



# GUILD SOMM

## *Beer*

### STAFF TRAINING GUIDE

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Learning about beer requires an understanding of its long history as one of the oldest alcoholic beverages, its ingredients, the brewing process, and how beer styles evolved. Few beverages are as tied to history, culture, technology, sociology, and evolving human taste and trends as beer. These factors have shaped the styles known and loved today.

#### ***What is beer?***

Beer is an alcoholic beverage made from malted cereal grains such as barley that are flavored with hops (a plant), brewed, and fermented by the action of yeast.

It is important to study the ingredients that make beer and how each affects flavor and style. Brewers can add almost anything to a beer—and they do! Myriad ingredients including fruit, spices, chocolate, coffee, honey, bacon, donuts, and even certain strains of bacteria and wild yeast can add additional flavor, aroma, texture, and alcohol to beer. But there are four essential building blocks: malt, water, hops, and yeast.





# Malt

Beer is made from malted grain. Wine grapes have a sugar source ready and waiting for yeast to eat, or *metabolize*, to create alcohol. But grain needs an extra step to create the fermentable sugar necessary to produce alcohol.

*Malt* is shorthand for a grain that has undergone a process called malting, in which the grain is allowed to partly germinate. This is done by mimicking the plant's growth cycle as it gets ready to produce a new shoot or plant. Enzymes begin breaking down carbohydrate stores inside the seed, making them available to be converted into sugars so that fermentation can occur.

Malted barley is considered the best grain for brewing, but other grains such as corn, wheat, rice, rye, and oats are also used. The grain chosen can impact the appearance, taste, body, mouthfeel, and foam of a beer.

## Sometimes called the soul of beer, malt:

**Provides the sugar needed to create alcohol.** Malted barley is the source of the sugars that are fermented into alcohol.

**Determines beer color.** After grains become malt, they are *kilned*, or roasted. The various hues of beer—from a very pale straw to a medium amber all the way to an intense black—are directly related to the kilning process: its length, its temperature, and the amount of moisture present. A lightly roasted malt will produce a very pale beer, while a deeply roasted malt will produce a dark or black beer.

**Contributes to beer aroma and flavor.** Just like toasting a piece of bread or roasting a rack of lamb, kilning grain transforms its flavors. “Malty” beers have sensory characteristics directly associated with the roasting process.

**Creates sweetness and body.** Malt is generally very sweet from the sugars created during malting. After fermentation, sugar and proteins uneaten by the yeast are often left over. A beer with a lot of leftover sugar will have a fuller body and often taste sweeter, whereas one with less residual sugar will typically be drier and have a lighter mouthfeel.

### Malt Aromas & Flavors

- Toasty: Dough, cracker, biscuit, toast, burned toast
- Nutty: Nuts, grain, burned grain
- Roasty: Chocolate, coffee, espresso
- Sweet: Honey, toffee, caramel
- Dried Fruit: Raisin, prune

### Malt-Driven Beers

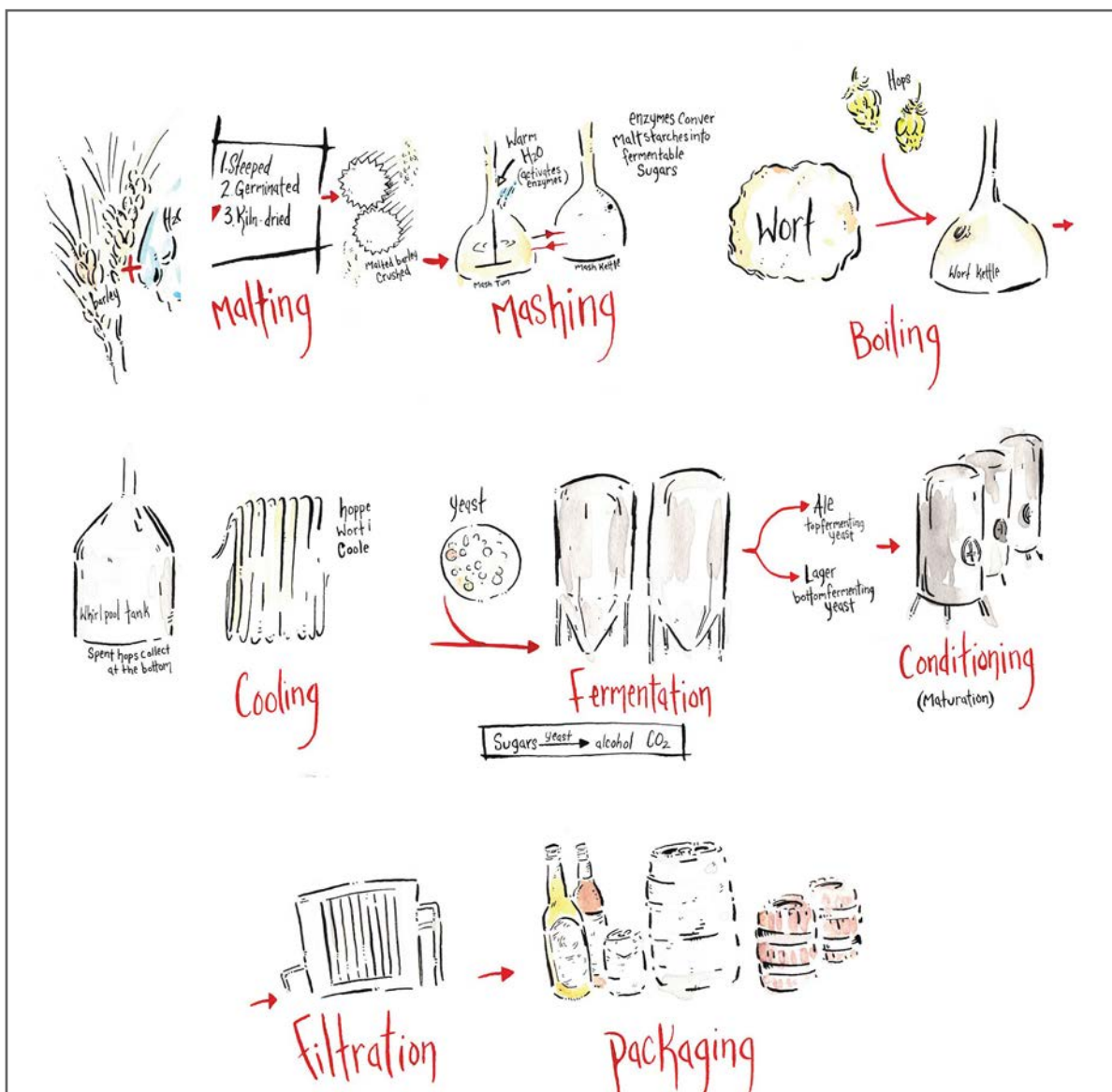
Style	Examples
Pale Lager	Stella Artois, Heineken
Oktoberfest	Victory Festbier, Ayinger Oktober
Vienna Lager	Negra Modelo, Sam Adams Vienna Style Lager
American Amber	New Belgium Fat Tire, Rogue American Amber
Brown Ale	Newcastle, Sam Smith Nut Brown
Doppelbock	Paulaner Salvator, Bell's Consecrator
Porter	Fuller's London Porter, Anchor Porter
Stout	Guinness



# Water

Water represents 85% to 95% of most beers and plays an important role in brewing chemistry. Water minerals bring flavors to beer such as chalk, flint, and sulfur. Historically, in the classic European beer cities, breweries were built close to suitable supplies of good water. The composition of the local water influenced the beer styles and brewing traditions that arose.

For many beer styles, an ideal type of water will either accentuate or reduce the impression of certain ingredients. Since the introduction of industrial water treatment technology in the early 20th century, breweries all over the world have been able to create water compositions that mimic those of classic brewing cities, allowing them to make traditionally styled beers.



The beer production process



# Hops

Hops are the flowering “cone” of the *Humulus lupulus* plant and have been used in brewing since at least the 11th century, possibly even longer. The plant thrives in sunny and dry climates, winding its way up and around training wires and growing over 25 feet high.

The cones of the plant have globules of a yellow substance called lupulin that contains bitter resins and aromatic oils that impact the resulting beer. There are hundreds of varieties of hops, each with a unique combination of oils and levels of bitter resins.

Just as certain grape varieties are associated with classic wine regions, hop varieties grown in specific areas give signature aromas and flavors to beers. Several hop varieties are associated with their tiny regions of origin, thus defining regional beer styles.

Top hop-growing areas include classic European brewing regions such as Germany, England, Belgium, and the Czech Republic. Slovenia and Alsace also have ideal climates for growing hops. In the US, the Pacific Northwest is the hotbed of production, and Washington’s Yakima Valley is the most significant source of hops.

## Hops play an important role in beer because they:

**Contribute an array of aromas and flavors.** Hops provide brewers with a varied palette of flavors from which they can draw.

**Impart bitterness to beer.** This is essential, as bitterness balances malt sweetness.

**Act as a preservative** due to their antimicrobial properties.



Hop plants



Hops



# Hops, continued

Nearly all beers have hops (a style called gruit ale uses herbs instead of hops), but the mere presence of hops doesn't make a beer taste hoppy. Many beer styles are achieved by striking a fine balance between malt and hop impressions. Further, the amount, variety, and point at which hops are used in the brewing process impact the intensity of bitterness and aromatics in the resulting beer.

IBUs, or International Bitterness Units, are a good indication of a beer's bitterness; this number can often be found on beer packaging or a brewery website. The scale runs from about 5 to over 120 and reflects bitterness from hops. Generally, the higher the IBU, the more bitter the beer. Yet this is just a reference point. Brewing is about the balance of ingredients, working toward a desired style, and moderating the interplay of the sweet malt with the bitterness of hops. Just because a beer has a high IBU number does not mean the beer will be perceived as bitter.

## Hop Aromas & Flavors

- Citric: Lemon, grapefruit, tangerine
- Fruity: Mango, peach, apricot, passionfruit
- Herbal: Mint, chervil, bay leaf, lemongrass, grassy
- Resin: Pine, cannabis
- Floral
- Spicy

## Hop-Driven Beers

Level of Hops	Style	Examples
Lightly hopped	Kölsch	Früh, Gaffel, Reissdorf
	International Lager	Heineken, Corona, Budweiser
Moderately hopped	Pilsner	Pilsner Urquell, Firestone Walker Pivo Pils
	Helles	Spaten München, Great Lakes Dortmunder Gold
	English Pale Ale	Bass Pale Ale, Fuller's London Pride
	Extra Special/Strong Bitter (ESB)	Fuller's ESB
Intensely hopped	American Pale Ale	Sierra Nevada Pale Ale, Deschutes Mirror Pond Pale Ale
	American IPA	Bell's Two Hearted Ale, Founders Centennial IPA, Stone IPA
	American Double/Imperial IPA	Dogfish Head 90 Minute IPA, Russian River Pliny the Elder





# Yeast & Fermentation

Yeasts are single-celled fungi cultivated since ancient Mesopotamian times for brewing and baking. In beer, as in wine, yeast metabolizes sugar and creates alcohol, CO<sub>2</sub>, and a host of other aromatic chemical compounds.

*Yeast + Sugars in malt → Alcohol + CO<sub>2</sub> + other chemical compounds*

Two strains of brewing yeast developed over time: ale yeast and lager yeast. Most beers are fermented with one of these two types, with only a few notable exceptions fermented by the action of wild yeasts or souring bacteria.

Like the other primary ingredients, yeast impacts the nose and the flavors of beer. Many of the sensory characteristics that result from the fermentation process mimic fruits, flowers, and spices.

### Ale Yeast: *Saccharomyces cerevisiae*

Ale yeast, also known as brewer's or baker's yeast, works at warmer temperatures (about 70°F or higher), rousing a relatively fast-paced fermentation that creates fruity and spicy aromatic compounds. Typically, fermentation occurs close to the top of the beer, creating a thick layer of yeast foam.

### Lager Yeast: *Saccharomyces pastorianus*

Lager yeast prefers cool temperatures (50 to 55°F), ferments at a very slow pace, and sinks to the bottom of the tank. Lagers have more subtle and clean flavors, with minimal fruity or spicy characteristics.

### Wild Yeast: *Brettanomyces*

While *Brettanomyces* is generally reviled in wineries, it is embraced in some breweries. There are many strains of Brett that impart potent funky flavors, ranging from earth and barnyard to overripe tropical fruits.

### Souring Bacteria: *Lactobacillus* & *Pediococcus*

Usually thought of as scary spoilage bacteria in wine and food, *Lactobacillus* and *Pediococcus* provide the tart twang beloved in yogurt or kimchi. If a brewer adds these types of bacteria, the resulting "sour beer" will taste acidic and sour. Some wild ales can be categorized as sour beer as well.

## Yeast-Driven Beers

Category	Aromas & Flavors	Style	Examples
German Weizenbier	Banana Clove	Hefeweizen	Harpoon UFO, Weihenstephaner Hefeweissbier
Many Belgian-styled beers	Fruity Floral Black pepper Spicy	Saison	Saison Dupont, Ommegang Hennepin
		Belgian Golden Ale	Duvel, Russian River Damnation
		Belgian Dubbel	Allagash Dubbel, Chimay Red
		Belgian Tripel	Westmalle Trappist Tripel, Victory Golden Monkey
Brettanomyces	Funky, earthy, barnyard Leather Tropical fruits	American Brett Beers	Boulevard Saison Brett, Russian River Sanctification
		Lambic	Cantillon Gueuze



# Selling Beer

As you make recommendations, be aware of ABV, or alcohol by volume. Beers can be sneaky in their alcohol content.

A basic understanding of beer and beer styles can help beverage professionals steer their guests to great recommendations or pairings. It is key to gauge a guest's preferences for flavor, sweetness, bitterness, and sourness. Use easy-to-understand descriptors of essential ingredients to guide conversation with guests and identify styles they will enjoy.

## Engage guests on their taste preferences using ingredient focus:

**Malt:** From light-toasted bread to caramel, toffee, chocolate, and espresso.

**Hops:** From low-to-no bitterness, to moderate bitterness, to full-on hophead status. Keep in mind that today, many hoppy beers are quite aromatic, without a lot of bitterness.

**Yeast:** From fruity and spicy to funky, earthy, and wild.

**Other:** A guest might love sour beers or sweeter beers with fruit added.

Simple descriptors	Recommended style
Refreshing thirst-quencher	International Lager
Refreshing & aromatic	Witbier Hefeweizen Saison
Refreshing, tart, & tangy	Gose Berliner Weiss
Mild & easygoing	American Amber Ale American Amber Lager Oktoberfest
Low-to-moderate hop bitterness	Pilsner Kölsch Helles English Pale Ale
Intense hop bitterness	American Pale Ale
Pale, aromatic, & potent	Saison Belgian Golden Ale Belgian Tripel
Dark, full flavored, rich, & roasty	London-Style Porter Irish-Style Stout
Dark, intensely flavored, & potent	Doppelbock American Porter American Stout American Imperial Stout Barley Wine
Funky	American Brett Beers American Wild Ales
Funky & tart	Lambic Flemish Red-Brown American Sour Ales American Wild Ales
Very sweet & fruity	Fruit-Sweetened Lambic



# *Review Questions*

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1. What are the four essential beer ingredients?
2. Name three ways malt impacts beer.
3. What is the most important cereal grain used for beer?
4. Describe the sensory impacts of hops on beer.
5. What are IBUs?
6. How are wild beers different from sour beers?

