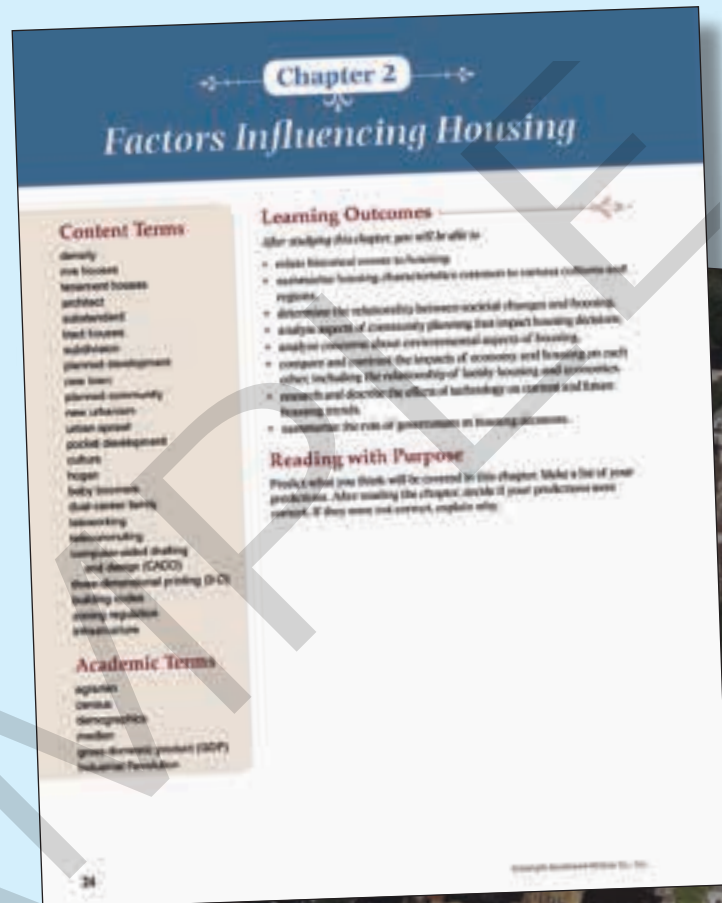
Job Outlook: Research shows that by 2020, approximately 20% of Americans will be over age 65. Aging citizens prefer to live in their own homes instead of moving to assisted living communities. Seniors with considerable income are seeking ways to enhance low-maintenance but functional homes as well as beach or mountain weekend properties. Those who do move to senior communities expect to have flexibility and amenities not available in previous generations. For all of these reasons, design for the aging has a faster than average employment outlook.

Source: The Occupational Outlook Handbook, the Occupational Information Network (O*NET), Americans with Disabilities Act, Age-in-Place National, The Center for Universal Design (CUD).

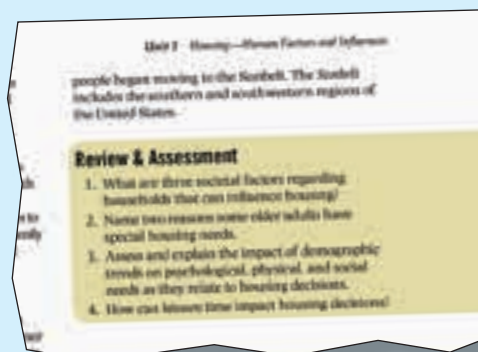
Maximizes Your Preparation

Preparation is key to maximizing your learning. This text is organized to encourage effective preparation for learning chapter content and includes the following content.

- **Learning Outcomes** help guide learning as you read each chapter. The Learning Outcomes align with content headings, Review & Assessment questions, and the Summary and end-of-chapter activities.
- **Reading with Purpose** activities enhance your reading experience and help you dig deeper into chapter content.
- **Content Terms** increase your understanding of content vocabulary and appear in bold type in the text where they are defined. **Academic Terms** help build your everyday vocabulary and appear in bold italic type in the chapters.



- **Review & Assessment** questions at the end of each section help you assess your understanding of text content.



Presents High-Interest Features

Engaging, high-interest features deliver thought-provoking realism to topics in the housing and interior design professions. These features enhance your learning in each chapter.

Sociocultural Connections

Economics: Supply and Demand

The U.S. has an economic system in which businesses are privately owned and operated with limited government regulation. Businesses compete with one another for sales and profits and people generally make their own decisions about what to buy and sell.

In other economic systems, the prices of goods and services, including housing, may be set by the government. In the market economy of the U.S., however, prices are determined by supply and demand.

- Supply is the quantity of a product or service businesses are willing to provide. According to the law of supply, the higher the price at which something can be sold, the more of it businesses want to produce.
- Demand is the quantity of a product or service consumers are willing to buy. According to the law of demand, the higher the price of something, the less of it consumers want to buy.

When demand is greater than the supply, price rises. This is why airlines are highest during the holidays. More people want to fly then, so airlines can charge a premium. Likewise, when supply is greater than demand, price falls. In the months after the holidays, the same seats on the same planes cost less. Airlines lower their prices to entice people to fly.

Supply and demand help set prices in the housing market as well. Supply is the number of existing homes for sale, and demand is the number of homes sought by home buyers at a given time. For example, a home for sale near the seashore or other desirable area may cost \$400,000 or more. In a less desirable area, the same home would sell for substantially less.

Dig Deeper

Use online resources to further investigate the laws of supply and demand in regard to housing prices. At what times of the year are home sales greater? lower? How do seasonal changes impact housing supply and demand? How does supply and demand impact product sales for home interiors?

Copyright Good and Beautiful Co., Inc.

- **Sociocultural Connections** features invite you to explore important topics relevant to housing and interior design. The *Dig Deeper* discussion questions utilize your critical-thinking skills and promote classroom discussion.

Sociocultural Connections

The Changing American Household

Households by Type: 1970 to 2019 (percent distribution)

Year	Married couples with and without children	Other family households	Men living alone	Women living alone	Other nonfamily households
1970	70.6	19.6	0.2	11.2	0.7
1980	66.8	12.9	0.4	14	3.8
1990	64.1	14.8	0.7	14.5	4.4
2000	52.9	16	16.3	14.8	3.7
2008	50.8	16.7	11.4	15.2	3.7
2019	48.2	16.7	12.9	15.5	6.7

Source: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplements, selected years 1970 to 2019, and Table H-1 Household by Type and Size of Household for Selected Characteristics 2019.

According to the U.S. Census Bureau, the composition of U.S. households changed between 1970 and 2019. The most significant changes include:

- **Reduction of family households.** Family households—two or more members related by birth, marriage, or adoption—decreased from 81 percent to 65 percent.
- **Reduction of married-couple households.** The share of married-couple households, either with or without children, decreased from 70 percent to 48 percent.
- **Increase in nonfamily households.** The proportion of nonfamily households—mostly people who live alone—almost doubled in size.

The Census Bureau cites many reasons for these changes. For example, the roles of men and women have changed. More women are working and living on their own. People are marrying and having children later or not at all. Also, people are living longer due to technological innovations. The baby boom generation—those born between 1946 and 1964, who make up more than 26 percent of the adult population—is moving into retirement.

Changes in the composition of U.S. households bring changes in the housing market. For example, after their children grow up and leave home, many baby boomers choose to downsize into smaller dwellings. Older adults generally prefer single-level homes or buildings with elevators since climbing stairs can be difficult.

Dig Deeper

Use online or print resources to investigate ways that households have changed in your community in the last 25 years. How have these changes influenced the type of housing available in your community? Discuss your findings with the class.

Green Choices

Choose a LEED-Certified Home

LEED stands for Leadership in Energy and Environmental Design. A LEED-certified home means that the structure meets the guidelines to be a green and sustainable building. The U.S. Green Building Council sets the guidelines and ratings. The Council has a rating system with four levels that certify that a house is environmentally responsible. The four levels include the following: Certified, Silver, Gold, and Platinum (highest).

The LEED certification means that a home's features provide such green and sustainable design, construction, and operations practices as the following:

- Innovation and design—highest standard for "green" performance
- Environmentally responsible within the larger community

- Sustainable sites—minimal impact of the home on the land
- Water efficiency—indoor and out
- Energy efficient—in the structure and heating and cooling design
- Materials and resources—efficient use of materials, use environmentally preferred materials, and produce less waste in construction
- Indoor environmental quality (IAQ)—reduce the creation of and exposure to pollutants
- Home owner education—how to use and maintain the green features
- Third-party verification—someone other than the builder has certified the green parts of a home

- **Green Choices** features introduce you to various green and sustainable housing and interior design issues relevant to today's society.

Green Choices

Eco-Friendly Labeling and Certification Programs

Many guides assist consumers or professionals in making decisions in finding green housing solutions. When selecting a new house or products for the home, choose an eco-friendly program to guide your choices.

Each of these programs certifies labels green components in different ways and some are highlighted in Green Choices features throughout this textbook. Programs that certify or label green housing and products include:

- **ENERGY STAR**—Identifies products and structures that use at least 30 percent less energy than the standard products and structures (Environmental Protection Agency and U.S. Department of Energy)
- **Energy Guide Label**—Relates the approximate energy consumption and utility cost of operating the products and is required on all ENERGY STAR products (U.S. Environmental Protection Agency and U.S. Department of Energy)
- **LEED Rating System**—Certifies structures that have overall sustainable features (U.S. Green Building Council—USGBC)

- **Forest Stewardship Council (FSC)**—Sets standards for responsible forest management; works with FSC-accredited certifiers to identify companies that follow sustainable practices in wood harvesting and manufacturing
- **WaterSense® Label**—Identifies products that use less water; manufacturers have partnership agreement with the U.S. Environmental Protection Agency and have products certified through an EPA-licensed certifying body
- **Sustainable Furnishings Council**—Large furniture that was manufactured using sustainable practices; promotes sustainable practices among furniture manufacturers
- **REGREEN**—Provides guidelines for incorporating green in remodeling projects (partnership between ASIO and USGBC)
- **Carpet and Rug Institute (CRI)**—Verifies that products (carpet, adhesives, and cushions) have low emission of VOCs (Indoor Air Quality testing)

Copyright Good and Beautiful Co., Inc.

Housing Health & Safety

Furniture Design and Ergonomics

Furniture, particularly workplace and home office furniture, is sometimes described as ergonomic.

The manufacturer or reseller claims certain furniture designs use principles from the science of ergonomics. The goals of ergonomics are to minimize injury and maximize comfort and efficiency of use. Interior designers and consumers should beware, however, because any product can be labeled as ergonomic. Ergonomics guidelines have been developed by the Business and Institutional Furniture Manufacturer's Association (BIFMA).

Two ergonomic products require designers to understand both the physical and psychological characteristics and special needs of their users. They consult anthropometric data, or human body measurements, and study how people interact with furniture and other elements of their environments.

As a result, ergonomic furniture is often adjustable and can be comfortably and safely used by people of different sizes. Controls are simple to use and easy to reach and manipulate without straining. Seats and their arms are usually padded and covered with nonslip breathable coverings. Many include lower-back supports that maintain the lumbar curve in the lower spine. Ergonomic tables are designed with adjustable-height legs.

Ergonomics is a broad and varied field that covers much more than furniture design. For more



information about ergonomics and ergonomic products visit the websites of the following organizations:

- Business and Institutional Furniture Manufacturer's Association
- Human Factors and Ergonomics Society
- U.S. Department of Labor's Occupational Safety & Health Administration (OSHA)

- **Housing Health & Safety** features help you examine key topics important to keeping building occupants healthy and safe.

Reinforces STEM Concepts

Integrated within the **Housing and Interior Design** text are STEM-related features for math and science and technology. The content in these features will help you apply skills and solve problems relevant to housing and interiors careers.

Chapter 1: Interior Design Style 117

STEM Math Symmetry

Objects are often described as being symmetrical or asymmetrical. An object is symmetrical if a line drawn through it divides it into two matching halves. The dividing line is called the line of symmetry. An object may have one or more lines of symmetry. For example, a rectangle has two lines of symmetry. A circle has an infinite number of lines of symmetry since any line drawn through the center creates a line of symmetry.

An object is asymmetrical if it has zero lines of symmetry; no two halves match. Your hand is asymmetrical; you cannot draw a line that will result in two matching halves.

Symmetry creates balance. Architects and interior designers often incorporate symmetry in their work. For example, the exterior of a Georgian home exhibits symmetry. You can also achieve symmetry by placing matching chairs on both sides of an entryway.

Work Practice

Take a walking tour in your neighborhood and carefully observe symmetry in the housing styles as you walk. Select at least six houses you think display symmetry and take digital pictures of the houses (give the owner's permission). Print the house pictures. On the printed house pictures, carefully draw a vertical line exactly through the middle. Do the houses actually display symmetry? Why or why not? Give an oral report to share your findings with the group.

- **STEM Math** features provide housing-related math formulas and practice activities.

STEM Math How to Read a Scale Rule

Architectural drawings are drawn in proportion to actual size. A floor plan of a room, for example, represents the actual dimensions of the room. This is done by using a scale and measurement represents another.

A scale table is used to create and read these drawings. A standard triangular ruler is one of the most common scale rulers. One edge has a 12-in. edge with each inch divided into 16 units. The other edges have two scales each—one is read from right to left and the other is read from left to right. The scale that reads from left to right is half as large as the scale that reads from right to left.

To use the ruler, find the scale you need and make sure you read it from the correct direction. (Left to right or right to left). House plans are usually drawn at a standard scale of 3/4 in. equals 1 ft. Each 3/4 in. on the drawing represents 1 ft. on the actual house. Always use zero—the ruler's edge—as the start point of the measurement.

Example 1: A house plan shows the length of a room as 2 in. How long is the actual room if you use the scale 3/4 in. = 1 ft.?
Answer: If $N = 1$, then $1 = 4 \cdot 3 \div 4 = 12$ ft.

Example 2: A room is 12 ft. wide by 15 ft. long. How would its width and its length be expressed in a drawing using the scale 3/4 in. = 1 ft.?
Answer:
A. Width: $12 \div 4 = 3$ in.
B. Length: $15 \div 4 = 3.75$ in.

Work Practice

Measure the width and length of two rooms in your home or school. Then use a scale rule to create a floor plan in a scale of 3/4 in. = 1 ft. Use a small ruler to mark the dimensions and then use a traditional ruler or straightedge to draw the lines. (Note: Do not use the scale ruler to draw your lines—doing so can damage the edge and make further measurements inaccurate.)

- **STEM Science & Technology** help you explore science concepts in housing and examine housing-related technology.

STEM Science & Technology Visible Light and the Electromagnetic Spectrum

Light is a form of energy called electromagnetic radiation. It travels through space as oscillating waves. From crest to trough, these waves range in size from large as a building to small as a microscopic particle. Wavelength is the distance between the crests of two adjoining waves. Frequency is the rate at which a wave oscillates or fluctuates and is measured in hertz. The chart shows the electromagnetic spectrum arranged according to wavelength and frequency in hertz. As the length of a wave increases, its frequency decreases.

Visible light makes up a small part of the electromagnetic spectrum and it's the only part you can see. Visible light consists of the colors you see in a rainbow—red, orange, yellow, green, blue, and violet. These colors form the basis for the color wheel that interior designers use for creating color schemes.

The spectrum also includes other forms of energy you encounter every day: infrared, radio waves, microwaves, X-rays, gamma rays, and ultraviolet rays. Many consumer electronics products utilize the electromagnetic spectrum. Can you identify a few of them?

STEM Science & Technology Designing for Disaster: Earthquakes

An earthquake is a sudden and sometimes violent shaking of the earth's crust or outer layer. The crust consists of large jigsaw-like pieces called tectonic plates. These plates float on a layer of rock heated by the high temperatures and pressure deep inside the earth. The plates are in constant motion, usually moving only a few centimeters a year. Violent moving or a sudden release of energy along points of stress between and within the plates, however, can cause intense shaking or earthquakes.

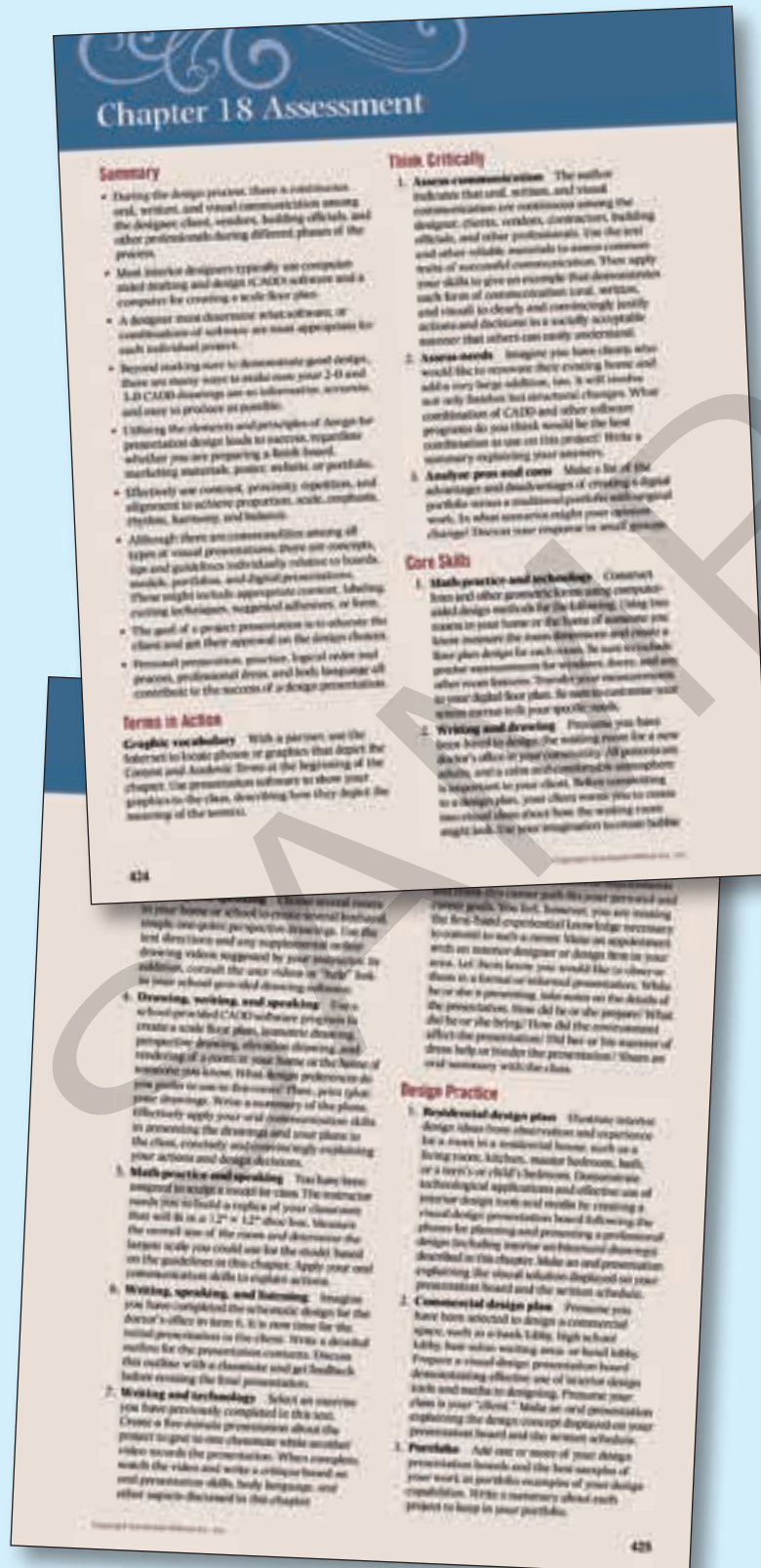
The number of earthquakes in the United States between 2000 and 2012 ranged from 1,342 to 8,498 according to the U.S. Geological Survey (USGS). The USGS is the federal agency that records and reports U.S. earthquake activity. Fortunately, most earthquakes are mild and cause little or no damage. They can, however, be extremely destructive and lethal. In 2008 for example, an earthquake in Sichuan, China, caused more than 1 million buildings to collapse and killed or injured 82,347 people. In 2010, another earthquake killed multitudes of people in Haiti. Many had their lives in their homes, schools, and other buildings been taking their toll. The goal for design and construction in earthquake-prone areas is to minimize damage to homes and other structures and to prevent deaths. Designers and builders use such resources as the following:

- **International Residential Code (IRC).** In the United States, this is the principal building code for residential construction. It includes recommendations by the National Earthquake Hazard Reduction Program (NEHRP).
- **Homebuilder's Guide to Earthquake-Resistant Design and Construction.** This document, published by the Federal Emergency Management Agency (FEMA), offers construction guidelines and provides supplemental information to the IRC. The guide also presents some "above-code recommendations" and low-cost construction measures to increase building performance and functionality during and after an earthquake.

For more information about the theory of plate tectonics and earthquakes, go to the U.S. Geological Survey's website. Use the key words plate tectonics and earthquakes to learn more.

Maximizes Assessment and Application

Assessing what you learn is important as you progress through the text. Multiple opportunities are provided to help you assess and validate learning as you explore the text, and include the following:



- The **Summary** provides an overview of chapter content for reference purposes.
- The **Terms in Action** activities invite you to apply your vocabulary knowledge at the end of every chapter.
- **Think Critically** questions and activities strengthen your higher-order thinking, problem-solving, personal, and workplace skills as related to housing and interior design topics.
- **Core Skills** activities offer opportunities for developing workplace knowledge and skills and collaborative learning, including reading, writing, speaking, listening, math, research, technology, and CTE career readiness practice activities.
- **Design Practice** activities focus on specific design-related skills and building your career portfolio.

Brief Contents

Unit 1	Housing—Human Factors and Influences	2
Chapter 1	The Human Need for Housing	4
Chapter 2	Factors Influencing Housing	24
Chapter 3	Decision Making and Housing Options.....	58
Chapter 4	Sustainability and Housing	88
Unit 2	The Built Environment and Space Planning	106
Chapter 5	Exterior Design Styles	108
Chapter 6	Reading Architectural Plans	134
Chapter 7	Space Planning and Functionality	152
Chapter 8	Planning for Individual Spaces	170
Chapter 9	Understanding Construction Basics	200
Chapter 10	Interior Systems	224
Chapter 11	Lighting Considerations	250
Chapter 12	Selecting Appliances and Electronics.....	268
Chapter 13	The Outdoor Living Environment	296
Unit 3	Fundamentals of Interior Design	320
Chapter 14	Elements of Design	322
Chapter 15	Color in Design	336
Chapter 16	Principles of Design	356
Unit 4	The Process of Interior Design	372
Chapter 17	The Process of Design	374
Chapter 18	Design Communication	400
Unit 5	Interior Surfaces, Materials, and Furnishings	426
Chapter 19	Textiles for Environments	428
Chapter 20	Understanding Surface Materials and Treatments	452
Chapter 21	Furniture Styles and Window Treatments	476
Chapter 22	Selection of Furnishings, Accessories, and Art.....	510
Unit 6	Housing Choices	536
Chapter 23	Acquiring Housing	538
Chapter 24	Home Safety and Security	568
Chapter 25	Maintaining a Home	588
Unit 7	Careers in Housing and Interiors	614
Chapter 26	Career Planning	616
Chapter 27	Preparing for Career Success	634
Chapter 28	Entrepreneurship for Housing and Interiors	662

Contents


Unit 1	Housing—Human Factors and Influences	2
	Chapter 1 <i>The Human Need for Housing</i>	4
	 People and Their Housing	6
	Meeting Needs Through Housing	7
	Factors Affecting Housing Choices	12
	Housing Needs Through the Life Span	16
	Housing and Quality of Life	20
	Chapter 2 <i>Factors Influencing Housing</i>	24
	 Historical Influences on Housing	26
	Cultural Influences on Housing	34
	Societal Influences on Housing	37
	Environmental Influences on Housing	40
	Economic Influences on Housing	42
	Technological Influences on Housing	44
	Governmental Influences on Housing	46
	Chapter 3 <i>Decision Making and Housing Options</i>	58
	 Types of Decisions	60
	Resources for Housing Decisions	60
	The Decision-Making Process	62
	Housing Options	64
	Location	65
	Types of Housing	74
	More Housing Decisions	80
	Innovative Housing Solutions	83
	Chapter 4 <i>Sustainability and Housing</i>	88
	 Defining Sustainability and Sustainable Design	90
	Principles of Sustainable Design	91
	Features of Sustainable Buildings	97
	Designer Responsibilities for Sustainable Design	102
Unit 2	The Built Environment and Space Planning	106
	Chapter 5 <i>Exterior Design Styles</i>	108
	 Traditional Houses	110
	Modern Houses	122
	Postmodern Houses	126
	Contemporary Houses	126
	Historic Preservation	129
	Chapter 6 <i>Reading Architectural Plans</i>	134
	 Architectural Drawings for a House	136
	Drawing Methods and Prints of Architectural Drawings	138
	Views for Architectural Drawings	143


Chapter 7	<i>Space Planning and Functionality</i>	152
	The Space Within	154
	Arranging Furniture	162
Chapter 8	<i>Planning for Individual Spaces</i>	170
	Clients and Their Needs	172
	Design for All.....	173
	Existing Home Characteristics	179
	Considerations for Individual Spaces.....	180
Chapter 9	<i>Understanding Construction Basics</i>	200
	The Foundation and Frame.....	202
	Materials Used for Exterior Construction	206
	Windows and Doors.....	211
	Interior Construction.....	215
	Computer Applications in Construction	220
Chapter 10	<i>Interior Systems</i>	224
	Electrical Systems	226
	Gas as an Energy Source	230
	Plumbing Systems	230
	Heating Systems	234
	Cooling Systems	239
	Conserving Energy	240
Chapter 11	<i>Lighting Considerations</i>	250
	Types of Artificial Light	252
	The Properties of Light.....	255
	Functions of Lighting.....	256
	Structural and Nonstructural Lighting	260
	Lighting Layout Throughout the Home	262
Chapter 12	<i>Selecting Appliances and Electronics</i>	268
	User Satisfaction and Appliance Considerations	270
	Choosing Kitchen Appliances.....	276
	Choosing Laundry Appliances	285
	Choosing Climate-Control Appliances.....	288
	Choosing Other Appliances.....	289
	Choosing Electronics	291
Chapter 13	<i>The Outdoor Living Environment</i>	296
	Goals for Planning the Landscape	298
	Landscape Elements.....	299
	Designing Outdoor Living Spaces	304
	Landscaping for Sustainability and Conservation.....	312
	Completing a Scaled Plan	315
Unit 3	Fundamentals of Interior Design	320
Chapter 14	<i>Elements of Design</i>	322
	Design Characteristics	324
	Elements of Design.....	325

	Chapter 15	<i>Color in Design</i>	336
		Understanding Color	338
		The Color Wheel	339
		Color Harmonies	344
		Using Color Harmonies	348
	Chapter 16	<i>Principles of Design</i>	356
		The Principles of Design	358
		Goals of Design	365
		Sensory Design	368
Unit 4	The Process of Interior Design		372
	Chapter 17	<i>The Process of Design</i>	374
		What Is the Design Process?	376
		Phase 1: Programming	379
		Phase 2: Schematic Design	384
		Phase 3: Design Development	387
		Phase 4: Contract Documents	391
		Phase 5: Contract Administration	393
	Chapter 18	<i>Design Communication</i>	400
		Communication During the Design Process	402
		Communicating Through Technology	405
		Creating 3-D Drawings	407
		Fundamentals of Visual Presentation Materials	411
		Different Types of Visual Presentation Methods	414
		Presenting Your Design	420
Unit 5	Interior Surfaces, Materials, and Furnishings		426
	Chapter 19	<i>Textiles for Environments</i>	428
		Understanding Fibers, Yarns, and Fabrics	430
		Textiles for Residential and Commercial Use	437
		Textiles for Floor Treatments	440
		Textiles for Upholstered Furniture	442
		Textiles for Window Treatments	444
		Textiles for Kitchen, Bath, and Bed	445
		Textile Laws	449
	Chapter 20	<i>Understanding Surface Materials and Treatments</i>	452
		Floor Treatments	454
		Wall Treatments	461
		Ceiling Treatments	467
		Countertops	467
		Planning Background Surface Treatments	470
	Chapter 21	<i>Furniture Styles and Window Treatments</i>	476
		Understanding Furniture Styles	478
		Evaluating Furniture Construction	488
		Caring for Furniture	500
		Selecting Types of Window Treatments	501
		Protecting Consumers	507

Chapter 22	<i>Selection of Furnishings, Accessories, and Art</i>	510
	Selecting Furniture.....	512
	Selecting Accessories.....	519
	Selecting Art for the Home.....	523
	Identifying Information Sources.....	526
	Stretching Your Dollars.....	528


Unit 6 **Housing Choices**..... 536

Chapter 23	<i>Acquiring Housing</i>	538
	Acquiring a Place to Live—Costs and Decisions.....	540
	Renting.....	543
	Buying.....	546
	The Home-Buying Process.....	552
	Special Ownership Considerations.....	562
	Moving to a New Home.....	563

Chapter 24	<i>Home Safety and Security</i>	568
	A Safe Home.....	570
	A Secure Home.....	579

Chapter 25	<i>Maintaining a Home</i>	588
	Cleaning and Maintaining a Home.....	590
	Outdoor and Lawn Care.....	597
	Making Common Home Repairs.....	599
	Meeting Storage Needs.....	605
	Redecorating.....	607
	Remodeling.....	608
	Resources for Home Care.....	611

Unit 7 **Careers in Housing and Interiors**..... 614

Chapter 26	<i>Career Planning</i>	616
	Performing a Self-Assessment.....	618
	Researching Careers.....	620
	Investigating Education and Training Options.....	623
	Identifying Sources of Career Information.....	626
	Joining Organizations.....	630

Chapter 27	<i>Preparing for Career Success</i>	634
	Preparing for Future Success.....	636
	Applying for a Position.....	638
	Succeeding in the Workplace.....	648
	The Evolution of Your Career.....	656
	Leaving a Job.....	658

Chapter 28	<i>Entrepreneurship for Housing and Interiors</i>	662
	Entrepreneurship in Housing and Interior Design.....	664
	Types of Business Structures.....	665
	Starting a Business.....	666
	Develop a Business Plan.....	669
	Managing for Profit.....	671

<i>Appendix A</i>	<i>ASID Code of Ethics and Professional Conduct</i>	678
<i>Appendix B</i>	<i>Practical Math Review</i>	682
	<i>Glossary</i>	690
	<i>Index</i>	710

Features



Green Choices

What Does “Green” Mean?	20	Saving Resources with Lighting	254
Let the Environment Work for You!	32	Environmentally Friendly Appliance Decisions	271
What Is Sustainability?	34	GreenScaping: What Is It?	312
Choose a LEED Certified Home.	63	Avoid Greenwashing.	344
LEED Accredited Architects and Interior Designers.	64	Consider Environmentally Friendly Carpet	440
Consider a Live/Work Community	68	Be Kind to the Environment—Select Nontoxic Paint	473
Urban Designer’s Role in Sustainable Design	80	Determining “Sustainability” in Furniture and Furnishings	492
Eco-Friendly Labeling and Certification Programs	90	Green Furniture	514
Reusing Old Buildings	131	Considerations for Green or Sustainable Products.	520
Architect’s Responsibilities for Sustainable Design	139	Consumer Responsibility in Green and Sustainable Design	542
Forest Stewardship Council®.	207	Choose an ENERGY STAR® Qualified Home.	551
Builder Responsibilities for Sustainable Design	209	ENERGY STAR® Air Quality Label	575
Conserving Water in the Bathroom.	231	Eco-Friendly Cleaning Products and Tips.	593
Conserving Water in the Kitchen	233	Remodel with REGREEN	609
Engineer Responsibilities for Green and Sustainable Design	241		

Sociocultural Connections

The Changing American Household.	18	Color Psychology at Work.	341
The Tiny House Movement.	35	What Is Feng Shui?	515
Economics: Supply and Demand	43	Dealing with Foreclosure	547
Asian Origins of American Bungalows	124	The Housing Bubble Burst	553
Anthropometrics	162	Discrimination in the Workplace	645
Proxemics	330	Manners at Work	650

STEM Science & Technology

Telecommuting Technology	39	The Anatomy of Color.	349
Designing for Disaster: Earthquakes	203	Nanotechnology and Household Products	442
GFCIs for Household Use	228	Managing Your Online Image	629
Consumer Electronics Explosion	293	Tips for Applying Online	639
Visible Light and the Electromagnetic Spectrum.	341		

STEM Math

Fraction/Decimal Conversions	19	Estimating Wood Flooring Cost	454
Symmetry	117	Resilient Flooring and Carpeting Calculations . . .	460
How to Read a Scale Ruler	137	Paint Calculations	462
Determining Square Footage of a Home	144	Wall Covering Calculations	465
Polygons	210	Curtain and Drapery Calculations	502
Calculating Percentages and Energy Savings . . .	246	Measurements for Shades and Blinds	507
Estimating Appliance Energy Consumption	273	Buying Furniture on Credit	529
Calculating Volume for Landscape Design	306	Calculating Finance Charges	541
Estimating Perimeter	327	Meeting Lender Guidelines	548
Taking Measurements; Calculating Materials . . .	444	Calculating Price per Square Foot	556



Career Focus

Interior Designer—Early Childhood Facilities . . .	21	Color Designer	347
Industry Researcher and Trend Forecaster	54	Interior Designer—Restaurants	365
Civil Engineer	67	Interior Designer	394
Urban Planner	70	Interior Design Marketing	421
Environmental Scientist	95	Textiles and Furniture Designer	439
Sustainability Coordinator	100	Materials Scientist	447
Historic Preservationist	130	Interior Products Sales Representative	468
Architect	149	Interior Designer—Schools	471
In-House Commercial Designer	166	Upholsterer	498
Universal Design and Aging-in-Place Specialist	176	Visual Merchandising and Exhibit Design	527
Building Inspector	221	Real Estate Sales Agent	557
Industrial Designer	233	Security and Fire Alarm Systems Installers . . .	579
General Contractors and Allied Tradespeople . .	236	Professional Organizer	591
Lighting Designer	261	Interior Designer—Community Medical Complex	621
Interior Designer—Kitchens and Baths	280	Real Estate Appraiser	658
Landscape Architect	317	Interior Designer—Hotels/Vacation Lodges	674
Interior Designer—Community Libraries	331		



Housing Health & Safety

Reducing Mold with Paperless Drywall	217	Avoiding Lead Paint Dangers	466
Handling CFLs	254	Furniture Design and Ergonomics	495
Lighting Levels for the Home	258	Creating a Family Emergency Plan	580
Eliminate Hazards for Appliance Safety	275	Assembling an Emergency Preparedness Kit . . .	585
Monitoring Outdoor Air Quality	305	Material Safety Data Sheets (MSDS)	654

Introduction

This edition of *Housing and Interior Design* encourages you to develop foundational knowledge and skills relating to career pathways in housing and interior design. Chapter topics will lead you through many concepts and issues home owners and interior designers and their clients face when selecting and designing living spaces. With a strong emphasis on universal and green or sustainable design, this text offers you many practical ways to put the *design process* into practice.

Through this text, you will learn how to identify and evaluate the wide array of housing and design options to fill human needs. Hundreds of beautiful photos effectively illustrate design concepts you can adapt to fit various structures. The charts and illustrations help demonstrate and clarify important text information about such topics as architectural design, furniture design, and design technology and trends.

With a focus on professional practices and career success, the *Housing and Interior Design* text includes a number of elements that can help you on your career journey. The *Career Focus* features highlight related housing and interior design careers with a bright job outlook. In the chapter review, the *Design Practice* activities offer you a wealth of practical ways to develop your design creation and presentation skills. Because involvement with student and professional organizations is key to career success, the Family, Career and Community Leaders of America (FCCLA) activities on every unit opener reinforce teamwork, workplace skills, and community involvement.



Photographee.eu/Shutterstock.com