Beer is brewed in many different styles, defined by six key elements:

- Geography & Climate
- Aroma & Taste Profile
- Culture & History
- Yeast & Fermentation
- Ingredients
- Brewing Technology
Unique geographic circumstances lead to development of a style. Some examples:

- Airborne microflora around Brussels for Lambic’s unique spontaneous fermentation
- Soft water in the Czech city of Plzeň (Pilsen) allowed the creation of a pale lager with smooth bitterness
- Native American six-row barley varieties (high enzyme & protein) are well suited to brewing with unmalted cereal grains
Ingredients have a major impact on appearance, aroma and flavor of beer:

- The main ingredients for beer making are barley (malt) and hops

- Specialty ingredients:
  - Specialty malts like chocolate malt and caramel malt
  - Specialty extracts (honey, sugar, etc.)
  - Fruit such as raspberries, cherries and citrus fruits
  - Spices including vanilla and nutmeg
Brewing technology has a direct impact on the properties of beer:

- Specialized equipment can be used to control specific parameters during the brewing process.

- Temperatures and residency times can be varied depending on desired outcome.
Yeast and fermentation can also define a beer style:

- Based on the yeast strain used, beers can be classified as lagers or ales.
- There are a few styles that have characteristics of both lagers and ales and are classified as hybrids.
- In addition to yeast, some beers are fermented using bacteria like *lactobacillus* to create unique flavors and aromas.
### Ales

- Top fermenting yeast - *Saccharomyces cerevisiae*
- Warm fermentations (~20°C/70°F)
- Short/no maturation
- 5-20 day cycles
- Fruity, robust flavors

### Lagers

- Bottom fermenting yeast - *Saccharomyces uvarum (carlsbergensis)*
- Cold fermentations (~10°C/50°F)
- Cold maturation
- 10-30 day cycles
- Clean, crisp flavors
Aroma and taste combine to create a wide range of flavor profiles and appearance. For example:

- **Stouts** have roasted, coffee notes
- **American Pale Ales** have prominent hoppy aroma and flavor
- **Munich Dark Lager** has a pronounced malt character with little hop bitterness and aroma
Beer Styles:
Ales
American Ale: 
Pale Ale

Popular style based on English pale ale

- Beer with significant NW hop character (Cascade)
- Dry hopped
- Citrusy hop aroma, bitter, malty
- Commercial examples:
  - Sierra Nevada Pale Ale, Drifter Pale Ale

4.5 – 6.0% ABV
30 – 50 IBU
**English Ale:**

**Bitter/Pale Ale**

*Bitter, slightly malty, slightly fruity, floral hop aroma, low CO₂*

- Types: Ordinary, Nut Brown, Special (Best), ESB
- Bitters are cask conditioned versions of pale ale
- Pale Ale malt and English hop varieties, e.g. Fuggles, Goldings
- Commercial examples:
  - Bass, Boddingtons, Goose Island Honker’s Ale

3.2 – 4% ABV
25 – 35 IBU
**English Ale:**

**India Pale Ale**

*Higher in alcohol, more bitter with a distinctive hoppy-citrusy signature*

- Traditionally IPAs were brewed stronger and with more hops in order to survive long journeys aboard ships to India

- Pale Ale/crystal malts, English (traditional IPA) and US (American IPA) hop varieties

- Often dry hopped

- Very bitter, malty, hoppy, strong

- Commercial examples:
  - Goose Island IPA, Long Hammer

6 – 8% ABV
50 – 60 IBU
English Ale: Porter

Originally brewed for English laborers in 1700’s; style almost dead in England

- Porters are generally lighter bodied than stouts
- Dark & caramel malts
- Caramel, nutty, toffee character
- Commercial examples:
  - Brahma Porter, Andes Porter

4 – 6% ABV
18 – 40 IBU
English Ale: Stout

Opaque, black ale

- Types: Irish, Milk, Imperial, Oatmeal, Oyster
- Brewed with roasted barley
- Bitter, roasted/burnt flavor
- Commercial examples:
  - Quilmes Stout, Goose Island Bourbon County Stout, Red Hook Double Black Stout, Widmer Milk Stout, Guinness

3.5 – 10% ABV
25 – 60 IBU
English Ale: Barley Wine

*High gravity, high alcohol ales*

- Can be aged for long periods, like wine
- Sometimes wine yeasts or rousing needed to complete the fermentation
- Strong, malty, chewy, bitter
- Commercial examples:
  - Old Embalmer, Johan the Barleywine

8 – 12% ABV
35 – 65 IBU
German Ale: Kölsch

*Smooth, fruity, slightly sweet/bitter, tart*

- Cologne (Köln) appellation
- Fermented warm, aged cold
- Pale and (sometimes) wheat malts
- Commercial examples:
  - Dom, Früh
  - Küppers
  - Reissdorf
  - Goose Island Summertime

4 – 5% ABV
20 – 30 IBU
German Wheat Ale: Weissbier

Also brewed as “Dunkle Weizen” and filtered versions called “Kristall Weisse”

- Hefeweizen = unfiltered wheat beer
- Special ale yeast, <50% wheat malt
- Spicy, clove & banana esters (4-VG, isoamyl-acetate), low bitterness, high CO₂
- Commercial example:
  - Franziskaner

4 – 5.5% ABV
8 – 15 IBU
German Wheat Ale: 
Berliner Weisse

“Champagne of the North”

- Intentional lactobacillus activity
- Often served with dash of fruit syrup (raspberry, woodruff)
- Sour, tart, fruity, high carbonation
- Commercial examples:
  - Berliner Kindl
  - Schultheiss

2.8 – 4% ABV
3 – 8 IBU
Belgian Ale: Abbey or Trappist

Proven links to a specific abbey

- Trappist beers are abbey beers brewed in a Trappist monastery
- House, Dubbel, Trippel strengths
- Wild yeast and bacterial activity
- Estery, phenolic, malty

Commercial examples:
- Leffe, Chimay
- Orval (involves wild yeast and bacteria fermentation)

5 – 9% ABV
25 – 40 IBU
Belgian Ale: 
Lambic

*The oldest surviving brewing technique*

- Aged hops (Surannes), unmalted wheat, fruit
- Spontaneous fermentation

**Varieties:**

- Gueuze: Blended Lambic (bottle conditioned)
- Fruit: Raspberry (Framboise), Cherry (Kriek)
- Faro: candy sugar added to Gueuze Tart, fruity, sour, high CO₂

**Commercial example:**

- Belle-Vue
Belgian Ale: Wit

*Belgian white or wheat beer*

- Unmalted wheat up to 50% of grist
- Spiced with coriander/Curaçao
- Extended mash cycles
- Unfiltered, (usually) bottle conditioned
- Crisp, fruity, refreshing

**Commercial examples:**

- Hoegaarden
- Red Hook Wit

4.5 – 5.5% ABV
3 – 8 IBU
Belgian Ale: Many Others

- Various styles:
  - Flanders Red: sweet/sour from West Flanders
  - Flanders Brown: “Zuur” (sour)
  - Saison: sweet, tart, summertime beers
  - Strong Ales: complex, strong Ale

- Wide variety of attributes

- Commercial example:
  - Hertog Jan Grand Prestige
Beer Styles:

Lagers
German Lager: German Pilsner

Drier, lighter color and body than Bohemian Pilsner

- German malts and noble hops
- Adheres to German Reinheitsgebot
- Hoppy, crisp, clean
- Commercial examples:
  - Spaten
  - Beck’s

4 – 5.5% ABV
25 – 35 IBU
German Lager: Münchener Helles

Created in Munich in 1895 by G. Sedlmayer at the Spaten Brewery

- Pale, everyday beer of Munich (“hell” in German = pale)
- Adheres to German *Reinheitsgebot*
- Malty flavors dominate
- Slightly sweet, malty, hoppy
- Commercial example:
  - Löwenbräu

4.7 - 5.4% ABV
16 - 22 IBU
German Lager: Märzen / Oktoberfest

*German amber lager, first brewed in the early 1800’s*

- Brewed in spring to age in summer (März = March)
- Adheres to German *Reinheitsgebot*
- Malty, medium bitterness
- Commercial example:
  - Spaten Märzen
German Lager: Münchener Dunkel

Classic style from Munich

- “Dunkel” = dark
- Adheres to German Reinheitsgebot
- Very malty, complex
- Balanced hop bitterness
- Commercial examples:
  - Löwenbräu Dunkel
  - Beck’s Dark

4.5 – 5.6% ABV
18 – 28 IBU
German Lager: Bock

Originated in Einbeck Germany – 1300’s

- Strong, malty, complex beer
- Adheres to German *Reinheitsgebot*
- German law: > 16°B OG
- Commercial examples:
  - Hertog Jan Bockbier
  - Quilmes Bock

6.3 – 7.4% ABV
23 – 35 IBU
German Lager: Doppelbock

Strong German lager originally brewed by Bavarian monks

- Strong, rich, malty, complex
- German law: > 18°B OG
- Names end in “-ator”
- Special version: Eisbock - ice crystals removed during cold maturation
- Commercial example:
  - Triumphator

7 - 14% ABV
25 - 35 IBU
Belgian Lagers

*Slightly less bitter and dryer than their German cousins*

- Hoppy notes coming from the classical noble European hop varieties (Saaz)
- Uses a high proportion of barley malt and some unmalted cereals to deliver a crispier finish
- Commercial example:
  - Stella Artois
Lager: American Lager

Most popular beer style in the world

- Based on Pilsner style, but with additional unmalted cereals to create a smooth round finish
- Most difficult style to brew
- Crisp, refreshing
- Commercial examples:
  - Budweiser
  - Michelob
  - Busch

4.2 – 5.1% ABV
8 – 15 IBU
Lager:
American Light Lager

*Lower calorie version of American Lager*

- Different regulatory requirements may dictate the definition of “Light”

- Most difficult style to brew because of an extended and complex mashing process necessary after fermentation

- Light, crisp, dry

- Commercial examples:
  - Bud Light, Busch Light, Michelob Ultra

3.2 – 4.2% ABV
6 – 12 IBU
Beer Styles:
Specialties
Non-Alcohol Varieties

Great beer taste profiles without the alcohol

- Malt based beverages
- Can either be non-fermented or fermented with alcohol removal during later stages of production
- In some countries, cannot be labeled “beer”
- Commercial examples:
  - O’Doul’s, O’Doul’s Amber, Busch NA, Hoegaarden 0.0, Jupiler Force, Quilmes Lieber, Stella Artois NA, Siberian Crown NA, Franziskaner Hefe-Weissbier NA
Smoked Beers

Smoking adds complex flavor notes

- Malts smoked over peat (Scotland) or Beechwood/Alderwood (Franconia, Germany)

- Strong smoky (often meta-cresol) note

- Commercial examples:
  - Goose Island Bourbon County Smoke
Herb/Spice Beer

Seasonal twists, and more

Ingredients used include:

- nutmeg
- vanilla
- cinnamon
- coriander
- chili
- ginger

Some were traditional ingredients before hops became popular
Miscellaneous Flavors & Ingredients

*The sky is the limit*

- Alternative adjuncts and/or flavoring ingredients can be used in beer
- Commercial examples show the wide range of approaches:
  - Shock-Top Pumpkin Wheat, Ed’s Cave Creek Chili Beer, San Andreas Woodruff Ale, Left Hand JuJu Ginger Ale, Bison Coriander Rye