Cicerone® Certification Program
Advanced Cicerone® Syllabus

Updated June 1, 2019

This syllabus outlines the knowledge required of those preparing for the Advanced Cicerone® exam. While this list is comprehensive in its scope of content, further study beyond the syllabus is necessary to fully understand each topic. At the Advanced level, candidates are expected to possess knowledge of a wide range of beer service practices. This syllabus covers pouring and glassware cleaning techniques from around the world. The content tested on the Advanced Cicerone exam is a subset of the information presented within the Master Cicerone® syllabus, and individual syllabi for all four levels of the program may be found on the cicerone.org website.

Outline

(Full syllabus begins on next page.)

E. Creating a pairing
F. Designing a meal
G. Classic beer and food pairings
H. Cooking with beer

Full Syllabus

I. Keeping and Serving Beer

- A. Purchasing and accepting beer
  - 1. Assessing age and physical condition of beer shipment
    - a. Check date code if available (See section I.C.2.a for information on how to interpret date codes)
    - b. Physical condition of container
      - i. Container should not be dented or broken
      - ii. Container should not show any signs of leakage or box weakness
    - c. Temperature
      - i. Ideally beer will still be cool when it reaches the retailer—if beer is warm or hot to the touch when it arrives, its flavor may have changed substantially during shipment
- B. Serving alcohol
  - 1. Alcohol's effects
    - a. Absorption and elimination
    - b. Physical and behavioral indicators
  - 2. Responsible serving practices
    - a. Provide accurate ABV information to consumers
    - b. Adjust serving size based on ABV
- C. Beer storage
  - 1. Beer is best consumed fresh
    - a. When beer is released from the brewery, it is ready to drink
    - b. Certain types of beers may age in ways that make them interesting to drink months or years later if properly cellared, but the majority of beer should be consumed fresh
  - 2. Rotate inventory
    - a. Check date codes regularly
      - i. Meaning of code
        - Some date codes indicate the best-by date
          - In much of the world (including Europe, Central and South America, the Caribbean, and parts of Asia), alcoholic products with less than 10% ABV are required to display a best-by date
        - Some date codes indicate the bottling/packaging date
          - In regions where a best-by date is required, some brands will include a bottling/packaging date in addition to the best-by date
      - ii. Types of codes (order and number of digits may vary)
        - Traditional consumer date codes (e.g., 061512 = June 15, 2012)
        - Julian/ordinal date codes (364-14 = December 30, 2014)
        - Some breweries have their own proprietary date code format
    - b. Ensure that beer is consumed in the order of dating
    - c. Remove out of date products from service inventory
    - d. General freshness guidelines
      - i. Draft beer

        - Non-pasteurized draft beer can remain fresh for about 45–60 days (refrigerated)
        - Pasteurized draft beer can remain fresh for about 90–120 days (refrigerated)
        - When not refrigerated or subjected to other stresses, shelf life decreases significantly
    - ii. Bottled/canned beer
        - If kept refrigerated, can remain fresh for up to 6 months
            - Hoppy styles like IPA are more susceptible to the effects of time, and may show flavor changes in as little as 3 months, even when refrigerated
        - When not refrigerated or if subjected to other stresses, may be noticeably off after 3 months
        - Taste aged product against fresh product to determine deterioration
  - e. Train staff to promote and sell all beers offered
3. Store beer properly
  - a. Refrigerated storage is best for all beers at all times, excepting cask beer
    - i. If beer is not refrigerated, keep inventories small and sell the beer quickly
  - b. Cask ales should be stored in a temperature-controlled environment which is kept at cellar temperature—52–55 °F (11–13° C)
  - c. Non-refrigerated storage accelerates aging and development of off flavors
    - i. With time, all beers will develop signs of oxidation (diminished hop flavor and aroma; malt shift towards honey, caramel, toffee, etc.; papery and wet cardboard flavors)
    - ii. Bottle-conditioned beer or unfiltered beer with yeast present may develop signs of autolysis (umami, meaty, soy sauce, and/or rubbery flavors)
    - iii. Microbial contamination sometimes occurs in packaged beer resulting in various off flavors, depending on the contaminant
  - d. Temperature changes within a reasonable range (e.g., moving beer from cold storage (38 °F/3 °C) to room temperature storage (68–77 °F/20–25 °C) or vice versa) are not inherently damaging to a beer's flavor, though the beer will remain fresh for longer if stored at cold temperatures at all times
  - e. Beer should not be allowed to reach temperatures in excess of 77 °F (25 °C) as these conditions lead to rapid flavor degradation
  - f. Bottled beers can pick up moldy flavors when stored improperly
    - i. Beer stored in damp environments may develop cork taint (trichloroanisole) and other musty/moldy flavors
4. Protect beer from light
  - a. Skunky flavor (also known as lightstruck flavor) is caused by sunlight, fluorescent light, and most LED lights and is most noticeable in the aroma of the beer
  - b. Skunking may be evident after just a couple minutes of light exposure
  - c. Bottled beers are subject to skunking
    - i. Brown glass blocks most of the wavelengths of light that cause skunking, and therefore offers superior protection to clear and green glass
    - ii. Green glass blocks very little of the light that causes skunking
    - iii. Clear glass offers no protection against skunking

        d. Cans, ceramic bottles, and bottles in closed case boxes that completely shield beer from light give maximum protection from skunking
    5. Serve beer properly
        a. Draft beer must be served using CO_2 or a CO_2-nitrogen mix at the proper pressure setting
        b. Compressed air should never be used to pressurize traditional kegs in which the dispense gas comes into contact with the beer
            i. Single-use kegs with an internal bag holding the beer can be served using compressed air since the gas does not come into contact with the beer
        c. A party pump (a manually operated pump that attaches to the top of a keg to allow for temporary dispense of beer by pushing air into the keg) limits the flavor stability of the beer to **less than one day** because oxygen is put in contact with the beer
D. Draft principles
    1. CO_2 pressure is applied to maintain the carbonation level of beer during dispense
        a. Each beer is carbonated to a specific level. The brewer or brand owner should provide this information to the retailer
        b. The retailer must manage the temperature of the beer, the pressure applied to the keg, and the gas blend used in order to maintain this carbonation level
            i. Systems with long draws often employ blended gas to dispense beer
        c. Systems at different altitudes/elevation levels require adjustments to the gas pressure applied to kegs to maintain carbonation
    2. As beer moves from the keg to the faucet, it encounters resistance to flow from the primary elements of the draft system
        a. Friction in the draft lines
        b. Changes in elevation
        c. Variable resistance devices on faucet if present
    3. The relationship between applied gas pressure and resistance to flow determines the flow rate of beer at the faucet
        a. Draft systems with high resistance values may use beer pumps to contribute to the force provided by the applied gas pressure
E. Draft systems
    1. Draft system components[1]
        a. Pressure side components
            i. Gas cylinder and bulk tank
            ii. Nitrogen generator
            iii. Air compressor
                - **Never** use with traditional kegs
                - May be used with single-use kegs with an internal bag holding the beer
                - May be used to power beer pumps
            iv. Gas blender
            v. Beer pump
            vi. Gas distributor/manifold
            vii. Primary and secondary regulators

[1] Advanced Cicerone® candidates should be familiar with the function and anatomy of each draft system component.

        viii. Gas line
        ix. Coupler
            - Coupler systems: A, D, G, M, S, U, and KeyKeg®
    b. Beer side components
        i. Keg
            - Stainless steel
            - Single-use
        ii. Bulk serving tanks
        iii. Coupler
        iv. Jumper line
        v. Foam on Beer detector (FOB)
        vi. Wall bracket
        vii. Trunk line/python (an insulated bundle of beer line and glycol line)
        viii. Beer line (vinyl, barrier, stainless, etc.)
        ix. Choker line and other restriction devices
        x. Draft tower
        xi. Beer faucet
            - Standard (rear shutoff) faucet
            - Nitro faucet
            - Flow control faucet
            - European faucet
            - Ventless faucet
            - Roto faucet
    c. Cooling system components
        i. Glycol power pack/glycol chiller
        ii. Trunk line/python
2. Types of cooling systems
    a. Refrigerated storage
        i. Direct draw
        ii. Glycol-cooled
        iii. Air-cooled
    b. Unrefrigerated storage (cellar temperature or room temperature)
        i. Glycol chiller
            - Beer enters glycol chiller and is cooled to serving temperature
            - Python is used to keep beer cold as it travels from the chiller to the draught tower
                - Beer line carries beer from chiller to bar
                - Coolant lines carry chilled water or glycol to maintain beer temperature
    c. Cask beer
        i. Cask lines travel alongside coolant lines filled with cellar-temperature water
3. Draft system design
    a. System balance
        i. Dynamic resistance
        ii. Static resistance
4. Draft system operation

        a. Around the world, draft systems can be split into two basic groups—those in which kegs are refrigerated and those in which kegs are stored at cellar temperature or room temperature. Refrigerated storage is always the best option for preserving beer freshness
            i. Refrigerated storage
                - Standard cooler and system temperature of 38 °C (3 °C)
            ii. Unrefrigerated storage
                - Kegs are stored at cellar temperature or ambient temperature. Cooler storage temperatures will help slow degradation of beer flavor
        b. Troubleshooting
            i. No beer at faucet
            ii. Beer foaming
            iii. Flat beer
            iv. Cloudy beer
        c. High-volume configurations
            i. Series kegs
    5. Draft system maintenance
        a. Cleaning of lines, faucets, couplers, and FOBs
            i. Draft cleaning equipment
            ii. Manual cleaning of draft system components
            iii. Draft line cleaning process
        b. Use proper personal protective equipment (rubber gloves and eye protection)
        c. Criteria for proper cleaning[2]
            i. Frequency
            ii. Cleaner type
            iii. Concentration
            iv. Temperature
            v. Method and contact time
            vi. Flow rate (for dynamic cleaning)
        d. Safety issues for the operator and the consumer
F. Beer glassware
    1. Select appropriate glassware
        a. Size
            i. Higher alcohol beers should be served in smaller glasses
            ii. Glass should provide room for an appropriately sized head
        b. Shape
            i. Cultural and historical traditions connect certain glasses to specific styles
            ii. Glass shape impacts the aesthetics of presentation of a beer
            iii. Shape can also impact the perceived flavor and aroma of a given beer
        c. Brand
            i. Branded glasses matched to beer
    2. Use "beer clean" glassware
        a. Each glass must be cleaned before refilling. Do not refill a used glass

[2] The Cicerone® Certification Program uses the Draught Beer Quality Manual as the reference source for proper draft system cleaning criteria. You can access the manual online at draughtquality.org.

b. Glass cleaning procedures vary from region to region. What follows is a list of some of the most common procedures from across the globe
   i. Three-sink method
      - Prepare the three sinks for glassware cleaning
         - The first sink should be filled with warm water and a non-petroleum based (sudsless) detergent
         - The second sink should contain cool, clean rinse water that is being continually refreshed through use of an overflow tube
         - The third sink should contain hot water and an appropriate sanitizer at the correct concentration as specified by the manufacturer
      - Empty the glass into an open drain
      - Wash glass in the first sink with soap and a brush
      - Rinse glass in cold water in the second sink, heel in, heel out
      - Rinse glass in sanitizer in the third sink, heel in, heel out
      - Dry glass inverted on a rack so air circulates inside
   ii. Two-sink method
      - Prepare the two sinks for glassware cleaning
         - The first sink should be filled with warm water and a non-petroleum based (sudsless) detergent
         - The second sink should contain cool, clean rinse water that is being continually refreshed through use of an overflow tube
      - Empty the glass into an open drain
      - Wash glass in the first sink with soap and a brush
      - Rinse glass in cold water in the second sink, heel in, heel out
      - Dry glass inverted on a rack so air circulates inside
   iii. Spülboy
      - Set up Spülboy with appropriate detergent
      - Empty glass into open drain
      - Clean glass in brush bucket
      - Rinse glass using Spülboy glass rinser
      - Dry glass inverted on rack so air circulates inside
   iv. Glass washing machine
      - Empty the glass into an open drain
      - Place glass upside down on the rack of the dishwasher
      - Run the wash cycle according to the manufacturer's instructions
      - After washing, dry glass inverted on a rack so air circulates inside
      - Glass washing machine considerations
         - Use a machine dedicated to beer glassware ONLY. Do not use this machine to clean dishes or glassware with food or dairy residue (e.g., coffee mugs with cream or milk added, cocktails incorporating egg whites or cream, etc.)
            - Fats from food or dairy will coat other glassware in the washer resulting in dirty glasses and poor head retention
         - Use correct detergent and sanitizer—check concentrations daily or follow detergent and sanitizer supplier recommendations

- Water temperature should range between 130 and 140 °F (54–60 °C). High temperature machines designed to operate at 180 °F (82 °C) may be used in place of chemical sanitizers (though local health departments may have additional requirements)
- Maintain washer to assure proper water flow through each nozzle and washer arm
- Regularly service machine following manufacturer's guidelines to ensure proper operation
- Periodically check the interior of the dish washer to be sure that it is free of mold and debris

c. How to check that glass is beer clean
   i. Without beer
      - Sheeting (wet glass interior and then empty glass; water should sheet off of glass evenly; formation of droplets or webbing indicates that the glass is not beer clean)
      - Salt test (wet glass interior, empty glass and then sprinkle salt throughout; places where salt does **not** adhere are not beer clean)
   ii. With beer
      - Head size, shape, retention—good head formation and retention are signs of a beer clean glass
      - Bubbles clinging to the sides of the glass (in liquid beer) indicate that the glass is **not** beer clean
      - During consumption, lace will cling to the side of a beer clean glass following each sip

3. Preparation to serve
   a. Glass temperature
      i. Glasses should not be warm to the touch when filled
      ii. Room temperature and chilled glasses are acceptable
      iii. Frozen/frosted glasses are not recommended—they cause foaming, they make beer too cold, and frozen water or sanitizer may be present
   b. Cold water rinse of glass before filling
      i. Removes residual sanitizer
      ii. Cools glasses that may be warm from washing
      iii. Aids ideal head formation and retention
      iv. Do NOT rinse used glasses with a glass rinser—glass rinsers should only be used with clean glassware

G. Serving bottled beer
1. Prepare for service
   a. Bottle-conditioned beer should be stored upright prior to service
      i. Bottle-conditioned beer is carbonated by yeast in the package, and consequently contains some amount of sediment
   b. If possible, store beer at ideal serving temperature as dictated by style. Otherwise store all beer under refrigeration (43 °F/6 °C or less)
2. Examine bottle
   a. Look for white flakes (snow-like) which can indicate old, unstable beer. Do not serve beer in this condition

   b. Look for a thin ring of residue at liquid level in the neck of the bottle, which is generally indicative of a bad bottle if present. Do not serve beer in this condition
   c. Check for yeast on the bottom of the bottle
      i. Retain yeast in bottle unless:
         - Consumer requests yeast to be poured
         - Style (e.g., Weissbier) is traditionally poured with yeast
      ii. To pour yeast, rouse by swirling, rolling, or inverting
3. Open bottle
   a. Twist-off crown
      i. Twist off by hand
      ii. Napkin may be used to aid grip and protect hand
   b. Pry-off crown
      i. Prefer openers with a bar or other lift area at least 0.25 in (0.5 cm) wide to prevent the possibility of breaking the bottle during opening
      ii. Lift in one motion
   c. Mushroom cork
      i. Practice cork safety—keep bottle pointed away from consumer at all times
      ii. Remove wire cage by untwisting the tab
      iii. Hold thumb over cork at all times once cage has been removed
      iv. Grip the cork in one hand (a napkin may be used to aid your grip) and the bottle in the other. Remove cork by twisting the bottle to loosen the cork
      v. When removing the cork, do so slowly and gently so as not to disturb sediment and make the beer volatile
   d. Crown plus cork
      i. Practice cork safety—keep bottle pointed away from consumer at all times
      ii. Lift crown as described in I.F.3.b
      iii. Corkscrew will be required after removing crown
      iv. Place the tip of the corkscrew on the center of the cork and turn clockwise to drive the corkscrew into the cork
      v. When removing the cork, do so slowly and gently so as not to disturb sediment and make the beer volatile
   e. Wax-dipped crown
      i. Use a paring knife or the blade of a wine key to cut out a small notch of wax directly below the crown to allow a bar key to reach under the crown
      ii. Use a bar key to pry the crown off of the bottle, being careful to ensure that no flakes of wax fall in to the bottle
      iii. Use a clean bar towel to wipe any wax debris from the lip of the bottle
4. Final bottle check
   a. Check bottle lip—do not serve beer from bottles with broken or damaged lips
   b. Also examine bottle lip for rust, dried beer, or yeast that could affect flavor or appearance of the beer
   c. If the bottle has a cork, retain and present it to the consumer
      i. In the case of a rare, unusual, or new beer, the crown should be retained to present to the consumer
5. Pouring bottled beer
   a. Filtered beer

i. Beers bottled without yeast or other sediment—the entire contents of the bottle can be poured into the glass
ii. Hold the glass at a 45-degree angle and pour down the side of the glass until the glass is half full
iii. Gently tilt the glass upright and pour down the middle to create approximately 1 inch (2.5 cm) of foam head on the beer as the pour finishes. German wheat beers and Belgian ales traditionally should have 2–3 in (5–8 cm) of head

b. Unfiltered beers
   i. Some beers are packaged unfiltered or with yeast in the bottle. In most cases, yeast and sediment should be retained in the bottle
   ii. Throughout the pour, be careful not to disturb the sediment
   iii. Hold the glass at a 45-degree angle and pour down the side of the glass until the glass is half full
   iv. Gently tilt the glass upright and pour down the middle to create an appropriate amount of foam for the style being served
   v. While finishing the pour, watch the neck of the bottle and be prepared to stop pouring when the yeast moves toward the top of the bottle
   vi. When in doubt about whether to include the yeast, ask the consumer their preference

H. Serving draft beer
1. Pouring a beer
   a. **Never** put the faucet in contact with the glass or allow it to become immersed in the beer or foam in the glass
   b. Hold the glass at a 45-degree angle, 1 inch (2.5 cm) below the faucet
   c. Grip the faucet handle near the base and pull forward to the fully open position to start the flow of beer
      i. When a faucet is only open partially, beer will pour foamy
   d. Pour down the side of the glass until the glass is half full
   e. While continuing to pour, gently tilt the glass upright and pour down the middle to create an appropriate amount of head on the beer as the pour finishes
   f. Close the faucet as the foam cap reaches the top of the glass to prevent beer waste
2. Pouring a beer and cutting with a beer spatula (common in Belgium and the Netherlands)
   a. **Never** put the faucet in contact with the glass or allow it to become immersed in the beer or foam in the glass
   b. Fully open the faucet and allow a small amount of beer to pour down the drain
   c. After half a second of beer flow, move the glass into place below the open faucet, holding the glass at a 45-degree angle, 1 inch (2.5 cm) below the faucet
   d. Pour down the side of the glass until the glass is half full
   e. While continuing to pour, gently tilt the glass upright and pour down the middle to create an appropriate amount of head on the beer as the pour finishes
   f. Close the faucet as the foam cap reaches the top of the glass and set the beer on a drip tray away from the faucet so that drips from the faucet do not fall into the glass
   g. As the foam is rising out of the glass, cut the foam using a wetted beer spatula held at a 45-degree angle

   h. Dunk the glass in a sink filled with clean rinse water to remove any beer or foam from the outside of the glass
   i. Place the beer on a coaster in front of the consumer with any branding facing the consumer
3. Pouring nitro beer
   a. **Never** put the faucet in contact with the glass or allow it to become immersed in the beer or foam in the glass
   b. Hold the glass at a 45-degree angle, 1 inch (2.5 cm) below the faucet
   c. Pull the tap handle forward to the fully open position to start the flow of beer
   d. Pour down the side of the glass until the glass is three-quarters full
   e. Allow the beer to settle for 1–2 minutes, and then pour down the middle to create an appropriate amount of head on the beer as the pour finishes
4. Changing a keg (same product)
   a. Kegs must be chilled to draft system operating temperature (generally 38 °F/3 °C) before tapping and serving—the general guideline is to place kegs in the cooler at least 24 hours before serving
   b. For D-, G-, S-, and U-system couplers:
      i. Grip keg coupler handle, then pull out and raise the handle to the “up” or “off” position to disengage. Turn the coupler a quarter turn (90 degrees) counterclockwise to unseat. Lift off of the keg
      ii. Seat the coupler on a new keg. Turn clockwise a quarter turn (90 degrees) to lock the coupler in place, then lower the coupler handle to the “down” or “on” position to engage
   c. For A- and M-system couplers:
      i. Grip keg coupler handle, then depress the button on the underside of the handle (if a button is present) and raise the handle to the “up” or “off” position to disengage. Slide the coupler off of the keg valve
      ii. Slide the coupler on to the keg valve of a new keg. Lower the coupler handle to the “down” or “on” position to engage
   d. In systems that use them, the foam on beer detector (FOB) for the keg needs to be reset after a keg change. This is done by venting the FOB mechanism to release foam and gas from the chamber
5. Changing products on a line
   a. Ensure that the proper coupler for the new product is correctly installed
   b. If necessary based on contrast between products:
      i. Rinse or clean lines
      ii. Replace jumper hose (in extreme cases)
   c. Ensure that the gas blend and pressure are properly set for the new product

I. Other draft service practices
1. Growlers, crowlers, and draft beer to go
   a. Filling techniques and shelf life
   b. Closures (open container laws)
   c. Cleaning and reusing growlers
   d. Safety considerations
2. Temporary draft systems
   a. Party pump/picnic pump

            i. Hand pump
            ii. Single-use CO_2 cartridge
        b. Jockey box
            i. Types
                - Coil style
                - Cold plate
            ii. Operation
                - Set up of box
                - Gas and pressure settings
                - Cleaning and maintenance
        c. Lindr machines (mobile dispense unit)
    3. Cask-conditioned ale
        a. Definition of real ale (CAMRA)
        b. Conditions required to achieve carbonation
        c. Cask service components
            i. Cask
            ii. Tap
            iii. Soft and hard spiles/pegs
            iv. Keystone
            v. Shive
            vi. Sparkler
            vii. Beer engine
            viii. Cask breather
        d. Common cellar systems
            i. Traditional stillage
            ii. Autotilt stillage
            iii. Siphon (syphon)
            iv. Widge (floating inlet)
        e. Cellaring cask ale
            i. Stillaging
            ii. Spiling
            iii. Tapping
            iv. Assessing readiness for service
                - Clarity
                - Condition (carbonation level)
                - Flavor
                - Temperature
            v. Spile management
                - At the start of service, hard spiles must be removed from each cask to be served. At the end of service, hard spiles must be replaced in each cask that was on service
                    - Instead of using a hard spile, in some modern cask ale service systems a vent valve may be opened at the start of service and closed at the end of service
                    - Some establishments will leave a soft spile in the shive during service, but this can contribute to difficulty in pulling beer through the engine

f. Cask ale service
    i. Gravity dispense
    ii. Beer engine
        - Short spout
            - **Never** put the faucet in contact with the glass or allow it to become immersed in the beer or foam in the glass
            - Hold the glass at a 45-degree angle, 1 inch (2.5 cm) below the faucet
            - Pull the handle smoothly and steadily. Straighten the glass gradually as it fills to create an appropriate amount of head on the beer as the pour finishes
                - In the UK, traditionally the head on a cask ale should be no more than 0.4 in (1 cm). In the US, a more generous head–up to 1 inch (2.5 cm)–is typical
        - Swan neck with sparkler
            - Hold clean glass vertically with sparkler positioned against the bottom of the glass
            - Pull the handle smoothly and steadily. Gradually lower the glass as it fills, but always keep the sparkler below the foam, immersed in the liquid beer
            - Allow to settle and serve
                - In the UK, traditionally the head on a cask ale should be no more than 0.4 in (1 cm). In the US, a more generous head–up to 1 inch (2.5 cm)–is typical
            - Since the swan neck is immersed in the beer during the pour, regularly wipe down the swan neck with a clean, micro-fiber, lint-free cloth
    iii. Impact of sparkler use

g. Cask ale inventory and cellar management
    i. Casks should be sold within three days of being tapped for dispense
    ii. If two beer engines serve the same beer, use a double cask tap (one container to two beer engines) to empty the cask more quickly
    iii. Stock levels for continuous supply of standard ales
        - Minimum stock level: 3 days demand
        - Maximum stock level: 10 days demand
    iv. Rotate stock in the cellar, using oldest stock first
    v. Only store casks in temperature-controlled cellar
    vi. Do not store food in beer cellar

h. Cask system maintenance
    i. Cask lines should be cleaned weekly or on cask changes
    ii. Dismantle and clean cask taps and extractors with line cleaning solution and brush immediately after use
    iii. Store pegs/spiles, hop filters, and cask taps in a clean, dry place
    iv. Scrub autotilts and stillages weekly

II. Beer Styles

A. Understanding beer styles

1. Historical development of beer styles

      a. First driven by available ingredients, equipment, and water
      b. Shaped by technology, taxes and regulations, culture, consumer appeal, etc.
   2. Style guidelines are cataloged principally by:
      a. Beer Judge Certification Program[3]
      b. Brewers Association[4] (US)

B. Style parameters
   1. Quantitative parameters of beer character
      a. Alcohol content
         i. By volume (ABV)
         ii. By weight (ABW)
      b. International Bitterness Units (IBUs)
      c. Color
         i. SRM
         ii. EBC (SRM x 1.97 = EBC)
      d. Carbonation (Volumes of CO_2 or g/L)
      e. Original Gravity (OG)
      f. Final Gravity (FG)
      g. Apparent attenuation
   2. Qualitative parameters of beer character
      a. Appearance
      b. Aroma
      c. Flavor
      d. Finish/Aftertaste
      e. Mouthfeel
      f. Perceived bitterness

C. Beer style knowledge
   1. Knowledge requirements of the styles listed in this section
      a. Quantitative knowledge of the upper and lower limits for ABV, IBUs, and SRM
      b. Approximate quantitative knowledge of apparent attenuation and carbonation level
      c. Qualitative knowledge of the flavor profile and all mouthfeel characteristics
      d. Knowledge of the style's historical development
      e. Knowledge of four commercial examples covering classic producers and other notable producers of the style globally
   2. Beer styles by region
      a. Belgium and France
         i. Lambic beers
            - Lambic
            - Gueuze
            - Fruit Lambic (Kriek, Framboise, etc.)
         ii. Flanders ales

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[3] The Cicerone® Certification Program uses the 2015 BJCP Style Guidelines as the reference source for all quantitative style parameters in its exams. You can access the guidelines online at bjcp.org and through their mobile device apps.

[4] Certified Cicerone® and Advanced Cicerone® candidates should be aware of the US Brewers Association guidelines. Master Cicerone® candidates should have familiarity with the general differences between the BA and BJCP guidelines and should have knowledge of BA categories that do not exist in the BJCP guidelines.

        - Flanders Red Ale
        - Oud Bruin
    - iii. Trappist and abbey ales
        - Trappist Single
        - Belgian Dubbel
        - Belgian Tripel
        - Belgian Dark Strong Ale
    - iv. Pale Belgian beers
        - Belgian Blond Ale
        - Belgian Pale Ale
        - Belgian Golden Strong Ale
    - v. Unique beers
        - Saison
        - Bière de Garde
        - Witbier
- b. Britain and Ireland
    - i. England
        - Pale ales
            - Ordinary Bitter
            - Best Bitter
            - Strong Bitter
            - British Golden Ale
            - English IPA
        - Dark ales
            - Dark Mild
            - British Brown Ale
            - London Brown Ale
            - English Porter
            - Sweet Stout
            - Oatmeal Stout
            - Tropical Stout
            - Foreign Extra Stout
        - Strong ales
            - British Strong Ale
            - Old Ale
            - English Barleywine
    - ii. Scotland
        - Scottish Light
        - Scottish Heavy
        - Scottish Export
        - Wee Heavy
    - iii. Ireland
        - Irish Red Ale
        - Irish Stout
        - Irish Extra Stout
- c. Germany, Czech Republic, and Austria

i. Lagers
   - Pale
     - German Leichtbier
     - German Pils
     - Munich Helles
     - German Helles Exportbier
     - Czech Pale Lager
     - Czech Premium Pale Lager
   - Amber or dark
     - Vienna Lager
     - Czech Amber Lager
     - Czech Dark Lager
     - Festbier
     - Märzen
     - Munich Dunkel
     - Schwarzbier
     - Rauchbier
   - Bocks
     - Helles Bock
     - Dunkles Bock
     - Doppelbock
     - Eisbock

ii. Ales
   - Wheat/rye beers
     - Weissbier
     - Dunkles Weissbier
     - Weizenbock
     - Berliner Weisse
     - Gose
     - Lichtenhainer
     - Roggenbier
   - Rhine Valley ales
     - Altbier
     - Kölsch

d. United States

i. Pale lagers
   - American Light Lager
   - American Lager

ii. Pale ales
   - American Wheat Beer
   - American Blonde Ale
   - American Pale Ale
   - American Amber Ale

iii. IPAs
   - American IPA
   - New England IPA

- Double IPA
- Specialty IPA
  - Belgian IPA
  - Black IPA
  - Brown IPA
  - Red IPA
  - Rye IPA
  - Session IPA
  - White IPA

iv. Dark ales
- American Brown Ale
- American Porter
- American Stout
- Imperial Stout

v. Strong ales
- American Strong Ale
- American Barleywine
- Wheatwine

vi. Historic styles
- Cream Ale
- California Common

vii. Specialty beers (beers made with novel ingredients and/or processes)
- Novel ingredients
  - Alternate grains and malts (e.g., rye, spelt, etc.)
  - Smoked malts
  - Sugars and other non-malt fermentables (e.g., honey, molasses, etc.)
  - Fruits and vegetables
  - Herbs, spices, and natural flavorings (e.g., coffee, chocolate, etc.)
- Novel processes
  - Fermentation with non-*Saccharomyces* organisms (e.g., *Brettanomyces*, *Lactobacillus,* etc.)
  - Fermentation or aging with barrels/wood of various types

e. Other regions

i. International
- International Pale Lager
- International Amber Lager
- International Dark Lager

ii. Poland
- Piwo Grodziskie

iii. Scandinavia
- Baltic Porter
- Sahti

III. Beer Flavor and Evaluation

A. Taste and flavor

1. How we perceive flavor

- a. Aroma
  - i. Orthonasal
  - ii. Retronasal
- b. Taste
  - i. Established
    - Sweet
    - Salty
    - Sour
    - Bitter
    - Umami
  - ii. Emerging
    - Fat
  - iii. Tongue map myth
    - The different tastes are not mapped to distinct regions of the tongue
    - All of the tastes can be perceived on all parts of the tongue
- c. Mouthfeel
  - i. Body
  - ii. Carbonation
  - iii. Astringency
  - iv. Creaminess
  - v. Alcoholic warming

2. Variations in taste perception
   - a. Genetic and biological differences
   - b. Personal/behavioral factors
     - i. Smoking, coffee, food preferences
   - c. Mental and psychological factors
3. Beer evaluation
   - a. Temperature
     - i. Beer reveals more flavor as its temperature increases and should be served between 38 and 55 °F (3–13 °C) depending upon its style
   - b. Components of evaluation
     - i. Appearance
     - ii. Aroma
     - iii. Taste
     - iv. Mouthfeel
     - v. Finish/Aftertaste
   - c. Key evaluation techniques
     - i. Aroma techniques
       - Distant Sniff: Swirl beer while holding glass 6–8 in (15–20 cm) away from nose and take one to two short sniffs
       - Drive-by Sniff: Swirl beer; slowly pass glass across your face, underneath your nose; take a few short sniffs as the glass passes by
       - Short Sniff: Swirl beer; bring glass to nose and take one to two short sniffs
       - Long Sniff: Swirl beer; bring glass to nose and take one long sniff
       - Covered Sniff: Cover glass with hand; swirl beer for 3 to 5 seconds; bring glass to nose, remove hand, and sniff

ii. Use a consistent background to assess the color and clarity of the beer
iii. Beer should reach all parts of the tongue during tasting
iv. Flavor perception continues after swallowing

B. Normal beer flavors
1. Malt and grain flavors
   a. Pale beer: Uncooked flour, bread dough
   b. Golden beer: White bread, wheat bread, water cracker
   c. Light amber beer: Bread crust, biscuit, graham cracker
   d. Amber beer: Toast, caramel, pie crust
   e. Brown beer: Nutty, toffee, chocolate, dark/dried fruit
   f. Black beer: Roast, burnt, coffee
2. Hops
   a. Bitterness, flavor, and aroma effects
   b. Traditional regional hop traits
      i. American: Piney, citrus, resiny, tropical fruit, catty, onion/garlic
      ii. Australian/New Zealander: Passionfruit, melon, pear, stone fruit, tropical fruit
      iii. English: Earthy, herbal, woodsy
      iv. German/Czech: Floral, perfumy, peppery, minty
   c. Familiarity with flavors of specific hop varieties from each region
3. Fermentation flavors
   a. *Saccharomyces* fermentation
      i. Lager yeast
      ii. Ale yeast
         - American ale yeast
         - English ale yeast
         - Belgian ale yeast
         - Weizen yeast
   b. Acidic fermentation
      i. Lactic acid bacteria
      ii. Acetic acid bacteria
   c. *Brettanomyces* fermentation

C. Specific beer flavor compounds
1. Aldehydes
   a. Acetaldehyde
   b. Grainy (isobutyraldehyde)
   c. Trans-2-nonenal
2. Esters
   a. Ethyl acetate
   b. Ethyl butyrate
   c. Isoamyl acetate
   d. Know range of flavors associated with other esters
3. Organic acids
   a. Acetic acid
   b. Butyric acid
   c. Isovaleric acid
   d. Lactic acid

4. Phenols
    a. 4-ethylphenol (4EP)
    b. 4-vinylguaiacol (4VG)
    c. Chlorophenol
    d. Vanillin
    e. Know range of flavors associated with other phenols
5. Sulfur-containing compounds
    a. Catty—4MMP (4-methyl-4-mercaptopentan-2-one)
    b. DMS (dimethyl sulfide)
    c. H_2S (hydrogen sulfide)
    d. Lightstruck—3MBT (3-methyl-2-butene-1-thiol)
    e. Mercaptan (methanethiol)
    f. SO_2 (sulfur dioxide)
6. Vicinal diketones (VDKs)
    a. Diacetyl
7. Other compounds
    a. Damascenone
    b. Geosmin/earthy
    c. Metallic
    d. Cork taint—TCA (Trichloroanisole)

D. Other beer flavors
1. Oxidation/aging flavors
    a. Diminished hop flavor and aroma
    b. Decreased bitterness
    c. Damascenone
    d. Malt shift—increased honey/caramel/toffee/dark fruit
    e. Papery/wet cardboard (trans-2-nonenal)
    f. Waxy/lipstick
    g. Sherrylike
2. Autolysis
3. Astringent/tannic

E. Tasting exam format
1. On the Advanced Cicerone® tasting exam, you must perform the following exercises[5]:
    a. Off-Flavor Identification—By taste, detect and identify off flavors by comparing spiked samples to a control beer
        i. The possible flavors present in this panel are acetaldehyde, acetic acid, chlorophenol, diacetyl, DMS, H_2S, isovaleric acid, lactic acid, lightstruck, mercaptan, metallic, and trans-2-nonenal
    b. Consumer-Focused Description—Based on your sensory analysis of an unknown sample, offer five specific, evocative flavor descriptors to convey the key flavors found in the sample
    c. Style Discrimination—By taste, correctly categorize a sample as one of four beer styles

[5] To view a sample Advanced Cicerone® tasting exam, visit cicerone.org.

   d. Technical-Focused Description—Based on your sensory analysis of an unknown sample, offer a complete descriptive analysis of the flavor profile of the beer, covering appearance, aroma, flavor, and mouthfeel, using technical (chemical) terminology when appropriate

IV. Beer Ingredients and Brewing Processes

- A. Ingredients
  - 1. Grains
    - a. Malted barley
      - i. Unique properties of barley related to brewing
      - ii. Barley cultivation
        - Species of barley
        - Varieties of barley
        - Cultivation areas
      - iii. Stages of the malting process
      - iv. Process variations that lead to different malt types
        - Kilned base malts: Pils, Pale Ale, Vienna, Munich
        - Kilned specialty malts: Victory®, Biscuit®
        - Stewed: Crystal/caramel
        - Roasted: Chocolate, black
      - v. Malting variations
        - Roasting drums
        - Floor malting
    - b. Wheat, oats, rye, and other specialty grains
      - i. Characteristics of different forms
        - Raw
        - Malted
        - Flaked
        - Torrified
        - Roasted
      - ii. Contributions to wort and beer
      - iii. Requirements for processing/using
    - c. The use of corn and rice in beer
      - i. Contributions to wort and beer
      - ii. Requirements for processing
      - iii. Styles that use corn and/or rice
  - 2. Hops
    - a. Anatomy of the hop plant and cone
    - b. Cultivation and processing
      - i. Structure and layout of hop field
      - ii. Life cycle of hop plants
      - iii. Attending to the hop plant
        - Pruning
        - Training
      - iv. Factors affecting yield and quality
        - Agronomic considerations

            - Climate
            - Pests and diseases
            - Pollination
        v. Harvesting, drying, and baling
        vi. Storage, processing, and delivery to breweries
    c. Growing regions[6]
        i. Continental Europe
            - Germany
                - Hallertau
                - Spalt
                - Tettnang
            - Czech Republic
                - Saaz
            - Belgium
            - Slovenia
            - Poland
            - France
            - Spain
        ii. Britain
            - Kent
            - Sussex
            - Herefordshire
            - Worcestershire
        iii. United States
            - Yakima Valley, Washington
            - Oregon
            - Idaho
        iv. Australia and New Zealand
        v. Other regions
            - China
            - Japan
            - South Africa
    d. Categories of hops
        i. Bittering hops (high alpha acid content)
        ii. Aroma hops (desirable flavor and aroma properties)
            - Noble hops (Hallertau Mittelfrüh, Spalt, Tettnang, Saaz)
        iii. Dual-use hops (possessing properties of both bittering and aroma hops)
    e. Chemistry
        i. Alpha acid isomerization
        ii. Flavor and aroma impact of hop oils
            - Four major compounds (myrcene, humulene, caryophyllene, farnesene)
            - Additional compounds (e.g., linalool, geraniol, 4MMP, etc.)
    f. Hop forms and products used in brewing
        i. Whole hops

[6] Advanced Cicerone® candidates should be familiar with the names and characteristics of key hop varietals from each region.

    ii. Pellet hops
        - T-90 pellets
        - T-45 pellets
    iii. Extracts
        - Alpha acid
        - Hydro-isomerized alpha acid (skunk resistant)
        - Isomerized alpha acid
        - Essential oils
    iv. Lupulin powder (e.g., Cryo Hops®)
  g. Uses and effects during brewing
    i. Bittering contribution of hops added at different times during the boil
    ii. Flavor and aroma hop additions and effects
        - Boil
        - Hot wort steep/whirlpool
        - Dry hopping
    iii. Novel uses
        - Mash hopping
        - First wort hopping
        - Wet hopping
        - Hop back

3. Yeast
  a. Taxonomy
    i. Ale yeast
        - *Saccharomyces cerevisiae*
        - Generally produce esters in levels which give fruity flavors to finished beers
        - Some possess a certain gene (known as the POF+ or PAD+ gene) which results in production of phenolic flavors such as clove, nutmeg, and/or white pepper
    ii. Lager yeast
        - *Saccharomyces pastorianus* also known as *Saccharomyces carlsbergensis*
        - Generally do not produce esters or phenols in appreciable quantities, resulting in a focus on malt and hop character
    iii. Wild yeast
        - Non-brewing strains of *Saccharomyces* can cause off flavors or excessive attenuation
  b. Factors impacting fermentation characteristics
    i. Aeration
    ii. Pitching rate
    iii. Fermentation temperature
    iv. Yeast health
  c. Non-*Saccharomyces* organisms
    i. Important organisms
        - *Brettanomyces* species
            - *B. bruxellensis*
            - *B. anomalus* (Commonly referred to as *B. claussenii)*

- *Acetobacter* species
- *Lactobacillus* species
- *Pediococcus* species

ii. Intentional use
iii. Unintentional appearance

4. Water
   a. Water makes up 90+% of the weight of beer
   b. Chemistry of water
      i. Chlorine
         - Off flavors associated with chlorine
         - Common techniques for removal
      ii. Minerals
         - Calcium
         - Carbonate/bicarbonate
         - Chloride
         - Sodium
         - Sulfate
      iii. Water cycle and sources of salts
      iv. Permanent and temporary hardness
      v. Alkalinity
   c. Water traits of classic brewing cities—Munich, Pilsen, Burton-on-Trent, London, and Dublin
5. Other ingredients
   a. Specialty ingredients
      i. Sugars
         - Fermentable
           - Corn sugar/dextrose/glucose
           - Sucrose
           - Candi sugar/invert sugar syrup
             - Non-caramelized
             - Caramelized to various degrees
           - Specialty sugars (e.g., demerara, jaggery, piloncillo, etc.)
           - Honey, molasses, agave, etc.
         - Non-fermentable
           - Lactose
      ii. Fruits and vegetables
      iii. Herbs and spices
         - Common cooking herbs/spices
         - Chili peppers
         - Coffee, cocoa, chocolate, teas, etc.
         - Gruit/traditional herbs
      iv. Other flavorings
   b. Considerations regarding the addition of specialty ingredients
      i. When and how the ingredient is added
      ii. What form the ingredient is in (e.g., whole, pureed, etc.)
      iii. Process variations required to accommodate the addition

        c. Historical precedent for addition of non-traditional ingredients
B. Processes
    1. Milling
        a. Possible flavor impact of milling on finished beer
        b. Objectives of milling
        c. Variations in mills and milling techniques
        d. Qualitative traits of a proper grind
    2. Mashing
        a. Objectives of mashing
        b. Major enzymes active during mashing and their impact on beer attributes
        c. Different mashing methods
            i. Infusion mash
            ii. Cereal mash
            iii. Step mash
            iv. Decoction mash
            v. Turbid mash
    3. Lautering
        a. Objectives of lautering
        b. General process of lautering
            i. Initiate wort run-off
            ii. Vorlauf (recirculation)
            iii. Begin collection of wort for boiling
            iv. Sparge
        c. Potential impacts of lautering on beer character and flavor
    4. Boiling
        a. Process and objectives of boiling
            i. Inputs and outputs
            ii. Significant physical and chemical changes
        b. Flavor impacts of boil
        c. Different heating methods
        d. Equipment variations
    5. Whirlpool
        a. Objectives of whirlpool
        b. General operation of whirlpool, including wort removal
        c. Alternatives to whirlpooling
            i. Wort strainer
            ii. Cold flotation
            iii. Hop back
            iv. Coolship
    6. Chilling
        a. Methods of wort chilling
            i. Heat exchanger
            ii. Coolship
        b. Flavor issues associated with wort chilling
    7. Aeration and pitching
        a. Timing of aeration within the brewing process

    b. Reasons for wort aeration
    c. Potential flavor impact of aeration
8. Fermentation
    a. General description of fermentation
        i. Fermentations with different organisms
            - Ale fermentation
            - Lager fermentation
                - Diacetyl rest
            - Mixed-culture fermentation
        ii. Maturation after primary fermentation
    b. Major biochemical inputs and outputs
    c. Fermentation flavor compounds (see section III.C.1)
    d. Equipment used for fermentation
    e. Variations in fermentation parameters
        i. Aeration
        ii. Pitching rate
        iii. Fermentation temperature
        iv. Yeast health
        v. Fermenter geometry
9. Lagering
    a. Objectives of lagering
    b. Lagering temperature and duration
    c. Impact on finished beer characteristics
    d. Unique practices
        i. Use of neutral wood strips or chips
10. Aging
    a. Vessel materials
        i. Stainless steel
        ii. New wood
        iii. Previously used wood
    b. Factors influencing flavors produced during wood aging
        i. Prior use of vessel
            - Residual flavors from other liquids
            - Microflora
        ii. Porosity and micro-aeration
            - Impact of vessel size (surface to volume ratio)
        iii. Char or toast of wood
        iv. Length of time in wood
        v. Temperature
            - Temperature of aging space
            - Temperature fluctuations
11. Clarification
    a. Common methods used for beer clarification
        i. Filtration
        ii. Finings
        iii. Settling/lagering/aging

            iv. Centrifugation
        b. Consumer issues (dietary restrictions related to isinglass, gelatin, etc.)
    12. Carbonation
        a. Methods of achieving carbonation in beer
            i. Capture during fermentation
            ii. Forced carbonation
            iii. Secondary fermentation in serving vessel (e.g., bottle conditioned, cask conditioned, etc.)
            iv. Kräusening
        b. Sensory impact of carbonation on finished beer
    13. Packaging and pasteurization
        a. Package types
            i. Draft
            ii. Bottles
            iii. Cans
        b. Quality control
            i. Cleaning/sanitizing of containers
            ii. Importance of air exclusion during packaging
            iii. Cap-on-foam
        c. Pasteurization and its impact on beer
            i. Types of pasteurization
                - Flash pasteurization
                - Package pasteurization
            ii. Pasteurization conditions
            iii. Impact on stability and flavor
    14. Alternative production techniques
        a. Kettle souring
        b. High-gravity brewing

V. Pairing Beer with Food

No single model perfectly explains all the dynamics of beer and food pairing. This syllabus draws from various sources to present common concepts and widely accepted principles. Advanced Cicerone® candidates will be expected to demonstrate in-depth knowledge of food ingredients, cooking techniques, and global cuisines and to confidently create pairings based on their own experience and learned knowledge of what works well.

A. Possible outcomes of successful beer and food pairings
    1. Desirable flavors are highlighted in both the beer and the dish
    2. Combination of the two invokes memory, emotion, and/or deeper thought
    3. Pairing creates new flavors not originally present in either the beer or the dish
B. Beer and food vocabulary
    1. Beer vocabulary
        a. For common beer flavor descriptors, see section III.B
    2. Food vocabulary
        a. Describe specific food tastes beyond basic identification of key ingredients and preparation (e.g., instead of “seared scallop”, use “scallop has a caramelized,

crispy sear with rich toasted and toffee flavors, while the dense interior has a buttery sweetness")

b. Understand cooking techniques and their effects on flavor (e.g., poaching, roasting, frying, etc.)
c. Familiarity with a wide range of foods and ingredients (e.g., vegetables, fruits, herbs, spices, etc.)
d. Familiarity with a wide range of cuisines and common dishes

C. Pairing concepts
1. Intensity (sometimes referred to as impact or weight)
    a. A beer's intensity is determined by the levels of several characteristics
        i. Malt flavor
        ii. Hop bitterness
        iii. Sweetness/body (note that these are related)
        iv. Alcohol content
        v. Carbonation
        vi. Tartness/sourness
        vii. Fermentation-derived flavors (esters, phenols, etc.)
        viii. Hop flavor/aroma
        ix. Special ingredients/processes (e.g., fruit, coffee, barrel aging, etc.)
    b. A dish's intensity is determined by the interplay of several characteristics
        i. Flavor impact of individual ingredients
        ii. Preparation/cooking method
        iii. Spices used
        iv. Sauces served alongside
        v. Levels of fat, umami, sweetness, bitterness, saltiness, sourness, etc.
2. Flavor interactions
    a. Complement/resonate/harmonize—Similar or compatible flavors present in both the beer and the food complement one another (e.g., an Indian curry with cloves resonates with the clove flavors found in a Dunkles Weissbier)
    b. Contrast—By offering an opposing flavor, the beer highlights a flavor in the dish or vice versa. (e.g., mussels served with gueuze seem richer and sweeter due to the acidity of the beer)
    c. Cut—Some beer traits help refresh the palate by lifting, cleansing, or removing rich or fatty flavors from the palate. Common "cutting" beer traits include carbonation, sourness, and bitterness, and to a lesser extent, alcohol and roastiness
    d. Accentuating—A flavor from one side of the pairing highlights or heightens the perception of a flavor from the other side. (e.g., light diacetyl in a beer accentuates a faint caramel note in cooked meat; bitterness in a beer accentuates capsaicin heat from chili peppers)
    e. Canceling—Similar flavors in both sides of the pairing can seem to eliminate perception of that flavor in one side of the pairing. (e.g., smoky flavors seem diminished when a smoky beer is paired with smoked foods; fruit flavors seem bland when a fruit beer is paired with a fruit dessert)
    f. Clashing—A flavor present in the beer creates an unpleasant juxtaposition with a flavor in the dish (e.g., high bitterness and briny fish create clashing, metallic flavors)

   g. Softening—A flavor in the beer diminishes the intensity of a flavor in the dish, or vice versa (e.g., malt sweetness soothes spicy capsaicin "heat")

D. Common beer and food interactions
   1. Malt flavors
      a. Complement toasted and caramelized flavors in a variety of foods
      b. Soothe/soften capsaicin heat (spiciness)
   2. Hop flavors
      a. Depending on hop variety, can complement fruit, citrus, herb, and spice flavors
   3. Fermentation-derived flavors
      a. Esters
         i. Complement fruit flavors
         ii. Complement dairy
      b. Phenols
         i. Complement spices
         ii. Contrast fat and umami
         iii. Can become harsh in some pairings
   4. Carbonation
      a. Cuts fat, umami, and sweetness
      b. Accentuates capsaicin heat
   5. Bitterness
      a. Cuts fat, umami, and sweetness
      b. Accentuates capsaicin heat
      c. Can create harsh or metallic effects with certain foods (e.g., oily fish)
      d. Can complement bitter foods (e.g., bitter salad greens)
   6. Roastiness
      a. Complements chocolate, caramelized, and burnt flavors
      b. Cuts fat
      c. Contrasts sweetness
      d. Accentuates umami
   7. Alcohol
      a. Can cut fat
      b. Generally complements sweetness
      c. Can accentuate capsaicin heat
   8. Tartness/sourness
      a. Can brighten some food flavors
      b. Can complement or accentuate sour flavors
      c. May favorably contrast fat, umami, or salt
   9. Sweetness
      a. Soothes capsaicin heat and other spices
      b. Accentuated by saltiness

E. Creating a pairing
   1. Match intensities of both beer and dish so that neither overpowers the other
   2. Consider the flavor interactions listed in sections V.C.2 and V.D to hone the pairing

F. Designing a meal
   1. Intensity of dishes and pairings generally increases as the meal progresses
   2. Plan meal around a unifying theme

G. Classic beer and food pairings
   1. European traditions
      a. Belgium
      b. Germany
      c. England
H. Cooking with beer
   1. Common uses
      a. Used in place of water or other liquid as an ingredient or cooking medium
         i. Batters and baked goods
         ii. Marinades, brines, and dressings
         iii. Braising, roasting, deglazing, and sauces
         iv. Soups or stews
         v. Desserts
   2. Flavor effects
      a. Concentrating beer through cooking intensifies non-volatile flavors
         i. Bitterness can intensify exponentially and may become unpleasant
         ii. Malt flavors and sweetness increase, sugars caramelize
         iii. Volatile hop and ester flavors decrease and may disappear entirely
         iv. Astringent/burnt flavors of roasted malt can increase and may become unpleasant
      b. Delicate hop and fermentation flavors in beer can be brought to a dish by not cooking the beer (e.g., using an IPA in a salad dressing)