

# On Baking

A TEXTBOOK OF BAKING AND PASTRY FUNDAMENTALS | FOURTH EDITION



# Approach and Philosophy of On Baking



Pearson | Revel

## Revel for On Baking Fourth Edition

New for this edition, *On Baking* is now available in Revel—an engaging, seamless, digital learning experience. The instruction, practice, and assessments provided are based on learning science. The assignability and tracking tools in Revel let you gauge your students' understanding and engagement in and out of the classroom. This visibility into student performance, paired with your students' renewed energy for the material, empowers you to spend your class time on the meaningful instruction that only you can deliver. For more details, see the Comprehensive Teaching and Learning Package page ix.

This new fourth edition of *On Baking: A Textbook of Baking and Pastry Fundamentals* follows the model established in our previous editions, which have prepared thousands of students for successful careers in the baking and pastry arts by building a strong foundation based upon proven techniques. *On Baking* focuses on learning the hows and whys of baking. Each section starts with general procedures, highlighting fundamental principles and skills, and then presents specific applications and sample recipes or formulas, as they are called in the bakeshop. Core baking and pastry principles are explained as the background for learning proper techniques. Once mastered, these techniques can be used to prepare a wide array of baked goods, pastries and confections. The baking and pastry arts are shown in a cultural and historical context as well, so that students understand how different techniques and flavor profiles developed.

Chapters are grouped into four areas essential to a well-rounded baking and pastry professional:

- ① **Professionalism** Background chapters introduce students to the field with material on culinary and baking history, food safety, tools, ingredients and baking science.
- ② **Breads** Five chapters focus on breadmaking, from basic quickbreads to yeast breads and advanced artisan specialties such as sourdough breads and laminated doughs.
- ③ **Desserts and Pastries** Fundamental baking techniques used in the preparation of cookies, pies, creams, custards, cakes and frozen desserts are explained and then demonstrated with a wide range of formulas for components and finished products. A chapter on healthy baking and special dietary needs concludes this section.
- ④ **Advanced Pastry Work** Chapters on tortes and entremets, petits fours, chocolate, plated desserts, sugar work and confections demonstrate advanced concepts and techniques.

## UPDATES

- **Three new chapters** expand coverage of yeast breads, cake assembly and sugar work.
- More than **375 new photographs and illustrations** provide clear representations of core preparations that are the foundation of any good baking textbook.
- Over **60 new formulas and variations** reflect up-to-the-minute trends in bakeries and foodservice operations.
- New **step-by-step photographs emphasize stages** in making key products such as yeast and sourdough breads, doughnuts, laminated dough, cake batters and pie crust, as well as cake decorating, torte assembly and advanced confectionery techniques.
- New **photographs illustrate contemporary plate presentation styles** to help students in their mastery of plating and presentation.
- Content revisions and updates were **written to improve readability** and align procedures, photos and recipes more closely.
- Content updates reflect **current trends in the world of baking and pastry**, such as the interest in food safety, gluten-free baking, use of whole grains, plant-based foods and advanced bread, pastry and confectionery techniques.
- **Enhanced food science coverage** highlights the functions of ingredients with additional information on flavor wheels.
- **Expanded tables and troubleshooting content** is included throughout the text to help students master fundamental bakeshop items such as puff pastry, pies, éclair paste and pastry cream.

# Visual Guide

Easy to navigate, *On Baking* is divided into bite-sized subsections to optimize the learning process. We invite you to explore this new edition with the following guided tour through the features included.

## After studying this chapter, you will be able to:

- ▶ describe and use various mixing methods, and explain the importance of gluten and moisture in mixing
- ▶ describe the three primary forms of heat transfer and explain how heat affects batters and doughs
- ▶ describe the various baking and cooking methods employed in the bakeshop
- ▶ describe the stages of the baking process
- ▶ explain the science of taste and basic flavor principles
- ▶ apply the science of taste and basic flavor principles

## ◀ Learning Objectives

Each chapter begins with clearly stated objectives that focus on what students can achieve by completing the material.

## Chapter Introduction ▶

Introductory paragraphs summarize the main themes in each chapter and help reinforce topics.

**B**read making dates back to ancient times. Over the centuries, bakers have learned to manipulate the basic ingredients—flour, water, salt and leavening—to produce a vast variety of breads. Thin-crusted baguettes, tender Parker House rolls, crisp flatbreads and chewy bagels are created by careful selection and handling of the same key ingredients. A renewed interest in the traditional craft of baking has seen many new artisan bread bakeries open in recent years. Customers are demanding, and more restaurants are serving, exciting bread assortments at every meal. Although few baked goods intimidate novice bakers as much as yeast breads, few are actually as forgiving to prepare. By mastering basic procedures and techniques, bakers and pastry chefs can offer their customers delicious, freshly-baked goods made with yeast.

We divide yeast breads into three major categories: basic lean doughs, naturally-leavened and rye breads, and rich doughs. Basic lean doughs, such as those used to make crusty French and Italian breads, rolls and sandwich loaves, contain little or no sugar or fat. Such doughs are the focus of this chapter. Naturally-leavened and rye breads are made from lean doughs that require special handling to bring out their unique flavor. They are discussed in Chapter 8, Preferments and Natural Starters. Rich doughs, such as brioche and challah doughs, contain significantly more sugar and fat than lean doughs. Rich doughs bake into softer products with a tender crust and interior crumb. These are discussed in Chapter 9, Enriched Yeast Breads. A specific type of rich, flaky dough is made by incorporating layers of fat and flour, referred to as **lamination**. This dough is covered in Chapter 10, Laminated Doughs.

## Margin Definitions ▶

Important terms are defined in margin notes to help with retention of new vocabulary and terminology.

**emulsify** to combine a fat and a liquid into a homogeneous mixture by properly blending ingredients

**aerate** to incorporate air into a mixture through sifting and mixing; to whip air into a mixture to lighten it, such as beating egg whites to a foam

## Safety Alerts ▶

Brief notes highlight safety issues and stress the importance of incorporating food safety and sanitation into regular kitchen activities.

## ⚠ Safety Alert

### Single-Use Gloves

Wearing clean single-use disposable gloves is the best way to avoid bare hand contact with ready-to-eat foods such as pies and sandwiches, or when garnishing or portioning baked goods such as cookies, cakes or brownies.

**Procedure for Blind Baking a Pie or Tart Shell**

❶ Line the pie or tart pan or ring mold with dough. Dock the dough with a fork, if desired. Chill for 1 hour to maintain the shape during baking. Cut a piece of parchment paper into a round that is slightly larger than the pan. Using scissors, cut the edge of the paper into  $\frac{1}{2}$ -inch-(1.2-centimeter-) wide strips the depth of the pan so that it will fit into the shell.



❷ Press the parchment paper against the walls of the shell, allowing a portion of it to extend above the pan. Fill the pan with pie weights, raw rice or dried beans. Bake the weighted crust at  $350^{\circ}\text{F}$  ( $180^{\circ}\text{C}$ ) for 10–15 minutes.



❸ Lift off the paper to remove the weights. Dock the crust with a fork and return it to the oven. Bake until golden brown, approximately 10–15 minutes. Cool, then fill as desired.

**◀ Procedures for ...**

Featured procedures for doing a specific technique include step-by-step instructions and photographs of various stages in preparing ingredients or executing a technique. These summaries encourage proper mise en place and organization.

**Product Identification ▶**

Hundreds of original photographs that identify ingredients, tools and equipment are provided.

Written descriptions explore a huge variety of foods, such as fruits, sugars, nuts and chocolates, as well as portioning tools, cookware and bakeware.

**Tables ▶**

Tables and figures offer visual support and organize material to enhance instruction and learning.

**CREAM (CRÈME) COMPONENTS****TABLE 16.2**

FOR A	BEGIN WITH A BASE OF	THICKEN WITH	THEN FOLD IN
Bavarian	Custard	Gelatin	Whipped cream
Chiffon	Custard or starch-thickened fruit	Gelatin	Whipped egg whites
Mousse	Melted chocolate, puréed fruit or custard	Nothing or gelatin	Whipped cream, whipped egg whites, whipped egg yolks or all three

**▼ Icons**

Formulas are marked with various icons to indicate at a glance those addressing health and dietary concerns. The icon shown here identifies formulas that are good choices for health-conscious diners.

**Good Choice**

Gluten-free, vegetarian and vegan icons identify formulas in Chapter 18, Healthy Baking and Special Diets.

**Gluten Free**

**Vegetarian**

**Vegan**

## Formulas ►

Recipes, more appropriately called *formulas* in professional bakeshops, demonstrate techniques and provide delicious laboratory experiments for all skill levels.

MISE EN PLACE			
• Allow butter, eggs and buttermilk to come to room temperature.			
• Zest lemon and orange.			
• Grease pans.			
• Preheat oven to 400°F (200°C).			

## ◀ Mise en Place

French for “put in place,” the mise en place list accompanying in-chapter formulas points out what needs to be done *before* starting to prepare the formula, such as preheating the oven, chopping nuts or melting butter.

### Measurements

All formulas include ingredient quantities in both U.S. and metric measurements. U.S. and metric measurements for all temperatures, pan sizes and other quantities are provided throughout the text.

### Baker's Percentage

A way of expressing the ratio of ingredients unique to professional baking, baker's percentages are used primarily with breads, cakes and dough products and are provided with all of those formulas.

### Variations

Variations provided at the end of some formulas show how to modify that formula to create different flavor profiles and new dishes.

### Nutritional Analysis

All formulas include a nutritional analysis prepared by a registered dietitian.

### BRAN MUFFINS WITH RAISINS

YIELD	18 Muffins, 3½ oz. (105 g) each	METHOD	Muffin
Buttermilk	16 fl. oz.	480 ml	152%
Wheat bran	5 oz.	150 g	47%
Salt	0.4 oz. (1¼ tsp.)	10.5 g	3.5%
All-purpose flour	10.5 oz.	315 g	100%
Baking powder	0.2 oz. (2 tsp.)	8 g	3%
Baking soda	0.3 oz. (2 tsp.)	8 g	3%
Cinnamon, ground	0.2 oz. (1 Tbsp.)	6 g	2%
Eggs	3.3 oz. (2 eggs)	100 g	31%
Vegetable oil	6 fl. oz.	180 ml	57%
Brown sugar	12 oz.	360 g	114%
Raisins, conditioned	8 oz.	240 g	75%
Streusel Topping (page 145; optional)	as needed	as needed	
Total batter weight:	3 lb. 13 oz.	1857 g	587%

Good Choice



### TRADITIONAL SHORTBREAD

YIELD	84 Cookies, approximately ½ oz. (15 g) each	METHOD	Icebox Cookies
Unsalted butter, softened	1 lb.	480 g	84%
Powdered sugar	8 oz.	240 g	42%
Vanilla extract	0.5 fl. oz.	15 ml	3%
Salt	0.2 oz. (1 tsp.)	5 g	1%
Pastry or all-purpose flour	1 lb. 3 oz.	570 g	100%
Egg wash	as needed	as needed	
Total dough weight:	2 lb. 11 oz.	1310 g	230%

- Blend the butter and powdered sugar in a mixing bowl without creaming. Stir in the vanilla and salt, mixing thoroughly. Add the flour and mix until just combined.
- Divide the dough into four equal portions. Roll each piece of dough into 8-inch (20-centimeter) disks. Wrap in plastic. Freeze until hard, approximately 30 minutes.
- Remove from the freezer and unwrap, then lightly brush each disk with egg wash. Cut each disk of dough into eight wedges. Dock the wedges with a fork. Place on parchment paper-lined sheet pans.
- Bake at 375°F (190°C) until pale golden brown, approximately 15–20 minutes.

#### ► Variations:

**Bergamot Shortbread**—Add 12 drops oil of bergamot with the vanilla in Step 1. Divide the dough into four equal portions. Roll each piece into a 10-inch-(25-centimeter)-long cylinder. Freeze until hard, approximately 30 minutes. Brush each cylinder with egg wash, then roll in granulated sugar. Cut the cylinders into ½-inch-(1.2-centimeter)-thick slices and place slices cut side down on parchment paper-lined sheet pans. Dock the cookies with a fork and bake.

**Pecan Shortbread**—Add 7 ounces (210 grams/37%) of finely chopped pecans to the dough in Step 1.

Approximate values per cookie: Calories 70, Total fat 4.5 g, Saturated fat 3 g, Cholesterol 10 mg, Sodium 30 mg, Total carbohydrates 8 g, Protein 1 g



Bergamot Shortbread



Pecan Shortbread

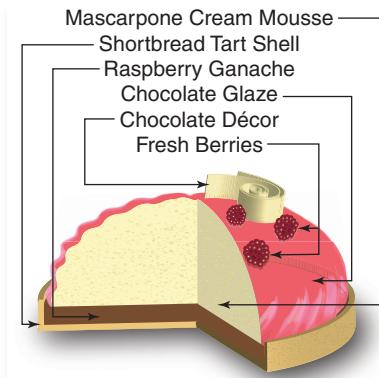


## ► Photographs

Formulas are illustrated with step-by-step photographs showing procedural techniques and photographs of finished products or plated desserts.

## Color Illustrations of Torte and Entremet Assembly ►

Full-color illustrations accompany torte formulas to show the internal assembly of these finished desserts.



TROUBLESHOOTING CHART FOR CUSTARDS

TABLE 16.1

PROBLEM	CAUSE	SOLUTION
Custard sauce watery	Custard overcooked	Adjust temperature; remove from heat promptly; cook in a bain marie; chill over an ice bath.
Custard sauce lumpy	Improper mixing of sugar and yolks	Whisk yolks and sugar together properly.
Pastry cream lumpy	Starch not incorporated properly	Blend starch with sugar before adding liquid; stir cream while cooking.
Pastry cream runny	Insufficient starch Undercooked starch Wrong starch used Overstirred after pastry cream has set	Adjust formula; measure ingredients properly. Cook longer. Adjust formula. Avoid stirring once pastry cream has set.
Baked custard curdled, lumpy or watery	Custard overcooked Insufficient water in bain marie	Adjust oven temperature; remove from oven promptly; remove from water bath to prevent carryover cooking. Increase water in bain marie.
Custard greasy	Too much fat	Adjust formula; use a combination of heavy cream and milk; use more whole eggs than yolks.
Cheesecake grainy	Overcooked Batter overmixed	Adjust oven temperature or baking time. Soften cream cheese before using; blend batter on low speed.
Cheesecake cracks	Baked cake cooled too quickly Batter overmixed	Cool slowly. Soften cream cheese before using; blend batter on low speed.

## ► Troubleshooting Charts

Troubleshooting charts enhance the learning experience by clarifying why a problem occurred and how an error can be corrected or avoided in the future.

## The Story Behind the Chip

History was made in 1930 when Ruth Wakefield, innkeeper of the Toll House Inn in Whitman, Massachusetts, cut up a semisweet chocolate bar and added the pieces to cookie dough. She was disappointed that the pieces kept their shape when baked—until her first bite, that is.

Mrs. Wakefield contacted Nestlé Foods Corporation, which published her cookie recipe on the wrapper of its semisweet chocolate bars. The recipe's popularity led Nestlé to create and begin selling chocolate chips in 1939.

Today's cookie maker can now choose from milk, white, sweet or bitter chocolate chips, along with mint, butterscotch, peanut butter, cinnamon and other flavor chips, offered in several sizes by a variety of manufacturers.

### ◀ Sidebars

Sidebars present additional information on food history, food in culture and the background of professional food service. Flavor sidebars discuss how flavorings and other ingredients may be used to change the character of a product. Convenience product sidebars present prepared ingredients available to help streamline production. These sidebars help explain baking and pastry arts in a wider social context and provide additional resources that support a student's work in the bakeshop.

## ▼ Questions for Discussion

Questions for Discussion located at the end of each chapter are aligned with the chapter's Learning Objectives. These questions encourage the integration of theory and technique for a broader understanding of the material presented. Some questions require library or online research to emphasize the importance of assimilating information and seeking solutions beyond primary classroom materials.

## QUESTIONS FOR DISCUSSION

- 1 Describe important influences on the baking industry in the 21st century.
- 2 Many contemporary confections and pastries are rooted in ancient recipes. Use the internet and library resources to research a product such as a cake, cookie or candy that was originally popularized in the 19th or 20th century and discuss how its taste and preparation technique have evolved over time.
- 3 List three different types of bakery operations and explain their similarities and differences.
- 4 What are the roles of the executive chef and the pastry chef in the modern kitchen brigade?
- 5 Describe the key attributes of a baking and pastry professional, and things you can do to develop the skills, taste and judgment required to advance your career.
- 6 Review the 2017 Food Code and discuss its impact on sanitary practices in the bakeshop.
- 7 What precautions should you take to ensure that food allergens do not contaminate baked goods, pastries and other foods?

# Comprehensive Teaching and Learning Package

## FOR THE INSTRUCTOR



Imagine what you could do if every student came to class ready to learn.

Revel is an engaging, digital, learning environment that prepares your students for class through a continuous experience—anytime, anywhere, on any device.

Using this learning-science based technology, your students will be able to:

- **Read, or listen to, the On Baking content on any device**
- **Practice concepts through multiple interactivities that check their understanding**
- **Stay engaged using videos and writing exercises**
- **Finish each chapter with an auto-graded quiz**

**With the assignability and performance tracking tools in Revel, you can:**

- **Set the pace for progress:** Revel allows educators to indicate precisely which reading must be completed by which dates. This clear, detailed calendar helps students stay on task by eliminating ambiguity as to which material will be covered during each class. When students understand exactly what is expected of them, they are better motivated to keep up.
- **Focus your time and resources on students' needs:** Using the performance dashboard, educators can monitor class assignment completion as well as individual student achievement. Actionable information, such as points earned on quizzes and tests and time on task, helps educators engage with their students in meaningful ways. For example, the trending column in the performance dashboard reveals whether students' grades are improving or declining, helping educators identify students who might need help staying on track.
- **Provide easy access on the first day of class:** LMS integration provides institutions, instructors, and students easy access to their Revel courses via Blackboard Learn™ and Canvas™. With single sign-on, students can be ready to access Revel's interactive blend of authors' narrative, media, and assessment on their first day.

## INSTRUCTOR TEACHING RESOURCES

### Online Instructor's Manual

Includes chapter outlines, objectives and summaries, a list of figures and key terms, and problem-based learning exercises.

### PowerPoint Lecture Presentations

This comprehensive set of slides can be used by instructors for class presentations or by students for lecture preview or review. There is a presentation for each chapter, including a selection of full-color photographs from the book. Available through the Revel platform or the Instructor Resource Site.

### TestGen (Computerized Test Bank)

The TestGen program contains preloaded text-based questions for instructors to use to create their own exams and quizzes.

## FOR THE STUDENT

**Revel for On Baking** brings concepts to life!

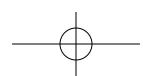
Revel was designed to help every student come to class ready to learn. Using this seamless, digital, learning experience, students are continuously engaged in reading, learning with interactives, exploring key topics with videos, and practicing with flashcards and check your understanding questions. Each chapter includes a shared writing activity covering a key topic, and ends with a quiz assessing mastery of the learning objectives.

This engaging presentation has been designed to encourage students to complete their assigned reading and retain what they've read, so they can show up to class better prepared to participate and learn.

- **Provides an all-in-one solution:** Fully digital and highly engaging, Revel gives students everything they need for the course—all in one continuous, integrated learning experience. Highlighting, note taking, and a glossary let students read and study however they like. Educators can add notes for students, too, including reminders or study tips.
- **Encourages practice and review:** Embedded assessments such as quizzes and concept checks give students opportunities to check their understanding at regular intervals before moving on. Assessments in Revel let instructors gauge student comprehension frequently, provide timely feedback, and address learning gaps along the way.
- **Enables learning anytime, anywhere:** The Revel mobile app also lets students read, practice, and study—anywhere, anytime, on any device. Content is available both online and offline, and the app syncs work across all registered devices automatically, giving students great flexibility to toggle between phone, tablet, and laptop as they move through their day. The app also lets students set assignment notifications to stay on top of all due dates. Available for download from the App Store or Google Play.

Audio available on any device, including Alexa!





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# About the Authors



## SARAH R. LABENSKY

Chef Sarah is a culinary educator with an extensive background as an academic administrator, restaurateur, caterer and advocate for culinary professionalism. She is currently a chef-instructor for Oceania Cruises. From 2014 to 2019, Chef Sarah was a professor at Woosong University's Sol International Culinary Arts School in Daejeon, Korea. She was also Founding Director of the Culinary Arts Institute at Mississippi University for Women and a professor of culinary arts at Scottsdale (Arizona) Community College. While in Mississippi, Chef Sarah owned two restaurants and worked as food and beverage director for a country club. Before teaching, Chef Sarah spent many years as a pastry cook and caterer.

In addition to *On Baking*, Chef Sarah is coauthor of *On Cooking; The Prentice Hall Dictionary of Culinary Arts* and *Applied Math for Food Service*. She holds a J.D. from Vanderbilt University, is a past president of the International Association of Culinary Professionals (IACP) and is a charter member of the Southern Foodways Alliance. Chef Sarah's passions include travel and mentoring young people along their own professional paths.



## PRISCILLA MARTEL

Chef Priscilla is a professional chef, educator and food writer with a special interest in almonds, Mediterranean cuisines and artisan baking. She honed her cooking skills at Restaurant du Village, a country French restaurant she opened in Chester, Connecticut, in 1979. Today she operates All About Food, which holds several baking patents and collaborates with food manufacturers and restaurants to create innovative products, menus and marketing programs.

Chef Priscilla is a visiting instructor at Boston University's certificate program in the culinary arts and in the Hospitality Management Program at Gateway Community College in New Haven, Connecticut. She is also a contributing writer for *Gourmet Retailer* among other food trade publications. To honor her commitment to help young people prepare for their culinary careers, Chef Priscilla advises Pro Start Culinary teams in Connecticut. She is coauthor of *On Cooking: A Textbook of Culinary Fundamentals* (Pearson, 6th edition, 2019) and *Math for Bakers* (DVD).



## EDDY VAN DAMME

Chef Eddy Van Damme, born in Belgium, studied Baking and Patisserie in Belgium and France. As a teenager he wanted nothing more than to come to America, which he loves and where he has made his home. He is a passionate baking professor at Houston Community College, where he inspires students to reach their maximum potential. Chef Eddy constantly researches, innovates and perfects recipes. He has won numerous competitions and awards and holds five ACF Gold medals. He travels at least twice a year to Europe to remain current in the latest patisserie trends. He creates recipes for Imperial Sugar, Dixie Crystals and other companies.

Chef Eddy has been featured on American and European television shows. When asked what his favorite baking subject is, he answers "The entire bakery/patisserie/confectionery field is extraordinarily spectacular to me and I deeply treasure it all". Currently he is developing allergen-free and nutrition-enhanced bakery goods.



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# Preface

*On Baking: A Textbook of Baking and Pastry Fundamentals* builds on the successful approach developed in *On Cooking: A Textbook of Culinary Fundamentals*. This is a carefully designed text intended to teach both the principles and practices of baking and the pastry arts. The baking information presented in *On Cooking* is suitable for culinary students seeking a general knowledge of baking. *On Baking* takes the same clear, organized approach and expands the material into far greater depth, covering techniques and formulas required for core and advanced baking and pastry programs.

This text aims to teach professional culinary students core baking principles and the skills necessary to produce a wide array of baked goods, desserts and confections. Our goal is not merely to offer a collection of recipes or formulas, although there are over 750 formulas and variations for a wide variety of baked goods and confections. We include these formulas to illustrate the techniques presented in the teaching sections of each chapter. Throughout the text, we discuss both the “how” and “why” of baking. Extensive step-by-step photographs help illustrate techniques used to, for example, form bread dough, shape cookies or temper chocolate, while complete formulas present the baking principles and procedures. Throughout the text we provide extensive illustrated sections identifying bakeshop ingredients and equipment. We believe that a thorough understanding of the function of ingredients will serve you well throughout your baking career.

Winner of the 2004 **Gourmand World Cookbook Award as the “Best Book for Food Professionals in the World,”** *On Baking* has been uniformly praised for its organization, clarity, ease of use and use of quality photography to illustrate professional techniques. This fourth edition seeks to further enhance the content included in prior editions.



## THE STORY BEHIND THIS UPDATE

Much of the feedback received since *On Baking* was first published indicates that students and instructors appreciate a text with clear, thorough explanations of fundamental techniques used in professional bakeries. Users also look for an assortment of formulas for making classic pastries and items served at modern bakery cafés as well as dishes that reflect an interest in plant-based cooking and wider cultural influences. We have edited this text to improve readability for today's student and to align procedures, formulas and photos more closely. New and revised formulas speak to current trends. New photographs clearly illustrate baking procedures and techniques. Because pastry and baking programs vary in content and depth, we incorporated material appropriate for a range of skill levels and interests. Expanded coverage of advanced yeast bread, confectionary and pastry work addresses the needs of a variety of pastry and baking programs.

## A NOTE ON RECIPES AND FORMULAS

The featured formulas, as recipes are called in the bakeshop, are designed to reinforce and demonstrate techniques presented within each chapter. Many of these formulas intentionally produce smaller yields, which are more appropriate for students beginning to learn about baking and for small schools and teaching kitchens. Professional bakeshops prefer to measure ingredients by weight, so volume measurements are used only when the quantity of an ingredient is difficult to weigh without specialized equipment: less than  $\frac{1}{2}$  ounce (30 grams) of salt, leavening or spices, for example. All ingredients are listed in both **U.S.** and **metric measurements** with the metric equivalents rounded to even, easily measured units when possible.

It is important to understand that the U.S. and metric quantities of ingredients are actually separate formulas; do not measure some ingredients in the metric amounts and other ingredients in the U.S. amounts, or the ratios will not be accurate and the intended result will not be achieved. We provide **yields** in either total batch weight or total yield and offer suggested portion sizes where appropriate.

**Baker's percentages** are included with many formulas, especially those for breads and flour-based products. Widely used in the professional bakeshop, baker's percentages are very useful for increasing or decreasing yields as needed.

We present detailed procedures for standard techniques, then generally do not repeat them in each formula (for example, "apply egg wash" or "divide the dough"). A **mise en place** feature is included with formulas that appear in the front section of formula chapters. Ingredients that require preparation before beginning to assemble the formula are listed in the margin. Consult this brief checklist after you read the formula but before you begin to bake. No matter how detailed the written formula, however, we must assume that you possess certain knowledge, skills and judgment.

**Variations** appear at the end of selected formulas. These variations enable you to see how a set of techniques or procedures can be used to prepare different dishes or new flavors with only minor modifications. Variations also provide the advanced baker or pastry chef the opportunity to customize formulas for different applications. **Headnotes** that describe the cultural or historical background of a bread or pastry or the unique techniques used in its preparation appear with many of the formulas. This short text should enhance your understanding of a baking style or technique.

**Baking instructions** are based on the use of a conventional oven. If a convection oven is used instead, you may need to reduce the temperatures by 25–50°F (15–30°C) from those recommended in the recipes. Watch the baking time as well because convection ovens can cook as much as 20 percent faster than conventional ovens.

A registered dietitian analyzed each formula using nutritional analysis software that incorporates data from the U.S. Department of Agriculture, research laboratories and food manufacturers. The **nutrient information** provided here should be used only as a reference, however. A margin of error of approximately 20 percent can be expected because of natural variations in ingredients. Preparation techniques and serving sizes may also significantly alter the values of many nutrients. In the nutritional analysis for a formula that offers a choice of ingredients, the first-mentioned ingredient is the one used unless stated otherwise. Ingredients listed as "as needed" are omitted from the analysis. Corn oil, whole milk, unsalted butter and table salt are used throughout for "vegetable oil," "milk," "butter" and "salt," respectively. In cases of a range of ingredient quantities or numbers of servings, the average was used.

Throughout this text the Good Choice symbol highlights formulas that are particularly low in calories, fat, saturated fat or sodium; if appropriate, these formulas may also be a good source of vitamins, protein, fiber or calcium. Gluten-free, vegetarian and vegan formulas found in Chapter 18, Healthy Baking and Special Diets, are indicated with the symbols shown here.



Gluten Free



Vegan

Bakeshop products are often challenging to produce from start to finish in a single two- to three-hour class session. Formulas that can be produced in a limited amount of time are printed in blue in the master formula list on pages xx through xxv. If a dough, pastry or frozen component must rest or chill overnight before it can be used, that formula

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will not be highlighted even if the final preparation can be made quickly. Should components such as tart dough or puff pastry be readily available, more of the formulas in this text may be prepared in a two- to three-hour class. As in restaurant and bakery settings, however, many breads and pastries will need to be made in stages. For example, puff pastry can be produced one day, then refrigerated for baking and assembly on a later day. This reinforces the component approach to pastry preparation, in which fillings, doughs, toppings, icings and such can be prepared in advance and assembled in various ways to complete desserts and pastries. Similarly, starters for yeast breads, doughs and fillings for Danish pastries and many dessert sauces can be prepared days in advance of final use.

Baking is both an art and a science. It is best learned through hands-on experience combined with study of the principles that underlie each technique. As a student, you should rely on the knowledge and skills of your instructor for guidance. Although some skills and an understanding of theory can be acquired through reading and study, no book can substitute for repeated, hands-on preparation and observations. We hope you enjoy *On Baking*!

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