

BEER SENSORY FROM A TO QC

RESOURCES FOR BUILDING AND GROWING YOUR PROGRAM

Liz Pratt, Karl Arnberg, and Luci Benedict

Craft Brewers Conference 2019
Denver, CO



Overview and Goals

- Sensory program philosophy
- Immediate steps to take right now
- Next steps in developing a program
- Seeking support from outside labs
- Questions
- Additional resources (check out the Brewer's Association Craft Brewers Guide to Building a Sensory Panel)

*Don't worry: slides will be available online
after the conference!*

Liz Pratt

Sensory Specialist Amsterdam, NL

2018 “DIY Sensory” presentation available
on the Brewers Association website





Arches
National Park

Dewey

Gateway

Castle Valley

191

Moab

191

Mt Waas

Spanish Valley

191

Paradox

Tangren, M. C.

Beer

259-6798

can of Malt

3# sugar or ^{1 3/4 C} 3pts of sugar

water 4-5 gal

1 yeast - 1 can malt extract (2 1/2 lb)

What is SENSORY ANALYSIS?

Using human senses (sight, smell, taste, touch, and sound) to evaluate consumer products like perfume, moisturizer, food, juice, or...BEER!

What is a SENSORY PROGRAM?

For our purposes, this term refers to a system of evaluating the characteristics of beer (or ingredients) by appearance, aroma, flavor, and mouthfeel.

Why Start Now?

"I don't have time, money, or staff."

Every department needs these skills

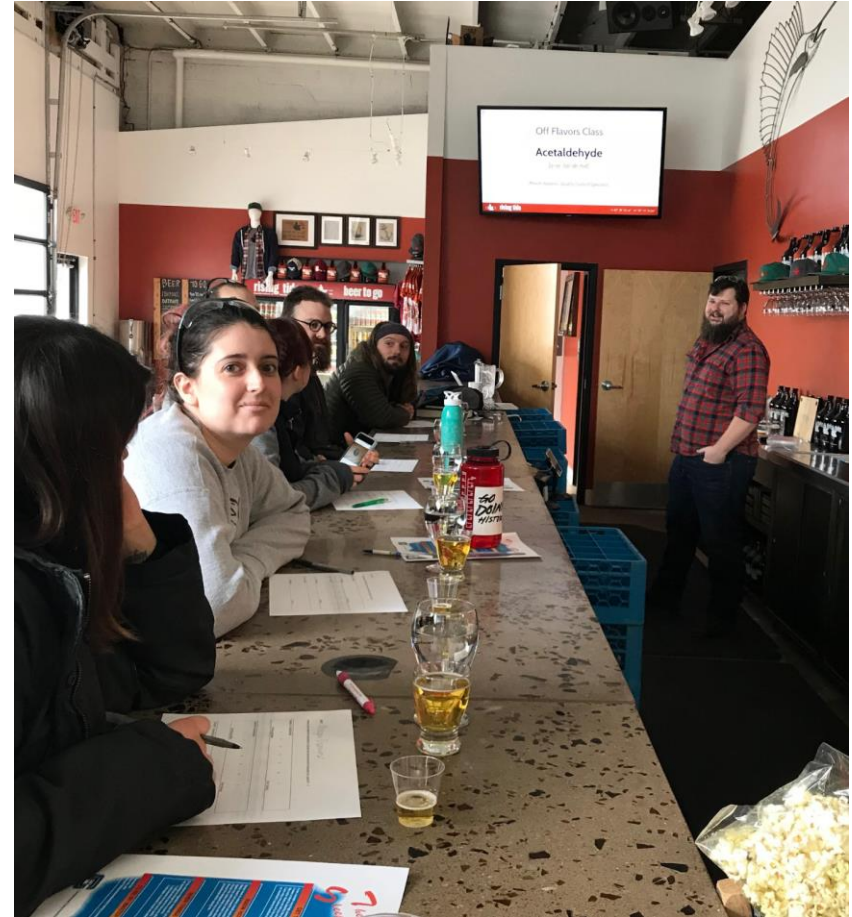
- Brewing, cellar, packaging
- Marketing, serving and sales, development

Establish strong foundations for the future

- Don't wait for something to go wrong!
- Do this favor for yourself and your team
- Create good habits now – no coffee, no talking, etc.

Build enthusiasm and support your team

- Investment in skill building is great for morale
- Practicing mindfulness leads to fewer mistakes and safer choices



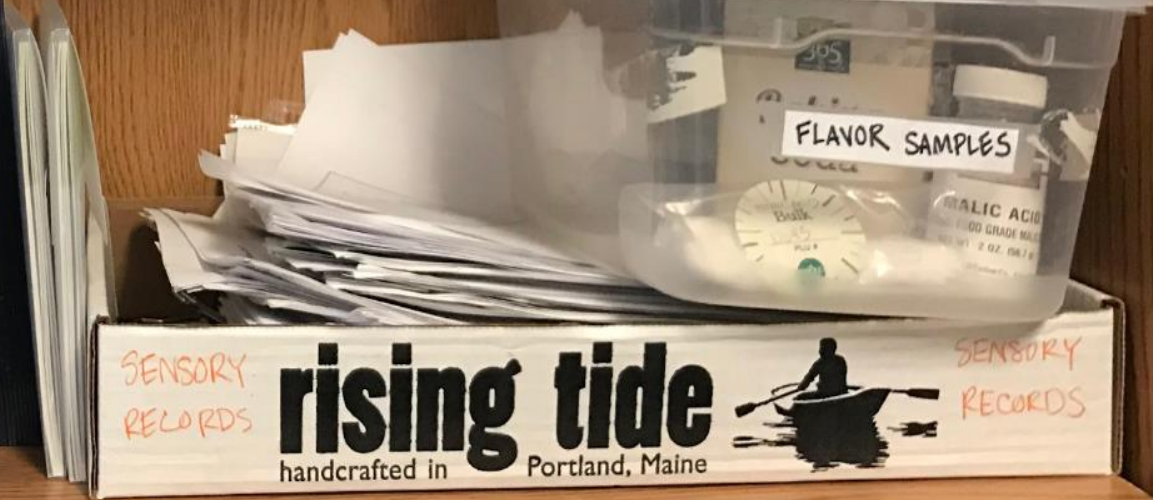
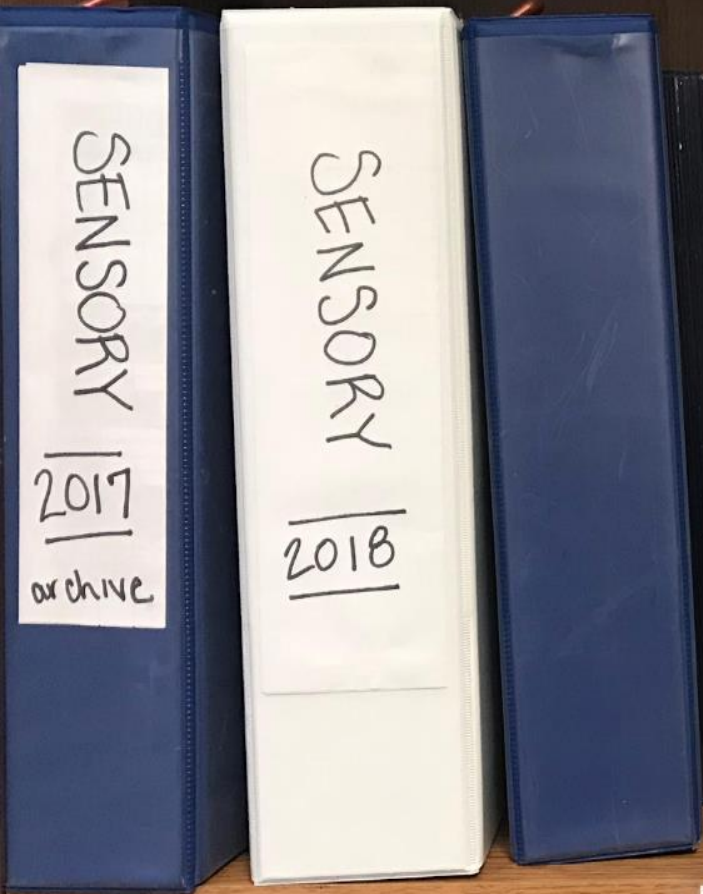
Good Bare Bones: Basic Sensory Supplies

Printer, paper, pens

Glasses and caps

Beer or ingredients

A few hours a week



↑SENSORY PROGRAM MATERIALS ONLY↑

DIY "Spikes" for beginning training

Lightstruck or skunky: set a pitcher in the sun
Oxidation or hop aroma degradation: beer library
Diacetyl: artificial butter flavoring
Acetic acid: white vinegar
Citric acid: check the baking section!
Mineral hardness: baking soda
DMS: Rolling Rock



Sensory Philosophy for Every Brewery

Protect your market share, control costs,
and keep making and selling amazing beer!

- Ask the right questions: what do you need to know right now? What is most important to you and your brand?
- Invite everyone! You never know who your best taster will be.
- Leadership must be on board. Work towards TOTAL company buy-in. One bad example can weaken the entire program.
- Sensory is a journey and journeys need to start somewhere.
- ALL SENSORY IS GOOD SENSORY! What is needed, and what is possible, for every brewery is DIFFERENT. Don't let perfect get in the way of good.

Karl Arnberg

Sensory Manager



Sensory Space

Good Lighting

Away from areas with strong smells or noises

Low foot traffic

Clean glassware

Beer storage

Keep what you're pouring confidential





Description Panel

"What are the characteristics that define this beer?"

Describe the elements of your beer.

What about how your beer looks, smells, tastes or feels sets it apart from other beers, or other beers of a similar style?

Focus on what you actually perceive, not what you know think you should.

Product Release Panel

"Is this sample free of flaws and consistent with its brand?"

True to Type or True to Brand test

Evaluate a sample of beer against its description and taste for off-flavors



Education



Off-flavors vs. On-flavors

Acetaldehyde

Acetic acid

Diacetyl

Dimethyl sulfide

Lightstruck

Mercaptan

Trans-2-nonenal

Ethyl acetate

Ethyl Hexanoate

Ethyl Decanoate

Isoamyl acetate

4-vinylguaiacol

Malt character

Hop character

Luci Benedict

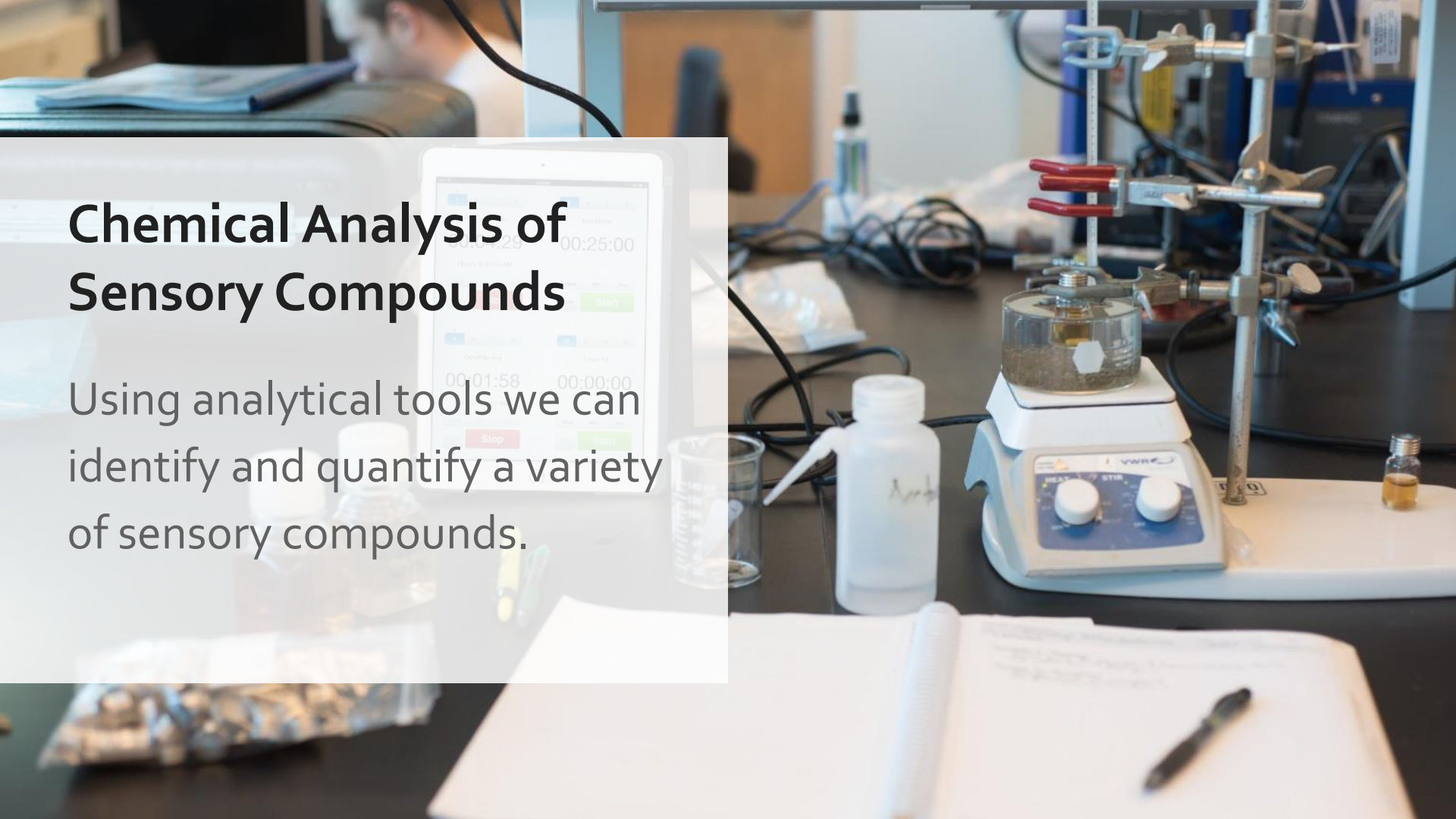
Director of QC² Lab



**UNIVERSITY OF
SOUTHERN MAINE**

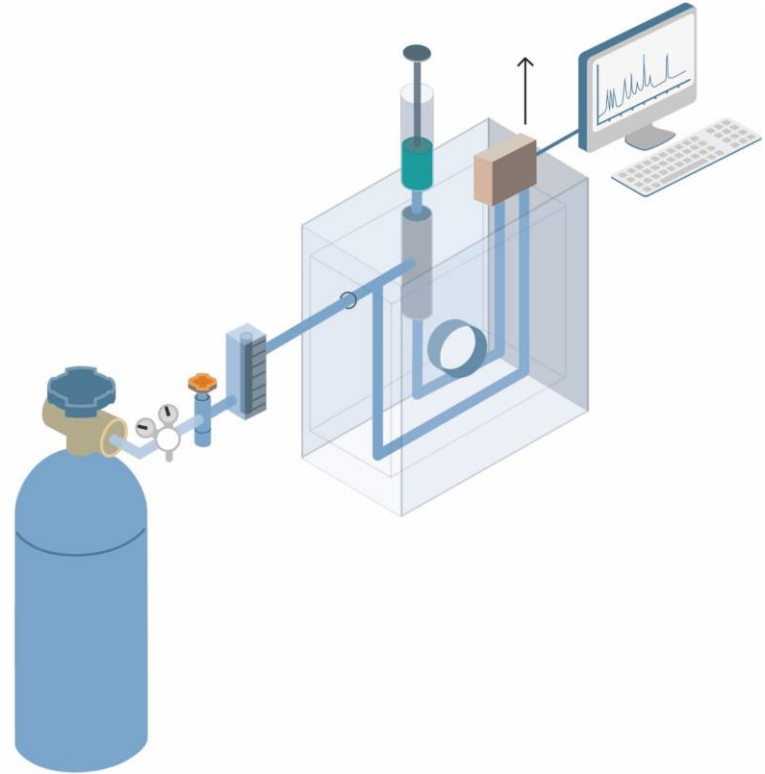
Chemical Analysis of Sensory Compounds

Using analytical tools we can identify and quantify a variety of sensory compounds.



Chemical Sensory Analysis Options

- **Gas Chromatography** - a powerful technique that is used to separate out volatile compounds.
- Compounds can be detected based on mass spectra or through smell.



Introducing the sample to the GC

- **Solid phase microextraction (SPME)** - expose a fiber to the headspace above a beer sample and allow the volatile compounds to absorb onto the fiber.
- **Direct Headspace Injection** - Gas from above a beer sample is collected into a gas tight syringe and injected into the GC
- **Liquid-Liquid Extraction** - A beer sample is mixed with a solvent to extract the volatile compounds and the solvent with volatiles is injected into the GC.



GC Detection Options

Olfactory Smelling Port

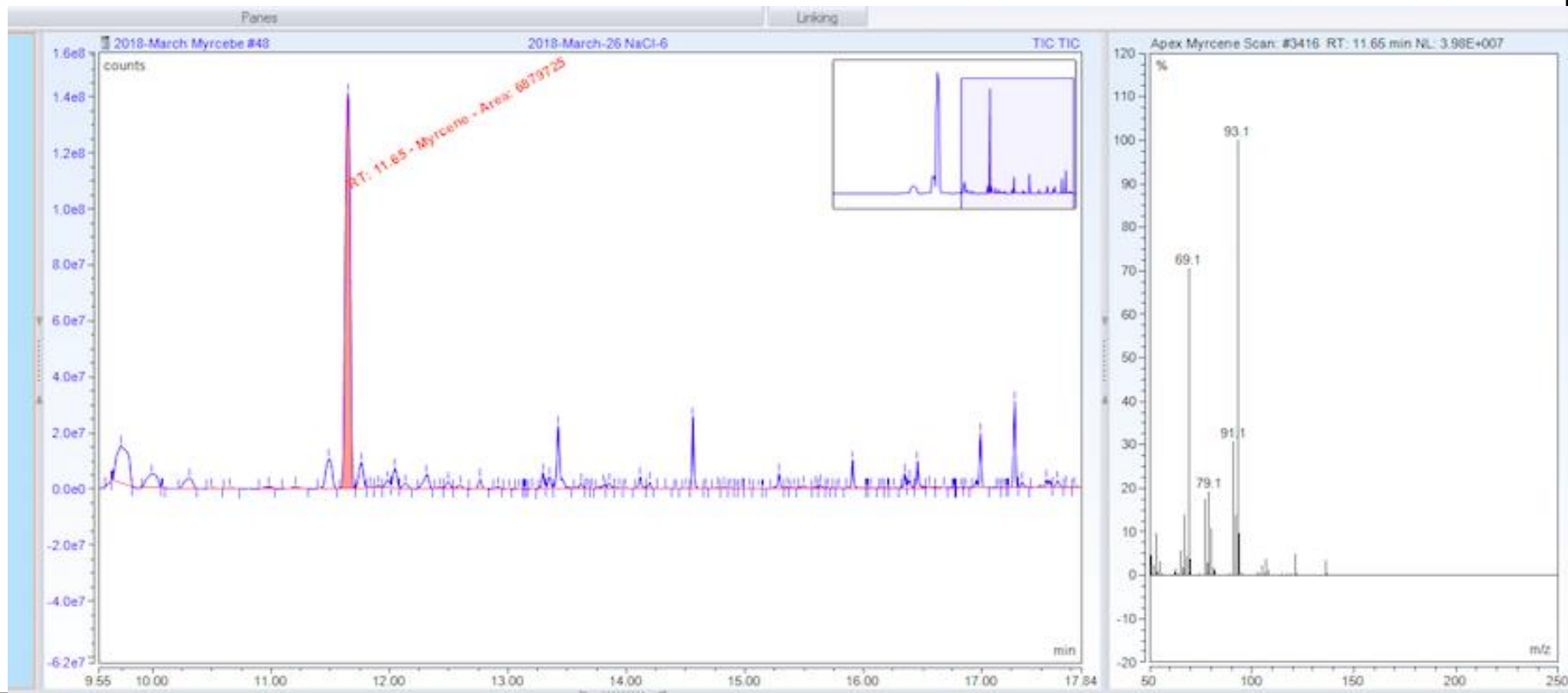
- allows for the human detection of volatile compounds separated by chromatography
- Qualitative technique

Mass Spectrometry

- detects compounds based on their mass spectra response and allows for compound identification
- Qualitative and Quantitative technique



GC-MS: Powerful tool to separate volatiles



Where to go next...

Getting Creative

- Study and train with other brewers - we're all friends here!
- Go to beer, wine, or spirit tastings, solo or with your team
 - This makes a great staff outing
- Volunteer to judge home brew competitions
- Have fun with putting together exploratory flights, organized by style, ingredient, region, or brewery
- Ask questions everywhere!

Where to go next...

Other Community Resources

- **Brewers Association Craft Brewers Guide to Building a Sensory Panel**
- Master Brewers Association of the Americas, local and national
- Pink Boots Society
- American Society of Brewing Chemists (ASBC)
- Tufts University Sensory Science Center
- UC Davis Applied Sensory and Consumer Science Certificate Program
- Siebel Institute Sensory Panel Management Course
- Oregon State University Sensory Course
- Aroxa Practical Beer Taster Trainer Course
- Beer Judge Certification Program (BJCP)
- Certified Cicerone Exam

Where to go next...

Reference Materials

- Civile, G. V., Carr, B. T., and Meilgaard, M. (2015) Sensory Evaluation Techniques, Fifth Edition. CRC Press, Boca Raton, FL.
- Evaluating Beer (1993), Brewers Publications, Boulder, CO.
- Lawless, H.T. and Heymann, H., (2010) Sensory evaluation of food: principles and practices. Springer Science & Business Media.
- O'Mahony, M., (1986) Sensory evaluation of food: statistical methods and procedures (Vol. 16). CRC Press, Boca Raton, FL
- Pellettieri, M., and Grossman, K. (2015) Quality Management: Essential Planning for Breweries. Brewers Publications, Boulder, CO.
- Stuckey, Barb, (2012) Taste What You're Missing. Free Press, New York, NY.

Big thanks to Jamie Floyd of Ninkasi Brewing for helping to assemble these resource slides.

Questions?

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Quality Control Collaboratory:
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Super Simple Data Tracking Slides

"Can our staff members
identify our brands?"

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1			Alex	Chris	Jack	Jess	Jon	Kate	Mike	Page	Pete	Tim	Steph	Zoe	Avg Score
2	10/16/2017	Zephyr	F	P	F	F	F	-	-	-	F	F	-	F	20
3	11/2/2017	Cutter	-	F	P	P	F	P	F	F	F	F	F	P	36
4	11/13/2017	Waypoint	-	P	-	P	F	P	A	P	P	-	P	P	92
5	12/4/2017	Daymark	P	U	P	-	P	F	P	-	P	P	F	P	57
6	12/7/2017	Ishmael	P	F	P	-	P	P	P	-	F	F	-	U	56
7	1/4/2018	Waypoint	U	P	P	P	-	-	P	P	-	-	-	P	86
8	1/8/2018	Daymark	F	P	F	U	F	-	P	P	F	F	-	-	33
9	1/15/2018	Daymark	-	F	-	-	P	-	P	P	-	P	F	-	73
10	1/25/2018	Zephyr	-	P	-	-	P	P	P	-	F	F	-	P	71
11	2/8/2018	Ishmael	-	P	P	P	F	F	-	P	-	P	F	-	50
12	2/15/2018	Waypoint	P	-	P	P	-	P	P	P	U	F	-	P	80
13	2/26/2018	Daymark	P	-	-	-	F	F	P	-	P	-	F	P	70
14	3/1/2018	Ishmael	F	P	F	P	P	P	P	F	F	P		P	64
15	3/8/2018	Zephyr	P	-	P	F	-	-	A	-	P	-	-	P	83
16	3/12/2018	Back Cove	F	P	-	-	F	-	P	P	F	-	F	P	45
17	3/22/2018	Zephyr	-	P	P	-	P	P	P	P	P	F	-	-	89
18	3/38/2018	Ishmael	P	P	F	P	-	P	P	-	P	-	-	P	90
19	4/5/2018	Daymark	P	-	-	F	P	-	A	U	P	-	-	F	63
20		Overall Score	58	71	67	64	50	73	92	73	47	36	14	79	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1			Alex	Chris	Jack	Jess	Jon	Kate	Mike	Page	Pete	Tim	Steph	Zoe	Avg Score
2	10/16/2017	Date of Session			F	F	F	-	-	-	F	F	-	F	20
3	11/2/2017				P	P	F	P	F	F	F	F	F	P	36
4	11/13/2017	Waypoint	-	P	-	P	F	P	A	P	P	-	P	P	92
5	12/4/2017	Daymark	P	U	P	-	P	F	P	-	P	P	F	P	57
6	12/7/2017	shmael	P	F	P	-	P	P	P	-	F	F	-	U	56
7	1/4/2018	Waypoint	U	P	P	P	-	-	P	P	-	-	-	P	86
8	1/8/2018	Daymark	F	P	F	U	F	-	P	P	F	F	-	-	33
9	1/15/2018	Daymark	-	F	-	-	P	-	P	P	-	P	F	-	73
10	1/25/2018	Zephyr	-	P	-	-	P	P	P	-	F	F	-	P	71
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14	3/1/2018	shmael	F	P	F	P	P	P	P	F	F	P		P	64
15	3/8/2018	Zephyr	P	-	P	F	-	-	A	-	P	-	-	P	83
16	3/12/2018	Back Cove	F	P	-	-	F	-	P	P	F	-	F	P	45
17	3/22/2018	Zephyr	-	P	P	-	P	P	P	P	P	F	-	-	89
18	3/38/2018	shmael	P	P	F	P	-	P	P	-	P	-	-	P	90
19	4/5/2018	Daymark	P	-	-	F	P	-	A	U	P	-	-	F	63
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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1			Session Focus			Jess	Jon	Kate	Mike	Page	Pete	Tim	Steph	Zoe	Avg Score
2	10/16/2018	Zephyr				F	F	-	-	-	F	F	-	F	20
3	11/2/2018	Cutter				P	F	P	F	F	F	F	F	P	36
4	11/13/2018	Waypoint	-	P	-	P	F	P	A	P	P	-	P	P	92
5	12/4/2018	Daymark	P	U	P	-	P	F	P	-	P	P	F	P	57
6	12/7/2018	Ishmael	P	F	P	-	P	P	P	-	F	F	-	U	56
7	1/4/2019	Waypoint	U	P	P	P	-	-	P	P	-	-	-	P	86
8	1/8/2019	Daymark	F	P	F	U	F	-	P	P	F	F	-	-	33
9	1/15/2019	Daymark	-	F	-	-	P	-	P	P	-	P	F	-	73
10	1/25/2019	Zephyr	-	P	-	-	P	P	P	-	F	F	-	P	71
11	2/8/2019	Ishmael	-	P	P	P	F	F	-	P	-	P	F	-	50
12	2/15/2019	Waypoint	P	-	P	P	-	P	P	P	U	F	-	P	80
13	2/26/2019	Daymark	P	-	-	-	F	F	P	-	P	-	F	P	70
14	3/1/2019	Ishmael	F	P	F	P	P	P	P	F	F	P		P	64
15	3/8/2019	Zephyr	P	-	P	F	-	-	A	-	P	-	-	P	83
16	3/12/2019	Back Cove	F	P	-	-	F	-	P	P	F	-	F	P	45
17	3/22/2019	Zephyr	-	P	P	-	P	P	P	P	P	F	-	-	89
18	3/38/2019	Ishmael	P	P	F	P	-	P	P	-	P	-	-	P	90
19	4/5/2019	Daymark	P	-	-	F	P	-	A	U	P	-	-	F	63
20		Overall Score	58	71	67	64	50	73	92	73	47	36	14	79	

Participants

			Alex	Chris	Jack	Jess	Jon	Kate	Mike	Page	Pete	Tim	Steph	Zoe	Avg Score
2			F	P	F	F	F				F	F		F	20
3	11/2/2017	Cutter	-	F	P	P	F	P	F	F	F	F	F	P	36
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9	1/15/2018	Daymark	-	F	-	-	P	-	P	P	-	P	F	-	73
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18	3/38/2018	Ishmael	P	P	F	P	-	P	P	-	P	-	-	P	90
19	4/5/2018	Daymark	P	-	-	F	P	-	A	U	P	-	-	F	63
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3	11/2/2017	Cutter	-	F	P	P	F					F	F	P	36
4	11/13/2017	Waypoint	-	P	-	P	F					-	P	P	92
5	12/4/2017	Daymark	P	U	P	-	P					P	F	P	57
6	12/7/2017	Ishmael	P	F	P	-	P					F	-	U	56
7	1/4/2018	Waypoint	U	P	P	P	-					-	-	P	86
8	1/8/2018	Daymark	F	P	F	U	F					F	-	-	33
9	1/15/2018	Daymark	-	F	-	-	P					P	F	-	73
10	1/25/2018	Zephyr	-	P	-	-	P					F	-	P	71
11	2/8/2018	Ishmael	-	P	P	P	F					P	F	-	50
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20		Overall Score	58	71	67	64	50	73	92	73	47	36	14	79	

SCORE TRACKING

P = Pass, correct
 F = Fail, incorrect
 U = Unclear
 A = Admin
 - = Not Present

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1			Alex	Chris	Jack	Jess	Jon	Kate	Mike	Page	Pete	Tim	Steph	Zoe	Avg Score
2	10/16/2017	Zephyr	F	P	F	F	F	-	-	-	F	F	-	F	20
3	11/2/2017	Cutter	-	F	P	P	F	P	F	F	F	F	F	P	36
4	11/13/2017	Waypoint	-	P	-	P	F	P	A	P	P	-	P	P	92
5	12/4/2017	Daymark	P	U	P	-	P	F	P	-	P	P	F	P	57
6	12/7/2017	Ishmael	P	F	P	-	P	P	P	-	F	F	-	U	56
7	1/4/2018	Waypoint	U	P	P	P	-	-	P	P	-	-	-	P	86
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9	1/15/2018	Daymark	-	F	-	-	P	-	P	P	-	P	F	-	73
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13	2/26/2018	Daymark	P	-	-	-	F	F	P	-	P	-	F	P	70
14	3/1/2018	Ishmael	F	P	F	P	P	P	P	F	F	P		P	64
15	3/8/2018	Zephyr	P	-	P	F	-	-	A	-	P	-	-	P	83
16			-				F	-	P	P	F	-	F	P	45
17							P	P	P	P	P	F	-	-	89
18							P	P	P	P	P	-	-	P	90
19	4/5/2018	Daymark	P	P	P	P	P	P	A	U	P	P	P	P	63
20		Overall Score	58	71	67	64	50	73	92	73	47	36	14	79	

Participants Average Score Over Time

	A	B	C	D	E	F	G	H	Group Average Score by Session						I
1			Alex	Chris	Jack	Jess	Jon	Kat							Avg Score
2	10/16/2017	Zephyr	F	P	F	F	F	-							20
3	11/2/2017	Cutter	-	F	P	P	F	P	F	F	F	F	F	P	36
4	11/13/2017	Waypoint	-	P	-	P	F	P	A	P	P	-	P	P	92
5	12/4/2017	Daymark	P	U	P	-	P	F	P	-	P	P	F	P	57
6	12/7/2017	Ishmael	P	F	P	-	P	P	P	-	F	F	-	U	56
7	1/4/2018	Waypoint	U	P	P	P	-	-	P	P	-	-	-	P	86
8	1/8/2018	Daymark	F	P	F	U	F	-	P	P	F	F	-	-	33
9	1/15/2018	Daymark	-	F	-	-	P	-	P	P	-	P	F	-	73
10	1/25/2018	Zephyr	-	P	-	-	P	P	P	-	F	F	-	P	71
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12	2/15/2018	Waypoint	P	-	P	P	-	P	P	P	U	F	-	P	80
13	2/26/2018	Daymark	P	-	-	-	F	F	P	-	P	-	F	P	70
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15	3/8/2018	Zephyr	P	-	P	F	-	-	A	-	P	-	-	P	83
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18	3/38/2018	Ishmael	P	P	F	P	-	P	P	-	P	-	-	P	90
19	4/5/2018	Daymark	P	-	-	F	P	-	A	U	P	-	-	F	63
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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1			Alex	C	Weak Performance Sessions						George	Pete	Tim	Steph	Zoe	Avg Score
2	10/16/2017	Zephyr	F								F	F	-	F	20	
3	11/2/2017	Cutter	-							F	F	F	F	P	36	
4	11/13/2017	Waypoint	-	P	-	P	F	P	A	P	P	-	P	P	92	
5	12/4/2017	Daymark	P	U	P	-	P	F	P	-	P	P	F	P	57	
6	12/7/2017	Ishmael	P	F	P	-	P	P	P	-	F	F	-	U	56	
7	1/4/2018	Waypoint	U	P	P	P			P	P				P	86	
8	1/8/2018	Daymark	F	P	F	U	F	-	P	P	F	F	-	-	33	
9	1/13/2018	Daymark		P			P		P	P		F	P	P	73	
10	1/25/2018	Zephyr	-	P	-	-	P	P	P	-	F	F	-	P	71	
11	2/8/2018	Ishmael	-	P	P	P	F	F	-	P	-	P	F	-	50	
12	2/15/2018	Waypoint	P	-	P	P	-	P	P	P	U	F	-	P	80	
13	2/26/2018	Daymark	P	-	-	-	F	F	P	-	P	-	F	P	70	
14	3/1/2018	Ishmael	F	P	F	P	P	P	P	F	F	P		P	64	
15	3/8/2018	Zephyr	P		P	F			A		P			P	83	
16	3/12/2018	Back Cove	F	P	-	-	F	-	P	P	F	-	F	P	45	
17	3/22/2018	Zephyr	-	P	P	P	P	P	P	P	P	P	-	-	89	
18	3/38/2018	Ishmael	P	P	F	P	-	P	P	-	P	-	-	P	90	
19	4/5/2018	Daymark	P	-	-	F	P	-	A	U	P	-	-	F	63	
20		Overall Score	58	71	67	64	50	73	92	73	47	36	14	79		

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1			Alex	Chris	Jack	Jess	Jon	Kate	Mike	Page	Pete	Tim	Steph	Zoe	Avg Score
2	10/16/2017	Zephyr	F	P	F	F	F	-	-	-	F	F	-	F	20
3	11/2/2017	Cutter	-	F	P							F	F	P	36
4	11/13/2017	Waypoint	-	P	-							-	P	P	92
5	12/4/2017	Daymark	P	U	P							P	F	P	57
6	12/7/2017	Ishmael	P	F	P	-	P	P	P	-	F	F	-	U	56
7	1/4/2018	Waypoint	U	P	P	P	-	-	P	P	-	-	-	P	86
8	1/8/2018	Daymark	F	P	F	U	F	-	P	P	F	F	-	-	33
9	1/15/2018	Daymark	-	F	-	-	P	-	P	P	-	P	F	-	73
10	1/25/2018	Zephyr	-	P	-	-	P	P	P	-	F	F	-	P	71
11	2/8/2018	Ishmael	-	P	P	P	F	F	-	P	-	P	F	-	50
12	2/15/2018	Waypoint	P	-	P	P	-	P	P	P	U	F	-	P	80
13	2/26/2018	Daymark	P	-	-	-	F	F	P	-	P	-	F	P	70
14	3/1/2018	Ishmael	F	P	F	P	P	P	P	F	F	P		P	64
15	3/8/2018	Zephyr	P	-	P	F	-	-	A	-	P	-	-	P	83
16	3/12/2018	Back Cove	F	P	-	-	F	-	P	P	F	-	F	P	45
17	3/22/2018	Zephyr	-	P	P	-	P	P	P	P	P	F	-	-	89
18	3/38/2018	Ishmael	P	P	F	P	-	P	P	-	P	-	-	P	90
19	4/5/2018	Daymark	P	-	-	F	P	-	A	U	P	-	-	F	63
20		Overall Score	58	71	67	64	50	73	92	73	47	36	14	79	

Folks Who Need More Practice

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1			Exceptionally Strong Performers					ate	Mike	Page	Pete	Tim	Steph	Zoe	Avg Score
2	10/16/2017	Zephyr	-	-	-	-	-	-	-	-	F	F	-	F	20
3	11/2/2017	Cutter	-	-	-	-	-	-	F	F	F	F	F	P	36
4	11/13/2017	Waypoint	-	P	-	P	F	P	A	P	P	-	P	P	92
5	12/4/2017	Daymark	P	U	P	-	P	F	P	-	P	P	F	P	57
6	12/7/2017	Ishmael	P	F	P	-	P	P	P	-	F	F	-	U	56
7	1/4/2018	Waypoint	U	P	P	P	-	-	P	P	-	-	-	P	86
8	1/8/2018	Daymark	F	P	F	U	F	-	P	P	F	F	-	-	33
9	1/15/2018	Daymark	-	F	-	-	P	-	P	P	-	P	F	-	73
10	1/25/2018	Zephyr	-	P	-	-	P	P	P	-	F	F	-	P	71
11	2/8/2018	Ishmael	-	P	P	P	F	F	-	P	-	P	F	-	50
12	2/15/2018	Waypoint	P	-	P	P	-	P	P	P	U	F	-	P	80
13	2/26/2018	Daymark	P	-	-	-	F	F	P	-	P	-	F	P	70
14	3/1/2018	Ishmael	F	P	F	P	P	P	P	F	F	P	-	P	64
15	3/8/2018	Zephyr	P	-	P	F	-	-	A	-	P	-	-	P	83
16	3/12/2018	Back Cove	F	P	-	-	F	-	P	P	F	-	F	P	45
17	3/22/2018	Zephyr	-	P	P	-	P	P	P	P	P	F	-	-	89
18	3/38/2018	Ishmael	P	P	F	P	-	P	P	-	P	-	-	P	90
19	4/5/2018	Daymark	P	-	-	F	P	-	A	U	P	-	-	F	63
20		Overall Score	58	71	67	64	50	73	92	73	47	36	34	79	