

Gordon M. Wardlaw

Anne M. Smith

Angela L. Collene

CONTEMPORARY

Nutrition

A Functional Approach Third Edition



Completely Updated! Includes MyPlate, Healthy People 2020, and Dietary Guidelines for Americans, 2010



CONTEMPORARY

Nutrition

A Functional Approach

Third Edition

Gordon M. Wardlaw PH.D.

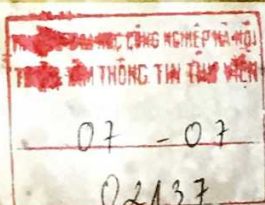
Formerly of Department of Human Nutrition,
College of Education and Human Ecology
The Ohio State University

Anne M. Smith PH.D., R.D., L.D.

Department of Human Nutrition,
College of Education and Human Ecology
The Ohio State University

Angela L. Collene M.S., R.D., L.D.

Dietetics Program
Department of Family and Consumer Sciences
Ashland University



Connect
Learn
Succeed

GIFT OF THE ASIA FOUNDATION
NOT FOR RE-SALE

QUÀ TẶNG CỦA QUỸ CHÂU Á
KHÔNG ĐƯỢC BÁN LẠI



CONTEMPORARY NUTRITION: A FUNCTIONAL APPROACH, THIRD EDITION

Published by McGraw-Hill, a business unit of The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas, New York, NY 10020. Copyright © 2013 by The McGraw-Hill Companies, Inc. All rights reserved. Printed in the United States of America. Previous editions © 2012 and 2009. No part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written consent of The McGraw-Hill Companies, Inc., including, but not limited to, in any network or other electronic storage or transmission, or broadcast for distance learning.

Some ancillaries, including electronic and print components, may not be available to customers outside the United States.

This book is printed on acid-free paper.

6 7 8 9 0 RMN/RMN 18 17 16 15 14

ISBN 978-0-07-802134-3

MHID 0-07-802134-0

Vice President, Editor-in-Chief: *Marty Lange*
 Vice President, EDP: *Kimberly Meriwether David*
 Senior Director of Development: *Kristine Tibbetts*
 Publisher: *Michael S. Hackett*
 Sponsoring Editor: *Lynn M. Breithaupt*
 Director of Digital Content Development: *Barbekka Hurtt, Ph.D.*
 Senior Developmental Editor: *Lynne M. Meyers*
 Marketing Manager: *Amy L. Reed*
 Lead Project Manager: *Sheila M. Frank*
 Senior Buyer: *Kara Kudronowicz*
 Senior Media Project Manager: *Tammy Juran*
 Designer: *Tara McDermott*
 Cover/Interior Designer: *Ellen Pettengell*
 Cover Image: © The McGraw-Hill Companies, Inc., *Kevin May Photography*
 Senior Photo Research Coordinator: *John C. Leland*
 Photo Research: *Mary Reeg*
 Compositor: *Laserwords Private Limited*
 Typeface: *10/12 Giovanni Book*
 Printer: *RR Donnelley*

All credits appearing on page or at the end of the book are considered to be an extension of the copyright page.

Library of Congress Cataloging-in-Publication Data

Wardlaw, Gordon M.

Contemporary nutrition : a functional approach / Gordon M. Wardlaw, Anne M. Smith, Angela Collene.—3rd ed.

p. cm.

Includes bibliographical references and index.

ISBN 978-0-07-802134-3—ISBN 0-07-802134-0 (hard copy : alk. paper) 1. Nutrition. I. Smith, Anne M., 1955- II. Collene, Angela. III. Title.

QP141.W377 2013

612.3—dc23

2011036578

Brief Contents



Part One Nutrition: A Key to Health 2

- 1 Choosing What You Eat and Why 2
- 2 Guidelines for Designing a Healthy Diet 34
- 3 The Human Body: A Nutrition Perspective 80

Part Two Energy Nutrients and Energy Balance 122

- 4 Carbohydrates 122
- 5 Lipids 164
- 6 Proteins 208
- 7 Energy Balance and Weight Control 242

Part Three Vitamins, Minerals, and Water 288

- 8 Overview of the Micronutrients 288
- 9 Nutrients Involved in Fluid and Electrolyte Balance 314
- 10 Nutrients That Function as Antioxidants 344
- 11 Nutrients Involved in Bone Health 378
- 12 Micronutrient Function in Energy Metabolism and Blood Health 414

Part Four Nutrition: Beyond the Nutrients 460

- 13 Nutrition: Fitness and Sports 460
- 14 Eating Disorders: Anorexia Nervosa, Bulimia Nervosa, and Other Conditions 498
- 15 Undernutrition Throughout the World 526
- 16 Safety of Our Food Supply 558

Part Five Nutrition: A Focus on Life Stages 594

- 17 Pregnancy and Breastfeeding 594
- 18 Nutrition from Infancy Through Adolescence 632
- 19 Nutrition During Adulthood 672

Preface

Dear Students,

Welcome to the fascinating world of nutrition! We are all nutrition experts, in a sense, because we all eat several times a day. At the same time, though, nutrition can seem a bit confusing. One reason for all the confusion is that it seems like “good nutrition” is a moving target: different authorities have different ideas of how we should eat and nutrition recommendations are subject to change! Are eggs good for us or not? Should we model our diets after a pyramid or a plate? Second, there are so many choices. Did you know that the average supermarket carries about 40,000 food and beverage products? Food manufacturers and grocery chains have one purpose—to make as large a profit as possible. Typically, the most aggressively marketed items are not the healthiest. This has made shopping very complicated. In addition, as a nation, we eat out a lot. When we eat foods that someone else has prepared for us, we surrender control over how much salt and fat is in our food and how much food goes on our plates. There is a lot yet to learn, and you are undoubtedly interested in what you personally should be eating and how the food you eat affects you.

Contemporary Nutrition: A Functional Approach is designed to accurately convey changing and seemingly conflicting messages to all kinds of students. Our students commonly have misconceptions about nutrition, and many have a limited background in biology or chemistry. We teach complex scientific concepts at a level that will enable you to meaningfully apply the material to your own life. *Contemporary Nutrition: A Functional Approach* is organized somewhat differently than the traditional nutrition textbook in that Part Three presents information on vitamins, minerals and water using “a functional approach”. Instead of describing these nutrients in their traditional categories (e.g., water soluble vitamins), we discuss them in groups based on their functions in either fluid and electrolyte balance, bone health, energy metabolism, or bone health, and as antioxidants. Learning about these nutrients in this format will enable you to immediately understand how they interact in food and in our bodies and how they work together to support these key functions that sustain our health.

We have written *Contemporary Nutrition: A Functional Approach* to help you make informed choices about the food you eat. We will take you through explanations of the nutrients in food and their relationship to health, but will also make you aware of the multitude of other factors that drive food choices. To guide you, we refer to many reputable research studies, books, policies, and web sites throughout the book. With this information at your fingertips, you will be well equipped to make your own informed choices about what and how much to eat. There is much to learn, so let's get started!

-Anne Smith
-Angela Collene



Instructors

CONNECT VIA CUSTOMIZATION

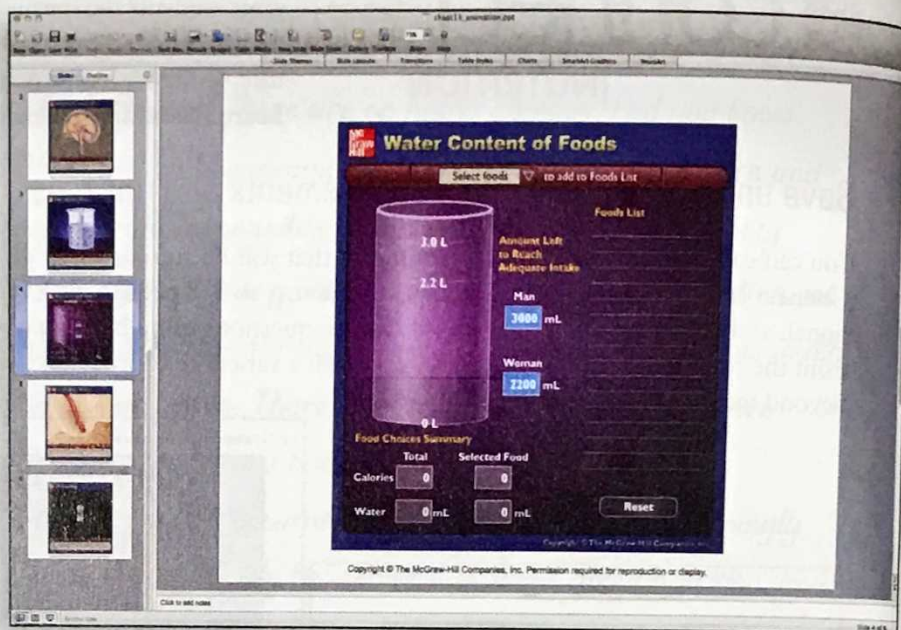
Presentation Tools allow you to customize your lectures.

Enhanced Lecture Presentations contain lecture outlines, art, photos, tables, and animations embedded where appropriate. Fully customizable, complete and ready to use, these presentations will streamline your work and let you spend less time preparing for lecture!

Editable Art Fully editable (labels and leaders) line art from the text.

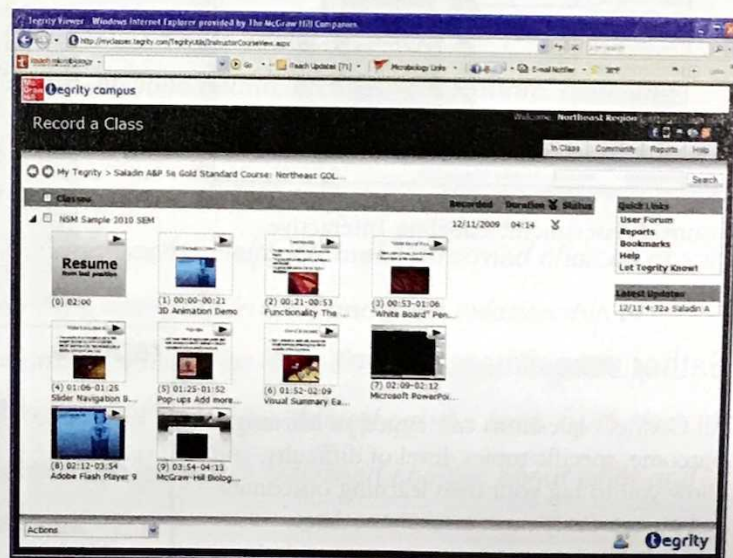
Animations Over 50 animations bringing key concepts to life, available for instructors *and* students.

Animation PPTs Animations are truly embedded in PowerPoint® for ultimate ease of use! Just copy and paste into your custom slideshow and you're done!



Take your course online—*easily and quickly* with one-click Digital Lecture Capture.

McGraw-Hill Tegrity® records and distributes your lectures with just a click of a button. Students can view them any-time/anywhere via computer, iPod, or mobile device. Tegrity® indexes and records your slideshow presentations, and anything shown on your computer, so students can use keywords to find exactly what they want to study.



Students

CONNECT 24/7 WITH PERSONALIZED LEARNING PLANS

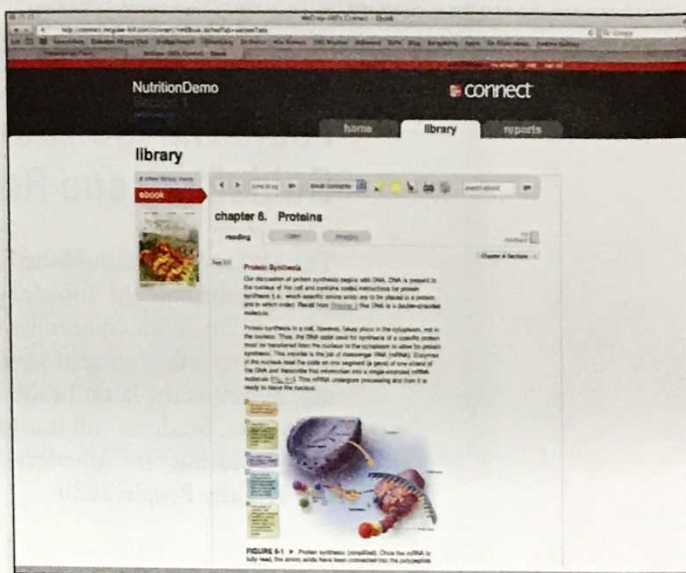


Access content anywhere, any time,
with a customizable, interactive eBook.

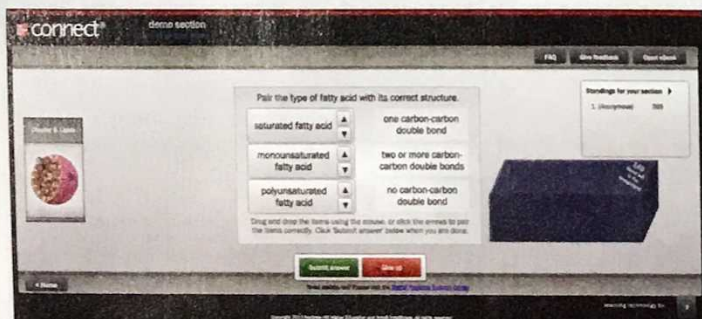
McGraw-Hill ConnectPlus eBook takes digital texts beyond a simple PDF. With the same content as the printed book, but optimized for the screen, ConnectPlus has embedded animations and videos, which bring concepts to life and provide “just in time” learning for students. Fully integrated self-study questions allow students to interact with the questions in the text and determine if they’re gaining mastery of the content.

“Use of technology, especially LEARNSMART, assisted greatly in keeping on track and keeping up with the material.”

—student, Triton College



McGraw-Hill LearnSmart™ A Diagnostic, Adaptive Learning System



Self-study resources are also available
at www.mhhe.com/wardlawcont9.

McGraw-Hill *LearnSmart* is an adaptive learning system designed to help students learn faster, study more efficiently, and retain more knowledge for greater success.

LearnSmart effectively assesses students’ skill levels to determine which topics students have mastered and which require further practice. A personalized learning path based upon student strengths and weaknesses gives students exactly the help they need, when they need it.

**“I love LearnSmart. Without it, I
would not be doing as well.”**

—student, Triton College