



KWANTLEN
POLYTECHNIC
UNIVERSITY

Brewing and Brewery Operations
Program Review
Self-Study Report Appendices

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Appendix A Brewery and Brewery Operations Courses

Retrieved June 21, 2022 from <https://calendar.kpu.ca/programs-az/science-horticulture/brewing/brewing-brewery-operations-diploma/#requirementstext>

Year 1

| TERM 1 | CREDITS |
|--------|---------|
|--------|---------|

| | | |
|-----------|-------------------------|---|
| HOPS 1100 | Introduction to Brewing | 3 |
|-----------|-------------------------|---|

| | | |
|-----------|-----------|---|
| HOPS 1105 | Brewing 1 | 3 |
|-----------|-----------|---|

| | | |
|-----------|------------------------------------|---|
| HOPS 1110 | Sensory Evaluation and Ingredients | 3 |
|-----------|------------------------------------|---|

| | | |
|-----------|-------------------|---|
| HOPS 1212 | Brewing Chemistry | 4 |
|-----------|-------------------|---|

| | | |
|------------------------------|--|---|
| Select one of the following: | | 3 |
|------------------------------|--|---|

CMNS 1140

Introduction to Professional Communication

Select 3 credits from a course in CMNS or ENGL at the undergraduate level

Credits 16

| TERM 2 | CREDITS |
|--------|---------|
|--------|---------|

| | | |
|-----------|-----------|---|
| HOPS 1205 | Brewing 2 | 3 |
|-----------|-----------|---|

| | | |
|-----------|----------------------|---|
| HOPS 1211 | Brewing Microbiology | 4 |
|-----------|----------------------|---|

| | | |
|-----------|----------------------------------|---|
| HOPS 1213 | Brewing Equipment and Technology | 3 |
|-----------|----------------------------------|---|

| | | |
|-----------|---|---|
| HOPS 1214 | Introduction to Finishing and Packaging | 3 |
|-----------|---|---|

| | | |
|------------------------------|--|---|
| Select one of the following: | | 3 |
|------------------------------|--|---|

CBSY 1110

Business Problem Solving with Spreadsheets

Select 3 credits from a course in CBSY, CPSC or INFO at the undergraduate level

Credits 16

Year 2

| CREDITS |
|---------|
|---------|

| TERM 3 |
|--------|
|--------|

| | | |
|-----------|-----------|---|
| HOPS 2305 | Brewing 3 | 3 |
|-----------|-----------|---|

| | | |
|-----------|----------------------------------|---|
| HOPS 2314 | Advanced Finishing and Packaging | 3 |
|-----------|----------------------------------|---|

| | | |
|-----------|-------------------------------------|---|
| HOPS 2315 | Calculations and Recipe Formulation | 3 |
|-----------|-------------------------------------|---|

| | | |
|-----------|----------------------|---|
| HOPS 2422 | The Brewing Industry | 3 |
|-----------|----------------------|---|

| | | |
|-----------|-----------------|---|
| PHIL 3033 | Business Ethics | 3 |
|-----------|-----------------|---|

Credits 15

| TERM 4 | CREDITS |
|--------|---------|
|--------|---------|

| | | |
|-----------|--------------------------------|---|
| HOPS 2310 | Product Evaluation and Judging | 3 |
|-----------|--------------------------------|---|

| | | |
|-----------|-----------|---|
| HOPS 2405 | Brewing 4 | 6 |
|-----------|-----------|---|

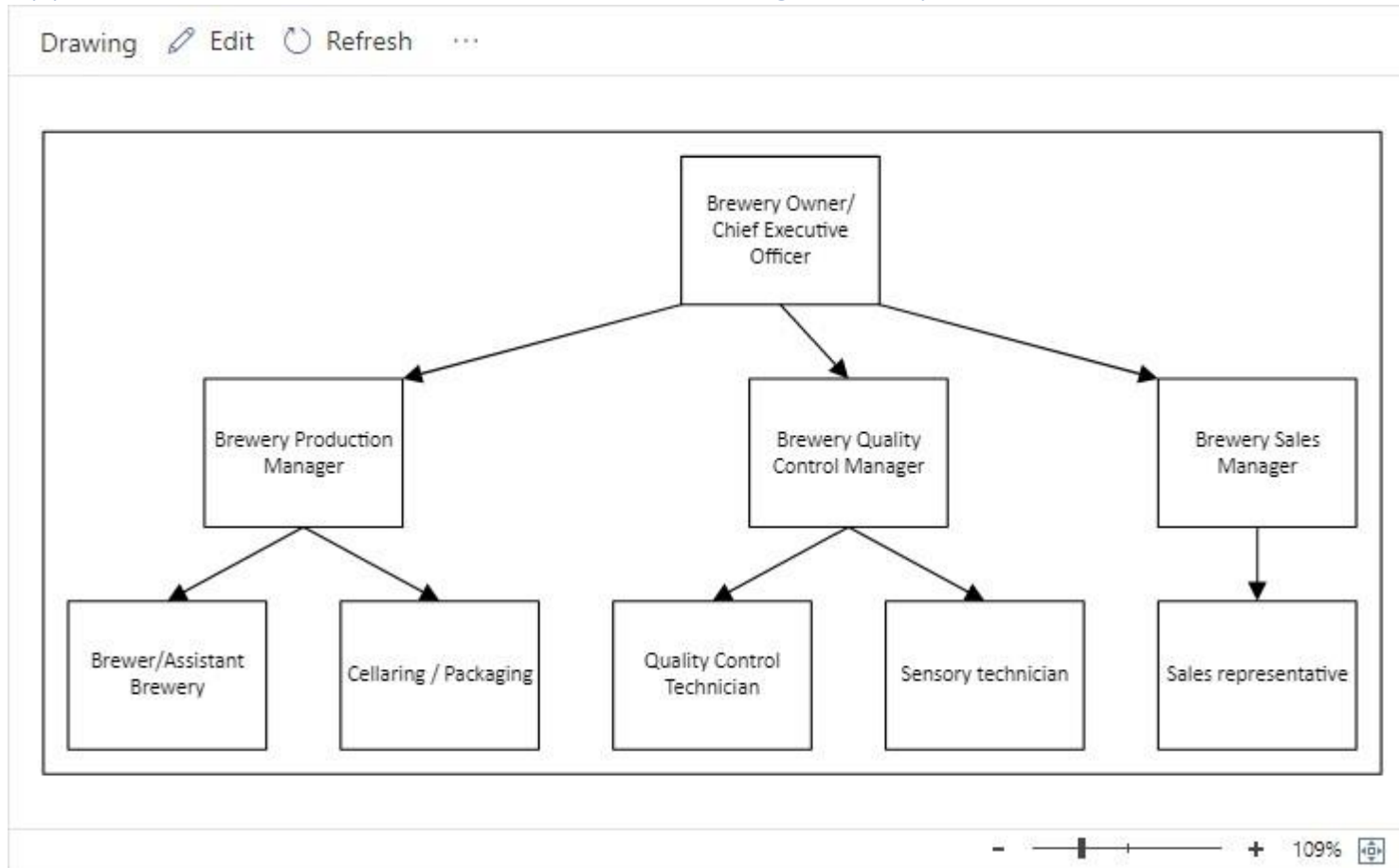
| | | |
|-----------|--------------------------|---|
| HOPS 2420 | Beer Marketing and Sales | 3 |
|-----------|--------------------------|---|

| | | |
|-----------|--------------------------------------|---|
| HOPS 2421 | Brewery Management Business Planning | 3 |
|-----------|--------------------------------------|---|

Credits 15

Total Credits 62

Appendix B Possible Career Paths in the Brewing Industry



Brewing and Brewery Operations Diploma CAREER PATHWAYS

| Your Passion | Your Brewing and Brewery Operations Diploma |
|---------------------|--|
| Brewing | Other Diploma |
| Fermented beverages | Other Certificate |
| Brewery Sales | Other Degree |
| Marketing | |
| Quality Assurance | |
| Science | |
| Brewery Management | |
| Leadership | |

Employment Opportunities with the Diploma in Brewing

| Positions: | In these Sectors: |
|--------------------------------------|--------------------------------------|
| Quality Assurance/Control Technician | Brewery Tasting Room |
| Packaging Technician | Craft Brewery |
| Packaging Manager | Brew Pub |
| Assistant Brewer | Production Brewery |
| Head Brewer | University |
| Cellar Technician | Malting |
| Tasting Room Manager | Distilling |
| Tasting Room Server | Cideries |
| Sales Representative | Kombucha and non-alcoholic beverages |
| Brewery Social Media Coordinator | Other alcoholic beverage production |
| Sensory Technician | Liquor Distribution Branch |
| Brewing Lab Instructor | |
| Brewery Consultant | |
| Brewery Owner | |
| Maltster | |
| Logistics and warehousing | |
| Liquor Distribution Staff | |

Additional Career Pathways

| More Education: | More Advanced Positions: |
|-----------------------------------|--|
| Bachelor of Science | Quality Assurance/Control Manager |
| Masters in Brewing and Distilling | Production/Operations Manager |
| Masters in Food Science | Sensory Director |
| KPU Business Diploma | Sales Manager |
| Marketing Degree | Marketing Director |
| Management Diploma | Master Brewer |
| Management Degree | Quality Assurance/Control Manager |
| Management Masters | Accountant |
| Computer Science Degree | Territory Manager |
| Design Diploma/Degree | Research & Development |
| Mechatronics Diploma | Financial Analyst |
| | Brewery IT Project Manager |
| | Designer |
| | Brewery Engineer |
| | Facilities Engineering |
| | Brewery equipment manufacturing and installation |
| | Human Resources |

Appendix C Non-Degree Program Proposal



| |
|---|
| Name of Institution: Kwantlen Polytechnic University |
| Title of Program: Brewing and Brewery Operations |
| Credential to be awarded to graduates: Diploma |
| Length of Program: 4 semesters, 2 years |

| | |
|--|--|
| Institutional Contact: Elizabeth Worobec | Title: Dean, Faculty of Science and Horticulture |
| Phone: 604 599 2244 | Email: Elizabeth.Worobec@kpu.ca |
| Date: 2013 11 08 | |

Executive Summary:

Non-Degree Program Proposal

A1. Summarize the purpose of the proposal

Kwantlen Polytechnic University's recently completed strategic plan includes reference to the desire of the University to partner in regional economic development and to expand the distinctiveness and scope of its program offerings to realize its polytechnic university mandate. The proposed Brewing and Brewery Operations Diploma Program satisfies both objectives. The craft brewing industry in British Columbia grew by 119% (sales in retail dollars) over the five-year period from 2009 to 2013 and 17% in the most recent year. There has been a concomitant increase in the demand for trained employees. This program will be one of only three diploma programs offered in North America (Niagara College in the Niagara Peninsula, Ontario and Olds College in Olds, Alberta are the other two locations).

KPU offers an impressive array of programs at the certificate, diploma and degree levels in the fields of horticulture, agriculture and urban ecosystems. The proposed Brewing and Brewery Operations Program, which will be located in the School of Horticulture at the Langley Campus, draws on all areas (e.g. hops growing). Opportunities exist for degree completion and dual program completion through related programs.

A2. Outline the key objectives and outcomes of the proposed program in one or two pages

In British Columbia, craft breweries/brewpubs have increased their production and sales considerably over the last four years to the point where these enterprises now account for 19% of the market in British Columbia compared to 9% in 2009.

Employment in the craft brewery/brewpubs industry has increased in proportion to the increase in the number of establishments. BC craft brewers employ over 1200 people with an additional 1000 working in the province's brewpubs.

These craft breweries/brewpubs provide employment as brew masters and assistant brew masters, licensee and agency sales and operations, brewery operations, marketing and public relations, brew pub operations and retail sales. Employment opportunities also exist with the larger national and international breweries.

The proposed Brewing and Brewery Operations Program will train graduates to work in both the craft brewery/brewpub establishments as well as larger establishments.

Students will study the science, production and sensory evaluation of world beers through such courses as: brewing ingredients, practical brewing, sensory evaluation of beer, brewing microbiology, brewing chemistry, brewery equipment and technology and specialty brewing. Courses in computer applications, packaging and promotion, communications and human resources will prepare students for the business side of the operations in which they will be employed.

The students' studies will begin in a brew laboratory to be built on the Langley Campus, as well as in general science laboratories. Applied brewing technologies will be gained in a production facility to be provided, initially, through a craft brewery partner and, eventually, through a small production facility to be built on the Langley Campus. The latter will give the students an opportunity to create unique beers and market them to local consumers.

Program Rationale:

A3. Provide rationale for the credential

There are a few establishments in the United States that offer training in the making of beer. The most notable are Siebel Institute of Technology in Chicago and the University of California at Davis. These institutions offer short, high level courses and programs at relatively steep tuition rates and tend to be attractive to mature individuals who are already involved in the brewing industry. The only comparable program offered in Canada is the Brewmaster and Brewery Operations Management Program at Niagara College, Niagara on the Lake, Ontario (first offered in 2010) and recently replicated at Olds College in Olds, Alberta with a first intake in September of 2013. The Niagara College and Olds College programs are the only two-year diploma level programs offered in North America.

The increase in craft breweries and brew pubs has created a demand for graduates trained in the art of understanding, producing and marketing specialty beers. The science, production and business of these craft breweries/brewpubs means that students require training in the science, production, evaluation and business operations of these increasingly complex operations. As an example, the most recent expansion of a Surrey-based craft brewery has resulted in a large, sophisticated brewery with capacity for 10 million litres per year, complemented by attractive retail and tasting areas.

Interviews with the owners and brew masters at a number of BC based craft breweries and brew pubs, as well as the BC Craft Brewers Guild, provide strong support for the type of programming being proposed by Kwantlen.

An Advisory Committee has been formed with the first meeting held on October 22. See attached list of contacts and Committee members.

Program Description:

B1. State the goals and objectives of the new program

The overall goal of the program is to provide education and training to permit a graduate to enter the brew industry with the knowledge and skills to immediately become a valued member of the company's workforce. Typically, a graduate of this program will be hired as an assistant to the company's Brewmaster (a key position with any brew company) or as an assistant in a production or marketing function. Graduates will find work in the fast-growing craft brewery industry, in brewpubs and in larger national and international brewery companies.

Graduates will have knowledge and skills in:

- The history of brewing and beer
- Brewery equipment, technology and safe working practices
- The science of making beer including brew house calculations and recipe formulations
- The practice of making many different types of beer
- Sensory evaluation of beers
- Areas related to the brewery business including packaging, sales and promotion, management, human resources

B2. Identify the target student audience(s) for this program

Based on the experiences of Niagara and Olds Colleges, KPU anticipates that this program will be of equal interest to high school graduates as well as mature students interested in pursuing a new career. We anticipate there will be great interest in this program, drawing students locally, nationally and internationally (in particular the Northwest States, China and South America). Niagara reports that, for the September 2013 intake, approximately 350 prospective students applied for the 24 seats in its program while Olds reports over 85 applying for its 26 seats.

External advisors also indicated that under qualified brewery employees would be encouraged to enrol in this program to upgrade their skills. With this in mind, class timetabling will ensure the working student is accommodated.

Students who do not have the high school admissions requirement will be encouraged to take upgrading courses offered by the Faculty of Science and Horticulture and the Faculty of Academic and Career Advancement.

B3. State how the institution satisfied itself that there is not unnecessary duplication in the system

Although there are comparable two year diplomas offered by Niagara College and Olds College, this would be the only such program in British Columbia. As outlined in section A3 above, and the Viability Report produced by the KPU Office of Institutional Analysis and Planning, there are several institutions in the United States and Europe that offer short term training in this field. These programs are, typically, aimed at a more mature student market and at considerably higher tuition rates than those typically charged by Canadian postsecondary institutions.

B4. Provide evidence of labour market demand

Please see attached Viability Report produced by the Office of Institutional Analysis & Planning.

Curriculum:

C1. Describe the skills, knowledge, or other attributes students will develop from the program

Upon completing the Brewing and Brewery Operations Program, graduates will be able to:

- ◆ Demonstrate safe working practices.
- ◆ Demonstrate the fundamental techniques of beer making.
- ◆ Demonstrate laboratory analysis of beer as required in a brewery.
- ◆ Select and use established techniques in marketing and public relations related to the beer industry.
- ◆ Discuss the history and evolution of the beer industry in relation to today's market.
- ◆ Analyze and determine options and select styles from advanced techniques in the beer making process.
- ◆ Identify, select and utilize process technology practices in brewery operations, packaging and handling.
- ◆ Evaluate consistency and quality of beer, and determine beer style and characteristics.
- ◆ Discuss and apply business principles & strategies related to brewery operations, including human resource management, sales and government legislation.
- ◆ Formulate and develop products for the market.
- ◆ Understand the chemical and microbiological basis of beer formation.
- ◆ Drive a fork lift.

C2. Describe the program/course structure

This is proposed as a standard two year, four semester diploma program with a September intake: two semesters in each of years 1 and 2. The program comprises 16 courses specifically related to the brewing industry and 3 courses addressing more generic skills including: language and communications, computer applications and business ethics. Program hours will total 65 over 4 terms including a 3 credit work experience component. In addition to the experience students will gain brewing beer in a laboratory setting, students will also gain experience in a production environment, initially through a partnership with a local craft brewery and, within two years, through an on-site, small-scale production facility that will produce and sell beer, similar to the operations of a craft brewery.

C3. Identify the provincial, national and/or international certifications and standards achieved in the new program, if applicable

Graduates from the Brewing and Brewery Operations Program may be eligible to obtain certification from the Institute of Brewing and Distilling (IBD), an international organization based in London, England; the University will aggressively explore this option for graduates of this program.

Program Consultations and Evaluation:

D1. List the other provincial post-secondary institutions consulted about the proposed program

1. KPU has held extensive discussions with Niagara College and Olds College about the proposed program.
2. Simon Fraser University recently (October 2, 2013) announced the development of a course, the 'Science of Brewing', to be launched in January, 2014. Senior academic administrators at KPU and Simon Fraser have shared and discussed their respective plans and it is understood that there is no overlap or duplication in the programming being contemplated by the two institutions.
3. Extensive discussions and visitations have occurred with the craft brewing/brewpub industry in the lower mainland. Meetings have been held with several such organizations resulting in very strong endorsements and willingness to assist the University by participating in an Advisory Committee and in other ways. The first Brewing and Brewery Operations Program Advisory Committee meeting was held on October 22.

A list of external contacts and copies of letters of support are attached.

The Advisory Committee is composed of individuals who, in the case of the breweries, are either brewmasters or presidents (occasionally both) at their respective organizations. External organizations consist of craft breweries, brew pubs, industry experts and the Executive Director of the BC Craft Brewers Guild.

4. The University has met with the Executive Director of the BC Craft Brewers Guild; the Guild has also been highly supportive of KPU's proposal to offer the program and, in addition, is assisting the University by providing industry data, participating in the advisory committee, etc. A copy of their letter of support is attached.

D2. State whether or not the program meets the program eligibility requirements as outlined at www.bcsap.bc.ca

The Brewery Operations Diploma is a full-time program as defined by the Dean of Science and Horticulture and meets eligibility requirements as outlined by the BC Student Assistance Program.

D3. Indicate what policies/procedures are planned for ensuring adequate depth and breadth of ongoing review and evaluation once the program has been implemented

1. KPU faculty and program co-ordinators review course offerings on a regular basis to ensure currency and relevancy as well as the appropriateness of the program's structure and course/program delivery.
2. The University has created an Advisory Committee for the Brewing and Brewery Operations Program; this Committee is composed of a number of individuals, drawn from the industry and, in most cases, directly responsible for the positions the graduates are being trained for; the Advisory Committee will, once the program is approved, become an ongoing source of advice for the University as outlined in the University's policy on advisory committees, B3 "Advisory Committees".
3. Under the University's policy B12, "Program Review", non-degree programs are reviewed at least once every seven years. The University's Program Review Manual outlines an extensive and detailed program review process including a self-study team, an external review team, identification of six review categories, role of various academic bodies in reviewing the results of the program review, etc.

D4. Indicate whether safety and other risk management factors have been addressed where appropriate

From: Louella Mathias
Sent: Thursday, October 24, 2013 2:44 PM
To: Hans Van Der Slagt
Cc: Elizabeth Worobec
Subject: RE: Brewing and Brewery Operations Program

Hi Hans,

Thanks for passing this along.

I had a brief conversation with Betty, and understand that at this time, just indicating that we are working on a risk assessment should be adequate.

Now that I have some documentation, I can begin the development of a risk register. Please note, it is a long process that includes a team of experts. However, I will connect with Betty and we will begin work on it shortly. The risk assessment usually takes 2-3 weeks. (depending on peoples time/schedules) I can assure you, that the risk report will be ready in time for submission to the ministry. Would that be sometime In Jan? In the meantime, I will review the 2 documents more closely to see if anything 'pops out' at me.

Thanks
Louella

Louella Mathias.

Director, Organizational Risk

Kwantlen Polytechnic University

Tel: 604.599.3381. Cell: 604-376-9225. Fax: 604.599.3044. email: Louella.Mathias@kpu.ca

Admissions and Transfer:

E1. Indicate how the institution plans to ensure students' ability to access the program through transfer

Admissions:

In addition to KPU's General university admission requirements, including the undergraduate-level English Proficiency Requirements, the following program admission requirements apply:

- English 12 (or equivalent) with a minimum grade of C+
- Chemistry 12 (or equivalent) with a minimum grade of C+
- Pre-calculus 11 or Foundations of Mathematics 11 (or equivalent) with a minimum grade of C+
- Portfolio Review including:

Letters of reference or additional documents to enhance the application. Cover

Letter including:

- Reasons for interest in the program
- Career goals and how this program will factor in reaching these goals
- Experience with brewing and the brewery or related industries
- Why applicant is an ideal candidate for this program

Resume containing:

- Work experience (particularly in the brewing, hospitality, or other related industry).
 - Post-secondary and/or Continuing Education
- Students are required to be a minimum of 19 years of age by the first day of classes.
 - Selection will be made by an Admissions Selection Committee composed of faculty, staff, and external members of the Program Advisory Committee following a rubric developed by the Committee.

When the number of qualified applicants exceeds the number of available spaces, selection will be based on the highest cumulative percentages or cumulative grade point average from the high school English, Chemistry and Mathematics courses required for admission AND their portfolio.

Transfers:

The University recognizes the importance of student access to programs through transfer. Prospective students for the Brewery Operations Program will be able to access the program through a variety of means as articulated in the following policies:

- B8 Credit for Advanced Placement Program Courses (Secondary school graduates admitted to Kwantlen Polytechnic University who have completed advanced placement subjects)
- B9 Credit for International Baccalaureate Program Courses (Secondary school graduates admitted to Kwantlen Polytechnic University who have completed Higher Level Baccalaureate subjects)
- B14 Credit for Prior Learning (credit for learning that the

- student has gained through prior course work and/or life and work experiences)
- B15 – Transfer of Articulated Courses from other Post-Secondary Institutions to Kwantlen Polytechnic University (increases student accessibility to post-secondary education by facilitating mobility between other institutions and Kwantlen)
 - Underprepared students will be referred to the Faculty of Academic and Career Advancement in order to upgrade their qualifications

E2. Describe how students will be able to transfer out of the proposed program into other programs within the same institution or at another institution

Degree completion opportunities within the University have been identified in the following areas:

- Bachelor of Business Administration in Marketing Management or Human Resources Management or Entrepreneurial Leadership; graduates of the Brewing and Brewery Operations Program would be required to complete designated bridging courses prior to entering the program: Basic Economics, Statistics, Accounting; this option currently exists within the University for students completing the Horticulture Technology Diploma.
- Preliminary discussions have been held with Chemistry faculty, to explore possible degree completion opportunities in the Faculty of Science and Horticulture; there is potential for a Bachelor of Science in Fermentation Science, using a model similar to that used in the existing transition from Horticulture Technology Diploma into the Bachelor of Horticultural Science degree programs; further information is required before this option can be fully explored.
- There are a number of opportunities that are being explored in the Faculty of Trades and Technology leading to a Bachelor's degree or an advanced diploma or certificate. Courses relevant to the Brewery Operations Program include: automation, packaging, mechanical systems, instrumentation and control systems, maintenance and millwright.

Letters of support from Jennifer Au, Chair, Department of Chemistry, Henry Reiser, Dean, Faculty of Trades and Technology, and Wayne Tebb, Dean, School of Business are attached.

Policies B14, Credit for Prior Learning and B15, Transfer of Articulated Courses... outlined in E1 above will be applied to transfers both between programs within the University.

Transfers outside the University will be governed by the British Columbia Council on Admissions and Transfer and the related BC Transfer Guide.

E3. Indicate how students will be able to transfer into related degree-level programs, if applicable

Refer to E2 above.

Other:

F1. Include any additional information not addressed in the sections above that may be helpful in better understanding the major components of the proposal

Deborah Henderson, Director of the Institute for Sustainable Horticulture, has been briefed about the proposed program and has expressed interest concerning a number of potential research spin-offs including:

- Investigating the growing potential for hops based on ecological principles including the use of natural fertilizers
- Investigating the use of native beneficial fungi to control one of the main pests, spider mite on hops crops
- Investigating the potential to use native beneficial fungi to control plant diseases (affecting hops) such as powdery mildew

There is potential for the University to work with local breweries on these issues. These companies are eligible for Natural Sciences and Engineering Research Council grants.

Program Consultation

Internal (KPU) Consultations:

- Department of Chemistry, faculty and staff
- **Wayne Tebb**, Dean, School of Business
- **Henry Reiser**, Dean, Faculty of Trades and Technology
- **Diane Purvey**, Dean, Faculty of Arts
- **Diane Salter Menzo**, Vice Provost, Teaching and Learning
- **Kathleen Bigsby**, Director, Institutional Analysis and Planning
- **Joshua Mitchell**, Director, Student Engagement
- **Lyn Benn**, Director, Student Development
- **Zena Mitchell**, Associate Registrar, Admissions and Records
- **Warren Stokes**, Associate Registrar, Records, Registration and Systems
- **John Boylan**, Associate Registrar, Student Financial Services
- **Paula Hannas**, Manager, User Support

External Consultations

- **Nick Bolton**, Brewmaster, Big Ridge Brewing Company, Surrey, BC
- **Michael Stewart**, Brewmaster, Big River Brewpub, Richmond, BC
- **Dex Stewart**, Assistant Brewmaster, Big River Brewpub, Richmond, BC
- **Ken Bopari**, President, Coal Harbour Brewing Company, Vancouver, BC
- **Ethan Allured**, Brewmaster, Coal Harbour Brewing Company, Vancouver, BC

- **Darryll Frost**, Central City Brewers/Distillers, Surrey, BC
- **Derrick Smith**, Dead Frog Brewing, Aldergrove, BC
- **Donna Smith**, Dead Frog Brewing, Aldergrove, BC
- **Peter Haupenthal**, Brewmaster, Dockside Brewing, Vancouver, BC
- **Vern Lambourne**, Brewmaster, Granville Island Brewing, Vancouver, BC
- **Jim Lister**, General Manager, Granville Island Brewing, Vancouver, BC
- **Jack Bensley**, Part-Owner & Brewmaster, Main Street Brewing, Vancouver, BC
- **Iain Hill**, Head Brewmaster, Mark James Group, Vancouver, BC
- **Angie Fernandez**, Owner & Director, Marketing and Communications, Russell Brewing, Surrey, BC
- **Kevin Wilson**, Assistant Brewmaster, Russell Brewing, Surrey, BC
- **James Walton**, Owner and Brewmaster, Storm Brewing, Vancouver, BC
- **Ken Beattie**, Executive Director, BC Craft Brewers Guild
- **Brad McQuhae**, Owner, NSI Newlands, Langley, BC
- **Jim Clarke**, Owner, First Key Consulting, Richmond, BC
- **Mark Benzaquen**, Consultant, First Key Consulting, Richmond, BC
- **Steve Hudson**, VP Academic, Niagara College, Ontario
- **Craig Youdale**, Acting Dean, Canadian Food and Wine Institute, Niagara College, Ontario
- **Peter Johnson-Berresford**, Co-ordinator, Olds College, Alberta
- **Jason Dewling**, VP Academic, Old College, Alberta
- **Chandra Morrison**, Senior Licensing Analyst, BC Provincial Licensing Board



October 7, 2013

Alan Davis, President
Kwantlen Polytechnic University
12666 72nd Avenue
Surrey BC V3W
2M8

Dear President Davis:

On behalf of the BC Craft Brewers Guild, I am delighted to hear that Kwantlen Polytechnic University is proposing to offer a Brewmaster and Brewery Operations Management Program to start in September, 2014.

The Craft Brewing and Brewpub industry is growing exponentially in British Columbia and, for that matter, across Canada and the United States. Craft brewers/brewpubs are generally independently owned businesses that are filling a niche by producing, on a small scale, beers that emphasize flavor and brewing technique.

The growth and increasing sophistication of the industry means that producers need to attract individuals with a passion for, understanding of and training in the business of brewing beer. Your proposed program will fill this need at a very propitious time.

We congratulate you on your initiative and extend our desire to assist you in any way we can in bringing this program to fruition.

Yours sincerely

Ken Beattie
Executive Director
British Columbia Craft Brewers Guild



DEAD FROG BREWERY
Unit 1 27272 Gloucester Way
Aldergrove BC, V4W 4A1
Ph. 604-856-1055 Fx. 604-856-9803

Alan Davis, President
Kwantlen Polytechnic University
12666 72nd Avenue
Surrey BC
V3W 2M8

Dear President Davis:

We at Dead Frog Brewery are very pleased to learn that Kwantlen Polytechnic University is proposing to offer a Brewmaster and Brewery Operations Management Program to start in September, 2014.

We are seeing tremendous growth in our industry in the lower mainland, in British Columbia and across Canada. Demand for craft brewery and brewpub product is on the increase and so is the demand for people to work in the industry. Your program comes at a very good time to address a potential shortfall of qualified staff.

We want to express support for your initiative and will be very pleased to work with the University in helping the program to get off the ground and prosper. We are excited to be able to hire qualified students from your program. We are more than willing to support the students with the internships and jobs while they are attending the program.

We look forward to participating in the ad hoc advisory committee and providing any support that may be helpful in ensuring the success of the program. We are located within 15 min. from the campus and feel that we can be instrumental in allowing the students to experience firsthand the workings of a real brewery.

Please feel free to call on us at anytime we would be happy to share our knowledge and experience. We look forward to developing a long lasting relationship with Kwantlen Polytechnic University.

Yours sincerely,

Derrick and Donna Smith

NOTHING DOES DOWN BETTER THAN DEAD FROG



Vancouver's Award Winning Microbrewery

Alan Davis, President
Kwantlen Polytechnic University
12666 72nd Avenue
Surrey BC
V3W 2M8

Dear President Davis:

Our team at Granville Island Brewing were very pleased to learn that Kwantlen Polytechnic University is proposing to offer a Brewmaster and Brewery Operations Management Program to start in September, 2014.

We are seeing tremendous growth in our industry in British Columbia and across Canada. Demand for craft brewery and brewpub products is increasing and so is the demand for people to work in the industry. Your program comes at a very good time to address a current and growing shortfall of skilled employees.

We want to express support for your initiative and will be very pleased to work with the University in helping the program to get off the ground and prosper.

Both myself and our Brewmaster, Vern Lambourne are participating on your ad-hoc Advisory Committee and we will entertain co-op work placements and other support as appropriate to continue to see this program succeed.

We will be watching your progress on this with great interest.

Yours sincerely

A handwritten signature in black ink, appearing to read "Jim Tister".

Jim Tister
General Manager

A handwritten signature in black ink, appearing to read "Vern Lambourne".

Vern Lambourne
Brewmaster

OFFICE: 310-1385 West 81st Ave., Vancouver, BC Canada V6H 3V9
Tel: (604) 688-2227 Fax: (604) 688-1185
BREWERY: 1441 Cartwright St., Granville Island, Vancouver, BC Canada V6H 3R7
Tel: (604) 687-2759 Fax: (604) 685-0502
www.gil.ca



Alan Davis, President
Kwantlen Polytechnic University
12666 72nd Avenue
Surrey BC
V3W 2M8

Dear President Davis:

We at Main Street Brewing Company were very pleased to learn that Kwantlen Polytechnic University is proposing to offer a Brewmaster and Brewery Operations Management Program to start in September, 2014.

We are seeing tremendous growth in our industry in the lower mainland, in British Columbia and across Canada. Demand for craft brewery and brewpub product is on the increase and so is the demand for people to work in the industry. When seeking further education in brewing, I myself had to utilize an institution in another country due to lack of local offerings. Your program comes at a very good time to address a potential shortfall of qualified staff.

We want to express support for your initiative and will be very pleased to work with the University in helping the program to get off the ground and prosper. As such, I am looking forward to participating in the ad hoc Brewmaster Program advisory committee, and in being involved in work placement or on-op for this program.

We look forward to seeing this program become a reality.

Yours sincerely,

Jack Bensley
Brewmaster
Main Street Brewing Co.

260 East 7th Avenue, Vancouver, BC V5T 1M9 | T: 604-792-0898 | w. mainstreetbrewingcompany.com

THE MAIN THING IS THE BEER



Department of Chemistry

12666-72 Ave, Surrey, BC

Canada V3W 2M8

November 1, 2013.

Dr. Elizabeth Worobec
Dean, Faculty of Science and Horticulture
Kwantlen Polytechnic University
12666 72nd Avenue
Surrey, BC V3W 2M8

Dear Dean Worobec:

The Department of Chemistry supports the proposal from the School of Horticulture to develop a new and innovative diploma program in Brewing and Brewery Operations. With the growth of the craft brewing and brewpub industries in recent years, this is a very timely program that will fill a market niche in British Columbia and provide job-ready skills for our students. The proposed program speaks to the Quality, Reputation, and Relevance themes of Vision 2018, KPU's Strategic Plan for 2013 to 2018. Furthermore, it aligns well with the provincial government's Skills and Training Plan, <http://www.bcjobsplan.ca/skills/bc-skills-and-training-plan/>.

I am impressed with the strong support from local industry. The consultations that had been undertaken with a large group of Brewmasters and employers of the craft brewing and brewpub industries in the development of the curriculum lend further strength to the program. Thus, I believe this proposal will be an invaluable addition to KPU's mix of polytechnic programs.

We have discussed the possibility of degree completion options within the Faculty of Science and Horticulture. For example, there is potential for a Bachelor of Science in Fermentation Science, using a model similar to that used in the existing transition from the Horticulture Technology Diploma programs into the Bachelor of Horticulture Science degrees. Further information is required before this option can be fully explored.

On behalf of the Department of Chemistry, I endorse the proposal for the Brewing and Brewery Operations Program, and I look forward to witnessing the implementation of this new opportunity for students at KPU.

Sincerely,

Jennifer Au, B.Sc., Ph.D.
Chair, Department of Chemistry

LETTER IN SUPPORT OF THE BREWING AND BREWERY OPERATIONS PROGRAM

Oct. 29, 2013

Elizabeth Worobec
Dean, Science and Horticulture

Dear Betty:

Thanks for meeting with me to review the proposed Brewing and Brewery Operations Program. I am impressed with the program, as outlined, and believe that it represents a valuable addition to our roster of programs.

During our review, we discussed the possibility of program completion options within my Faculty. I believe that, with some additional information about the program and courses you are developing and some further work within my Faculty that there are a number of opportunities to be explored, some leading to a degree and others to an advanced diploma or certificate. Courses relevant to the Brewing and Brewery Operations Program include: automation, packaging, mechanical systems, instrumentation and control systems, maintenance and millwright. I would be very pleased to explore these opportunities further with you at any time.

I wish you well in bringing this program to fruition.



Henry Reiser
Dean, Faculty of Trades and Technology



MAILING ADDRESS
12666-72 Ave, Surrey, BC
Canada V3W 2M8

October 29, 2013

Dr. Elizabeth Worobec
Dean, Faculty of Science and Horticulture
12666 72 Avenue
Surrey, B.C. V3W 2M8

Dear Dr. Worobec:

SUBJECT: Program Concept Brewing and Brewery Operations Diploma

Based on the information provided to us by your office, I am pleased to offer an unconditional letter of support for the Program Concept for Brewing and Brewery Operations Diploma. The specific business skills sought align well with our existing curriculum without modifications.

Sincerely,

A handwritten signature in black ink, appearing to read 'Wayne Tebb', written in a cursive style.

Wayne Tebb
Dean, School of Business

WT/sh



Brewing and Brewery Operations Management Program Viability Report

Office of Institutional Analysis & Planning
Kwantlen Polytechnic University
October 2013

<http://www.kwantlen.ca/iap.html>

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Section 1: Competitive Environment

This section identifies the postsecondary education in North America, Europe and Australia that offer programs related to breweries.

| Institution | Program Name & Description |
|--|---|
| Simon Fraser University, BC | Offering a course on the Science of Brewing that explores the chemistry, biology and microbiology involved in the brewing process. Students of all disciplines, including business, mathematics, science and engineering, will be eligible to register. Considering the potential to expand the program to include a master's degree or Certificate in Brewing, and to further develop a "science entrepreneurship" program. |
| Olds College, Alberta | Brew master and Brewery Operations Management Diploma (2 year program) Offered in collaboration with Niagara College, the Olds College Brew master program will equip graduates for a variety of careers within the brewing industry. The program will provide a mix of theory and hands-on practice, a long-standing strength with Olds College programs. The brewing facility will include a teaching brewery with state-of-the-art equipment. |
| Niagara College, Ontario | The Niagara College program is in great demand. In the last three years, the number of applicants has greatly exceeded the number of spots available. In fall 2013 alone, there were 350 applicants for 24 spots. Old College is launching the program. For the first intake there were 85 applicants for 26 spots. |
| Prud'homme Beer Certification | Offers three levels of beer certification training aimed at the hospitality industry. Topics covered include beer and food pairing, pouring and serving, identifying flavours, etc. (each level ranges from 30 to 40 hours; \$450 - \$750 per level) |
| Oregon State University | Continuing education courses offered: Brewing analytics, Sensory analysis, Beer proficiency, Craft brewery start-up (3 to 4 day courses) Bachelor in Fermentation Science -Students learn about wine production, beer and fermented foods (cost per term \$2,582 for residents, \$7154 for non-residents; 3 years) Graduate studies are also available. |
| Central Washington University | Craft Beer Trade Certificate – An interdisciplinary program that provides an overview of the art, science, technology, and business aspects of the craft beer industry. Students learn about the craft beer trade using a variety of approaches including lab work, hands on experience, lectures, field trips, and industry speakers (30 weeks) |
| The Siebel Institute of Technology Montreal facility | Offers state-of-the-art facilities set within the laboratory at the Biotechnology Research Institute, a center for yeast genetics and fermentation research. |
| Siebel Institute of Technology Chicago | Master Brewer Program – complete understanding of the commercial brewing process: production, business related. Half of the time is in spent in Chicago, the other half in Munich at the Doemens Academy to learn applied brewing techniques in recipe design, brewing, fermentation, finishing and packaging. Tours of European breweries are conducted. (20 weeks) International Diploma in Malting and Brewing Technology: \$14,900–\$16,400 (3 months) |

| | |
|--|--|
| | <p>Master Brewer Program: Sold out through 2012; tuition for 2013 TBD (5 months)</p> <p>Associate in Malting and Brewing Technology: \$8,800–7,900 (6 weeks)</p> <p>Note: Siebel offers many additional courses for all levels of brewing.</p> <p>Online brewery program (12 week)</p> |
| University of California Davis con | <p>Continuing and Professional Education:</p> <p>Diploma in brewing (3 six day modules)</p> <p>Variety of short courses related to brewing</p> <p>-Master Brewer Program provides an in-depth understanding of brewing science and brewery engineering. Major topics covered in brewing science include malting, mashing, brewing, fermentation and finishing, while the brewery engineering subject matter focuses on fluid flow, heat and mass transfer, solid-liquid separation and more. Students extensively explore these two fields through courses that are the professional-level equivalents of UC Davis degree-program courses, seminars and tutorials in these fields. (18 weeks)</p> <p>-Professional Brewers Certificate Program meets four to six hours a day, five days a week. The curriculum duplicates the first 10 weeks of the Master Brewers Program. (10 weeks)</p> |
| University of California San Diego | <p>Master Brewers Program: \$14,300 (5 months)</p> <p>Professional Brewers Certificate Program: \$8,800 (2 months)</p> <p>UC-Davis also offers undergraduate and graduate degree programs as well as other courses for all levels of brewing.</p> |
| University of Sunderland, UK | <p>British Brewing Technology course (10 weeks)</p> <p>Practical Brewing course (3 weeks)</p> |
| Doemens Academy, Germany | <p>1. Brewing and Beverage Technologist (2 years; \$16,000)</p> <p>2., Brew Master Program (1 year; \$8,000)</p> |
| Heriot Watt University, Scotland | <p>All programs cost \$15,000 to \$18,000 per year</p> <p>BSc (Hons) Brewing and Distilling (4 years)</p> <p>Postgraduate Diploma in Brewing and Distilling (9 months)</p> <p>Postgraduate MSc in Brewing and Distilling (1 year)</p> <p>MBA in Brewing and Distilling (2 years)</p> <p>A variety of courses are available both on campus and by distance learning and short courses and workshops are catered for on request.</p> |
| Institute of Brewing and Distilling, England | <p>Fundamentals of Brewing and Packaging Beer (4 days; £755)</p> <p>Fundamentals of Distilling (4 days; £850)</p> <p>Brewers Diary (self-study; £215)</p> <p>General Certificate in Brewing (5 days; £700)</p> <p>General Certificate in Distilling (4 days; £870)</p> <p>Diploma in Brewing (3 modules 20 days total; £ 1820 - £3800 each module. Online option modules are each 5 months and cost £950-£1800 each)</p> <p>Diploma in Distilling (Online: 3 modules 5 months each; £950-£1800 each)</p> <p>Diploma in Packaging (Online: 3 modules 6 months each; £1100 each)</p> <p>Master Brewer(4 modules 3 to 5 days each; £1000 to £1250 each)</p> |

| | |
|--|--|
| Scandinavian School of Brewing, Copenhagen | The Diploma Master Brewer Course Executive in Beverage Industry Supply Chains Brewing Course for Administrative Staff Beer Flavour Session Cider Course Professional Updates within Microbiology, Process Techniques Innovation etc. Tailor made course in cooperation with specific breweries |
| Edith Cowan University, Australia | Graduate Diploma of Brewing (\$24,500; 1 year) |
| Versuchs- und Lehranstalt für Brauerei Berlin, Germany | VLB Brew master Certificate: (\$19,800; 6 months) |
| American Brewers Guild, Vermont | Craft Brewers Apprenticeship Program (\$8,950; 7 months) Intensive brewing Science and Engineering (\$6,750; 6 months) |
| Master Brewers Association of the Americas, Minnesota | Brewing and Malting Science: (\$3,650; 2 weeks) Brewery Packaging Technology: (\$3,775; 2 weeks) |

Overall, there are very few programs that prepare people to work in the brewing industry. The existing programs vary in breadth and depth and can range from two weeks to four years. The cost can range from \$3,600 for a short program to \$30,000 - \$40,000 or more for the advanced programs. Some programs require 40 hours a week of instruction time while others allow students to study on your own time in an online format. Both postsecondary institutions and industry associations provide educational and training options.

Due to the recent boom in the craft brewing industry, many of the more popular schools have waiting lists.

Industry Overview:

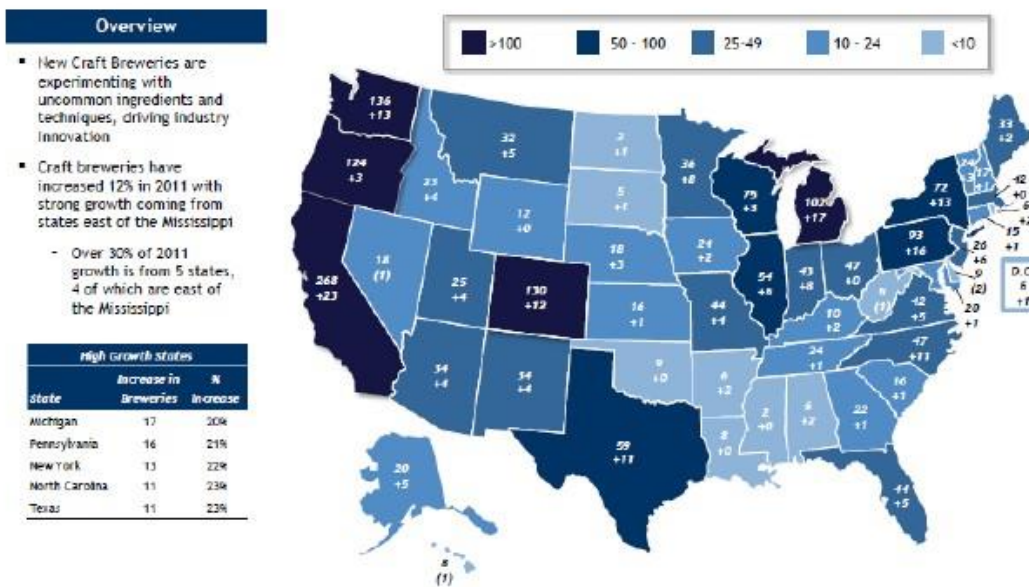
- a) Current Number of Craft Breweries in BCⁱ



- b) The craft brewing industry is growing in BC. Sales of bottled craft beer have risen by more than 55% in BC over last year [2012 to 2013], and the industry now accounts for 20% of the market in the province compared to 9% in 2009 and 4% of the national average. Craft beer culture is so strong in Vancouver that the city has been christened Portland Northⁱⁱ. According to the BC Craft Brewer Guild, craft beer sales are growing. In 2009, retail sales were \$75.3 million and by 2013, they were \$165 million.
- c) In 2009, there were 8,377 people employed in the industry across Canada, which represents a decrease from 10 years earlier when 10,517 people were employed. This drop is explained by an increase in manufacturing productivity of 45% over this ten year period. However, in the craft brewery/brewpubs, employment has increased in proportion to the increase in the number of establishments. BC craft brewers employ over 1,200 people with an additional 1,000 working in the province's brewpubs.ⁱⁱⁱ
- d) Alberta: There are 11 microbreweries and 3 brewpubs¹. Alberta's requirements are quite stringent making it difficult for craft breweries to get off the ground.^{iv}
- e) Ontario: There are about 75 microbreweries.^v Ontario is providing small craft brewers with renewed support by extending the Ontario Microbrewery Strategy for two more years to help create jobs and expand the industry. Through the Ontario Microbrewery Strategy, the province is helping small brewers explore new marketing, training and tourism development opportunities. Craft beer is a growing and important industry in Ontario, employing more than 650 people in direct brewery jobs at 47 microbreweries. Support through Ontario's Microbrewery Strategy also helps create indirect jobs in Ontario's agriculture and hospitality sectors.^{vi}

- f) Yukon: There is 1 microbrewery.
- g) Oregon: "Oregon currently has 137 brewing companies operating 174 brewing facilities in 59 cities across the state. There are currently 51 breweries in Portland, 15 in Bend and 10 in Eugene. More than 17 percent of the 2.79 million barrels of all beer — bottled and draft — consumed in the state were made in Oregon. For draft beer, that percentage is even higher, with Oregon breweries producing an estimated 47 percent of all draft beer consumed in the state. Oregonians consumed 12.8 percent more Oregon craft beer over last year, equaling 483,400 barrels. Craft beer production in the U.S. grew 15 percent in 2012 and now represents 6.5 percent of the total volume of beer brewed in the United States."¹
- h) Washington: There is a very active microbrewery industry in Washington State with over 145 microbreweries and 70 brewpubs.
- i) Alaska: The craft beer market has grown 10% annually in the last five years. At these current growth

Growth in Number of Craft Breweries Driven by "Extremists"



¹¹ High growth states show an increase of over 10 breweries and a percentage increase over 20%. Source: Brewers Association.

rates, craft beer is expected to represent 15% of the market by 2020.^{vii}

Demand for Graduates

- a) At a meeting with industry reps on October 22, 2013, the eleven attendees who were present are all very enthusiastic about having the program and are confident that the industry can absorb 25 grads each year and use students between year 1 and year 2 in a summer work experience.
- b) A current survey of 21 craft brewer revealed the following: 406 full time jobs currently within the 21 BC Craft brewers; 94 jobs were created between 2012 and 2013; Over \$13 million invested in equipment and expansions (in the past two years).^{viii}

Career Opportunities

- Beer Making
- Licensee and agency sales and operations
- Brewery Operations
- Marketing and Public Relations
- Brew Pub Operations
- Retail Sales
- Special Events
- Packaging,
- Cellaring
- Quality control
- Brewery lab technician.^{ix}

Conclusion

Overall, there is sufficient evidence to suggest that graduates from the KPU Brewing and Brewery Operations Management Program could find employment upon graduation.

ⁱ <http://engage.gov.bc.ca/liquorpolicyreview/files/2013/10/BC-Craft-Brewers-Guild-2.pdf> Dated Sept. 30, 2013

ⁱⁱ <http://life.nationalpost.com/2013/06/08/could-there-be-a-craft-beer-bubble-in-vancouver/> Dated 7 July 2013

^{iv} <http://www.cbc.ca/news/canada/edmonton/alberta-beermakers-say-trouble-is-brewing-1.1317033> Dated April 15, 2013

^v <http://www.fin.gov.on.ca/en/lists/bwt/beer.html> Dated October 7, 2013

^{vi} http://www.ontariocraftbrewers.com/OntarioNewsRoom_ExcitementBrewingForOntarioCraftBeers.php Date July 25, 2013

^{vii} http://www.demetergroup.net/docs/perspective/Craft_Beer.pdf Dated 2013

^{viii} <http://engage.gov.bc.ca/liquorpolicyreview/files/2013/10/BC-Craft-Brewers-Guild-2.pdf>

^{ix} Getting serious on Brewing Education.

https://www.google.ca/search?q=getting+a+serious+brewing+education&rls=com.microsoft.en-us:IE-SearchBox&ie=UTF-8&oe=UTF-8&sourceid=ie7&gws_rd=cr&ei=BSZoUofoAcSFQLbiYCwDw and Niagara College Brew Program Job Opportunities

Appendix D Mapping of Program Learning Outcomes with Brewery Job Descriptions from 17 different breweries

| Part 01 | Part 02 | | | | | | | |
|--|---|---|---|---|--|--|---|---|
| COMPETENCIES TAKEN FROM JOB DESCRIPTIONS FROM 17 DIFFERENT BREWERIES | PROGRAM LEARNING OUTCOMES | | | | | | | |
| | PLO#1 | PLO#2 | PLO#3 | PLO#4 | PLO#5 | PLO#6 | PLO#7 | PLO#8 |
| | 1. Demonstrate and evaluate safe work practices based on hazard analysis. | 2. Demonstrate the fundamental techniques of beer production. | 3. Apply knowledge of beer chemistry and microbiology in brewery operations | 4. Evaluate appropriate process technology practices in brewery operations. | 5. Evaluate and control the consistency and quality of beer using chemical, microbiological and sensory analysis | 6. Relate the history and evolution of the beer industry to today's market, beer styles and regulations. | 7. Develop a product portfolio that addresses consumer needs. | 8. Discuss and apply business principles and strategies related to running a brewing company. |
| INDUSTRY COMPETENCIES | | | | | | | | |
| Managing, ordering and scheduling any and all raw materials necessary for the production and packaging of our beer. | | X | | | | | | X |
| Day to day maintenance of equipment within the brewery and work to maintain and adjust the brewery equipment based on our annual maintenance schedule. | | X | | X | | | | |
| Overseeing and participating in brewing, cleaning and packaging as well as performing other duties as required. | | X | X | X | X | | | |
| Sampling, monitoring and documenting the brewing and fermentation process. | | | X | | X | | | |
| Chemical analysis of water, wort, yeast, beer, etc. | | | X | | X | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lab maintenance, yeast management, and sensory analysis. | | | X | | X | | | |
| Unload alcohol and syrup from tankers into the brewery; blend alcohol to correct % where required | | X | X | | X | | | X |
| Spearhead the writing of Standard Operating Procedures. | | | | | | | | X |
| Understand and use standard operation procedures (SOPs), | | X | | | | | | |
| Recipe/ product development. | | | | | | | X | |
| Demonstrated ability to learn BOTEC Brewing software and other software used in the Brewing Process, Stanley | | X | | | | | | |
| Good decision making skills based on the feedback from information provided by the PLC interface and other related information, | | X | | X | X | | | |
| Computer and systems literate skills | | | | | | | | X |
| Pouring and filling growlers and glasses as required | X | | | | | X | X | X |
| Maintaining cleanliness of the tasting room | X | | | | | | | X |
| Managing the brewing operations, | | X | | X | X | | | |
| Co-ordinating logistics, warehouse management | | | | | | | | X |
| Maintaining draught system | | X | | X | | | | |
| Build and update production schedule, in conjunction with the sales and marketing team, based on sales forecast | | | | | | | X | X |
| Forklift experience is an asset (not part of PLOs), | | | | | | | | |
| Front of House Skills | | | | | | | | X |
| Financial/ Cash Management | | | | | | | | X |
| Create & Execute Promotions | | | | | | | | X |
| Inventory Management (logisitics & physical labour) | X | | | | | | | X |

| | | | | | | | | |
|---|---|--|--|---|---|---|--|---|
| Food & Beverage Knowledge/ Skills | X | | | | | X | | X |
| Sales Management Skills | | | | | | | | X |
| Sales Analytic Skills | | | | | | | | X |
| Computer Skills | | | | | | | | X |
| REGULATORY BODY COMPETENCIES | | | | | | | | |
| Maintaining our manufacturing system to organize and record all of our brewing operations. | | | | | | X | | X |
| Maintaining and executing proper safety procedures within the brewery, the proper handling of ingredients and inventory, as well as brewery organization. | X | | | | | | | |
| Management of data entry for brewing, fermentation, cellar operations, and quality control. | | | | | X | | | X |
| Upkeeping the GMP and HACCP program regarding quality-related areas, CCBD, Stanley | | | | | | | | X |
| Accounting experience would be a bonus | | | | | | | | X |
| "Serving It Right" Certification | X | | | | | X | | X |
| Understanding of Hospitality Standard | X | | | | | X | | X |
| Public Health Safety Standards | X | | | | | X | | X |
| Provincial Regulatory Requirements | | | | | | X | | |
| FUTURE STUDIES COMPETENCIES | | | | | | | | |
| Team management, annual employee performance reviews, and hiring. | | | | | | | | X |
| ENRICHED CIVIC & PERSONAL LIFE COMPETENCIES | | | | | | | | |
| Ability to problem solve. | | | | | X | | | X |
| Must be organized and able to prioritize. | | | | | | | | X |
| Exhibit day-to-day enthusiasm, commitment, and a desire to work hard and learn new skills | | | | | | | | X |
| Strong critical thinking, analytical and effective decision-making skills | | | | X | | | | X |

| | | | | | | | | |
|--|--|--|--|--|--|---|---|---|
| Demonstrated collaborative teamwork and ability to work cooperatively with co-workers and managers, | | | | | | | | X |
| Customer Focused Providing an enjoyable and entertaining experience for customers | | | | | | | | X |
| Communication Skills: Engaging and Educating Customers | | | | | | X | | X |
| Our lineup of beer, Craft Beer | | | | | | X | X | X |
| Be an advocate for the Brand/Brewery, | | | | | | X | X | X |
| People Skills: friendly, passionate, good listener | | | | | | X | | X |
| Service Oriented | | | | | | | | X |
| Achievement Oriented | | | | | | | | X |
| Results Oriented: Organized , | | | | | | | | X |
| Resourceful Dauntless/fearless | | | | | | | | X |
| Commitment to Learning: Positive outlook on life TP | | | | | | | | X |
| Ability to work independently in a fast-paced environment, under pressure and tight deadlines, and overtime, | | | | | | | | X |
| Keen attention to detail, | | | | | | | | |
| Customer Focused | | | | | | | | X |
| Problem Solving with Customers/ Consumers | | | | | | | | X |
| Developing People (training, scheduling, payroll) SG | | | | | | | | X |
| Team Work | | | | | | | | X |
| Leadership Skills | | | | | | | | X |
| Communication Skills | | | | | | | | X |
| Problem Solver | | | | | | | | X |
| Achievement Oriented | | | | | | | | X |
| Resourceful | | | | | | | | X |

Appendix E Mapping of Program Learning Outcomes to Course Learning Outcomes

| PROGRAM COURSES AND THEIR CLOs | PROGRAM LEARNING OUTCOMES | | | | | | | |
|--|---|---|---|---|--|--|---|---|
| | PLO#1 | PLO#2 | PLO#3 | PLO#4 | PLO#5 | PLO#6 | PLO#7 | PLO#8 |
| | 1. Demonstrate and evaluate safe work practices based on hazard analysis. | 2. Demonstrate the fundamental techniques of beer production. | 3. Apply knowledge of beer chemistry and microbiology in brewery operations | 4. Evaluate appropriate process technology practices in brewery operations. | 5. Evaluate and control the consistency and quality of beer using chemical, microbiological and sensory analysis | 6. Relate the history and evolution of the beer industry to today's market, beer styles and regulations. | 7. Develop a product portfolio that addresses consumer needs. | 8. Discuss and apply business principles and strategies related to running a brewing company. |
| HOPS 1100: Introduction to Brewing | | | | | | | | |
| Describe the processing and role of the major ingredients in the brewing process | | | | | | | | |
| Explain the major processes involved in beer production from grain to package | | | | | | | | |
| Discuss the history of brewing | | | | | | | | |
| Describe how the development of technologies, beer styles, regulations, and entrepreneurs have influenced each other to form the current state of the brewing industry | | | | | | | | |
| Explain the impact of beer on the human body | | | | | | | | |
| HOPS 1105: Brewing 1 | | | | | | | | |
| Employ safe work practices | | | | | | | | |
| Identify all components of brewing equipment | | | | | | | | |
| Choose appropriate brewing ingredients | | | | | | | | |
| Operate brewing equipment correctly | | | | | | | | |
| Clean and sanitize brewing equipment | | | | | | | | |
| Describe proper storage of brewing supplies and raw materials | | | | | | | | |
| Describe basic brewing procedures | | | | | | | | |
| Make beer starting from the raw ingredients | | | | | | | | |
| Maintain brewing equipment | | | | | | | | |

| | | | | | | | | |
|--|---|---|---|---|---|---|---|---|
| Perform basic brewing measurements | | | I | | I | | | |
| Produce and interpret basic brewing graphs | | | | | I | | | |
| HOPS 1110: Sensory Eval & Ingredients | | | | | | | | |
| Explain how humans experience and process sensory information | | | | | I | | | |
| Utilize the Standard International Beer Flavor terminology and the Beer Flavor Wheel to describe beer flavor and sensory attributes | | | | | I | | | |
| Identify and recognize common beer attributes and defects | | | | | I | | | |
| Describe the influence of brewing ingredients and processes on the flavor of the beer | | I | | I | | | | |
| Apply basic sensory panel tests to meet different goals | | | | | I | | | |
| HOPS 1205: Brewing 2 | | | | | | | | |
| Explain health and safety measures to ensure safe working conditions in a brewery | D | | | | | | | |
| Describe a Hazard Analysis Critical Control Plan (HACCP) | | | | | I | | | |
| Select brewing ingredients based on product requirements | | D | | | | | | |
| Source brewing supplies and raw materials | | D | | | | | | |
| Operate brewing equipment | D | D | | D | | | | |
| Clean and sanitize brewing equipment | D | D | D | D | | | | |
| Explain brewing procedures | | D | D | | | | | |
| Make beer using low gravity and high gravity techniques | | D | D | | | | | |
| Prepare and interpret wort and beer samples | | | D | | D | | | |
| Produce and interpret graphs used in brewing | | | | | D | | | |
| Estimate production costs | | I | | | | | | |
| HOPS 1211: Brewing Microbiology | | | | | | | | |
| Describe the importance of yeast strain and culture purity | | D | D | | | | | |
| Discuss the major factors of yeast performance and how to utilize these to impact finished beer flavor and operational results | | D | D | D | D | I | I | I |
| Optimize a brewery fermentation profile to meet various competing output requirements (flavor, alcohol production, tank utilization, energy costs) | | D | D | D | D | | I | I |
| Perform basic microbiological testing | D | D | D | | D | | | |

| | | | | | | | | |
|---|---|---|---|---|---|--|--|---|
| Identify common beer spoilage organisms | | | D | | D | | | |
| Create a brewery microbiological sampling plan | | D | D | D | D | | | I |
| Show basic microbiological problem solving techniques | | | D | | D | | | I |
| HOPS 1212: Brewing Chemistry | | | | | | | | |
| Explain basic chemistry fundamentals | | | D | | | | | |
| Solve a variety of stoichiometric, thermodynamic and gas law problems | | | D | | | | | |
| Recognize the variety of organic compounds contained in beer | | | D | | | | | |
| Explain the chemical properties of brewing ingredients and how they influence wort and beer production | | | D | | | | | |
| Describe pH and its effects on wort and beer production | | | D | | | | | |
| Explain the chemistry of brewing, fermentation and post-fermentation processes | | | D | | | | | |
| Describe the isomerization of organic compounds found in beer | | | D | | | | | |
| Explain and apply the chemistry of brewery cleaning and sanitation processes | | | D | | | | | |
| Describe and apply basic principles of quality management and process control to wort and beer production | | | I | | | | | |
| Explain and apply the laboratory concepts and techniques used to assess and control the chemical properties of wort and beer | I | I | | | I | | | |
| HOPS 1213: Brewing Equipment & Technology | | | | | | | | |
| Explain the technological requirements and equipment choices for the brewing process stages | I | I | | | | | | |
| Describe the safety, quality, food production requirements, and environmental and efficiency factors for the brewing process stages | | | | | I | | | |
| Recognize the importance of brewery utilities throughout the process | | | | | I | | | |
| Apply basic pump theory to selection of pump types for various process stages | | I | | | I | | | |
| Describe the basics of process control and automation and the process sensors available for the brewing process | | | | | I | | | |
| HOPS 1214: Intro to Finishing | | | | | | | | |
| Explain basic filtration theory | | | | | I | | | I |
| Identify different types of filters | | | | | I | | | I |
| Explain the basic principles of counter-pressure filling of carbonated beverages | | D | | | | | | D |

| | | | | | | | | |
|---|---|---|---|---|---|--|---|---|
| Describe packaging containers and materials used in the brewing industry | | | | I | | | | |
| Describe processing techniques that affect colloidal stability, microbiological stability and oxygen pickup | | | | I | | | | |
| Explain quality control tests and measurements that are performed on finished beer | | | D | | D | | | |
| Compare bottle, can and keg filling technologies | | | | I | | | | |
| Explain cleaning and sanitation of packaging systems | | D | | D | | | | |
| Describe draught system design for delivering beer | | | | I | | | | |
| Outline basic principles of labeling and packaging line layout | | | | I | | | | |
| HOPS 2300: Brewing Work Experience HAS NEVER BEEN OFFERED | | | | | | | | |
| Perform brewery labour operations as required by the employer for a minimum of 455 hours of work | | | | | | | | |
| Work independently with minimal supervision | | | | | | | | |
| Appropriately use skills and abilities developed in first year studies | | | | | | | | |
| Participate as a member of a brewery team within the work environment | | | | | | | | |
| Record workplace activities and insights | | | | | | | | |
| Appreciate the demands of the modern workplace | | | | | | | | |
| Respond constructively to feedback from the host organization | | | | | | | | |
| HOPS 2301: Brewing Work Exp Dissemination HAS NEVER BEEN OFFERED | | | | | | | | |
| Compare practical experiences with class mates | | | | | | | | |
| Identify concerns for brewing methods used at the work site | | | | | | | | |
| Discuss possible solutions or improved brewing methods used at the work site | | | | | | | | |
| Summarize work placement experiences through reports and presentations | | | | | | | | |
| HOPS 2305: Brewing 3 | | | | | | | | |
| Analyze health and safety measures | A | | | | | | | |
| Evaluate brewing ingredients based on product requirements | | D | D | | | | I | |
| Manage brewing supplies and raw materials | | | | | | | | I |
| Operate brewing equipment independently | | D | | | | | | |
| Clean and sanitize brewing equipment independently | | D | | | | | | |
| Explain advanced brewing procedures | | D | | | | | | |

| | | | | | | | | |
|--|--|---|---|---|---|--|---|---|
| Produce beer using advanced brewing techniques | | D | | | | | | |
| Select quality control measurements (students aren't really selecting the QC measurements) | | | D | | D | | | |
| Produce and interpret graphs used in brewing | | | | | D | | | |
| Troubleshoot production problems | | | | | D | | | |
| Calculate production costs | | | | | | | | D |
| HOPS 2310: Product Evaluation and Judging | | | | | | | | |
| Evaluate common styles of beers against recognized standards | | | | | I | | | |
| Plan brewery sensory evaluation facilities | | | | | D | | | I |
| Create a sensory sampling program | | | | | I | | | |
| Train brewery sensory panel participants | | | | | D | | | |
| Select methods for quantification of sensory evaluation results | | | | | A | | | |
| Collect and analyze controlled consumer sensory feedback | | | | | A | | D | |
| Propose and justify suitable beer and food combinations | | | | | I | | | |
| Develop strategies for submitting products for selected competitions | | | | | D | | | |
| HOPS 2314: Advanced Finishing | | | | | | | | |
| Compare the design and operation of different types of filters | | D | | A | | | | |
| Compare different clarification methods | | D | | | | | | |
| Select different methods of carbonation | | | | A | | | | |
| Describe haze formation and its effect on packaged beer | | | | D | | | | |
| Explain pasteurization and the different types of pasteurizers used in breweries | | D | | A | | | | |
| Critically examine packaging containers and materials employed in the brewing industry | | | | D | | | | |
| Evaluate quality control tests and measurements that are performed on finished beer | | | | | D | | | |
| Analyze the development of beer aging as it relates to production and packaging operations | | | | | D | | | |
| Plan a draught system for delivering beer from a keg | | | | D | | | | |
| Layout a packaging line | | | | D | | | | |
| Explain the importance of proper beer service | | | | D | | | | |

| | | | | | | | | |
|--|---|---|---|---|---|---|---|---|
| HOPS 2315: Calculations and Recipe Form | | | | | | | | |
| Develop a capacity plan for a brewery | | | | I | | | | |
| Calculate ingredient quantities for a given brew length | | | | D | | | | |
| Convert between different units of measurement used in breweries | | | | A | | | | |
| Calculate brewhouse yield, alcohol content, and grain and hop utilization | | | | A | | | | |
| Develop beer recipes | | | | A | | | | |
| Evaluate production losses and formulate improvements | | | | I | | | | |
| Calculate energy requirements for a brewery | | | | I | | | | |
| Calculate the quantities of raw ingredients and cleaning supplies needed for effective management of a brewery | | | | D | | | | |
| Calculate water usage, fermentation losses, and carbon dioxide emissions | | | | D | | | | |
| Calculate staffing requirements for a brewery | | | | I | | | | |
| HOPS 2405: Brewing 4 | | | | | | | | |
| Create health and safety procedures for a brewery | D | | | | | | | |
| Develop a beer recipe | | A | | | | | | |
| Formulate a cost analysis for the production of a beer | | A | | | | | | |
| Design a brewing schedule | | | | | | | | I |
| Evaluate and order brewing ingredients to produce a signature beer | | D | | | | | | |
| Clean and sanitize brewing equipment independently | | A | | | | | | |
| Order and propagate yeast for a signature beer | | | D | | | | | |
| Make beer from the raw ingredients and finish with a packaged product | | A | | | | | | |
| Produce a beer that passes organoleptic evaluation from an external panel of experts | | | | | | D | | |
| Create and implement a testing and analysis schedule for a beer | | | | | | A | | |
| Perform product analysis | | | | | | A | | |
| Operate, maintain and troubleshoot brewing equipment | | | | | D | | | |
| Organize a tasting panel for the evaluation of a beer | | | | | | | I | |
| Market a signature beer | | | | | | | | I |
| Maintain a comprehensive lab log book | | | | | | A | | |
| HOPS 2420: Beer Marketing & Sales | | | | | | | | |

| | | | | | | | | |
|--|---|---|---|---|---|---|---|---|
| Explain the regulatory requirements and responsibilities for beer sales and manage these effectively in sales and marketing plans | I | | | | | I | | I |
| Create an effective beer brand marketing and sales plan | | | | | | I | | I |
| Consider the current organizational priorities and financial planning in developing a sales department | | | | | | I | | I |
| Plan an effective sales call format and schedule | | | | | | I | | I |
| HOPS 2421: Brewery Business Planning | | | | | | | | |
| Recognize the primary responsibilities of brewery operations management | D | D | D | | D | I | | I |
| Explain the factors that must be considered in optimizing brewery scheduling | | D | | | | | | I |
| Calculate a brewery's capacity utilization and consider the implications for sales growth | | I | | D | | | | I |
| Validate the requirements for accurate and timely record-keeping | | | | | | | | I |
| Explain the relationship of long term strategic planning, annual operational plans, financial budgeting, and business performance management | | | | | | | | I |
| Contrast the roles of management and leadership | | | | | | | | I |
| Apply management and team skills | | | | | | | | I |
| HOPS 2422: The Brewing Industry | | | | | | | | |
| Discuss the involvement and impact of government regulations on the brewing industry | I | | | | | I | | I |
| Analyze the impact of the brewing industry on the economy and the community | | | | | | I | | I |
| Examine various professional and industry organizations and their contribution to the beer industry | | | | | | I | | I |
| Compare the various distribution systems utilized by the brewing industry | | | | | | I | | I |
| Devise effective plans for stakeholder engagement | | | | | | | | I |
| CMNS 1140: Intro to Professional Communication | | | | | | | | |
| Understand the basic communication models | | | | | | | I | I |
| Identify the differences between academic and business writing | | | | | | | I | I |
| Establish purpose and determine message content, medium and delivery strategy through context and audience analysis | | | | | | | I | I |

| | | | | | | | | |
|---|--|--|--|--|---|--|---|---|
| Adapt message and medium and purpose to a single audience and context, in both traditional and online environments | | | | | | | I | I |
| Compose the message for the appropriate medium, including online environments | | | | | | | I | I |
| Write to primary and secondary audiences | | | | | | | I | I |
| Communicate with diverse audiences | | | | | | | I | I |
| Demonstrate the ability to write clearly and concisely for the workplace using correct grammar, mechanics and syntax | | | | | | | I | I |
| Demonstrate understanding of appropriate business communication terminology | | | | | | | I | I |
| Employ fundamental principles of document design and business document conventions to produce a variety of correspondence and reports | | | | | | | I | I |
| Integrate clear, concise, grammatically-correct language with visual design components | | | | | | | I | I |
| Illustrate information using a variety of integrated figures and tables | | | | | | | I | I |
| Research data from primary and secondary sources, and evaluate that data for relevance and accuracy before integrating it with appropriate citations into documents | | | | | | | I | |
| Extract, synthesize and summarize essential information from both written and oral sources | | | | | | | I | I |
| Apply informative and persuasive strategies using direct and indirect approaches to achieve precisely defined goals | | | | | | | I | I |
| Develop and deliver oral presentations to an audience, within a variety of contexts | | | | | | | I | I |
| CBSY 1110: Business Problem Solving with S/S | | | | | | | | |
| Understand business problems and the need for data to address them | | | | | I | | I | I |
| Develop spreadsheets to gather data about business problems | | | | | I | | I | I |
| Employ functions and calculations available on spreadsheet software to analyze business data | | | | | I | | I | D |
| Create charts and analyze them to support business problem solving | | | | | I | | I | D |

| | | | | | | | | |
|--|--|--|--|---|--|--|---|---|
| Integrate spreadsheet-based analysis into the effective solutions to business problems | | | | I | | | I | D |
| PHIL 3033: Business Ethics | | | | | | | | |
| Defend an ethical position in a rational way | | | | | | | | I |
| Apply ethical theories to standard business practices | | | | | | | | I |
| Recognize the moral component of complex business decision-making | | | | | | | | I |
| Critically analyze business outcomes from a moral point of view | | | | | | | | I |
| Articulate the moral dimension of business decisions with respect to each of three theoretical approaches: the moral consequences of the decision, the relevant duties of the participants, and the fairness of the result | | | | | | | | I |
| Recognize several Canadian (and International) business scenarios, which illustrate the application of these methods | | | | | | | | I |

Introduced [I]: Course learning outcomes that concentrate on knowledge or skills related to the program outcomes at a basic level or skills at an entry-level of complexity.

Developing [D]: Course level outcomes that demonstrate learning at an increasing level of proficiency of the program level outcome as well expanding complexity.

Advanced [A]: Course level outcomes that demonstrate learning related to the program level outcome with an increasing level of independence, expertise and sophistication or integrate the use of content or skills in multiple levels of complexity.

Appendix F Administrative Data Report for Diploma in Brewing and Brewery Operations Program

Administrative Data Report for Diploma in Brewing and Brewery Operations Program

The chapter headings refer to the chapters in the Self-Study to which the data pertain.

Glossary

Average Seats Offered: Maximum number of seats available in a department/Faculty divided by the count of classes offered by the department/Faculty.

Average Seats Filled: Number of seats taken in a department/Faculty divided by the count of classes offered by the department/Faculty.

BC Student Outcomes: Results of the three annual surveys of former post-secondary students in BC, one to two years after graduation, as a supplemental tool for assessing programs offered by KPU and comparing them to similar programs at other institutions. The three BC Student Outcomes surveys include the Diploma, Associate Degree, and Certificate Student Outcomes Survey (DAC), the Baccalaureate Graduates Survey (BGS), and the Trades Student Outcomes Survey (Trades). Note that while DAC covers all BC public post-secondary institutions, BGS does not report data from programs at research-intensive universities such as UBC and SFU.

Cumulative Grade Distribution: The number of students who receive a particular letter grade (A+ through F) plus those who receive a higher grade, as a percentage of the total number of students with a grade or a W/WE or DEF (Deferred). Useful for estimating the proportion of passing students based on any specific grade requirement.

DFW Rate: % of students who received a grade of D or F or withdrew from the course. Percentage is calculated based on number of students with a grade or a W/WE or DEF (Deferred).

Faculty Student Headcount: Count of all students enrolled in a Faculty, including undeclared students.

Fill Rate: Number of seats filled divided by the number of seats offered.

Grade Point Equivalent Mean: The average grade of students in the selected courses, based solely on the numerical grade point equivalent of a letter grade. A weighted average is used, such that larger classes have a larger influence on the computed mean. It is not an average of course-level grades weighted by course credits.

Repeat Rate: Students who repeat a course, that is, have taken the course previously. Percentage is calculated based on number of students with a grade or a W/WE or DEF.

Unmet Demand: Number of waitlist seats held by students unable to enroll in the same course, and have not dropped that course, within the same term. A student waitlisted in multiple sections of the same course in the same term is counted as one waitlist seat.

Seats Offered: Maximum number of seats available in a unit (section, course, department, faculty).

Seats Filled: Number of seats taken in the unit (section, course, department, faculty)

Chapter 3. Program Relevance and Demand

3.1 Relevance

Are the program learning outcomes relevant to the current needs of the discipline/sector?¹

What percentage of the program graduates are satisfied with the education they received? What percentage of the graduates rate the quality of instruction they received as “very good”, “good”, or “adequate”? Do they find their program of study useful in their current position?

Exhibit 1: KPU Brewing and Brewery Operations Program Student Outcomes Data Compared with Ministry Targets

| Measures | Student Outcome Data for KPU Brewing and Brewery Operations Program (2018-20) | Ministry Target |
|---------------------------|---|-----------------|
| Respondents ² | 29 | - |
| Satisfaction ³ | 100% | ≥ 90% |
| Quality ⁴ | 100% | ≥ 90% |
| Usefulness ⁵ | 96% | ≥ 90% |

3.3 Student Demand

Who takes the program?⁶

Has the demographic profile of Brewing and Brewery Operations Program students changed over the last five years?

Exhibit 2: Demographic Profile of Brewing and Brewery Operations Program Students by Academic Year

| | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 |
|-------------------|---------|---------|---------|---------|---------|
| Student Headcount | 39 | 49 | 52 | 41 | 42 |

¹ Data reported in this section was obtained from the Student Outcomes Dashboard 2016-20, which is available at <https://our.kpu.ca/sites/sem/data/SitePages/Home.aspx>

² Results for groups of less than 5 graduates are not reported.

³ Respondents who are "very satisfied" or "satisfied" with the education or training they received in their program of study.

⁴ Respondents who rate the quality of instruction received from their program of study as "very good", "good" or "adequate".

⁵ Respondents who describe their program of study as "very" or "somewhat" useful in their current occupation.

⁶ Data reported in this section was obtained from the Enrolment Dashboard 2020-21, which is available at <https://our.kpu.ca/sites/sem/data/SitePages/Home.aspx>

| | | | | | |
|-----------------------|-----|-----|-----|-----|-----|
| % Female | 10% | 12% | 17% | 15% | 14% |
| % 22 years or younger | 33% | 16% | 23% | 24% | 14% |
| % International | 8% | 12% | 13% | 15% | 14% |

How does the demographic profile of Brewing and Brewery Operations Program students compare with that of students at the same level for the Faculty of Science and Horticulture as a whole over the same period?

Exhibit 3: Demographic Profile of Faculty of Science and Horticulture Students by Academic Year

| | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 |
|--------------------------|---------|---------|---------|---------|---------|
| <i>Student Headcount</i> | 2,591 | 3,256 | 2,795 | 2,672 | 2,405 |
| % Female | 53% | 58% | 55% | 56% | 58% |
| % 22 years or younger | 73% | 78% | 76% | 75% | 74% |
| % International | 18% | 38% | 36% | 35% | 34% |

Is demand for the program sustainable?

Various measures of student demand for the program are presented below. Consider what, collectively, these measures indicate about the demand for the program.

Has demand for Brewing and Brewery Operations courses been changing over the last five years? Is the overall class size, in terms of filled seats, sustainable? How does demand for Brewing and Brewery Operations courses compare with demand for Faculty of Science and Horticulture courses at the same level over the same period?

Exhibit 4: Student Headcount in Brewing and Brewery Operations Courses by Academic Year Compared with Faculty of Science and Horticulture Courses

| | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | %Change ⁷ |
|-------------------------------------|---------|---------|---------|---------|---------|----------------------|
| Brewing and Brewery Operations | 43 | 49 | 52 | 40 | 39 | -9% |
| Faculty of Science and Horticulture | 3,563 | 3,876 | 4,104 | 3,646 | 3,421 | -4% |

Has demand for the Brewing and Brewery Operations Program changed over the last five years? How does it compare with demand for Faculty of Science and Horticulture programs at the same level over the same period?

Exhibit 5: Student Headcount in Brewing and Brewery Operations Program by Academic Year Compared with Faculty of Science and Horticulture Programs

| | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | %Change |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| Brewing and Brewery Operations Total Headcount | 39 | 49 | 52 | 41 | 42 | 8% |

⁷ % Change refers to change between 2016/17 to 2020/21.

| | | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|------------|
| Faculty of Science and Horticulture Total Headcount | 2,591 | 3,256 | 2,795 | 2,672 | 2,405 | -7% |
|--|--------------|--------------|--------------|--------------|--------------|------------|

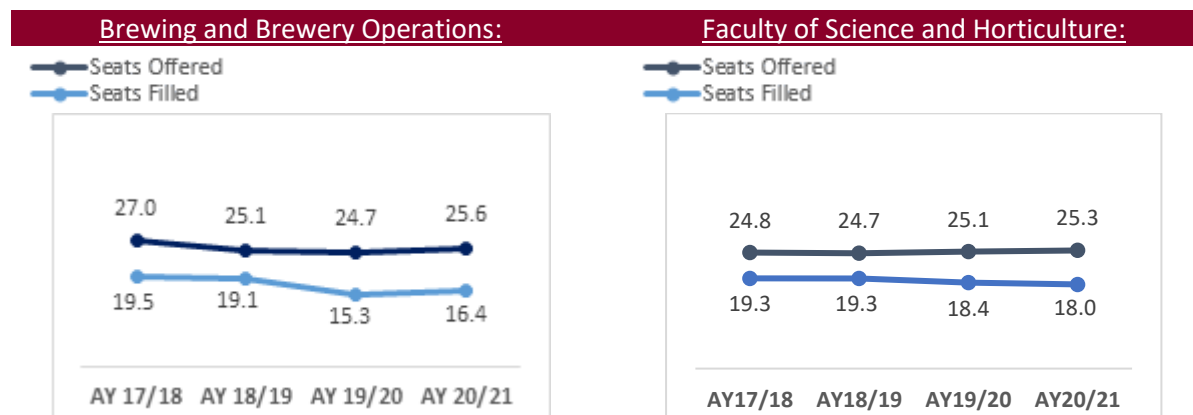
How do KPU Brewing and Brewery Operations Program enrolment trends compare with overall enrolment trends in similar programs in BC?

Exhibit 6: Number of Students Enrolled in similar Programs at BC Public Post-Secondary Institutions (excluding KPU students)⁸

| | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 |
|--|---------|---------|---------|---------|---------|
| Total (excluding KPU)⁹ | 99 | 86 | 87 | 67 | 63 |
| Certificate | 36 | 26 | 35 | 26 | 26 |
| Diploma | 48 | 45 | 41 | 41 | 36 |
| Bachelor's Degree | 15 | 15 | 11 | - | 1 |
| KPU Total | 40 | 39 | 49 | 52 | 41 |
| Diploma | 40 | 39 | 49 | 52 | 41 |

Has there been a change in average filled seats per class in Brewing and Brewery Operations courses? How do they compare with Faculty of Science and Horticulture courses at the same level? Is demand steady, declining, or increasing?

Exhibit 7: Average Filled Seats per Class by Academic Year

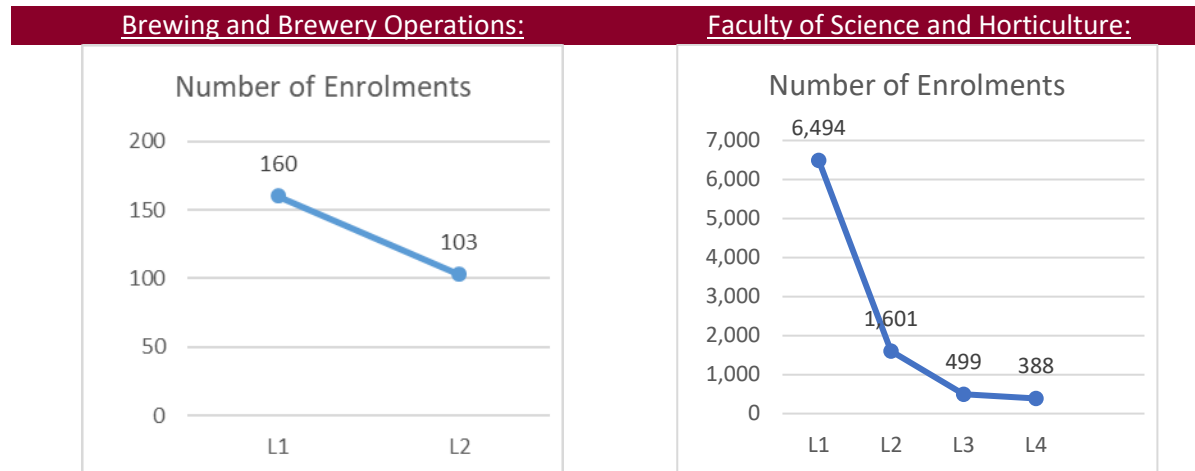


How does demand for lower level courses compare with demand for Faculty of Science and Horticulture lower level courses?

⁸ All data reported below was obtained from the STP Enrolment dashboard 2021. STP refers to the BC Student Transitions Project, which tracks students in the public post-secondary education system. Data are coded by Classification of Instructional Program (CIP). To identify Brewing and Brewery Operations programs, CIP code 01.1002 was used.

⁹ Okanagan College and BCIT.

Exhibit 8: Number of Course Enrolments by Level for Academic Year 2020/21



How does tuition compare with instructional costs for the average class in your program?

A program’s importance isn’t gaged by the tuition revenue it brings in, as some programs will not be able to cover their costs, but all programs should be delivered efficiently. Part of assessing a program’s sustainability is considering if it can be made more efficient without compromising student safety or success. The biggest driver of efficiency is class size in terms of filled seats. International enrolments, where relevant, can improve a program’s sustainability.

Exhibit 9: Cost Structure of Average Class for Brewing and Brewery Operations, Faculty of Science and Horticulture UG, and All KPU UG Courses for Academic Year 2020/21

| | Brewing and Brewery Operations Courses | Sci & Hort UG Courses | All KPU UG Courses |
|-----------------------------------|--|-----------------------|--------------------|
| Cost of Instruction | \$15,713 | \$15,713 | \$15,713 |
| Average # of Seats Filled | 16.4 | 18.0 | 25.1 |
| Overall % filled by International | 18% | 21% | 33% |
| Tuition Revenue | \$17,303 | \$13,904 | \$24,120 |
| Average Net Revenue | \$1,590 | \$(1,809) | \$8,407 |
| Total # of Classes | 16 | 697 | 4,302 |
| Total Net Revenue | \$25,436 | \$(1,260,946) | \$36,167,657 |

*Average Net Revenue = Cost of instruction - tuition revenue

Does the program have the capacity to meet demand?

Are there waitlists that limit students’ ability to progress through the program in a timely manner? Are the waitlists for courses delivered by the program, or delivered by other departments?

Exhibit 10: Unmet Demand at the Stable Enrolment Date

| | Unmet Demand | Fill Rate |
|-------------|--------------|-----------|
| Summer 2021 | NA | NA |
| Spring 2021 | 0 | 79% |
| Fall 2020 | 0 | 53% |
| Summer 2020 | NA | NA |
| Spring 2020 | 0 | 59% |
| Fall 2019 | 0 | 67% |

There is no notable unmet demand for the program’s discipline-specific courses. Unmet demand by course is available [here](#).

Chapter 4. Effectiveness of Instructional Delivery

4.1 Instructional Design and Delivery of Curriculum

Are appropriate opportunities provided to help students acquire the essential skills?¹⁰

Graduates are asked to indicate the extent to which the program helps them achieve the Ministry identified essential skills. Is the program achieving the Ministry’s targets in skills development?

Exhibit 11: KPU Brewing and Brewery Operations Program Student Outcomes Essential Skills Data Compared with Ministry Targets

| Measures | Student Outcome Data for KPU Brewing and Brewery Operations Program (2018-20) | Ministry Target |
|---------------------------------------|---|-----------------|
| <i>Respondents¹¹</i> | 29 | |
| <i>Skill Development¹²</i> | 86% | ≥ 85% |
| <i>Write Clearly and Concisely</i> | 68% | ≥ 85% |
| <i>Speak Effectively</i> | 83% | ≥ 85% |
| <i>Read and Comprehend Materials</i> | 100% | ≥ 85% |
| <i>Work Effectively with Others</i> | 89% | ≥ 85% |
| <i>Analyze and Think Critically</i> | 93% | ≥ 85% |
| <i>Resolve Issues or Problems</i> | 93% | ≥ 85% |
| <i>Learn on your Own</i> | 79% | ≥ 85% |

¹⁰ Data reported in this section was obtained from the Student Outcomes dashboard 2016-20, which is available at: <https://our.kpu.ca/sites/sem/data/SitePages/Home.aspx>

¹¹ Results for groups of less than 5 graduates are not reported.

¹² Program graduates’ assessment of their skill development at KPU. An overall average for all skills is provided, plus the results for each skill.

4.2 Student Success

Are students performing satisfactorily in courses?¹³

Are an adequate number of students in Brewing and Brewery Operations courses receiving a grade of C and above? How do they compare with the students in Faculty of Science and Horticulture courses at the same level?

Exhibit 12: Cumulative Grade Distribution for Brewing and Brewery Operations Courses from AY 2016/17 to AY 2020/21

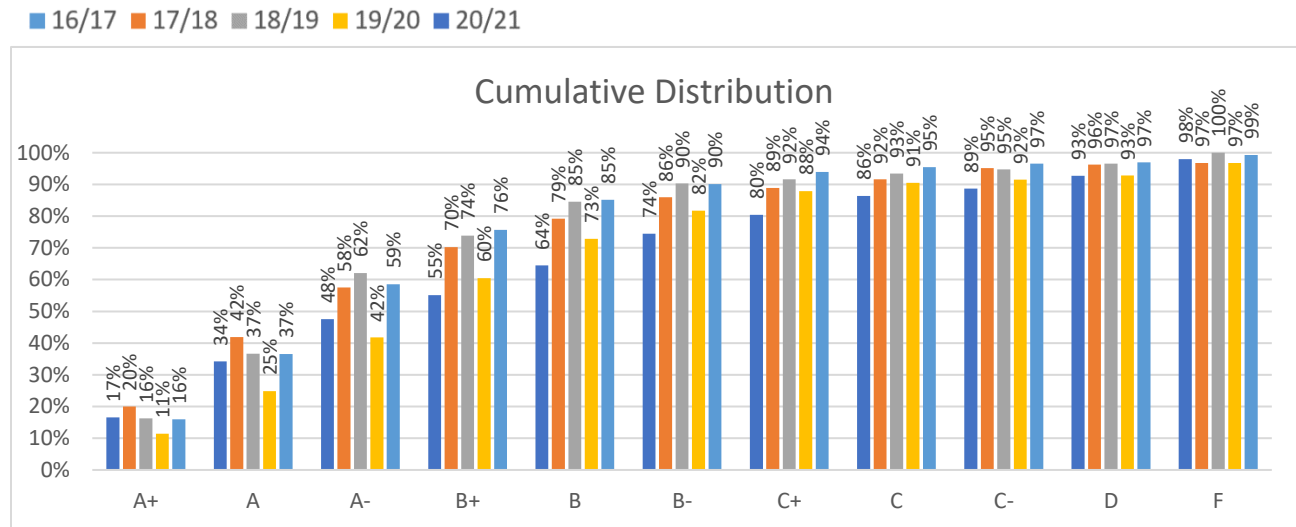
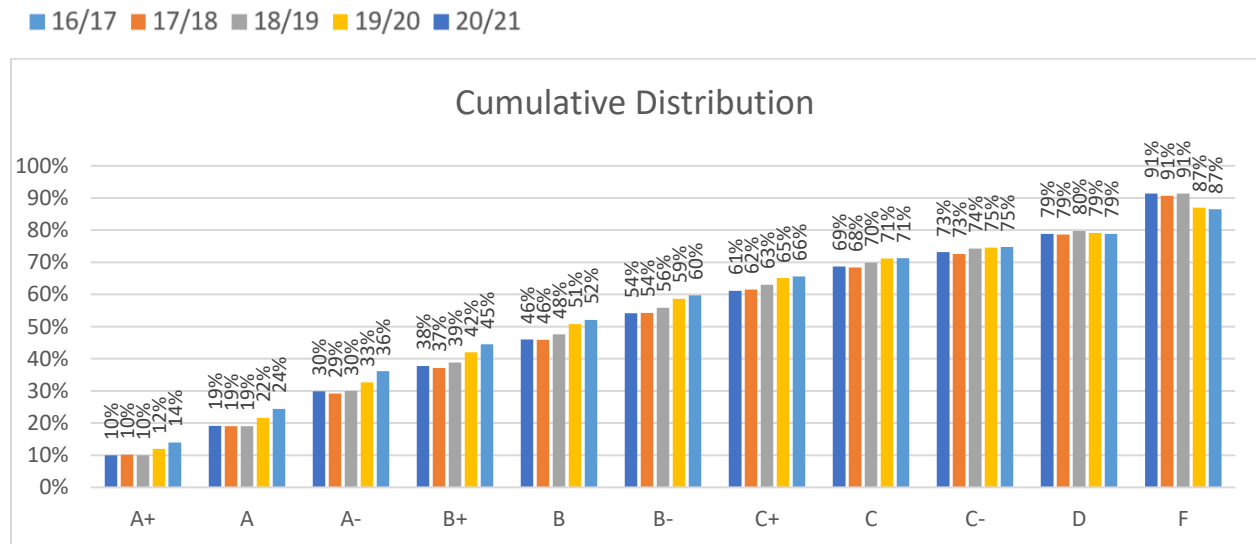


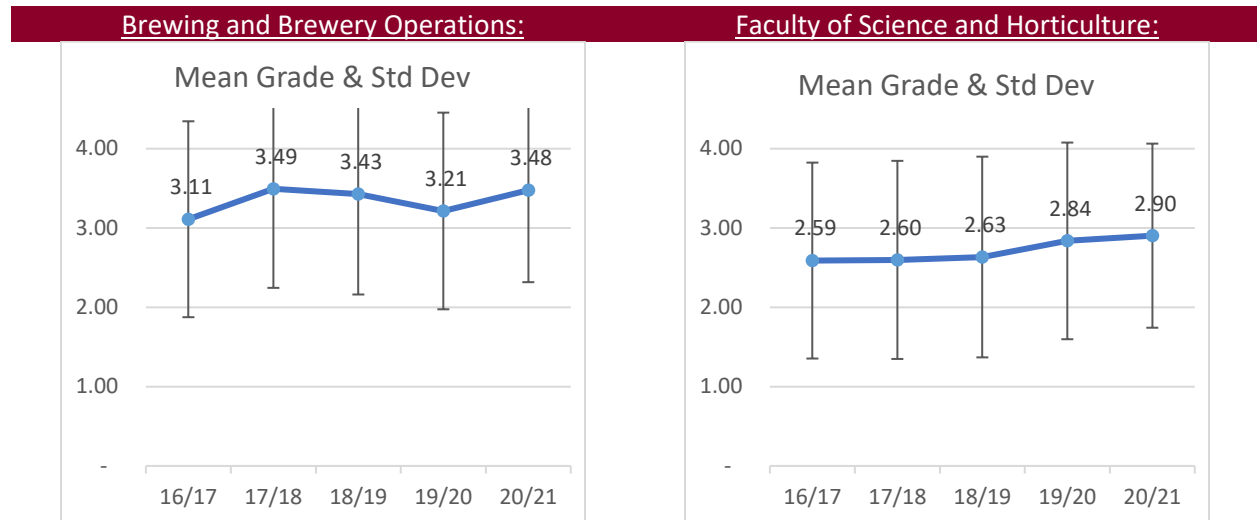
Exhibit 13: Cumulative Grade Distribution for Faculty of Science and Horticulture Undergraduate Courses from AY 2016/17 to AY 2020/21



¹³ Data reported in this section was obtained from the Grade Distribution dashboard 2020-21, which is available at <https://our.kpu.ca/sites/sem/data/SitePages/Home.aspx>

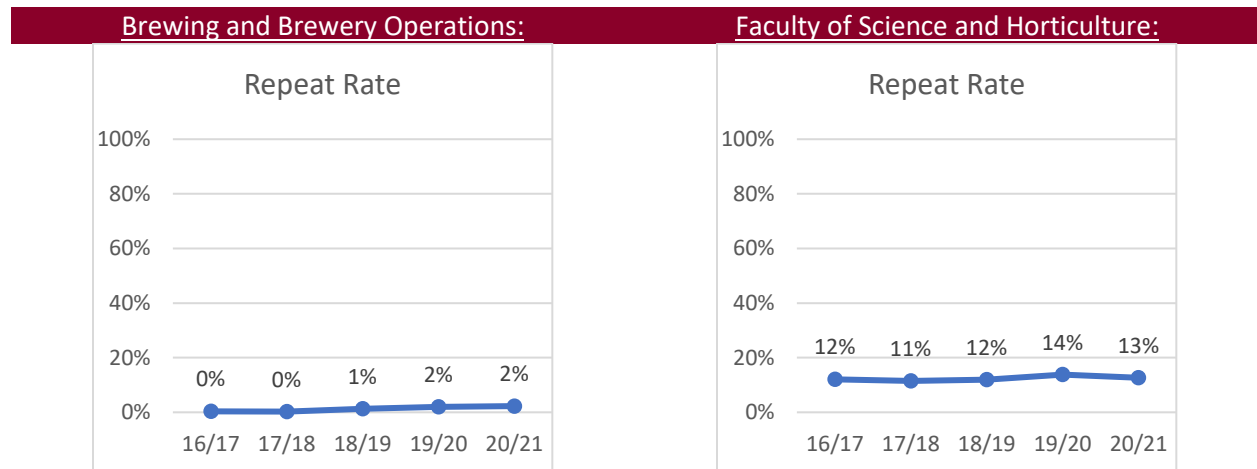
Do the overall grade trends for the program indicate an issue? How do they compare with the overall grades for Faculty of Science and Horticulture courses?

Exhibit 14: Grade Data for Brewing and Brewery Operations Undergraduate Level Courses by Academic Year compared with Faculty of Science and Horticulture



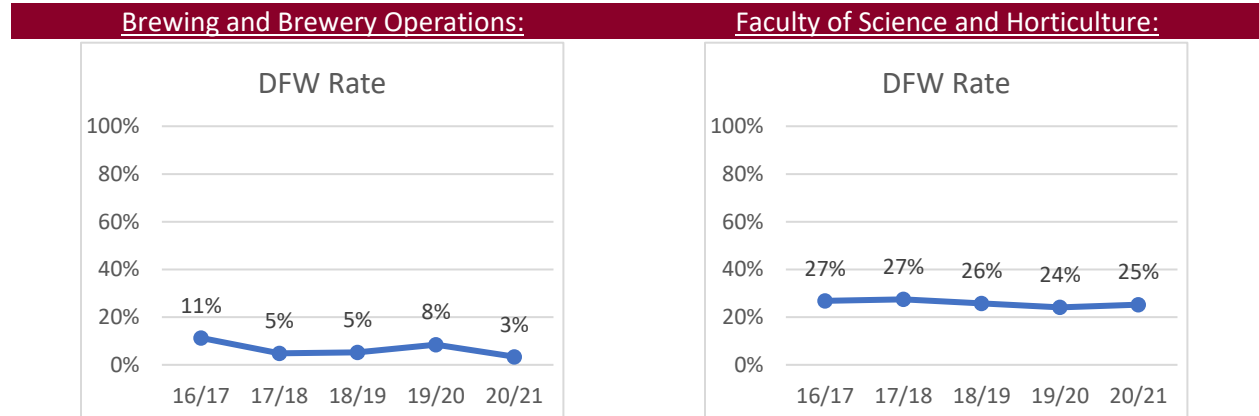
Do the repeat rate trends in Brewing and Brewery Operations courses indicate an issue? How does it compare with the repeat rate trends of Faculty of Science and Horticulture undergraduate courses?

Exhibit 15: Repeat Rates in Brewing and Brewery Operations Undergraduate Level Courses by Academic Year Compared with Faculty of Science and Horticulture



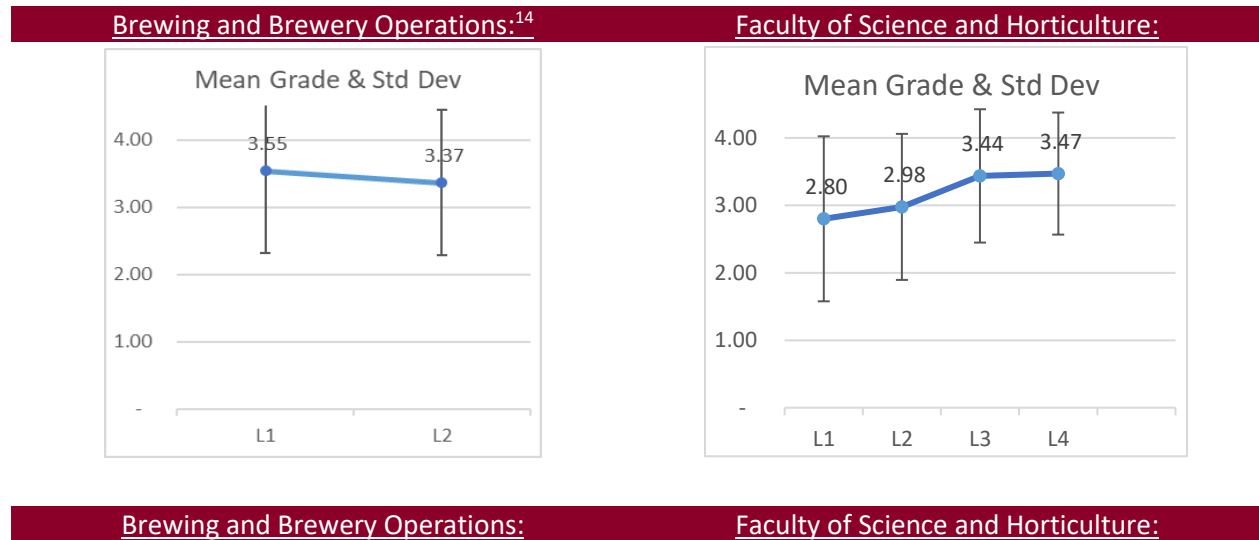
Does the DFW rate trends in Brewing and Brewery Operations courses indicate an issue? How does it compare with the DFW rate trends in Faculty of Science and Horticulture undergraduate courses?

Exhibit 16: DFW Rates in Brewing and Brewery Operations Undergraduate Level Courses by Academic Year Compared with Faculty of Science and Horticulture

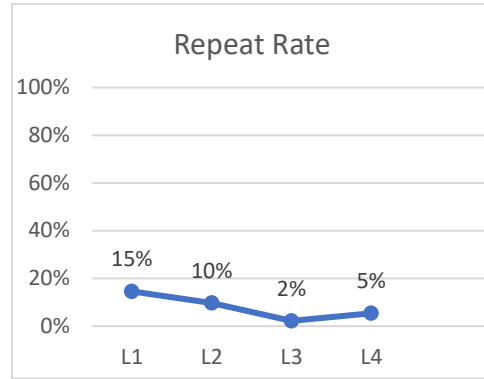
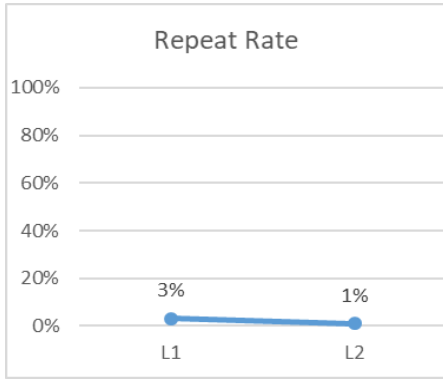


Are there any issues with Brewing and Brewery Operations students' performance at each level? How do they compare with Faculty of Science and Horticulture undergraduate courses?

Exhibit 17: Student Performance Data for Brewing and Brewery Operations Courses for Academic Year 2020/21 by Undergraduate Levels Compared with Faculty of Science and Horticulture

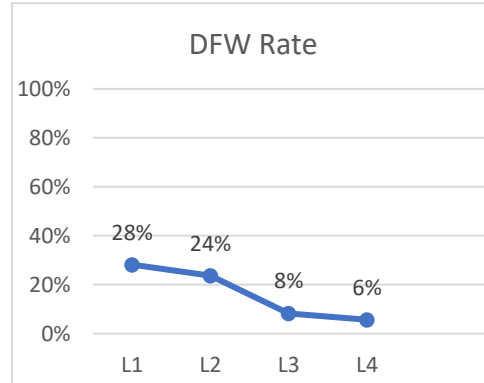
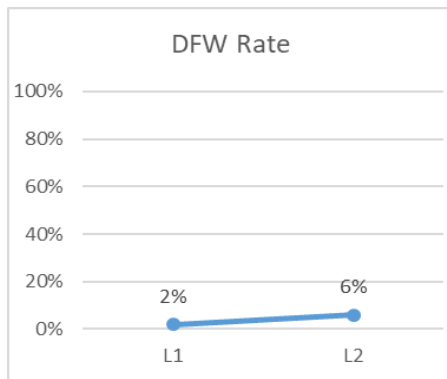


¹⁴ Note that variations in sample size can affect the Grade Point Equivalent Mean data.



Brewing and Brewery Operations:

Faculty of Science and Horticulture:



Are students making satisfactory progress in the program?¹⁵

Has there been a change in the number of Brewing and Brewery Operations Program graduates over time? How does it compare with Faculty of Science and Horticulture in general?

Exhibit 18: Brewing and Brewery Operations Program Graduate Headcount¹⁶ by Credential and Academic Year

| | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 |
|---------------------|---------|---------|---------|---------|---------|
| Total ¹⁷ | 6 | 14 | 21 | 17 | 13 |
| Diploma | 6 | 14 | 21 | 17 | 13 |

Exhibit 19: Faculty of Science and Horticulture Graduate Headcount by Credential and Academic Year

| | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 |
|-------------------|---------|---------|---------|---------|---------|
| Total | 181 | 205 | 228 | 256 | 162 |
| Associate Degree | 44 | 36 | 30 | 46 | 27 |
| Bachelor's Degree | 14 | 38 | 39 | 35 | 42 |

¹⁵ All data reported in this section was obtained from the Credentials dashboard AY 2020-21, which is available at <https://our.kpu.ca/sites/sem/data/SitePages/Home.aspx>

¹⁶ Count of unique students who have earned a KPU credential. Breakdown values may not add up to total or 100% because a student can earn multiple credentials in different categories within the same academic year.

¹⁷ To avoid double counting students, total graduate headcounts presented in Exhibits 18 and 19 are unique headcounts of students for the year, not the sum of the credential counts.

| | | | | | |
|-------------|----|----|----|-----|----|
| Certificate | 41 | 42 | 43 | 24 | 8 |
| Citation | 26 | 31 | 39 | 38 | 14 |
| Diploma | 68 | 68 | 93 | 126 | 79 |

Are Brewing and Brewery Operations students completing the program within a reasonable time? How does it compare with Faculty of Science and Horticulture in general?

Exhibit 20: Median¹⁸ Years to Graduate:¹⁹ Brewing and Brewery Operations

| | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 |
|---------|---------|---------|---------|---------|---------|
| Diploma | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |

Exhibit 21: Median Years to Graduate: Faculty of Science and Horticulture

| | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 |
|------------------|---------|---------|---------|---------|---------|
| Associate Degree | 3.5 | 3.2 | 3.0 | 3.2 | 3.2 |
| Bachelors Degree | 2.8 | 4.9 | 4.9 | 5.9 | 5.9 |
| Certificate | 0.9 | 1.1 | 0.9 | 1.3 | 1.9 |
| Citation | 0.9 | 0.6 | 1.2 | 1.4 | 1.3 |
| Diploma | 2.9 | 2.5 | 2.4 | 2.2 | 2.9 |

Are graduates of the program successful?

Are the graduates getting jobs in a related field? Are the graduates pursuing further education?

Exhibit 22: KPU Brewing and Brewery Operations Program Student Outcomes Data Compared with Ministry Targets

| Measures | Average Student Outcome Data for KPU Brewing and Brewery Operations Program (2018-20) | Ministry Target |
|----------------------------------|---|-----------------|
| <i>Respondents</i> ²⁰ | 29 | |
| Unemployment Rate ²¹ | 0% | ≤ 7.5% |
| Currently Employed ²² | 96% | |
| In a Related Job ²³ | 92% | |
| Further Studies ²⁴ | 10% | |

¹⁸ A computed "middle" number in a set of numbers when sorted by value, such that 50% of the values are higher and 50% are smaller than this number. The Median is preferred over the Mean when the distribution of numbers contains a few extreme values. Extreme values will distort the Mean in that direction, whereas the Median is not affected by extreme values.

¹⁹ The data in Exhibits 20 and 21 present the median number of years students took to receive their first credential.

²⁰ Results for groups of less than 5 graduates are not reported.

²¹ Unemployment rate of KPU's graduates (of those in the labour market).

²² Respondents who were working at a job or business at the time of the survey, as a percentage of all respondents, regardless of whether they were in the labour force (see above).

²³ Respondents who are currently employed in occupations that they describe as "very" or "somewhat" related to their studies, as a percentage of all employed respondents.

²⁴ Respondents who have taken further studies after taking the program, including those currently studying.

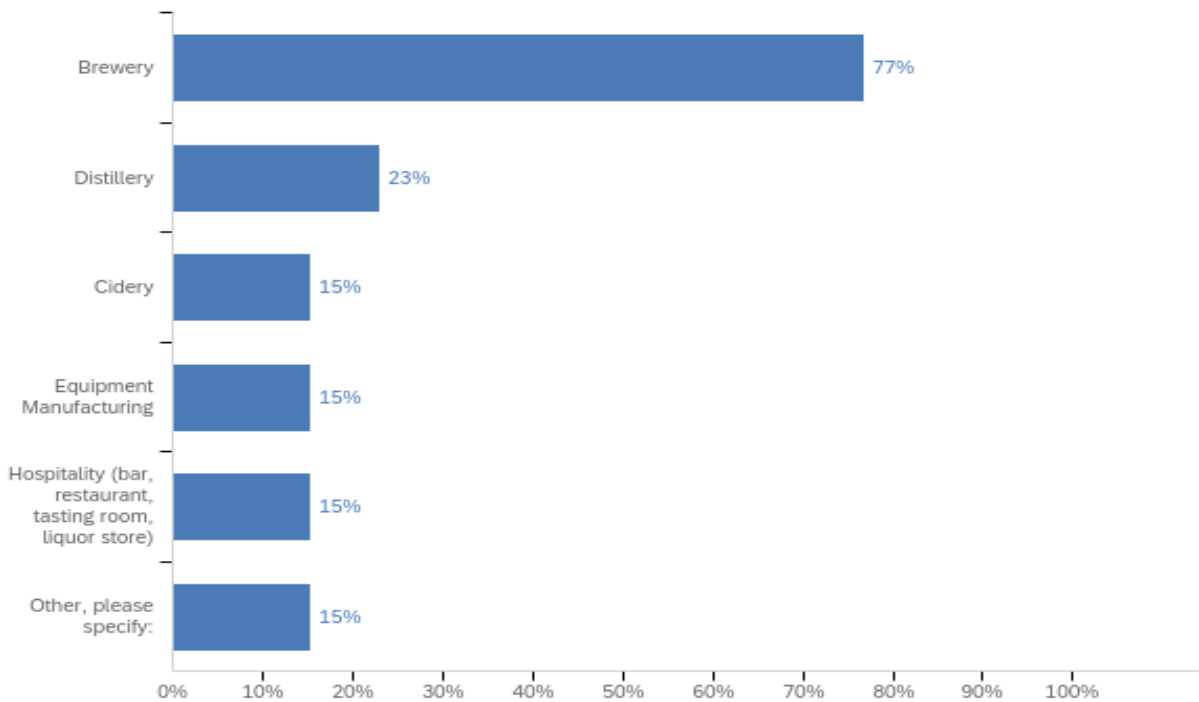
Appendix G Diploma in Brewing and Brewery Operations Program Review - Discipline/Sector Survey Report

The discipline/sector survey was sent to 31 discipline/sector representatives. A total of 13 representatives responded. The response rate is 42%.

Note: The data includes open-ended comments. In order to preserve integrity and objectivity, OPA does not do value-judgment editing (i.e. we do not fix spelling errors, syntax issues, punctuation, etc.). Comments are included verbatim – with one exception: if individuals or courses are named, OPA redacts the name of the instructor or course. This rule applies to whether the comment is good, bad or indifferent

About Your Organization/Role

1 - Which sector best describes your organization/business? Select all that apply.



| # | Answer | Percentage | Count |
|---|---|------------|-------|
| 1 | Brewery | 77% | 10 |
| 2 | Cidery | 15% | 2 |
| 3 | Distillery | 23% | 3 |
| 4 | Equipment Manufacturing | 15% | 2 |
| 5 | Hospitality (bar, restaurant, tasting room, liquor store) | 15% | 2 |
| 6 | Other, please specify: | 15% | 2 |
| | Total | 21 | 13 |

Note: The last row presents the total number of respondents. The total number of responses for this question is greater than the number of respondents. Therefore, the percentage total exceeds 100%.

Q1_6_TEXT - Other, please specify:

Ingredient Supplier

Consulting

2 - What is your current job title/role?

Western Canada Partner

Head Brewer

Owner/COO

President/manage managers/Technical director

Production Manager

GM / President

Senior Advisor, Technical Services

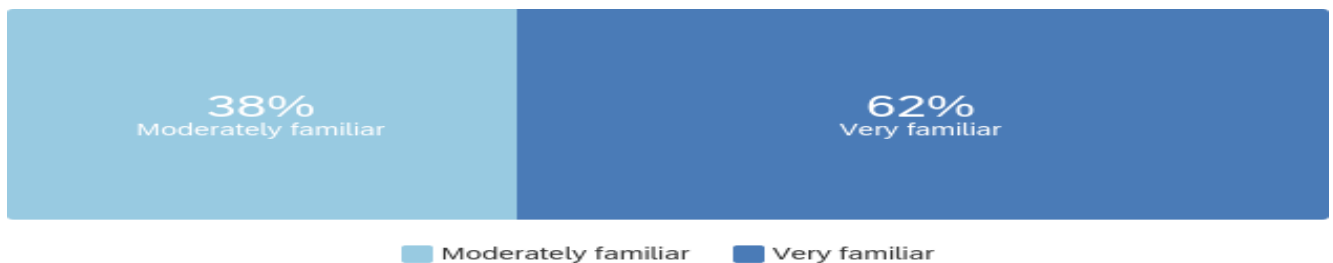
ceo

Director of Operations

Head Brewer/Facility Manager

Brewmaster

3 - How familiar are you with KPU's Brewing and Brewery Operations program?



Note that "not at all familiar" and "slightly familiar" categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the "not at all familiar" and "slightly familiar" categories

| # | How familiar are you with KPU's Brewing and Brewery Operations program? | Percentage |
|---|---|------------|
| 1 | Not at all familiar | 0% |
| 2 | Slightly familiar | 0% |
| 3 | Moderately familiar | 38% |
| 4 | Very familiar | 62% |
| | Total | 13 |

4 - When you think about KPU's Brewing and Brewery Operations program, what are the top three characteristics that come to mind?

| Characteristic #1 | Characteristic #2 | Characteristic #3 |
|--------------------------|------------------------------|-------------------------|
| Knowledgeable. | Reliable | Eager |
| successful | thorough technical teachings | well trained graduates |
| modern training facility | industry awareness | high job placement |
| Quality program | talented graduates | strong staff |
| Thorough | Technical | Broad scope of industry |
| dynamic | talented | developed |

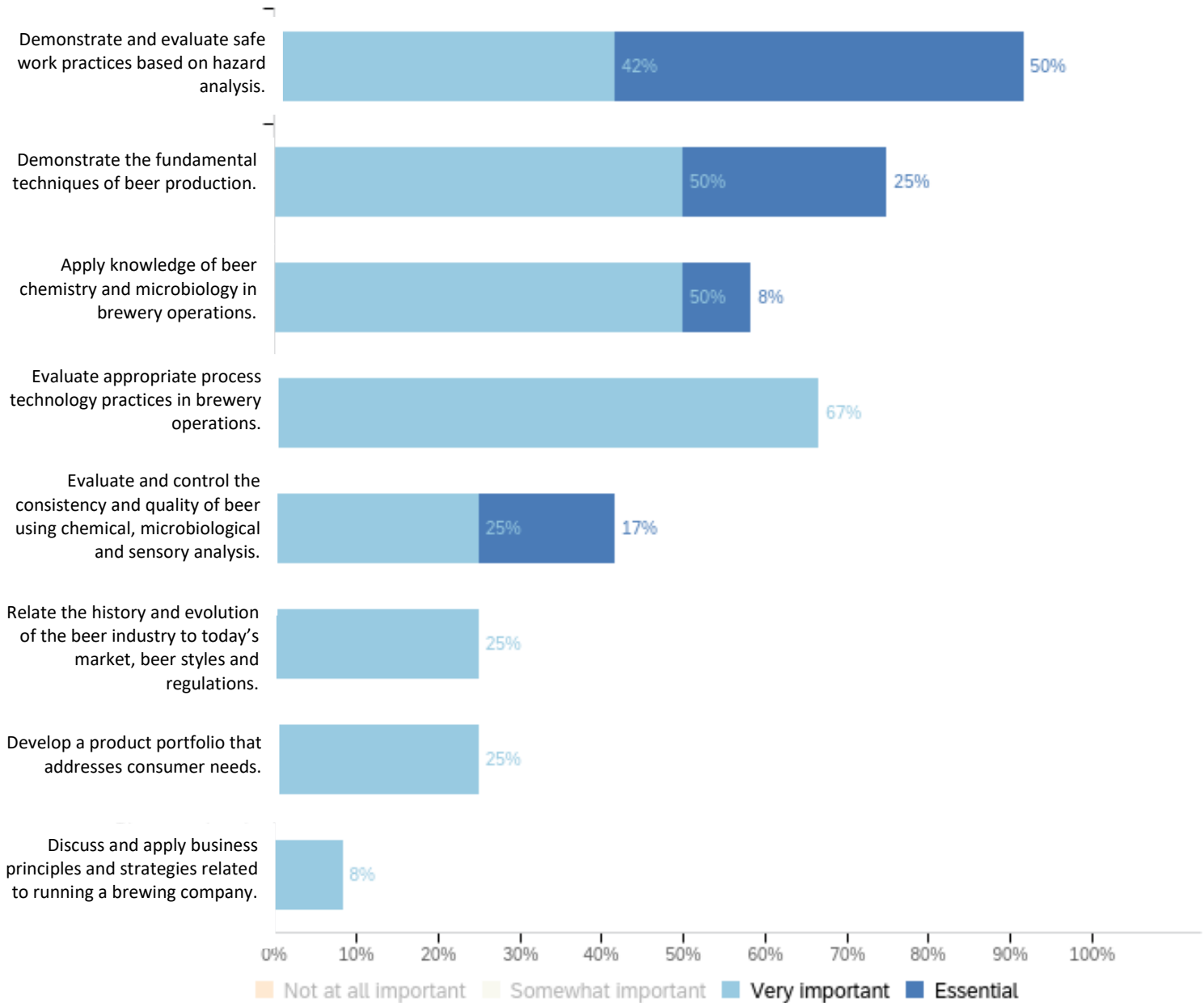
| Local | Current | Relevant |
|------------------|---------------------------|-------------------|
| Local | | |
| forward thinking | ambitious | supportive |
| clear focus | high collaboration levels | Strong leadership |
| Education | Microbiology | Very Idealistic |
| Practical | market oriented | competent |

QUESTIONS ON CHAPTER 3: PROGRAM RELEVANCE AND DEMAND

Program Relevance

Are the program learning outcomes relevant to the current needs of the discipline/sector?

5 - Considering the needs and expectations of your organization, how important is it for an entry-level employee to be able to demonstrate the following?



Note that 'Not at all important' and 'Somewhat important' categories are excluded from the chart. Use the frequency table below to review the proportion of 'Not at all important' versus 'Somewhat important' responses.

| # | Question | Not at all important | Somewhat important | Very important | Essential | Total |
|---|--|----------------------|--------------------|----------------|-----------|-------|
| 1 | Demonstrate and evaluate safe work practices based on hazard analysis. | 0% | 8% | 42% | 50% | 12 |
| 2 | Demonstrate the fundamental techniques of beer production. | 0% | 25% | 50% | 25% | 12 |
| 3 | Apply knowledge of beer chemistry and microbiology in brewery operations. | 0% | 42% | 50% | 8% | 12 |
| 4 | Evaluate appropriate process technology practices in brewery operations. | 8% | 25% | 67% | 0% | 12 |
| 5 | Evaluate and control the consistency and quality of beer using chemical, microbiological and sensory analysis. | 8% | 50% | 25% | 17% | 12 |
| 6 | Relate the history and evolution of the beer industry to today's market, beer styles and regulations. | 42% | 33% | 25% | 0% | 12 |
| 7 | Develop a product portfolio that addresses consumer needs. | 25% | 50% | 25% | 0% | 12 |
| 8 | Discuss and apply business principles and strategies related to running a brewing company. | 42% | 50% | 8% | 0% | 12 |

6 - What other skills, training or knowledge should an entry-level applicant have to be hired into your organization?

Strong work ethic - but I don't know if that can be taught.

- strong understanding of the chemistry and microbiology in producing beer - knowledge of the different beer styles and the process and equipment needed to produce them.

Some brewery engineering or technical knowledge of brewery equipment

cross-brewery functional training (packaging) and have mechanical aptitude

Knowledge of labeling and laws, cursory understanding of brewery utilities and their functions, basic tool-wielding capabilities. An understanding of business ERP systems, and very high level programming/automation familiarity

Packaging equipment maintenance and trouble shooting. importance of inventory control

Strong work ethic and critical thinking are essential. Solid understanding of the process and understanding the 'why'

Basic material handling, QC checking pre-packaging (CO2 and DO tests)

working ethics

7 - What are the emerging trends in the sector that KPU Brewing and Brewery Operations students should be prepared for? These trends might include technology, sustainability, and innovation. Please be as specific as you are able to.

Low alcohol beer production. Environmental impact/footprint reductions Diversity and inclusivity initiatives to further open up our industry

- flexibility to produce other beverages like seltzers, soda's, RTD's, etc.. - comfortable in using HMI screens and automated equipment - desire to reduce waste. In all areas time, material, and energy

Trends in energy conservation and overall brewery efficiency (raw material utilization; water consumption; solid and liquid waste reduction; etc). Lager styles are becoming popular.

Sustainability initiatives specific to brewing operations. Hard Seltzer, De-alc. brewing techniques. Water chemistry adjustments.

both technology and sustainability

Innovation - types of products that are slowly replacing beer for consumers, Technology & Sustainability - new brewing and cellaring equipment to solve problems, energy and gas recovery systems, any way to minimize water usage.

cost saving possible environmental impacts and cost and value

Sustainability and adaptation of more sustainable practices

environment protection, laws and regulations, basic accounting

QUESTIONS ON CHAPTER 4: EFFECTIVENESS OF INSTRUCTIONAL DELIVERY

Career and Further Education Preparedness

Are graduates of the program successful?

8 - Which of the following best describes your previous experience with students and/or alumni in KPU's Brewing and Brewery Operations program? Please select all that apply.

| # | Which of the following best describes your previous experience with students and/or alumni in KPU's Brewing and Brewery Operations program? Please select all that apply. | Percentage |
|---|---|------------|
| 1 | I have hired KPU Brewing and Brewery Operations students. | 39% |
| 2 | I have worked with KPU Brewing and Brewery Operations students on class projects. | 4% |
| 3 | I have hired KPU Brewing and Brewery Operations alumni to work in my organization. | 30% |
| 4 | I have worked with KPU Brewing and Brewery Operations alumni. | 26% |
| 5 | None of the above | 0% |
| | Total | 23 |

9 - Based on your experience, how prepared were KPU's Brewing and Brewery Operations students to work in your organization?



Note that "not at all prepared" and "somewhat prepared" categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the "not at all prepared" and "somewhat prepared" categories

| # | Based on your experience, how prepared were KPU's Brewing and Brewery Operations students to work in your organization? | Percentage |
|---|---|------------|
| 1 | Not at all prepared | 0% |
| 2 | Somewhat prepared | 44% |
| 3 | Very well prepared | 56% |

| | | |
|---|-------------------------|----|
| 4 | Extremely well prepared | 0% |
| | Total | 9 |

10 - Based on your experience, how prepared were the KPU Brewing and Brewery Operations students you worked with on class projects?



Note that “not at all prepared” and “somewhat prepared” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all prepared” and “somewhat prepared” categories

| # | Based on your experience, how prepared were the KPU Brewing and Brewery Operations students you worked with on class projects? | Percentage |
|---|--|------------|
| 1 | Not at all prepared | 0% |
| 2 | Somewhat prepared | 0% |
| 3 | Very well prepared | 100% |
| 4 | Extremely well prepared | 0% |
| | Total | 1 |

11 - Based on your experience, how prepared were KPU’s Brewing and Brewery Operations alumni to work in your organization?



Note that “not at all prepared” and “somewhat prepared” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all prepared” and “somewhat prepared” categories

| # | Based on your experience, how prepared were KPU's Brewing and Brewery Operations alumni to work in your organization? | Percentage |
|---|---|------------|
| 1 | Not at all prepared | 0% |
| 2 | Somewhat prepared | 17% |
| 3 | Very well prepared | 83% |
| 4 | Extremely well prepared | 0% |
| | Total | 6 |

12 - Please comment on how well the program is preparing students for work.

The program provides a strong foundation that allows students to adapt quickly to their individual work environment.

They exhibit a broad knowledge of brewing techniques and industry insight.

not well prepared for the demands of a commercial brewing operation vs small scale one

Not every student has the same abilities and all students have a basic knowledge and most important a desire to participate in making good beer.

Principles / fundamentals of brewing - all systems will be different, with the end goal relatively similar Good practical experience

In book knowledge very well. I had a KPU student that graduated this year working in my brewery that did not know how to check carbonation with a Zahm and Nagle CO2 tester.

QUESTIONS ON CHAPTER 3: PROGRAM RELEVANCE AND DEMAND

Program's Connections

Does the program have the connections to the discipline/sector to remain current?

13 - How satisfied are you with the opportunities you have to stay connected to KPU's Brewing and Brewery Operations program?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories to enable quick comparisons between items. For items with low positive percentages, use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | How satisfied are you with the opportunities you have to stay connected to KPU's Brewing and Brewery Operations program? | Percentage |
|---|--|------------|
| 1 | Very dissatisfied | 0% |
| 2 | Somewhat dissatisfied | 0% |
| 3 | Neither satisfied nor dissatisfied | 0% |
| 4 | Somewhat satisfied | 17% |
| 5 | Very satisfied | 83% |

14 - What can KPU’s Brewing and Brewery Operations program do to build better connections with the discipline/sector?

- industry open house at KPU facility to promote program - request feedback from employers who have hired KPU graduates of this program

Is there a way to do an employer job listing directly within the program's parameters?

Get the students ,as a class to spend time in breweries.

The last few years have been a bit of an unknown... however, with things opening up there is lots more that can happen to connect within the sector: link up with MBAA - ASBC - CBC organizations local brewing 'district groups' (Brewers Row, Brewery Creek, North Van, Yeast Van...)

15 - Please rate your level of interest in participating in projects that connect program students with the industry or sector.

| # | Please rate your level of interest in participating in projects that connect program students with the industry or sector. | Percentage |
|---|--|------------|
| 1 | Not at all interested | 0% |
| 2 | Somewhat interested | 58% |
| 3 | Very interested | 42% |
| | Total | 12 |

16 - Please share any project ideas you have to connect program students with the industry.

- free or discounted entry for students to local beer events - request industry to submit projects for students to work on

Suggest students volunteer for festival serving, etc.

malting cellar practices (dry hopping, CIP, centrifuge operation)

Trade different breweries ,,, brewmaster , cellar person, packaging cheif,,, spend a day with students in exchange for some lab or recipe development time with kpu.

Appendix H Diploma in Brewing and Brewery Operations Program Review - Alumni Survey Results

The alumni survey was sent to 94 Diploma in Brewing and Brewery Operations program alumni. A total of 23 alumni responded. The response rate is 24%.

Note: The data includes open-ended comments. In order to preserve integrity and objectivity, OPA does not do value-judgment editing (i.e. we do not fix spelling errors, syntax issues, punctuation, etc.). Comments are included verbatim – with one exception: if individuals or courses are named, OPA redacts the name of the instructor or course. This rule applies to whether the comment is good, bad or indifferent.

1 - When did you complete KPU's Brewing and Brewery Operations program?

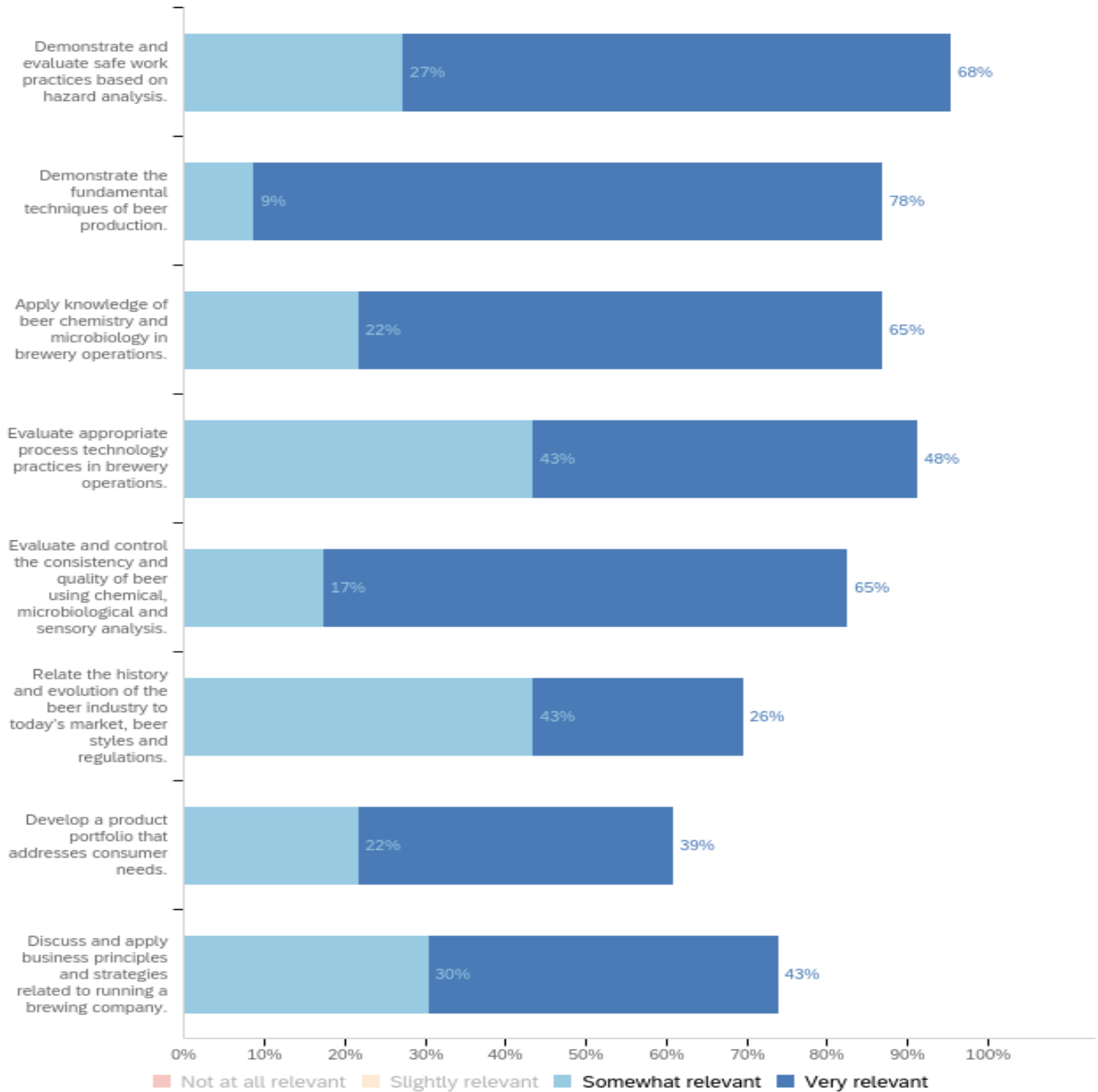
| # | When did you complete KPU's Brewing and Brewery Operations program? | Percentage |
|---|---|------------|
| 1 | 2021 | 17% |
| 2 | 2020 | 13% |
| 3 | 2019 | 22% |
| 4 | 2018 | 9% |
| 5 | 2017 | 9% |
| 6 | 2016 | 30% |
| | Total | 23 |

QUESTIONS ON CHAPTER 3: PROGRAM RELEVANCE AND DEMAND

Program Relevance

Are the program learning outcomes relevant to the current needs of the discipline/sector?]

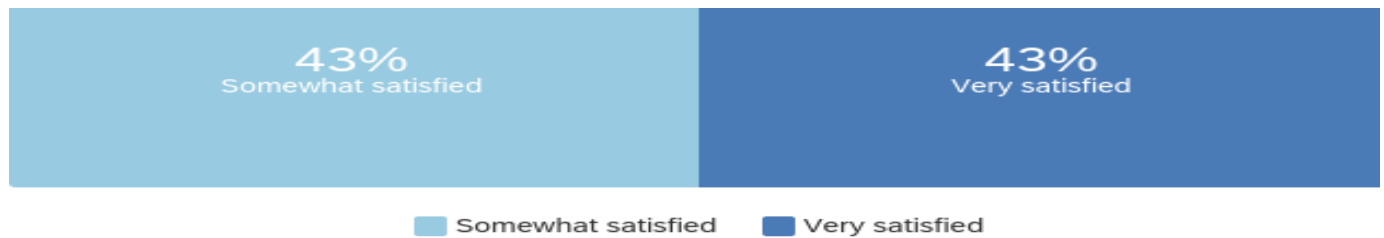
2- Program Learning Outcomes are statements that describe the knowledge and skills students will have upon completion of a program. Please indicate how relevant each of the following Program Learning Outcomes was to your career goals.



Note that “not at all relevant” and “slightly relevant” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all relevant” and “slightly relevant” categories.

| # | Question | Not at all relevant | Slightly relevant | Somewhat relevant | Very relevant | Total |
|---|--|---------------------|-------------------|-------------------|---------------|-------|
| 1 | Demonstrate and evaluate safe work practices based on hazard analysis. | 0% | 5% | 27% | 68% | 22 |
| 2 | Demonstrate the fundamental techniques of beer production. | 0% | 13% | 9% | 78% | 23 |
| 3 | Apply knowledge of beer chemistry and microbiology in brewery operations. | 0% | 13% | 22% | 65% | 23 |
| 4 | Evaluate appropriate process technology practices in brewery operations. | 0% | 9% | 43% | 48% | 23 |
| 5 | Evaluate and control the consistency and quality of beer using chemical, microbiological and sensory analysis. | 0% | 17% | 17% | 65% | 23 |
| 6 | Relate the history and evolution of the beer industry to today’s market, beer styles and regulations. | 9% | 22% | 43% | 26% | 23 |
| 7 | Develop a product portfolio that addresses consumer needs. | 17% | 22% | 22% | 39% | 23 |
| 8 | Discuss and apply business principles and strategies related to running a brewing company. | 0% | 26% | 30% | 43% | 23 |

3 - The program curriculum is the academic content taught in a specific program. Overall, how satisfied are you with the curriculum of KPU's Brewing and Brewery Operations program?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | The program curriculum is the academic content taught in a specific program. Overall, how satisfied are you with the curriculum of KPU's Brewing and Brewery Operations program? | Percentage |
|---|--|------------|
| 1 | Very dissatisfied | 4% |
| 2 | Somewhat dissatisfied | 4% |
| 3 | Neither satisfied nor dissatisfied | 4% |
| 4 | Somewhat satisfied | 43% |
| 5 | Very satisfied | 43% |
| | Total | 23 |

4 - Thinking of KPU's Brewing and Brewery Operations program's curriculum as a whole, please indicate the strengths of the program.

The networking mainly; the microbiology and yeast management was very important, business and marketing are becoming much more useful since I became management.

Good fundamental understanding of most of the processes and practices in the industry.

Brewing chemistry

Science - chemistry and microbiology of brewing Marketing - customer relations and approaches to selling the product

Very technically sound both in the classroom and hands on in the brewery. The instructors were great. Very engaged and clearly wanted students to succeed.

Direct connections to industry. Faculty who have relevant industry experience. positive long term relationship development with faculty members and cohort.

Thorough coverage of all necessary materials

Strong on theory.

Provides a solid foundation of theory and practical

the practical classes, chemistry and microbiology

It lays a great foundation of knowledge for the operation of a brewery from grain to glass.

• I felt that the program was very well-rounded, it covered fundamental science of brewing (chemistry & microbiology) as well as the necessary hands-on training and some business concepts (people management) • Instructors have a wealth of experience/ knowledge that was very beneficial to the course. • The hands-on brewery and opportunity to create/ market/ sell a product from start to finish is very beneficial to students.

Capacity of transferring theoretical knowledge into practical by working at the campus brewery. The practical side of the program really enhances the hands-on skills of students, leaving them ready for working in any craft brewery. Integration between science based courses (chemistry, micro, sensory) and business/operations courses (marketing, brewing industry, brewing ops) allow students to take away a whole understanding of the industry and requirements for running breweries.

Brewing chemistry and brewing microbiology lab applications. In depth theory and knowledge of brewing process and technology

Knowledgeable instructors that provide industry insights.

Hands on work in the brewery, instructors with plenty of industry experience.

The practical application of sensory analysis as well as time in the brewery doing hands-on learning.

5 - Thinking of KPU's Brewing and Brewery Operations program's curriculum as a whole, please provide any suggestions you have for improvement.

From talking to later students/graduates it sounds like the issues I had have been corrected already. Improved labs and more challenging/in depth chemistry and biology.

Would have liked options for electives to allow students from various backgrounds to better design their program to fit their career goals.

The packaging classes were a waste of time and money

Recipe development: the course on **[Course Name Redacted]** is all about calculations. Some background and insight into actual recipe development would be very helpful.

Focus more on the craft side of the business compared to larger macro side. Most breweries can't afford the high tech equipment or strategies that were taught in some sections. Teaching some low tech/cost options would be beneficial.

Offer the program with on a continuous intake basis for part time studies. Offer the theory classes online and the practical sessions with only evening and weekend and intensive summer classes over a longer period. Offer intensive summer sessions e.g. multiple 1 week 40-hour daytime courses.; 2 weeknights + all day Saturday for 5 week; 2 weeknights x 10 weeks. Allow students the flexibility to complete the program while working full-time or supporting a family so they can retrain to this industry. Too many potential students cannot put their life on hold while they attend full time classes for two

years. Many people in the industry right now need training and mentorship and cannot find it at KPU since the program is only offered full-time over 2 years. Create a plan for bridging and laddering opportunities with other Post-Secondary programs e.g. B Tech or process systems or production or business so graduates can upscale their diploma into a suitable degree. Study abroad term exchanges or summer programs.

Better communication between instructors on course materials to avoid repeat lectures.

Weak on practicality.

Include beer styles training in sensory 1 as it is more relevant during the program than at the end. More practical exams (i.e. packaging labs should have a lab exam)

a lot of focus on large-scale equipment

Obviously the first year was a bit rushed but we ended up learning a lot about the complexities of commissioning a brewery.

- I felt that the classes on **[Course Name Redacted]** and Judging were the least relevant in the program. They were very in-depth but also too niche to be helpful. For example, I recall having to learn very specific equipment measurements/functions - when in reality, someone working in a brewery would have access to the vendor assistance/ instructions.
- Despite the wealth of experience of some instructors, it's also important to know that instructor experience does not translate to teaching abilities. In some courses, I feel that I would have learned more with a different instructor.
- I did somewhat feel that the program/ career opportunities were not presented transparently. I think it can be more clearly stated that the credential is more of a career asset than the final end goal needed for career success. Maybe something that could be explored is having more clear routes for a graduate to pursue secondary education at KPU that complements the Diploma Program (and vice versa). For example, advertising within the sciences department to interest chemistry graduates in the diploma, or suggested business diplomas after the brewing diploma. However, I do understand that the end goal of the program may be to get graduates out working in the industry, so encouraging further education may not align.
- There could also be more emphasis on the opportunities for students in larger facilities. It felt like an afterthought when I was in the program. I understand that the main goal of the program may be to drive the craft beer industry. However, my perception (without looking into it in-depth) has been that compensation for working in craft can be insufficient to meet the cost of living (in certain areas such as Metro Vancouver) and there is limited upwards mobility in compensation/ salary.

I would suggest there is room for including more content geared towards big breweries (Macro breweries) as most of the knowledge given is oriented for Craft brewing. This will help attract people that has aspirations of going into big brewing. Partnering with other universities for students to do an exchange during the summer break would be good to have.

More practical experience or access to full size brewery operations/equipment for part of the program would be valuable. More hands on brewing and attention to ingredient choices, beer styles, unconventional brewing techniques. Evaluating beer processes that were not done correctly to assess differences. Better understanding how a full scale brewery operation effect beer differently than a 200L pilot system. Timing, hydrostatic pressure, carbing, cleaning. Practical yeast management for full scale breweries. Actually practice techniques and collect yeast assess viability then USE IT. Keg management. take apart a full size keg and trouble shoot for issues. There was a great amount of the curriculum dedicated to calculations related to equipment and thermal dynamics that may be better suited for a separate optional certificate if students chose to go into the brewing equipment manufacturing field. A pilot project of actually applying for all of the manufacturing licenses, business and brewery licenses as well as learning how to actually fill out the forms required to report production and pay excise as well as collecting liquor tax and sales tax would be highly beneficial.

[Course Name Redacted] should be teaching the students more in depth about beer styles with beer tastings and relating it with brewing ingredients and process. Actually teaching about the beer styles instead of getting students to do seminars about them.

It has been a few years since graduating so things may have changed, but it was lacking preparedness for work in a brewery. Theory was great but hands on knowledge was not up to speed. I learned more on the job in 3 months than in 2 years at KPU.

Remove the philosophy requirement, Almost anything would be more useful ex: forklift operation, accounting, design, marketing, business law

A certain instructor was not qualified to teach due to a lack of knowledge in Chemistry and constantly needed other students with a chemistry background to correct him. This particular instructor also showed signs of favoritism towards one student while ignoring some.

More time with recipe development. It felt like there weren't enough opportunities to experiment and discover what works and what doesn't.

6 - What topics, if any, were missing from the program?

Hands on brewery maintenance: replacing a pump head, trouble shooting a glycol system; some basic plumbing and electrical would be pretty helpful; how to swap a solenoid. A lot of the owners hiring KPU grads don't have a clue how to run a brewery.

More indepth business or accounting courses.

More classes on beer styles and recipe development

Social Media marketing needs to be emphasized more. Also, Email marketing, using google ads, etc

More hands-on brewing experience with recipe development. Preparatory course in Brewing Chemistry. Stand-alone courses in recipe development, food pairings, more business and entrepreneurship courses. Supervisory skills. WCB safety for Supervisors course. 1 day first aid course. HACCP level 2 courses for food / bev production. The Brewery and COVID19 - ways to develop plans for pivoting your brewing business when your industry shuts down unexpectedly. Lessons learned and opportunities developed.

I could have used a lecture that starts from nothing and works to completion on drafting a recipe and calculating every step along the way. Which we did sort of have, but it was in bits and pieces and never the complete process

Realistic brewing practices.

Not sure

forklift training

I feel like dry hopping was under represented in the curriculum.

N/A

1-I think maybe a course related to HR management or leadership/people management would be helpful and is not part of the curriculum. 2.- A research project for students would be advantageous. 3.- Opportunities for further studies (post-graduate courses) would be nice as there are currently no colleges or universities that offer this option.

Current social media techniques to drive sales and develop a brand. How to use modern brewing software such as Ekos. Practical yeast management techniques for craft breweries that do not have a lab. Practical tank techniques for full size brewing equipment. You cant have students trying to vent tanks using 2" hose on the top of a 20 foot tall tank. DIN system parts and names of parts for tanks and brewing equipment. Basic repairs and practical experience (taking apart a pump to replace gaskets etc) More access to brewing equipment and practical brewing experience so that the all of the beers that win awards are actually made by students not faculty.

Greater attention to Beer Styles and history.

Ingredients. There was nothing regarding different malts, yeasts, hops that we may encounter or use. A course or even a section of a course discussing information about ingredients would be beneficial

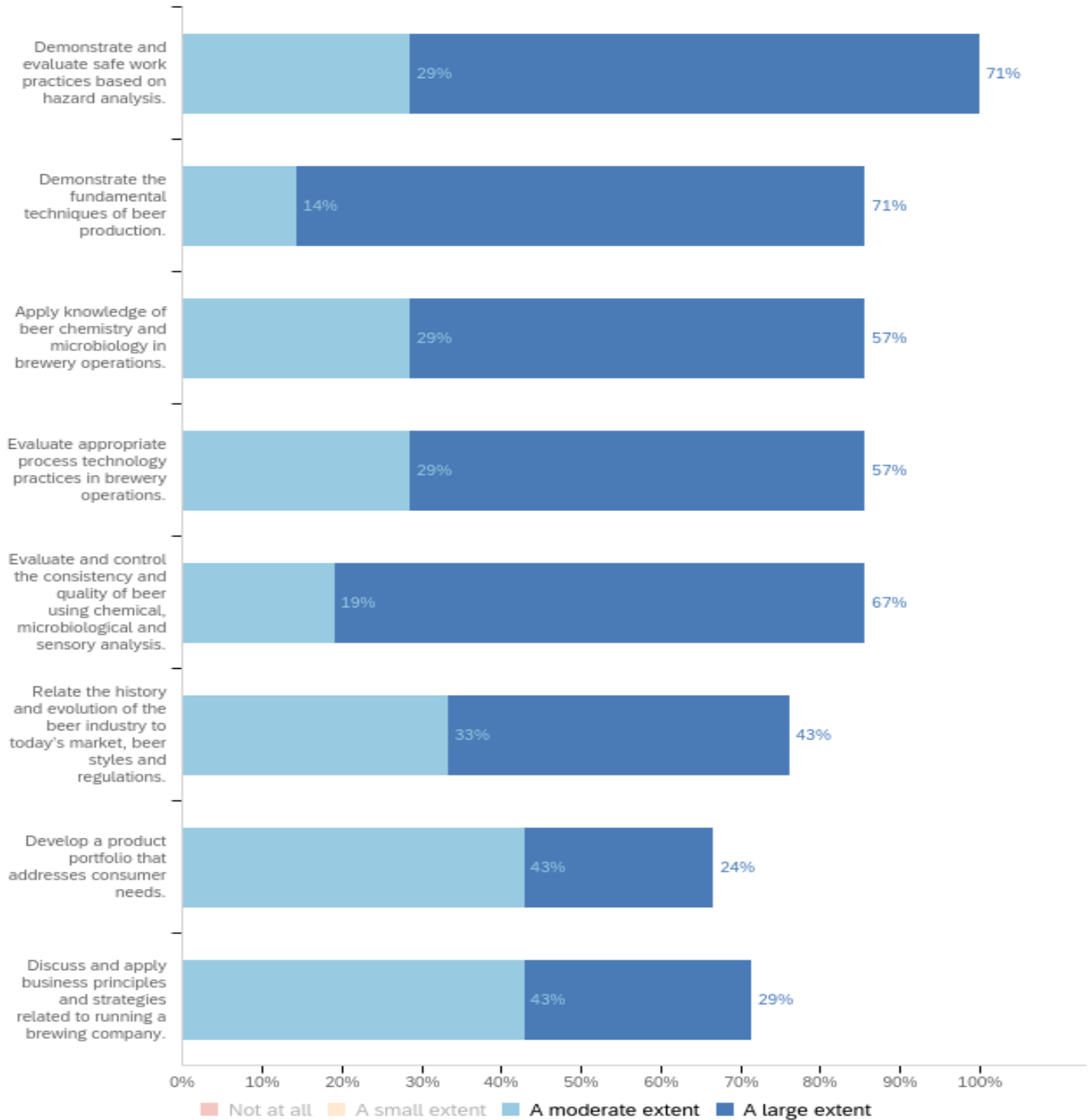
Lower technology equipment. KPU has much more advanced equipment than most grads will be using at work.

QUESTIONS ON CHAPTER 4: EFFECTIVENESS OF INSTRUCTIONAL DELIVERY

Instructional Design and Delivery

Are appropriate opportunities provided to help students acquire the PLOs?

7 - To what extent did KPU's Brewing and Brewery Operations program help you develop each of the following Program Learning Outcomes?

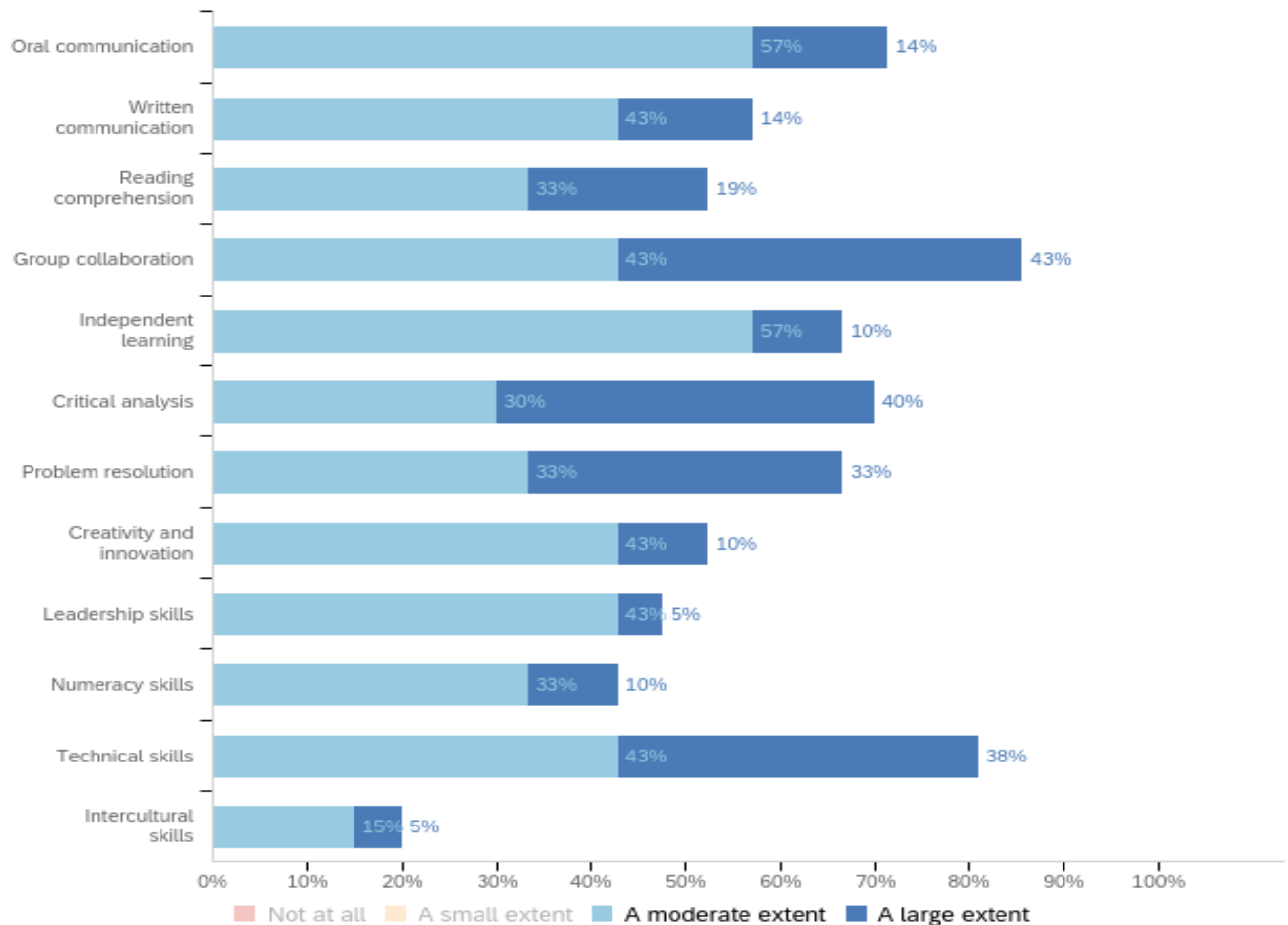


Note that “not at all” and “a small extent” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all” and “a small extent” categories.

| # | Question | Not at all | A small extent | A moderate extent | A large extent | Total |
|---|--|------------|----------------|-------------------|----------------|-------|
| 1 | Demonstrate and evaluate safe work practices based on hazard analysis. | 0% | 0% | 29% | 71% | 21 |
| 2 | Demonstrate the fundamental techniques of beer production. | 0% | 14% | 14% | 71% | 21 |
| 3 | Apply knowledge of beer chemistry and microbiology in brewery operations. | 0% | 14% | 29% | 57% | 21 |
| 4 | Evaluate appropriate process technology practices in brewery operations. | 0% | 14% | 29% | 57% | 21 |
| 5 | Evaluate and control the consistency and quality of beer using chemical, microbiological and sensory analysis. | 0% | 14% | 19% | 67% | 21 |
| 6 | Relate the history and evolution of the beer industry to today's market, beer styles and regulations. | 5% | 19% | 33% | 43% | 21 |
| 7 | Develop a product portfolio that addresses consumer needs. | 19% | 14% | 43% | 24% | 21 |
| 8 | Discuss and apply business principles and strategies related to running a brewing company. | 0% | 29% | 43% | 29% | 21 |

Are appropriate opportunities provided to help students acquire the essential skills?

8 - To what extent did KPU's Brewing and Brewery Operations program help you develop each of the following essential skills?



Note that “not at all” and “a small extent” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all” and “a small extent” categories.

| # | Question | Not at all | A small extent | A moderate extent | A large extent | Total |
|---|---------------------------|------------|----------------|-------------------|----------------|-------|
| 1 | Oral communication | 5% | 24% | 57% | 14% | 21 |
| 2 | Written communication | 5% | 38% | 43% | 14% | 21 |
| 3 | Reading comprehension | 10% | 38% | 33% | 19% | 21 |
| 4 | Group collaboration | 5% | 10% | 43% | 43% | 21 |
| 5 | Independent learning | 5% | 29% | 57% | 10% | 21 |
| 6 | Critical analysis | 0% | 30% | 30% | 40% | 20 |
| 7 | Problem resolution | 0% | 33% | 33% | 33% | 21 |
| 8 | Creativity and innovation | 10% | 38% | 43% | 10% | 21 |
| 9 | Leadership skills | 5% | 48% | 43% | 5% | 21 |

| | | | | | | |
|----|----------------------|-----|-----|-----|-----|----|
| 10 | Numeracy skills | 5% | 52% | 33% | 10% | 21 |
| 11 | Technical skills | 0% | 19% | 43% | 38% | 21 |
| 12 | Intercultural skills | 40% | 40% | 15% | 5% | 20 |

Are appropriate work-integrated and/or community-engaged learning opportunities provided to help students acquire the learning outcomes?

9 - To what extent do you agree that you had sufficient opportunities in the program to reinforce your learning through practical application of this learning?



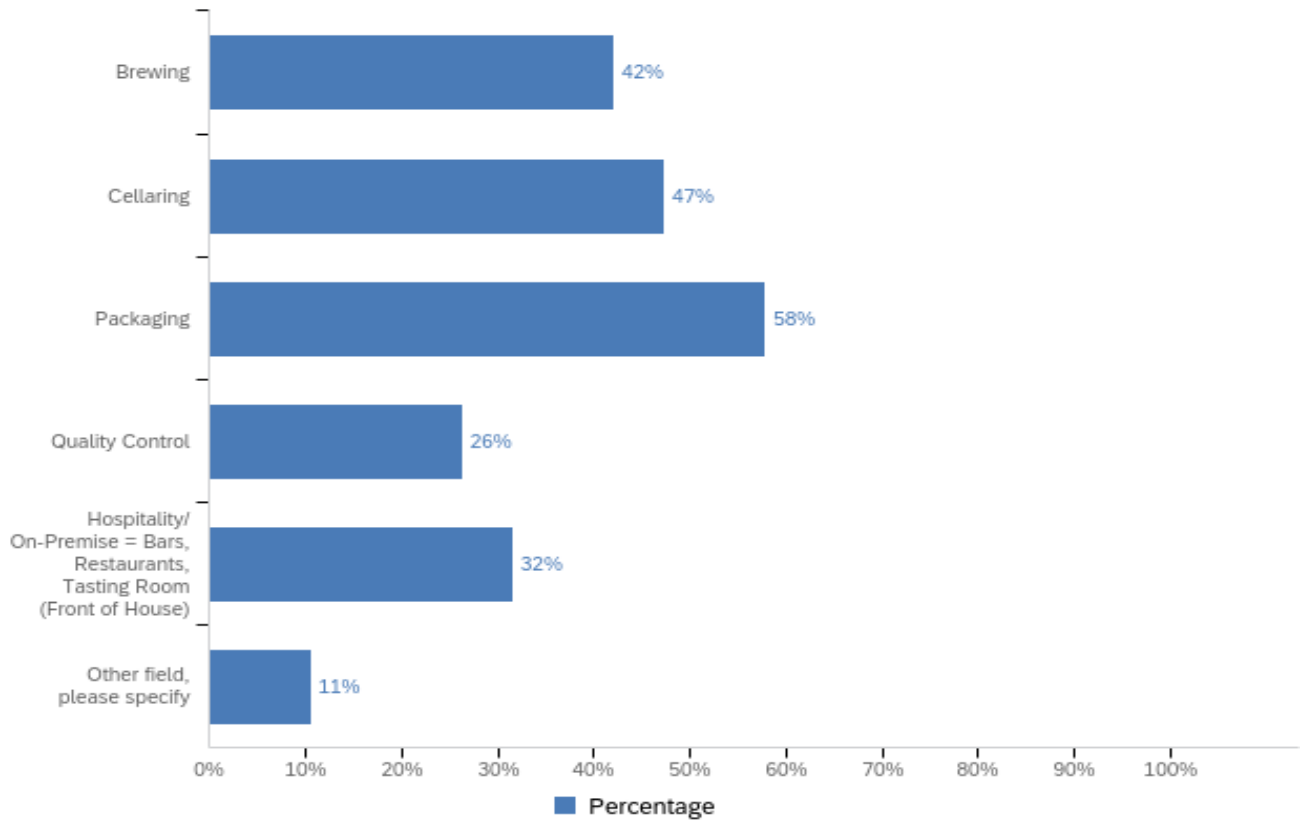
Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | To what extent do you agree that you had sufficient opportunities in the program to reinforce your learning through practical application of this learning? | Percentage |
|---|---|------------|
| 1 | Strongly disagree | 10% |
| 2 | Somewhat disagree | 14% |
| 3 | Neither agree nor disagree | 10% |
| 4 | Somewhat agree | 43% |
| 5 | Strongly agree | 24% |
| | Total | 21 |

10 - Did you work while attending the program?

| # | Did you work while attending the program? | Percentage |
|---|---|------------|
| 1 | Yes | 90% |
| 2 | No | 10% |
| | Total | 21 |

11 - In which of the following fields did you work during the program? Select all that apply.



| # | Answer | % | Count |
|---|--|-----|-------|
| 1 | Brewing | 42% | 8 |
| 2 | Cellaring | 47% | 9 |
| 3 | Packaging | 58% | 11 |
| 4 | Quality Control | 26% | 5 |
| 5 | Hospitality/ On-Premise = Bars, Restaurants, Tasting Room (Front of House) | 32% | 6 |
| 6 | Other field, please specify | 11% | 2 |
| | Total | | 19 |

Note: The last row presents the total number of respondents. The total number of responses for this question is greater than the number of respondents. Therefore, the percentage total exceeds 100%.

11_6_TEXT - Other field, please specify

high paying part time job to help with finances.

Sales

12 - Indicate the extent your work experience contributed to your learning in the program.

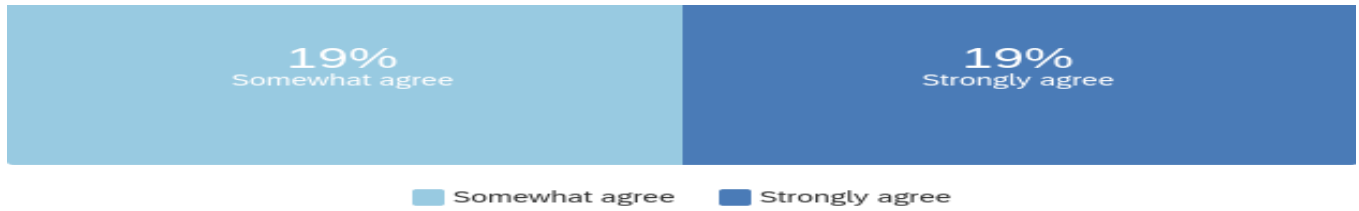


Note that “Not at all” and “A small extent” categories are excluded from the chart, leaving only “A moderate extent” and “A large extent” categories. Use the frequency table below to review the proportion of “Not at all” and “A small extent” responses.

| # | Indicate the extent your work experience contributed to your learning in the program. | Percentage |
|---|---|------------|
| 1 | Not at all | 11% |
| 2 | A small extent | 16% |
| 3 | A moderate extent | 53% |
| 4 | A large extent | 21% |
| | Total | 19 |

Does the program design ensure students are prepared for subsequent courses? / Are students making satisfactory progress in the program?

13 - Thinking of KPU's Brewing and Brewery Operations program as a whole, to what extent do you agree that the prerequisites offered prepared you for more advanced courses?

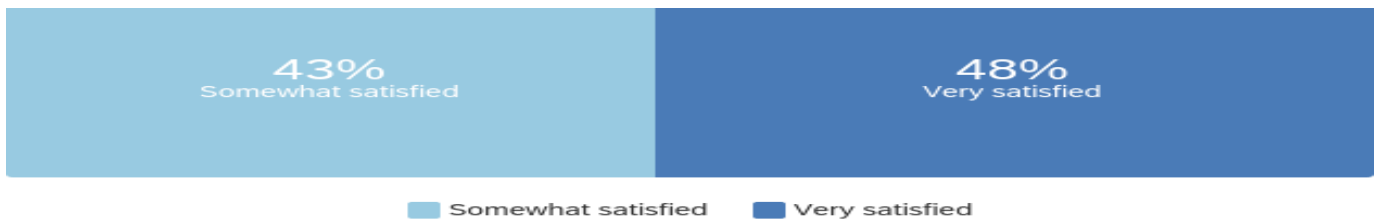


Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Thinking of KPU's Brewing and Brewery Operations program as a whole, to what extent do you agree that the prerequisites offered prepared you for more advanced courses? | Percentage |
|---|---|------------|
| 1 | Strongly disagree | 0% |
| 2 | Somewhat disagree | 14% |
| 3 | Neither agree nor disagree | 48% |
| 4 | Somewhat agree | 19% |
| 5 | Strongly agree | 19% |
| | Total | 21 |

Does the instruction meet the needs of diverse learners?

14 - Overall, how satisfied are you with the instruction you have received in KPU's Brewing and Brewery Operations program?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Overall, how satisfied are you with the instruction you have received in KPU's Brewing and Brewery Operations program? | Percentage |
|---|--|------------|
| 1 | Very dissatisfied | 5% |
| 2 | Somewhat dissatisfied | 0% |
| 3 | Neither satisfied nor dissatisfied | 5% |
| 4 | Somewhat satisfied | 43% |
| 5 | Very satisfied | 48% |
| | Total | 21 |

15 - Thinking of how instruction is delivered across the program as a whole, please indicate the strengths of the program instruction.

Professors were engaging and available.

The knowledge and experience of the faculty is impressive. This allowed the program to focus on critical application of techniques and procedures that ensured the graduate was prepared to accept responsibility and take on new challenges in the "real world."

See previous

Strong leadership from the past and current Program Chairs. Real life skills development in class that could quickly be used in the industry. Relevant industry connections.

Teachers were passionate and knowledgeable. Also approachable.

Provided a great foundation of knowledge to build upon in the industry

[Instructor Name Redacted]

Instructors had a lot of knowledge/ experience in the industry and connections

Instructors have lots of knowledge and understanding of the industry and brewery operations. Having the opportunity to see instructors both in theoretical and hands on activities allows lots of room for discussions and knowledge transfer. All instructors teaching courses were well prepared, open to questions and respectful to students.

every individual is treated the same regardless of previous experience or professional background.

The actual instruction was good, my issue is with some of the material that was lacking.

Depth of knowledge and attention to detail

16 - Thinking of how instruction is delivered across the program as a whole, please provide any suggestions you have for improvement in program instruction.

Unfortunately, as I was in the inaugural year some of the courses were in flux and a bit confusing at times. Not necessarily the instructors fault as they were building a brand new program.

Reduce the amount of on-line instruction as soon as COVID restrictions allow!

See previous

More hands on opportunities. Summer brewing workshops focusing on skills development, production and recipe testing. Offer the theory classes online and the practical sessions with only evening and weekend and intensive summer classes over a longer period. Offer intensive summer sessions e.g. multiple 1 week 40-hour daytime courses.; 2 weeknights + all day Saturday for 5 week; 2 weeknights x 10 weeks. Allow students the flexibility to complete the program while working full-time or supporting a family so they can retrain to this industry. Too many potential students cannot put their life on hold while they attend full time classes for two years. Many people in the industry right now need training and mentorship and cannot find it at KPU since the program is only offered full-time over 2 years.

A more realistic approach to brewing, rather than ideal situations.

More practical labs. Labs with more purpose to them, like the one testing the differences between different methods of rinsing bottles (ex. PA vs. water vs. treated water).

Some instructors, despite having industry experience, had some opportunity for growth in their instruction. If this is not already the case, perhaps it can be mandatory for instructors to pursue some kind of Professional Development around adult learning?

I think maybe having more industry experts coming to talk about topics would be great (i.e.: hops experts, webinars with maltsters, etc.)

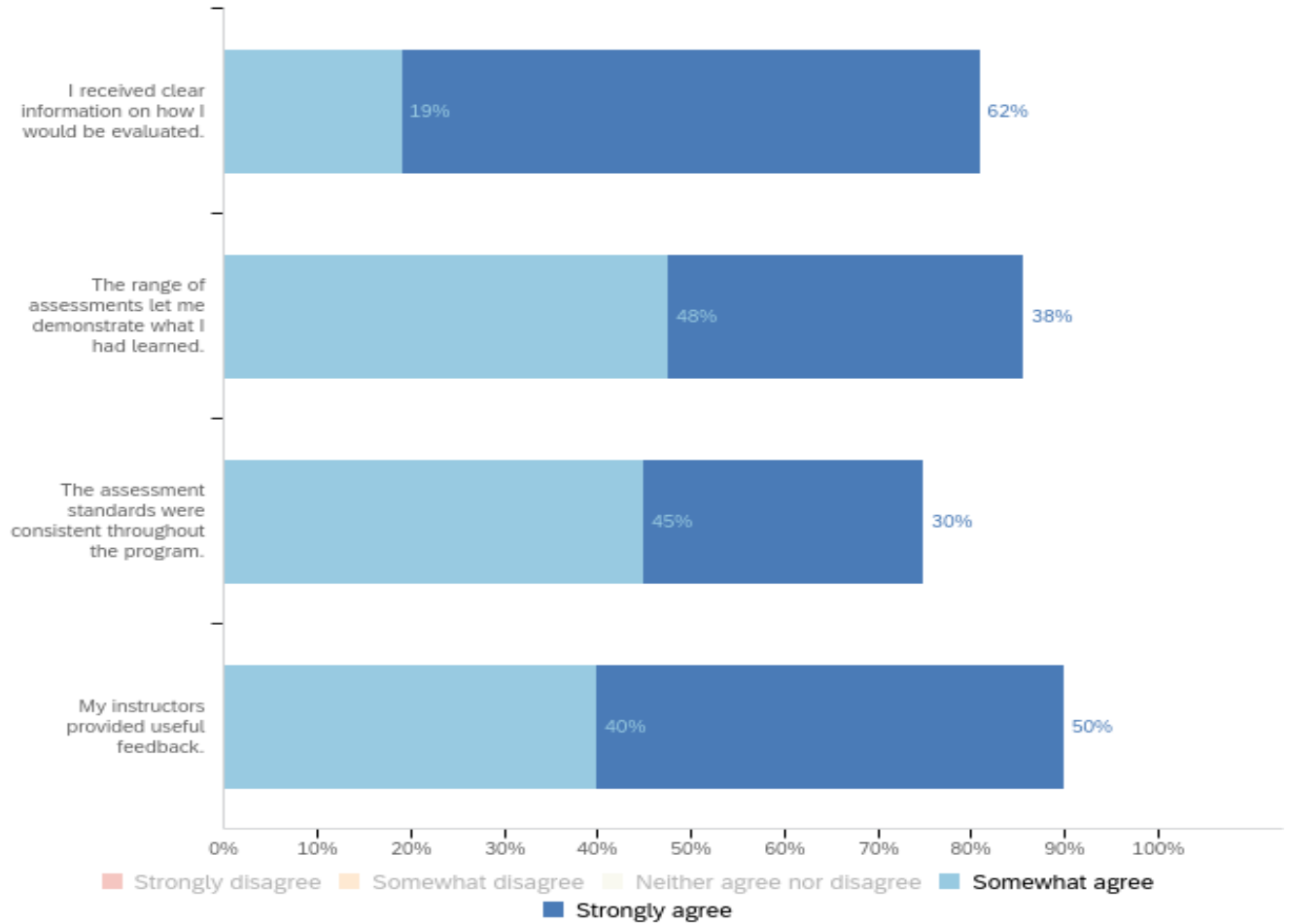
Less group work.

Ditch philosophy

There were just not enough practices on brewing in the brew lab. The instructors had attitude issues and were making students nervous. Overall, not a pleasant experience.

Do the assessment methods allow students to demonstrate to what extent they have achieved the learning outcomes?

17 - Thinking of how learning is assessed in the program as a whole, indicate your agreement with the following.



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories to enable quick comparisons between items. For items with low positive percentages, use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Question | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree | Total |
|---|--|-------------------|-------------------|----------------------------|----------------|----------------|-------|
| 1 | I received clear information on how I would be evaluated. | 5% | 0% | 14% | 19% | 62% | 21 |
| 2 | The range of assessments let me demonstrate what I had learned. | 0% | 5% | 10% | 48% | 38% | 21 |
| 3 | The assessment standards were consistent throughout the program. | 5% | 5% | 15% | 45% | 30% | 20 |
| 4 | My instructors provided useful feedback. | 5% | 0% | 5% | 40% | 50% | 20 |

Are graduates of the program successful?

Further Education

18 - Have you pursued further education since completing KPU's Brewing and Brewery Operations program?

| # | Have you pursued further education since completing KPU's Brewing and Brewery Operations program? | Percentage |
|---|---|------------|
| 1 | Yes | 19% |
| 2 | No | 81% |
| | Total | 21 |

19 - Please list the name of the program and the institution where you enrolled after completing KPU's Brewing and Brewery Operations program.

VCC - Provincial Instructor Diploma Program

BSc at Simon Fraser University

BBA (Human Resources Management), Kwantlen Polytechnic University

20 - What is the highest credential you have earned or are currently pursuing since completing KPU's Brewing and Brewery Operations program?

| # | What is the highest credential you have earned or are currently pursuing since completing KPU's Brewing and Brewery Operations program? - Selected Choice | Percentage |
|---|---|------------|
| 1 | Diploma | 33% |
| 2 | Associate's Degree | 0% |
| 3 | Bachelor's Degree | 67% |
| 4 | Master's Degree | 0% |
| 5 | Doctorate | 0% |
| 6 | Professional designation (please specify) | 0% |
| 7 | Other (please specify) | 0% |
| | Total | 3 |

20_6_TEXT - Professional designation (please specify)

No results

20_7_TEXT - Other (please specify)

No results

21 - To what extent do you agree that the KPU's Brewing and Brewery Operations program prepared you well for further education?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | To what extent do you agree that the KPU's Brewing and Brewery Operations program prepared you well for further education? | Percentage |
|---|--|------------|
| 1 | Strongly disagree | 0% |
| 2 | Somewhat disagree | 0% |
| 3 | Neither agree nor disagree | 0% |
| 4 | Somewhat agree | 100% |
| 5 | Strongly agree | 0% |
| | Total | 3 |

Employment

22 - Are you currently employed in a field related to what you studied at KPU?

| # | Are you currently employed in a field related to what you studied at KPU? | Percentage |
|---|---|------------|
| 1 | Yes | 85% |
| 2 | No | 15% |
| | Total | 20 |

23 - Which of the following best describes your current employment situation?

| # | Which of the following best describes your current employment situation? | Percentage |
|---|--|------------|
| 1 | In a full-time regular position | 94% |
| 2 | In a part-time regular position | 0% |
| 3 | In a contract position | 0% |
| 4 | In a casual or temporary position | 6% |
| | Total | 17 |

24 - What is your position/role/job title?

Head Brewer

Brewer

Production brewer

Distillery Production Manager

Brewer

Head Brewer

Brewing Laboratory Instructor

Brewer

Head Brewer

Manager of Brewing Operations

Brewer Supervisor

Brewery technician

Brewer

Quality Assurance Specialist

Head brewer

25 - Could you specify the organization where you are currently employed? This information will help us better determine KPU graduates' career trajectories.

Canoe Brewpub, now Craft Beer Market

Wooden Walls Distilling

Steamworks

Citizen Brewing Company

KPU

Mariner Brewing

Breton Brewing Co

Big Rock Brewery

Parallel 49 Brewing co

Moody Ales Co.

Horticulture Field

Ravens Brewing

26 - Were you previously employed in a field related to what you studied at KPU? (Asked to those who are not currently employed in a field related to what they studied at KPU)

| # | Were you previously employed in a field related to what you studied at KPU? | Percentage |
|---|---|------------|
| 1 | Yes | 67% |
| 2 | No | 33% |
| | Total | 3 |

27 - Which of the following best describes your employment situation? (Asked to those who answered Q26 yes)

| # | Which of the following best describes your employment situation? | Percentage |
|---|--|------------|
| 1 | Full-time regular position | 100% |
| 2 | Part-time regular position | 0% |
| 3 | Contract position | 0% |
| 4 | Casual or temporary position | 0% |
| | Total | 2 |

28 - Based on your experience since graduating, to what extent do you agree that the program prepared you well for an entry-level job in the industry?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Based on your experience since graduating, to what extent do you agree that the program prepared you well for an entry-level job in the industry? | Percentage |
|---|---|------------|
| 1 | Strongly disagree | 0% |
| 2 | Somewhat disagree | 11% |
| 3 | Neither agree nor disagree | 11% |
| 4 | Somewhat agree | 16% |
| 5 | Strongly agree | 63% |
| | Total | 19 |

29 - Please identify the skills/knowledge area(s) you felt were missing for an entry-level job in your industry.

Various techniques to accomplish the same task. Hands on training was fairly one dimensional.

Hands-on brewing with a relatively complex brewhouse. The home-brew systems that are used for the vast majority of the brewing labs at KPU do not prepare the student for brewing on an actual production system. More experience running the larger brewhouse in the KPU Brew Lab would be extremely helpful.

Practical skills

forklift training

I did not pursue an entry-level job in the industry. However, I strongly believe that, had I wanted to, I would have been sufficiently prepared for it (through this program)

Maybe being able to operate or run a commercial sized brewhouse

fork lift training repairs and maintenance of basic equipment. full size equipment practical experience.

More hands on brewing experience on medium to large automated brewing systems

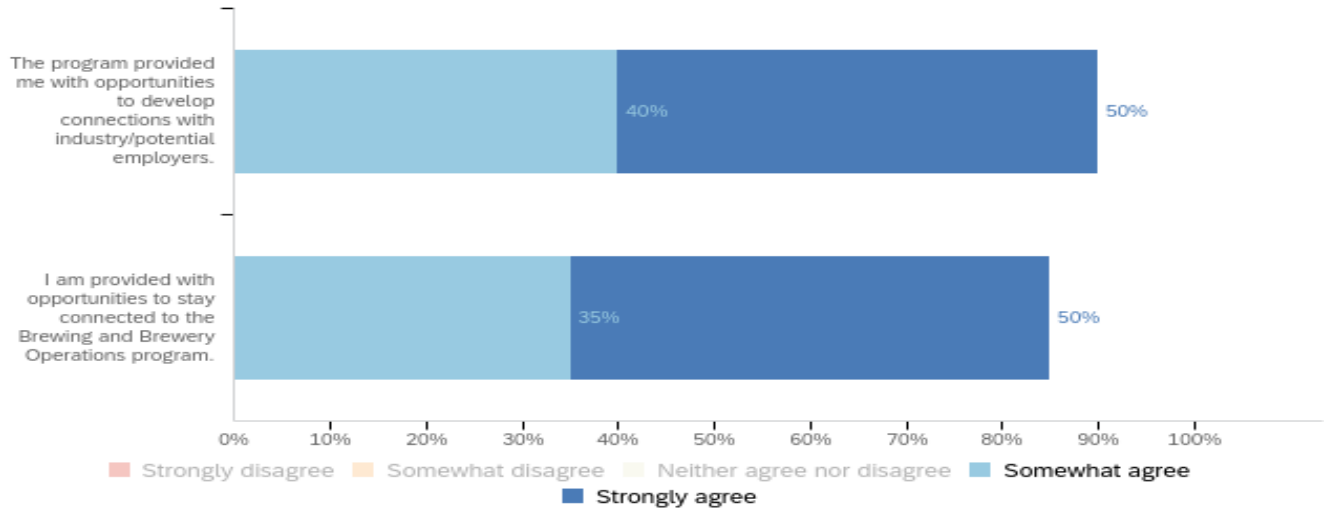
Hands on brewery work was very lacking, especially for someone that didn't know anything coming into the program. Learning how to be in the brewery and how to use certain equipment and tools wasn't great either.

Most places require use of forklift and/or pallet jack. I already had experience, but it would be very useful to include in the program.

Does the program have the connections to the discipline/sector to remain current?]

Alumni Connections

30 - Please indicate the extent you agree with the following statements:



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories to enable quick comparisons between items. For items with low positive percentages, use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Question | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree | Total |
|---|--|-------------------|-------------------|----------------------------|----------------|----------------|-------|
| 1 | The program provided me with opportunities to develop connections with industry/potential employers. | 0% | 10% | 0% | 40% | 50% | 20 |
| 2 | I am provided with opportunities to stay connected to the Brewing and Brewery Operations program. | 5% | 0% | 10% | 35% | 50% | 20 |

31 - What can the program do to build better connections with alumni?

Nothing that it is not already doing. Perhaps a class reunion?

I'm not in Greater Vancouver so there's not much more you can do.

Host Reunion events for alumni

Create some sort of informal get togethers may be semi annual or annual

Better social media for the brewing program Better promotion and recognition of brewing alumni. More events for alumni to participate in KPU brewing operations.

Alumni guest brewing sessions with current student cohorts. Recipe development opportunities on the NSI during program down times. Industry education sessions. Outreach for testing new recipes, methods, etc. Alumni chapter.

Appendix I Diploma in Brewing and Brewery Operations Program Review - Student Survey Report

The student survey was sent to 38 Diploma in Brewing and Brewery Operations students. A total of 12 students responded. The response rate is 32%.

Note: The data includes open-ended comments. In order to preserve integrity and objectivity, OPA does not do value-judgment editing (i.e. we do not fix spelling errors, syntax issues, punctuation, etc.). Comments are included verbatim – with one exception: if individuals or courses are named, OPA redacts the name of the instructor or course. This rule applies to whether the comment is good, bad or indifferent

QUESTIONS ON CHAPTER 3: PROGRAM RELEVANCE AND DEMAND

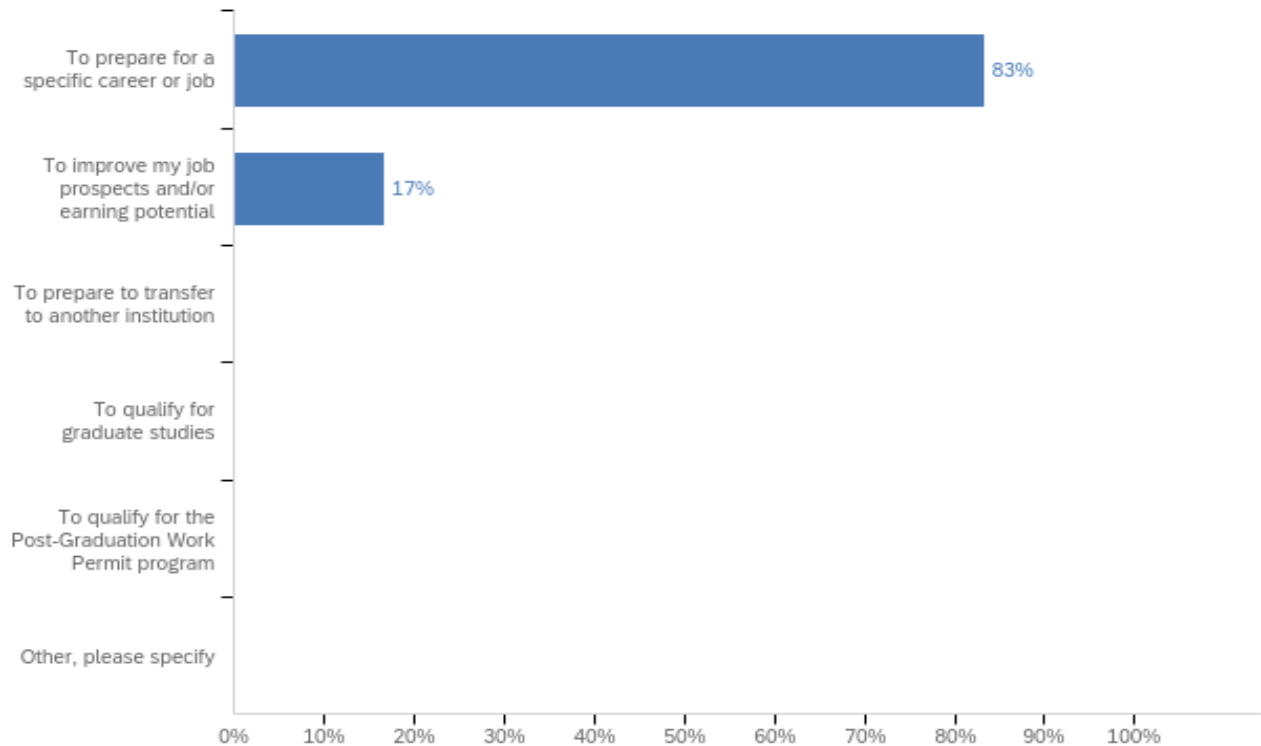
Your Program

1 - How many credits have you completed in Brewing and Brewery Operations program?

| # | How many credits have you completed in Brewing and Brewery Operations program? | Percentage |
|---|--|------------|
| 1 | Less than 15 credits | 0% |
| 2 | Between 15 and 30 credits | 33% |
| 3 | More than 30 credits | 67% |
| | Total | 12 |

Reasons for Taking the Program

2 - What was your main reason for enrolling in the Brewing and Brewery Operations program?

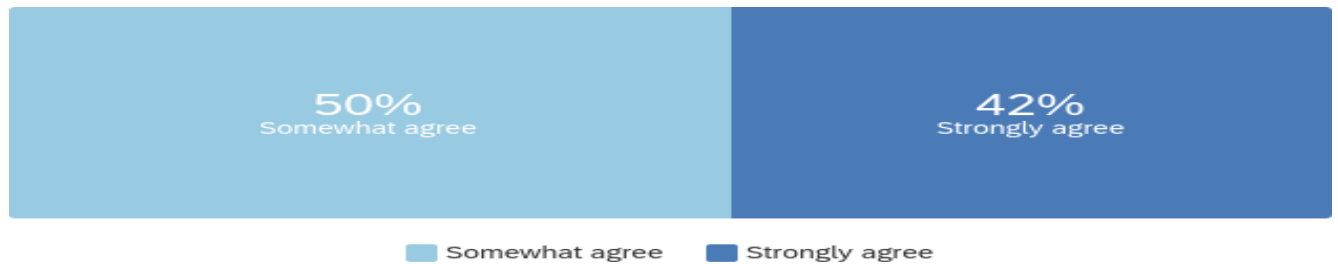


| # | What was your main reason for enrolling in the Brewing and Brewery Operations program? - Selected Choice | Percentage |
|---|--|------------|
| 1 | To prepare for a specific career or job | 83% |
| 2 | To improve my job prospects and/or earning potential | 17% |
| 3 | To prepare to transfer to another institution | 0% |
| 4 | To qualify for graduate studies | 0% |
| 5 | To qualify for the Post-Graduation Work Permit program | 0% |
| 6 | Other, please specify | 0% |
| | Total | 12 |

Program Relevance

Are the program learning outcomes relevant to the current needs of the discipline/sector?

3 - Thinking of KPU's Brewing and Brewery Operations program as a whole, to what extent do you agree that the program's curriculum is relevant to your career goals?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Thinking of KPU's Brewing and Brewery Operations program as a whole, to what extent do you agree that the program's curriculum is relevant to your career goals? | Percentage |
|---|--|------------|
| 1 | Strongly disagree | 0% |
| 2 | Somewhat disagree | 8% |
| 3 | Neither agree nor disagree | 0% |
| 4 | Somewhat agree | 50% |
| 5 | Strongly agree | 42% |
| | Total | 12 |

4 - Overall, how satisfied are you with the curriculum of KPU's Brewing and Brewery Operations program?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Overall, how satisfied are you with the curriculum of KPU's Brewing and Brewery Operations program? | Percentage |
|---|---|------------|
| 1 | Very dissatisfied | 0% |
| 2 | Somewhat dissatisfied | 8% |
| 3 | Neither satisfied nor dissatisfied | 0% |
| 4 | Somewhat satisfied | 58% |
| 5 | Very satisfied | 33% |

5 - Thinking of KPU's Brewing and Brewery Operations program's curriculum as a whole, please indicate the strengths of the program.

Great instructors, teaching facility (Brewery, labs, etc.)

Excellent teaching of industry relevant skills and knowledge

Provides good knowledge and allows for great industry connections.

The instructors have lots of experience and are very prepared to teach the classes, the program is very focused, hands on and practical, everything that we saw in class we can practice it at the brewery

The BBO Program blends both hands-on experience in the Brewery Instruction Lab with broad, science-based knowledge in the courses offered by the program. This gives students the best possible all-around experience in brewing beer, and offers plenty of background knowledge for students who may want to specialize further into more niche areas of the brewing industry, such as malting, or hop cultivation.

Very good, knowledgeable professors who are passionate about beer. Small intimate class sizes.

Understanding the science and techniques, along with safety. Job placement helps a lot!

The brew lab is a very good place to learn. The chemistry aspect was very well thought out too.

QA/QC, and Micro.

6 - Thinking of KPU's Brewing and Brewery Operations program's curriculum as a whole, please provide suggestions you have for improvement.

Increase the practical component (more brew days, field trips etc.)

Applying knowledge from recipe and development course

Provide more of an overview on different beer styles earlier in the program. Many students do not know all of the styles.

More field trips to breweries, malting plants, yeast labs, etc. Include as part of the curriculum making wine, spirits and other fermenting beverages, not as in depth as beer, but some general instruction.

In regards to the curriculum as a whole, I think one of the courses that could be re-evaluated is the CBSY requirement for the first year students. For those whose aspirations are to start their own brewery or business, or for those who haven't had the privilege to learn and use Microsoft Office or Excel, I can see that it has value, but I also feel that it's time and money I've wasted when I could be learning more about Beer Sensory training or Judging, for example.

Key topics that would help us as brewers are not discussed in detail, very little experience is given in the brewery. It has not prepared me for the industry as well as I would have hoped.

Some of the equipment training isn't really retentive in commercial setting. More hands on training and less theory.

There should be much more hands-on brewing in the program. The **[Course Name Redacted]** could have been paired down significantly and rolled into a more comprehensive hands-on brewing course. There was quite a bit of focus on 'big macro' brewing, labs, sensory, etc. I think the reality is that while there are some people moving on to these types of places the majority will work at the hundreds of smaller craft programs around and there should have been more focus on the type of work that needs to be done at these types of companies.

More time brewing on the NSI, more QA/QC work in regards to micro

7 - What topics, if any, are missing from the program?

Since RTDs are taking over market share, is it worthwhile discussing this category as well? Many are worries about the future of craft beer (which may decrease enrollment)

Wine, spirits, distillation, kombucha, socas and other fermented beverages

As I'm only in my first year, I don't have much feedback regarding this question because I don't quite know what the second year of the program entails. In regards to just the first two semesters of the program, I feel that the program isn't missing

anything – the knowledge base that's explored in the first two semesters is robust and broad enough to cover most background knowledge needed.

Beer style analysis in greater detail, more info on ingredients and recipe formation, especially in terms of flavours.

More hands on with beer styles, different ingredient and what makes a certain beer style, tasting or annualizing. A Work program would be awesome

Most topics seem to have been covered to some degree, however there should be more focus on the actual physical aspects of brewing.

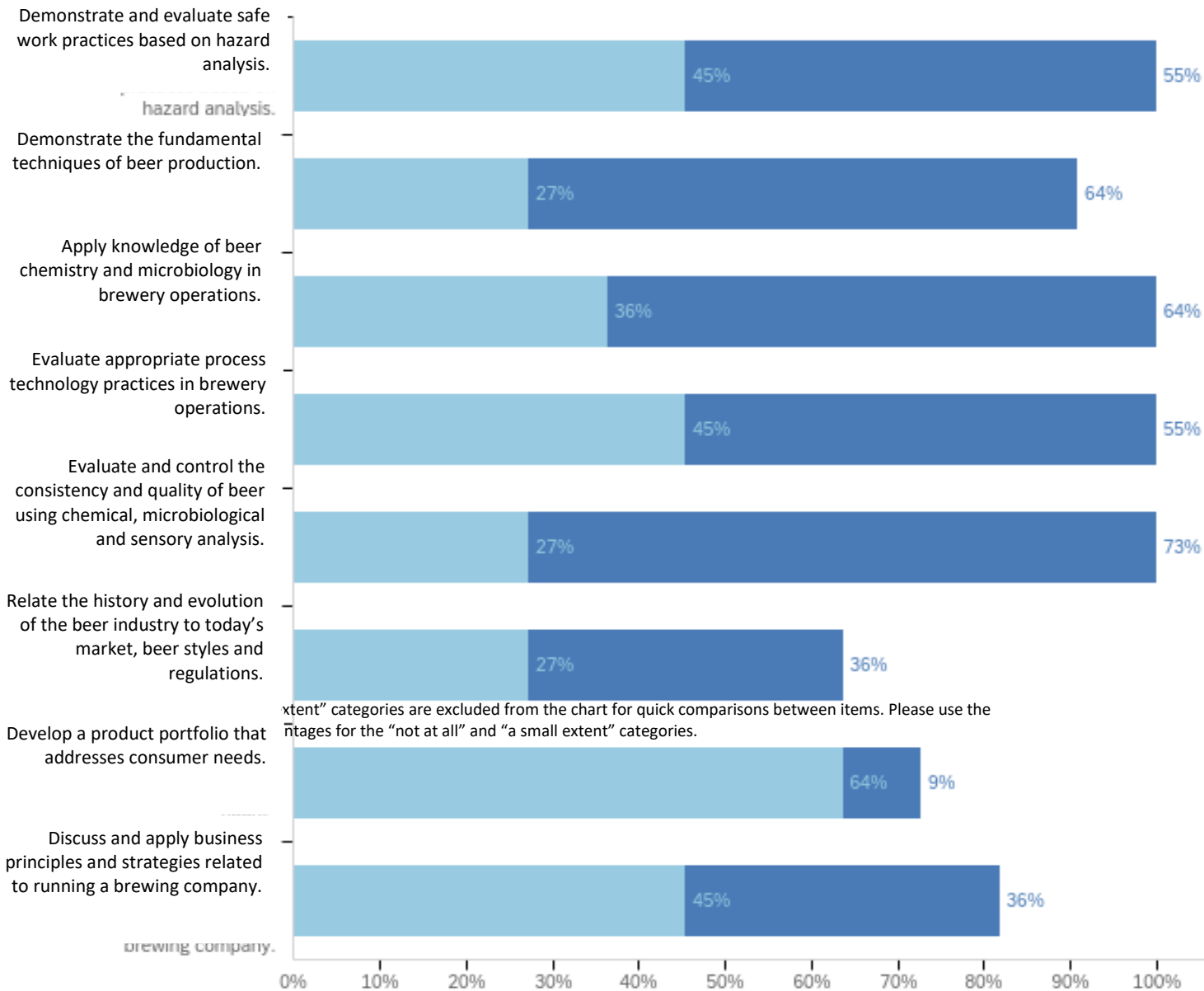
beer judging

QUESTIONS ON CHAPTER 4: EFFECTIVENESS OF INSTRUCTIONAL DELIVERY

Instructional Design and Delivery

Are appropriate opportunities provided to help students acquire the PLOs?

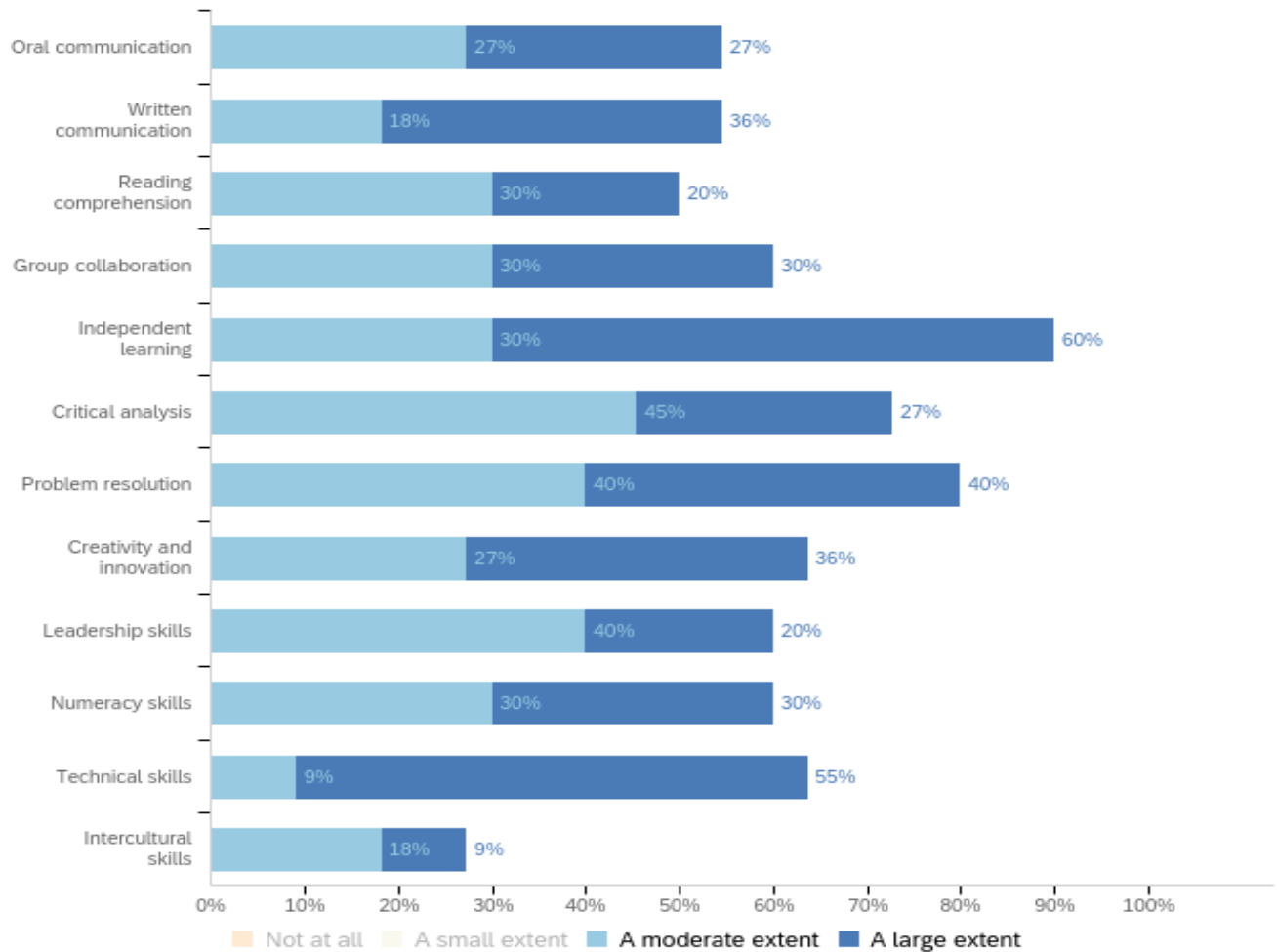
8 - Program Learning Outcomes are statements that describe the knowledge and skills students will have upon completion of a program. To what extent are the courses you are taking for KPU's Brewing and Brewery Operations program helping you develop each of the following learning outcomes?



| # | Question | Not at all | A small extent | A moderate extent | A large extent | Total |
|---|--|------------|----------------|-------------------|----------------|-------|
| 1 | Demonstrate and evaluate safe work practices based on hazard analysis. | 0% | 0% | 45% | 55% | 11 |
| 2 | Demonstrate the fundamental techniques of beer production. | 0% | 9% | 27% | 64% | 11 |
| 3 | Apply knowledge of beer chemistry and microbiology in brewery operations. | 0% | 0% | 36% | 64% | 11 |
| 4 | Evaluate appropriate process technology practices in brewery operations. | 0% | 0% | 45% | 55% | 11 |
| 5 | Evaluate and control the consistency and quality of beer using chemical, microbiological and sensory analysis. | 0% | 0% | 27% | 73% | 11 |
| 6 | Relate the history and evolution of the beer industry to today's market, beer styles and regulations. | 9% | 27% | 27% | 36% | 11 |
| 7 | Develop a product portfolio that addresses consumer needs. | 9% | 18% | 64% | 9% | 11 |
| 8 | Discuss and apply business principles and strategies related to running a brewing company. | 0% | 18% | 45% | 36% | 11 |

Are appropriate opportunities provided to help students acquire the essential skills?

9 - To what extent are the courses you are taking for KPU's Brewing and Brewery Operations program helping you develop each of the following essential skills?



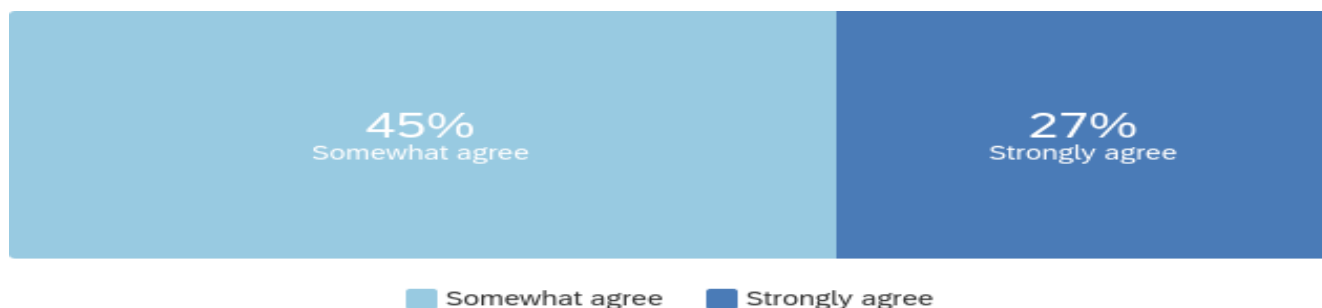
Note that “not at all” and “a small extent” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all” and “a small extent” categories.

| # | Question | Not at all | A small extent | A moderate extent | A large extent | Total |
|---|---------------------------|------------|----------------|-------------------|----------------|-------|
| 1 | Oral communication | 9% | 36% | 27% | 27% | 11 |
| 2 | Written communication | 9% | 36% | 18% | 36% | 11 |
| 3 | Reading comprehension | 20% | 30% | 30% | 20% | 10 |
| 4 | Group collaboration | 10% | 30% | 30% | 30% | 10 |
| 5 | Independent learning | 10% | 0% | 30% | 60% | 10 |
| 6 | Critical analysis | 9% | 18% | 45% | 27% | 11 |
| 7 | Problem resolution | 10% | 10% | 40% | 40% | 10 |
| 8 | Creativity and innovation | 9% | 27% | 27% | 36% | 11 |

| | | | | | | |
|----|----------------------|-----|-----|-----|-----|----|
| 9 | Leadership skills | 20% | 20% | 40% | 20% | 10 |
| 10 | Numeracy skills | 10% | 30% | 30% | 30% | 10 |
| 11 | Technical skills | 0% | 36% | 9% | 55% | 11 |
| 12 | Intercultural skills | 27% | 45% | 18% | 9% | 11 |

Are appropriate work-integrated and/or community-engaged learning opportunities provided to help students acquire the learning outcomes?

10 - To what extent do you agree that you have sufficient opportunities in the program to reinforce your learning through practical application of this learning?



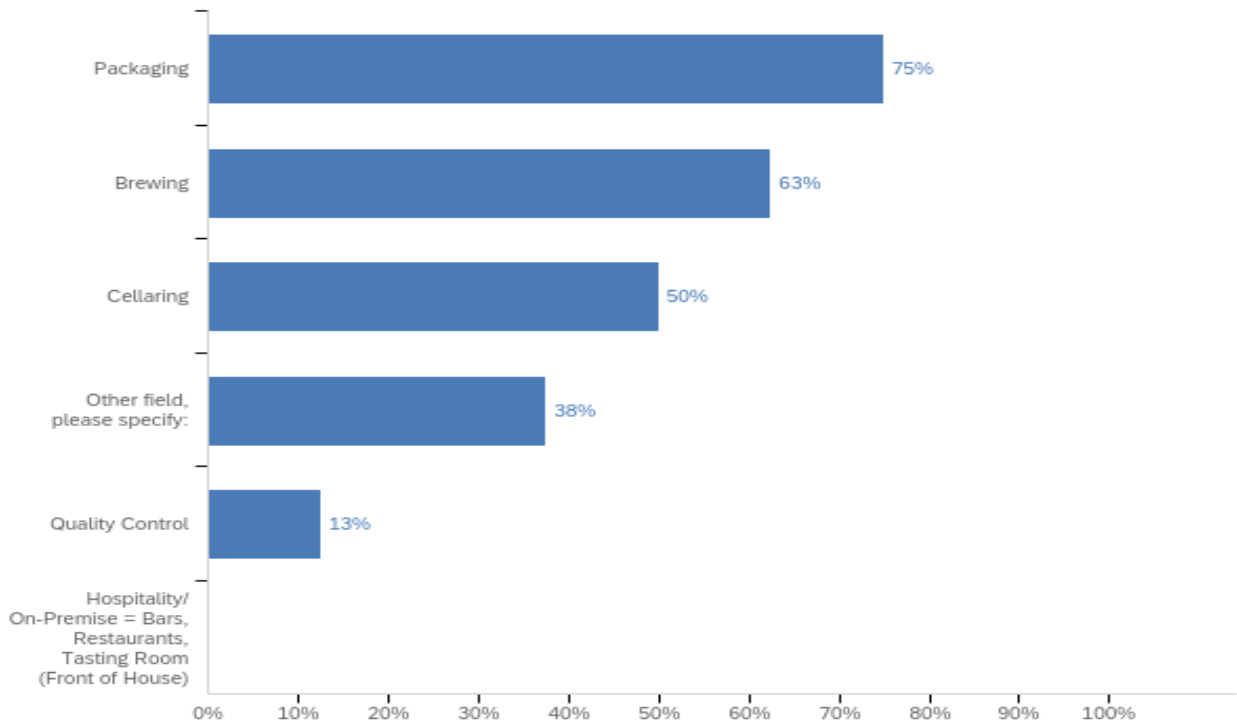
Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | To what extent do you agree that you have sufficient opportunities in the program to reinforce your learning through practical application of this learning? | Percentage |
|---|--|------------|
| 1 | Strongly disagree | 0% |
| 2 | Somewhat disagree | 18% |
| 3 | Neither agree nor disagree | 9% |
| 4 | Somewhat agree | 45% |
| 5 | Strongly agree | 27% |
| | Total | 11 |

11 - Have you worked during your studies in the program?

| # | Have you worked during your studies in the program? | Percentage |
|---|---|------------|
| 1 | Yes | 82% |
| 2 | No | 18% |
| | Total | 11 |

**12 - In which of the following fields have you worked during the program?
Select all that apply.**



| # | Answer | Percentage | Count |
|---|--|------------|-------|
| 1 | Brewing | 63% | 5 |
| 2 | Cellaring | 50% | 4 |
| 3 | Packaging | 75% | 6 |
| 4 | Quality Control | 13% | 1 |
| 5 | Hospitality/ On-Premise = Bars, Restaurants, Tasting Room (Front of House) | 0% | 0 |
| 6 | Other field, please specify: | 38% | 3 |
| | Total | 19 | 8 |

Note: The last row presents the total number of respondents. The total number of responses for this question is greater than the number of respondents. Therefore, the percentage total exceeds 100%.

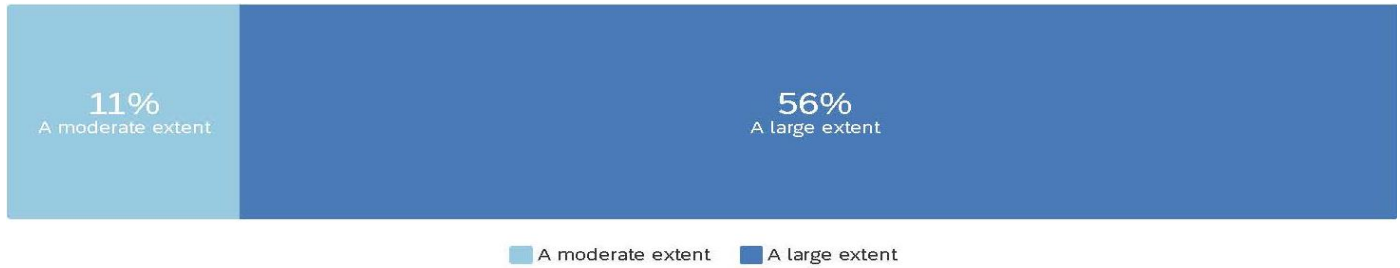
12_6_TEXT - Other field, please specify:

Assistant Laboratory

Video Game Design QA

Distribution (Non brewery related)

13 - Indicate the extent your work experience contributed to your learning in the program.

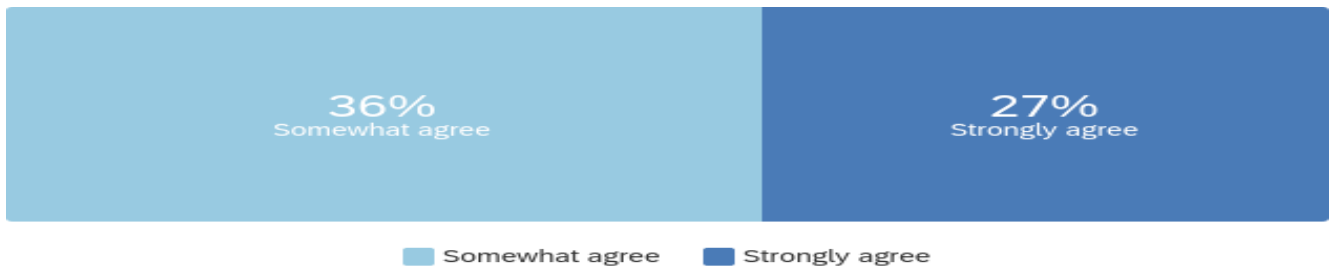


Note that "not at all" and "a small extent" categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the "not at all" and "a small extent" categories.

| # | Indicate the extent your work experience contributed to your learning in the program. | Percentage |
|---|---|------------|
| 1 | Not at all | 22% |
| 2 | A small extent | 11% |
| 3 | A moderate extent | 11% |
| 4 | A large extent | 56% |
| | Total | 9 |

Does the program design ensure students are prepared for subsequent courses? / Are students making satisfactory progress in the program?

14 - Thinking of KPU's Brewing and Brewery Operations program as a whole, to what extent do you agree that the prerequisites offered prepare you for more advanced courses?

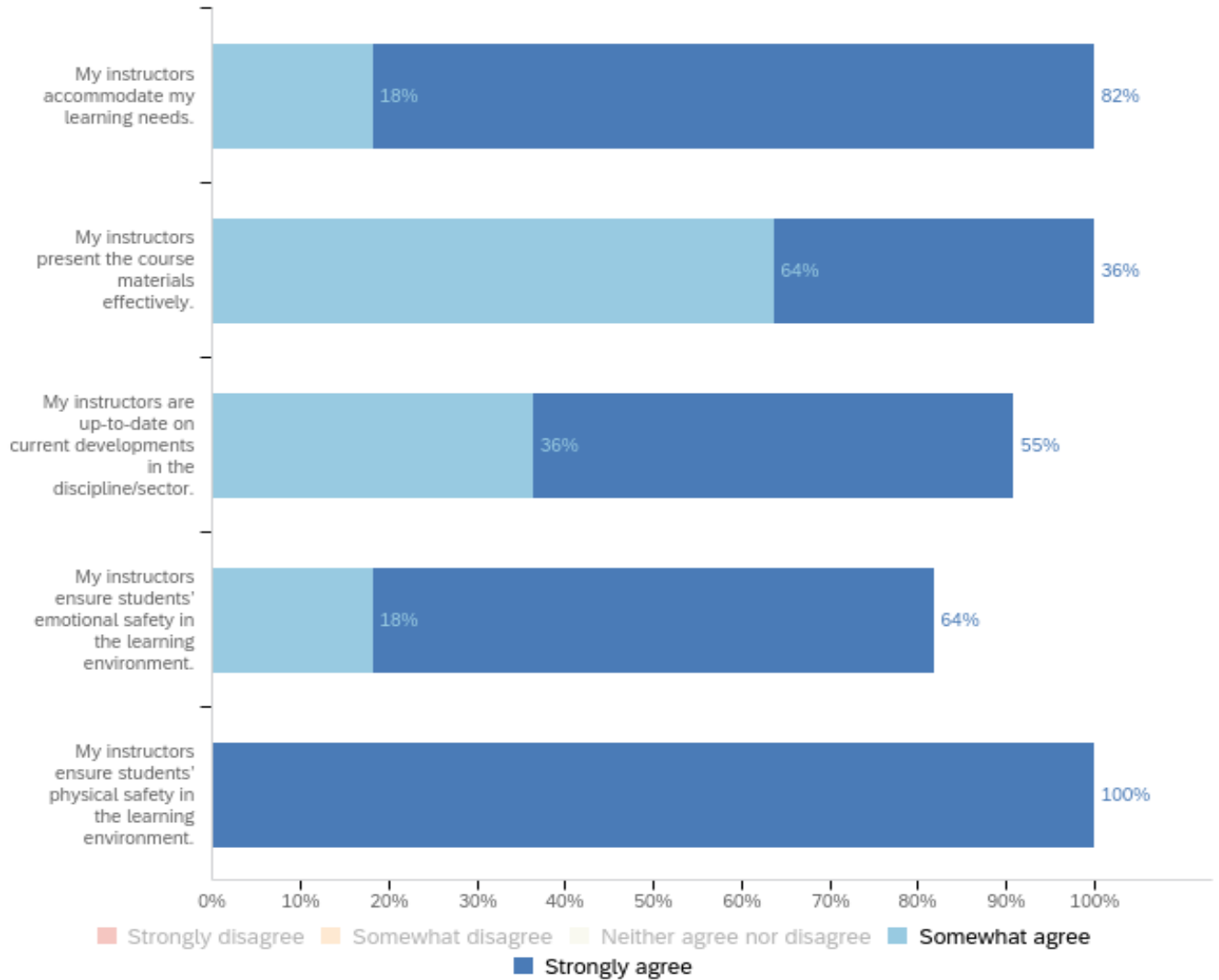


Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Thinking of KPU's Brewing and Brewery Operations program as a whole, to what extent do you agree that the prerequisites offered prepare you for more advanced courses? | Percentage |
|---|--|------------|
| 1 | Strongly disagree | 9% |
| 2 | Somewhat disagree | 0% |
| 3 | Neither agree nor disagree | 27% |
| 4 | Somewhat agree | 36% |
| 5 | Strongly agree | 27% |
| | Total | 11 |

Does the instruction meet the needs of diverse learners?

15 - Thinking of how the program is delivered, please indicate your agreement with the following.



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Question | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree | Total |
|---|---|-------------------|-------------------|----------------------------|----------------|----------------|-------|
| 1 | My instructors accommodate my learning needs. | 0% | 0% | 0% | 18% | 82% | 11 |
| 2 | My instructors present the course materials effectively. | 0% | 0% | 0% | 64% | 36% | 11 |
| 3 | My instructors are up-to-date on current developments in the discipline/sector. | 0% | 0% | 9% | 36% | 55% | 11 |

| | | | | | | | |
|---|---|----|----|-----|-----|------|----|
| 4 | My instructors ensure students' emotional safety in the learning environment. | 0% | 0% | 18% | 18% | 64% | 11 |
| 5 | My instructors ensure students' physical safety in the learning environment. | 0% | 0% | 0% | 0% | 100% | 11 |

16 - Overall, how satisfied are you with the instruction you have received in KPU's Brewing and Brewery Operations program?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Overall, how satisfied are you with the instruction you have received in KPU's Brewing and Brewery Operations program? | Percentage |
|---|--|------------|
| 1 | Very dissatisfied | 0% |
| 2 | Somewhat dissatisfied | 9% |
| 3 | Neither satisfied nor dissatisfied | 0% |
| 4 | Somewhat satisfied | 64% |
| 5 | Very satisfied | 27% |
| | Total | 11 |

17 - Thinking of how instruction is delivered across the program as a whole, please indicate the strengths of the program instruction.

Many of the hands-on/lab sessions are reinforced by instruction during lectures

great hands on learning and experience.

The practical component is essential for the program.

The BBO Program thrives thanks to its passionate and knowledgeable instructors. For the most part, they are always willing to sit down and chat with us if we have any questions, not just about the courses we're taking with them, but also about beer, brewing, and breweries in general.

Not every instructor is as good as others, but overall the instruction was good. We were going through covid so there could be improvements but under the circumstances it was good enough.

engaging us in relatable ways, pushing us to understand more in subjects

The hands on part was excellent, lots of 1 on 1 help if needed.

Technical knowledge

18 - Thinking of how instruction is delivered across the program as a whole, please provide suggestions you have for improvement in program instruction.

Reinforce when due dates are, expectations for assignments, and ensure all students are clear on their responsibilities over the program

Have more brew days and or cellaring duties that help us develop new skills, one or two in a semester is not enough

More hands on instruction in the brewery

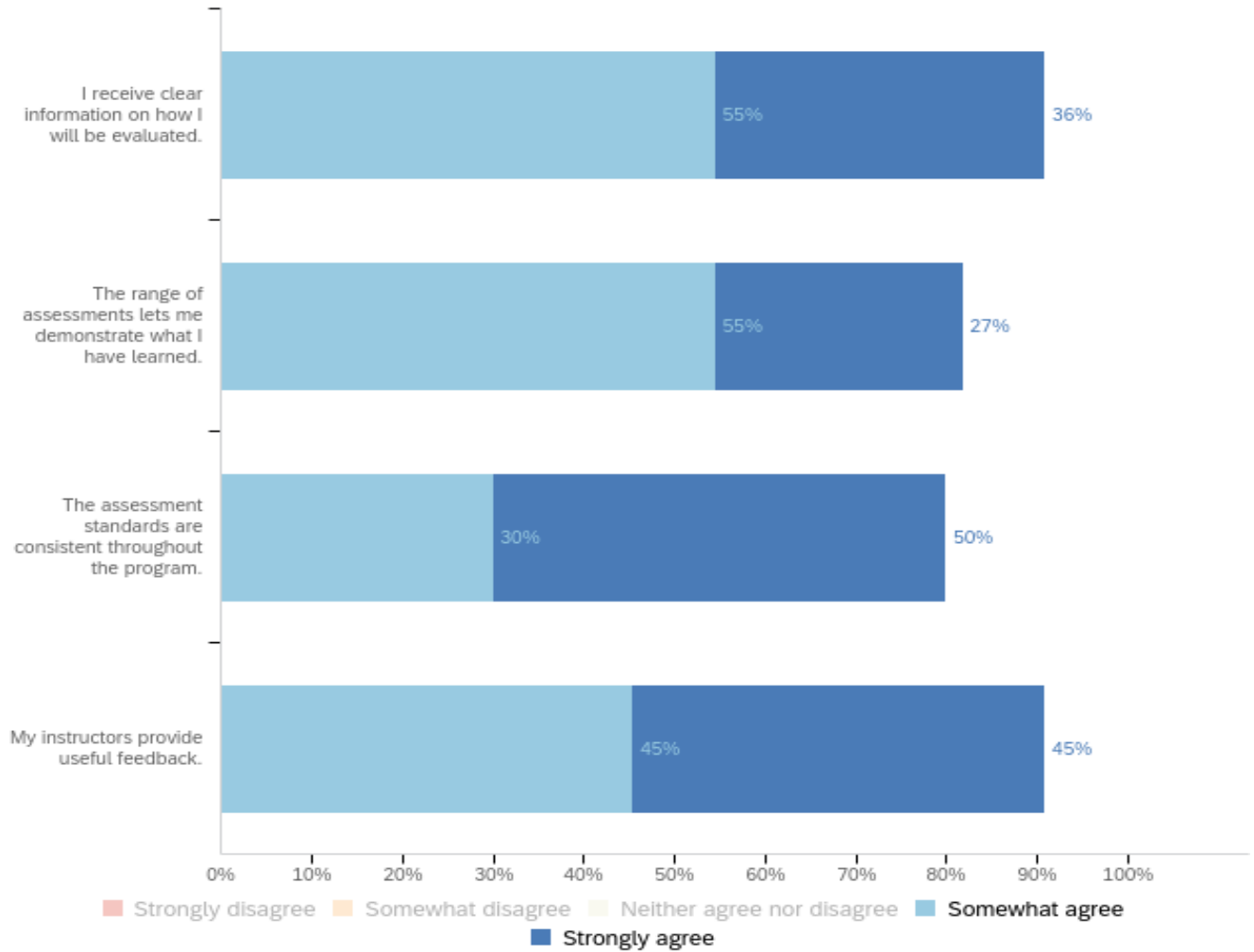
Less group projects, Shorter classes and more practice on theory or relevant operation problems.

The 'asynchronous' delivery of some courses was fairly difficult at times to learn.

More marked work, even if it's small, so we can reinforce training.

Do the assessment methods allow students to demonstrate the extent to which they have achieved the learning outcomes?

19 - Thinking of how learning is assessed in the program as a whole, indicate your agreement with the following.



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

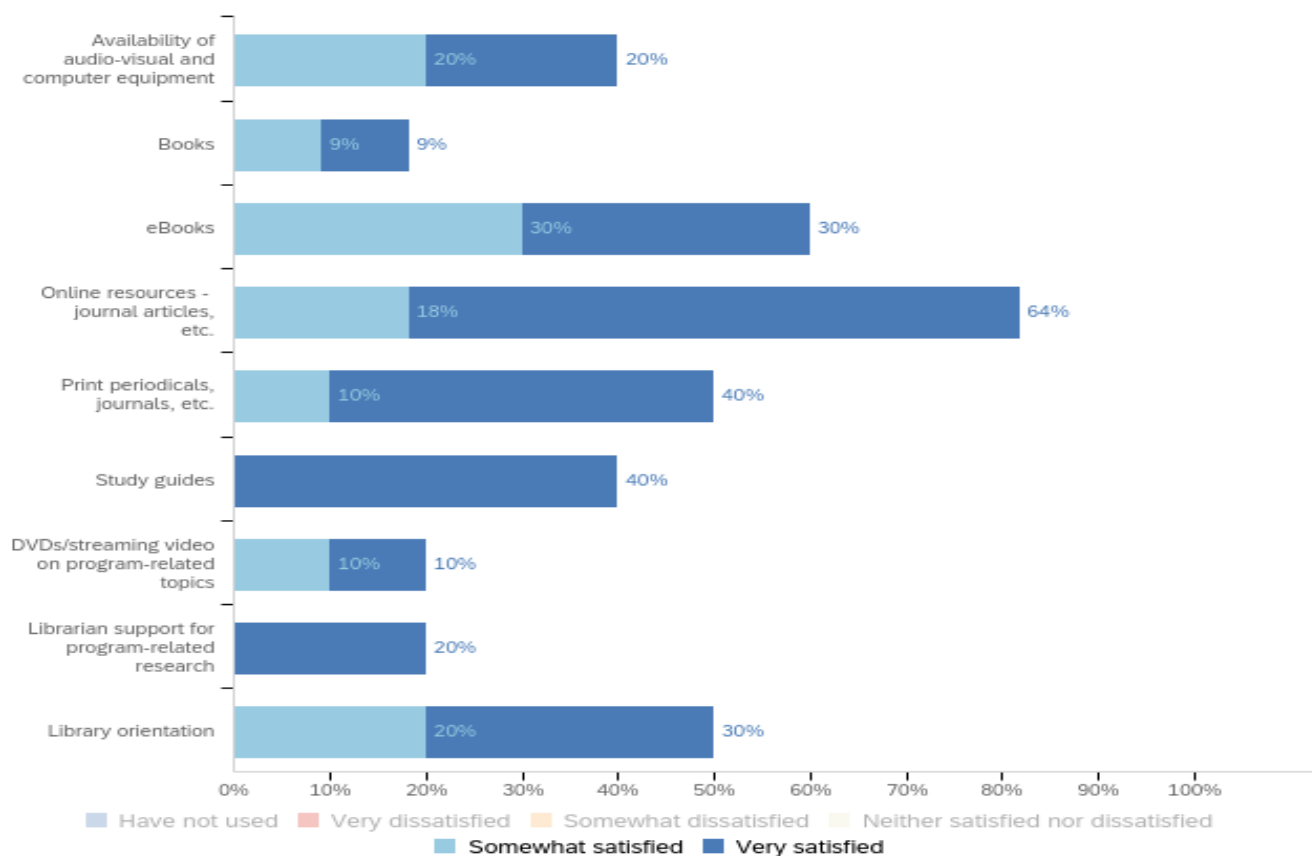
| # | Question | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree | Total |
|---|---|-------------------|-------------------|----------------------------|----------------|----------------|-------|
| 1 | I receive clear information on how I will be evaluated. | 0% | 0% | 9% | 55% | 36% | 11 |
| 2 | The range of assessments lets me demonstrate what I have learned. | 0% | 0% | 18% | 55% | 27% | 11 |
| 3 | The assessment standards are consistent throughout the program. | 0% | 20% | 0% | 30% | 50% | 10 |
| 4 | My instructors provide useful feedback. | 0% | 9% | 0% | 45% | 45% | 11 |

QUESTIONS ON CHAPTER 5: RESOURCES, SERVICES AND FACILITIES

Program Resources, Services and Facilities

Does the program have the library and learning resources needed to deliver the curriculum?

20 - How satisfied are you with the following library resources as they apply to KPU's Brewing and Brewery Operations program?

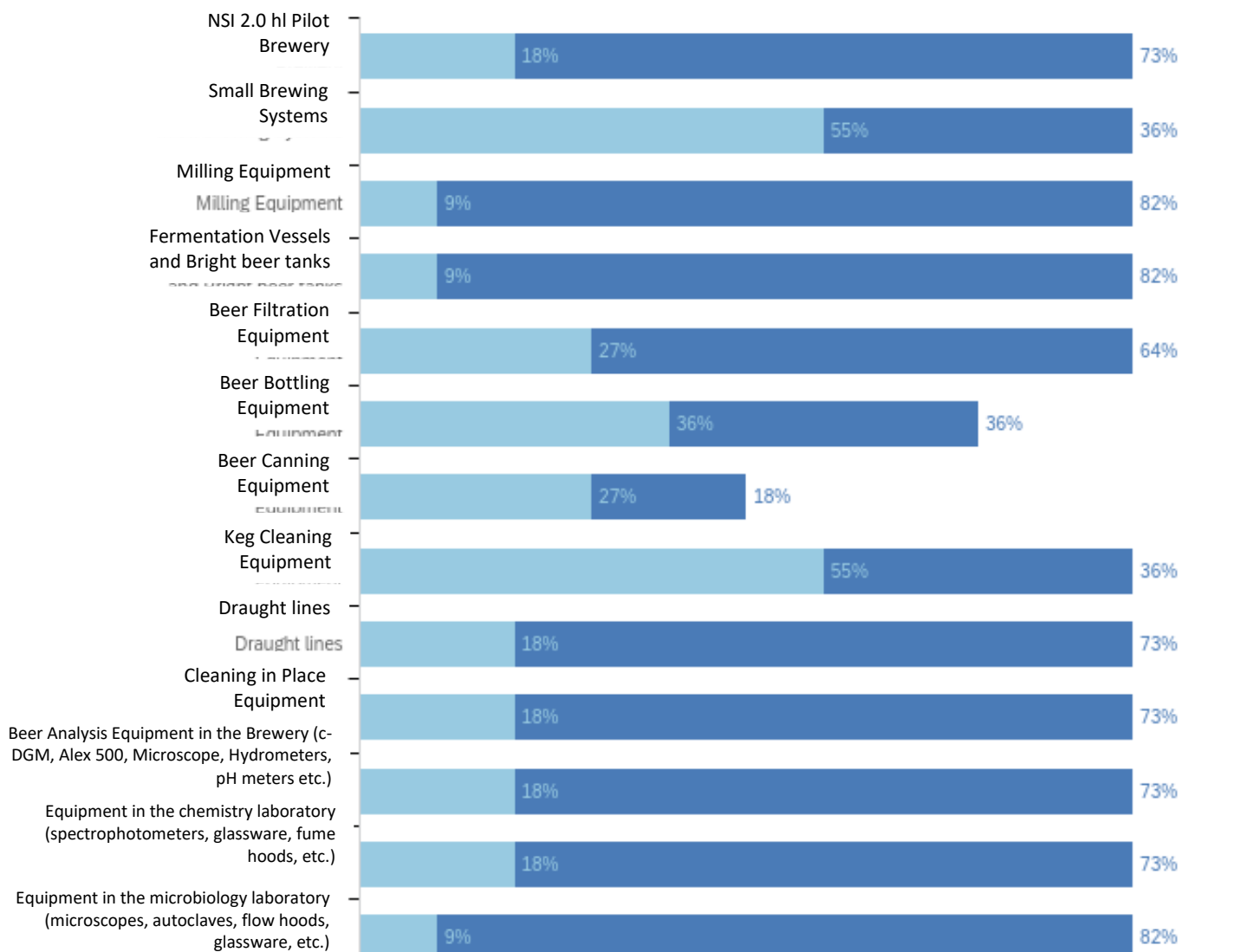


Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Question | Have not used | Very dissatisfied | Somewhat dissatisfied | Neither satisfied nor dissatisfied | Somewhat satisfied | Very satisfied | Total |
|---|---|---------------|-------------------|-----------------------|------------------------------------|--------------------|----------------|-------|
| 1 | Availability of audio-visual and computer equipment | 40% | 0% | 0% | 20% | 20% | 20% | 10 |
| 2 | Books | 45% | 0% | 9% | 27% | 9% | 9% | 11 |
| 3 | eBooks | 20% | 0% | 10% | 10% | 30% | 30% | 10 |
| 4 | Online resources - journal articles, etc. | 0% | 0% | 9% | 9% | 18% | 64% | 11 |
| 5 | Print periodicals, journals, etc. | 30% | 0% | 0% | 20% | 10% | 40% | 10 |
| 6 | Study guides | 20% | 0% | 30% | 10% | 0% | 40% | 10 |
| 7 | DVDs/streaming video on program-related topics | 40% | 0% | 0% | 40% | 10% | 10% | 10 |
| 8 | Librarian support for program-related research | 50% | 0% | 10% | 20% | 0% | 20% | 10 |
| 9 | Library orientation | 20% | 0% | 10% | 20% | 20% | 30% | 10 |

Does the program have the specialized technology needed to deliver the curriculum?

21 - How satisfied are you with the following specialized technology as they apply to KPU's Brewing and Brewery Operations program?

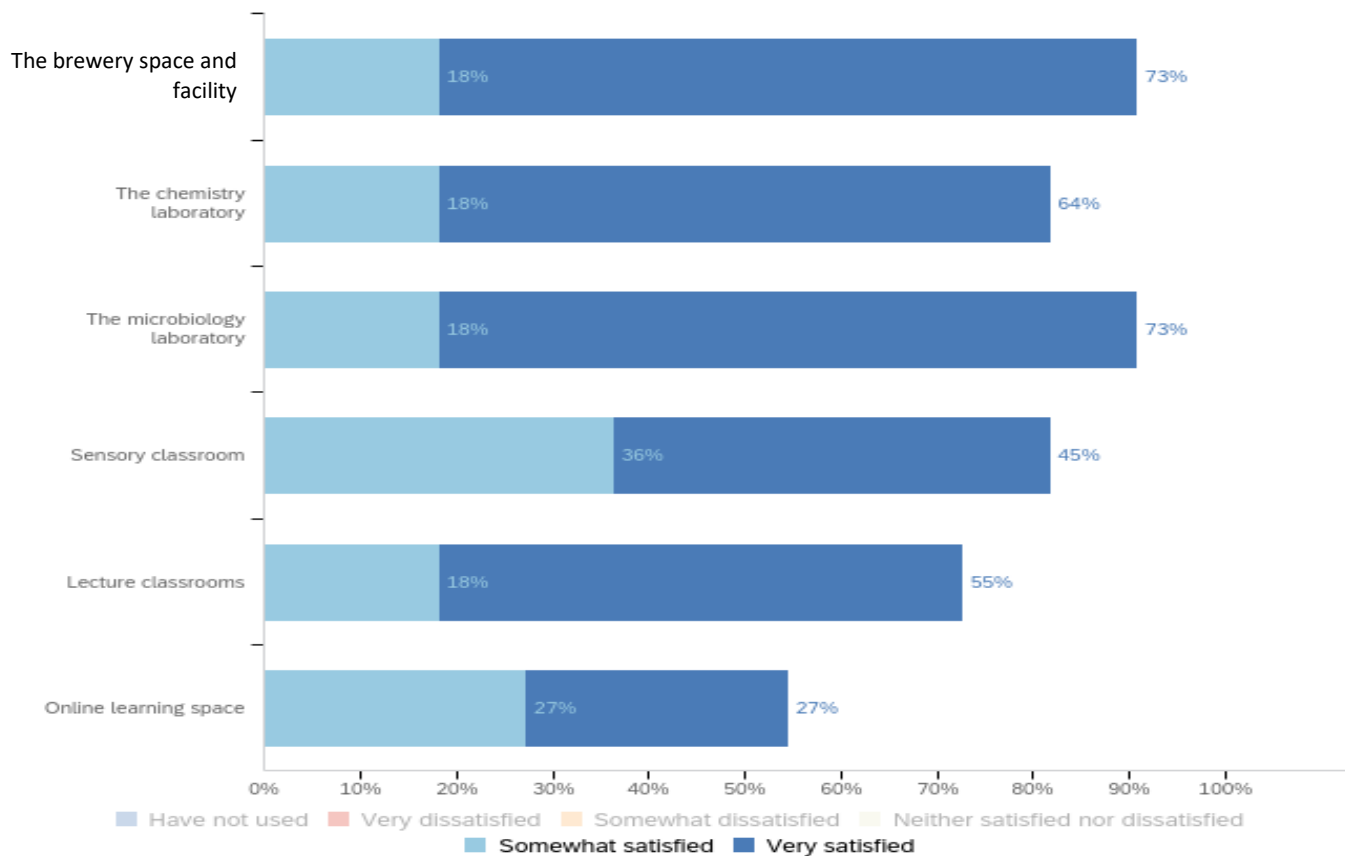


Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Question | Have not used | Very dissatisfied | Somewhat dissatisfied | Neither satisfied nor dissatisfied | Somewhat satisfied | Very satisfied | Total |
|----|---|---------------|-------------------|-----------------------|------------------------------------|--------------------|----------------|-------|
| 1 | NSI 2.0 hl Pilot Brewery | 0% | 9% | 0% | 0% | 18% | 73% | 11 |
| 2 | Small Brewing Systems | 0% | 9% | 0% | 0% | 55% | 36% | 11 |
| 3 | Milling Equipment | 0% | 0% | 9% | 0% | 9% | 82% | 11 |
| 4 | Fermentation Vessels and Bright beer tanks | 0% | 0% | 0% | 9% | 9% | 82% | 11 |
| 5 | Beer Filtration Equipment | 0% | 0% | 9% | 0% | 27% | 64% | 11 |
| 6 | Beer Bottling Equipment | 0% | 0% | 9% | 18% | 36% | 36% | 11 |
| 7 | Beer Canning Equipment | 9% | 0% | 18% | 27% | 27% | 18% | 11 |
| 8 | Keg Cleaning Equipment | 0% | 0% | 9% | 0% | 55% | 36% | 11 |
| 9 | Draught lines | 0% | 0% | 9% | 0% | 18% | 73% | 11 |
| 10 | Cleaning in Place Equipment | 0% | 0% | 0% | 9% | 18% | 73% | 11 |
| 11 | Beer Analysis Equipment in the Brewery (c-DGM, Alex 500, Microscope, Hydrometers, pH meters etc.) | 9% | 0% | 0% | 0% | 18% | 73% | 11 |
| 12 | Equipment in the chemistry laboratory (spectrophotometers, glassware, fume hoods, etc.) | 0% | 9% | 0% | 0% | 18% | 73% | 11 |
| 13 | Equipment in the microbiology laboratory (microscopes, autoclaves, flow hoods, glassware, etc.) | 0% | 9% | 0% | 0% | 9% | 82% | 11 |

Does the program have the facilities needed to deliver the curriculum?

22 - How satisfied are you with the following facilities as they apply to KPU's Brewing and Brewery Operations program?

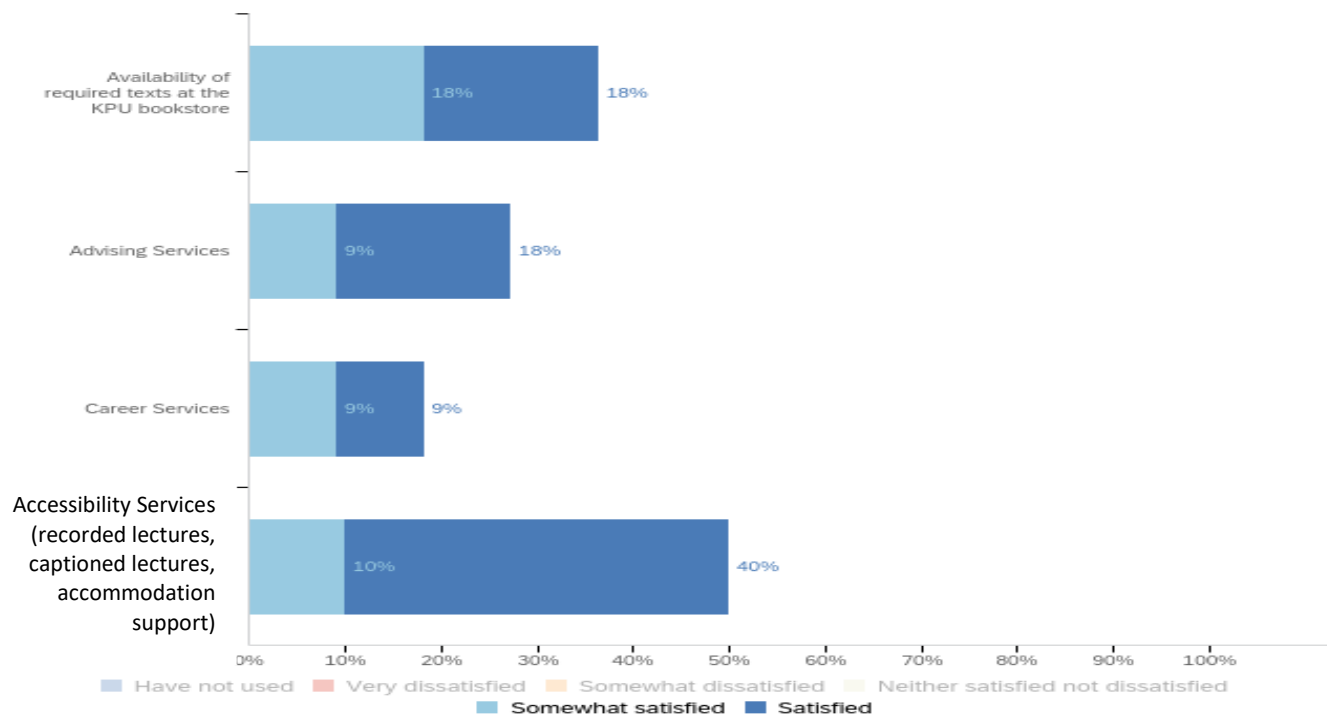


Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Question | Have not used | Very dissatisfied | Somewhat dissatisfied | Neither satisfied nor dissatisfied | Somewhat satisfied | Very satisfied | Total |
|---|--------------------------------|---------------|-------------------|-----------------------|------------------------------------|--------------------|----------------|-------|
| 1 | The brewery space and facility | 0% | 9% | 0% | 0% | 18% | 73% | 11 |
| 2 | The chemistry laboratory | 9% | 0% | 9% | 0% | 18% | 64% | 11 |
| 3 | The microbiology laboratory | 0% | 0% | 9% | 0% | 18% | 73% | 11 |
| 4 | Sensory classroom | 0% | 0% | 0% | 18% | 36% | 45% | 11 |
| 5 | Lecture classrooms | 9% | 0% | 0% | 18% | 18% | 55% | 11 |
| 6 | Online learning space | 9% | 9% | 9% | 18% | 27% | 27% | 11 |

Does the program have the support services needed to deliver the curriculum?

23 - How satisfied are you with the following as they apply to KPU's Brewing and Brewery Operations program?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Question | Have not used | Very dissatisfied | Somewhat dissatisfied | Neither satisfied not dissatisfied | Somewhat satisfied | Satisfied | Total |
|---|---|---------------|-------------------|-----------------------|------------------------------------|--------------------|-----------|-------|
| 1 | Availability of required texts at the KPU bookstore | 36% | 0% | 27% | 0% | 18% | 18% | 11 |
| 2 | Advising Services | 55% | 0% | 0% | 18% | 9% | 18% | 11 |
| 3 | Career Services | 55% | 0% | 0% | 27% | 9% | 9% | 11 |
| 4 | Accessibility Services (recorded lectures, captioned lectures, accommodation support) | 20% | 0% | 0% | 30% | 10% | 40% | 10 |

Appendix J Diploma in Brewing and Brewery Operations - Faculty Survey Report

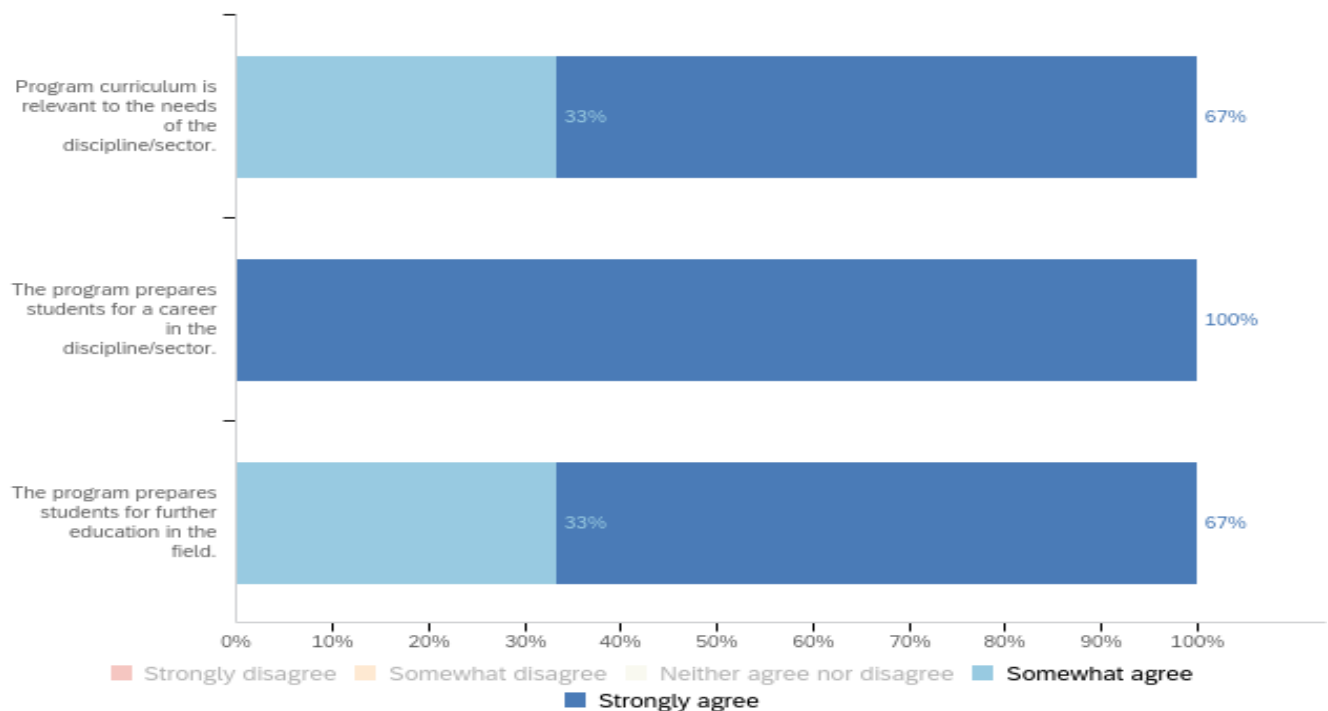
The faculty survey was sent to 9 Diploma in Brewing and Brewery Operations faculty. A total of 6 faculty members responded. The response rate is 67%.

Note: The data includes open-ended comments. In order to preserve integrity and objectivity, OPA does not do value-judgment editing (i.e. we do not fix spelling errors, syntax issues, punctuation, etc.). Comments are included verbatim – with one exception: if individuals or courses are named, OPA redacts the name of the instructor or course. This rule applies to whether the comment is good, bad or indifferent.

Program Relevance

Are the program learning outcomes relevant to the current needs of the discipline/sector?

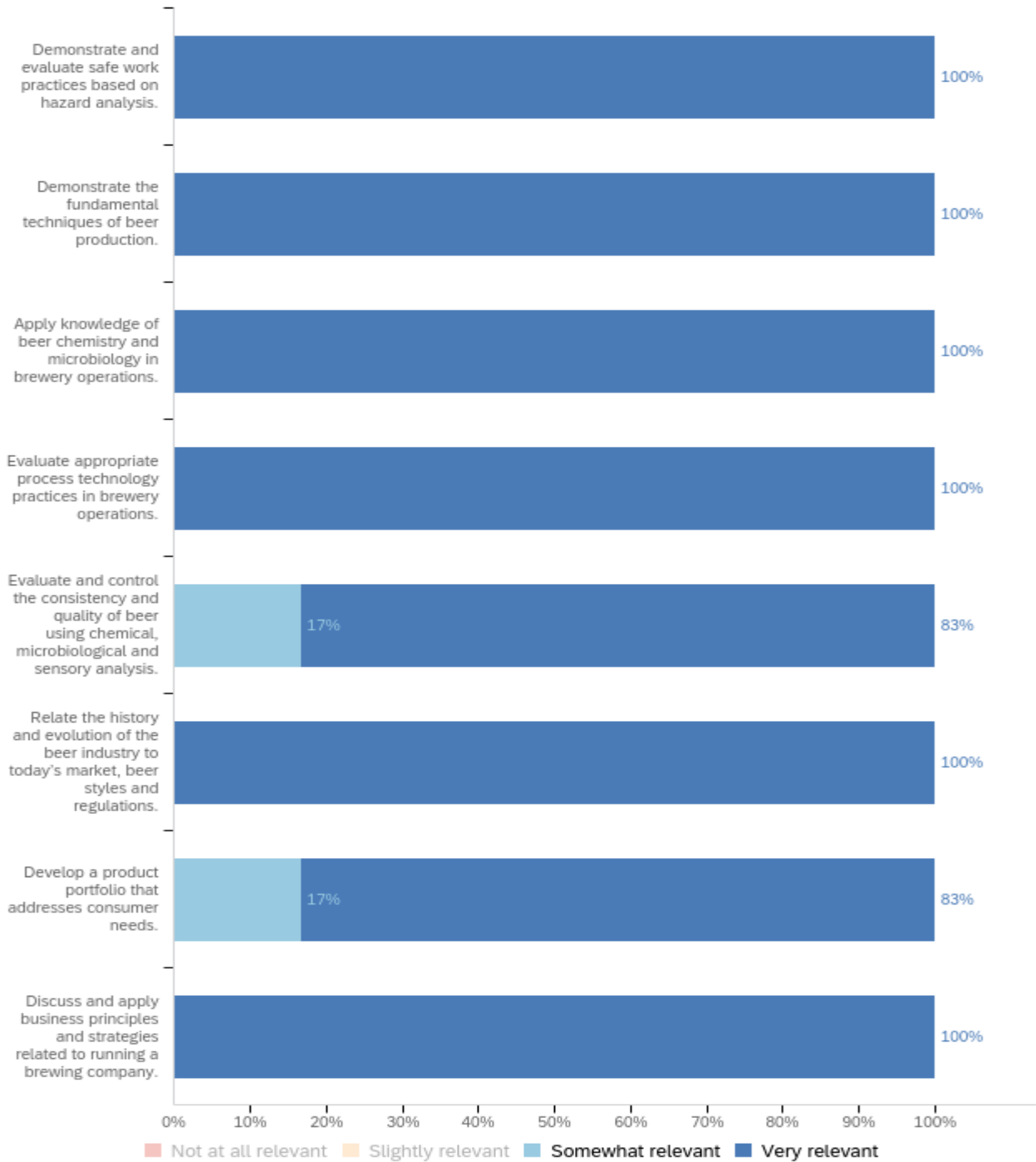
1 - Thinking of KPU's Brewing and Brewery Operations program as a whole, indicate the extent you agree with the following.



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories to enable quick comparisons between items. For items with low positive percentages, use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Question | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree | Total |
|---|---|-------------------|-------------------|----------------------------|----------------|----------------|-------|
| 1 | Program curriculum is relevant to the needs of the discipline/sector. | 0% | 0% | 0% | 33% | 67% | 6 |
| 2 | The program prepares students for a career in the discipline/sector. | 0% | 0% | 0% | 0% | 100% | 6 |
| 3 | The program prepares students for further education in the field. | 0% | 0% | 0% | 33% | 67% | 6 |

2 - Please indicate how relevant each of the following Program Learning Outcomes is to the current needs of the discipline/sector.



Note that “not at all relevant” and “slightly relevant” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all relevant” and “slightly relevant” categories.

| # | Question | Not at all relevant | Slightly relevant | Somewhat relevant | Very relevant | Total |
|---|--|---------------------|-------------------|-------------------|---------------|-------|
| 1 | Demonstrate and evaluate safe work practices based on hazard analysis. | 0% | 0% | 0% | 100% | 6 |
| 2 | Demonstrate the fundamental techniques of beer production. | 0% | 0% | 0% | 100% | 6 |
| 3 | Apply knowledge of beer chemistry and microbiology in brewery operations. | 0% | 0% | 0% | 100% | 6 |
| 4 | Evaluate appropriate process technology practices in brewery operations. | 0% | 0% | 0% | 100% | 6 |
| 5 | Evaluate and control the consistency and quality of beer using chemical, microbiological and sensory analysis. | 0% | 0% | 17% | 83% | 6 |
| 6 | Relate the history and evolution of the beer industry to today's market, beer styles and regulations. | 0% | 0% | 0% | 100% | 6 |
| 7 | Develop a product portfolio that addresses consumer needs. | 0% | 0% | 17% | 83% | 6 |
| 8 | Discuss and apply business principles and strategies related to running a brewing company. | 0% | 0% | 0% | 100% | 6 |

3 - Overall, how satisfied are you with KPU's Brewing and Brewery Operations program curriculum?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Overall, how satisfied are you with KPU's Brewing and Brewery Operations program curriculum? | Percentage |
|---|--|------------|
| 1 | Very dissatisfied | 0% |
| 2 | Somewhat dissatisfied | 0% |
| 3 | Neither satisfied nor dissatisfied | 0% |
| 4 | Somewhat satisfied | 67% |
| 5 | Very satisfied | 33% |
| | Total | 6 |

4 - Thinking of KPU's Brewing and Brewery Operations program's curriculum as a whole, please indicate the strengths of the program.

Provides a solid foundation of learning for students to enter the industry and grow

It has both theory and hands on components. The lecture material is reinforced in the practical setting.

The building from the science fundamentals to the application of those in the brewery.

Getting students ready to work in the Craft Beer Industry, not just in British Columbia but globally. In particular, students are ready to step into a variety of positions in brewing and brewery operations.

- High portion of practical experience in the curriculum (brewing and lab testing) - Instructors with industry experience and strong science backgrounds - Brewing facility and equipment availability

5 - Thinking of KPU's Brewing and Brewery Operations program's curriculum as a whole, please provide any suggestions you have for improvement.

More practical labs and access to chemical/microbiological analysis

Give the students more opportunities to develop critical thinking skills,. Have assessments/projects that would allow students trouble shoot productions issues. Match what is being taught in lectures with what they do in the brewery

A look at the curriculum to make sure that all the courses that are required of the students are relevant and see how we can give more time to the areas that we know could use more time and practice. Make sure that we are all working on building critical thinking skills and problem solving into all of our courses.

Consider a degree or CPS programs which would allow more hands-on teaching hour to learn and practice greatly details of brewing and brewery operations.

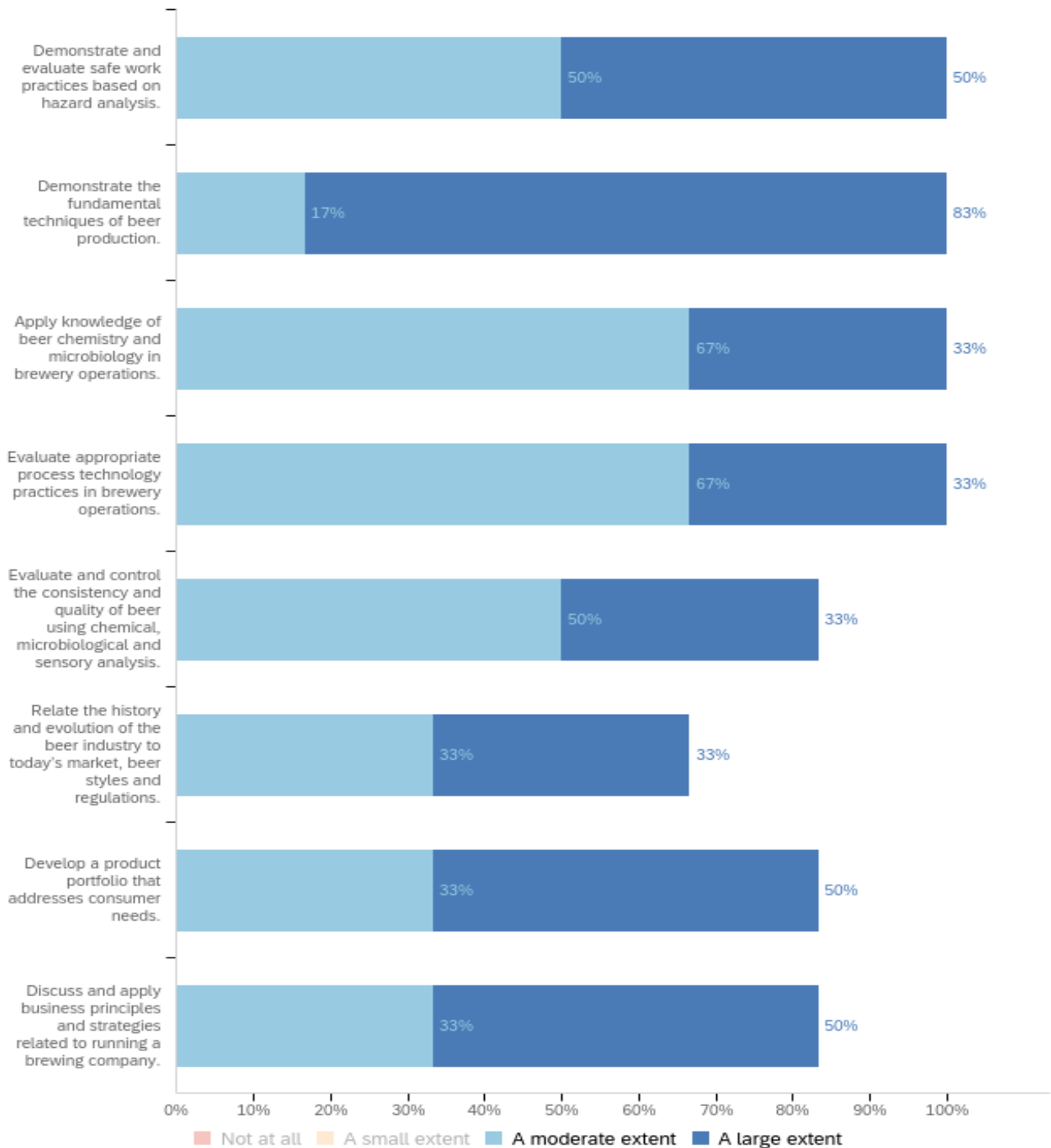
- More collaboration between courses showing the link between topics - Adapt or change some of the non HOPS courses (communications, ethical, excel, etc.) to address better the needs of students. - More focus on developing critical thinking in our students

QUESTIONS ON CHAPTER 4: EFFECTIVENESS OF INSTRUCTIONAL DELIVERY

Instructional Design and Delivery

Are appropriate opportunities provided to help students acquire the PLOs?

6 - To what extent is KPU's Brewing and Brewery Operations program helping students develop the following Program Learning Outcomes?

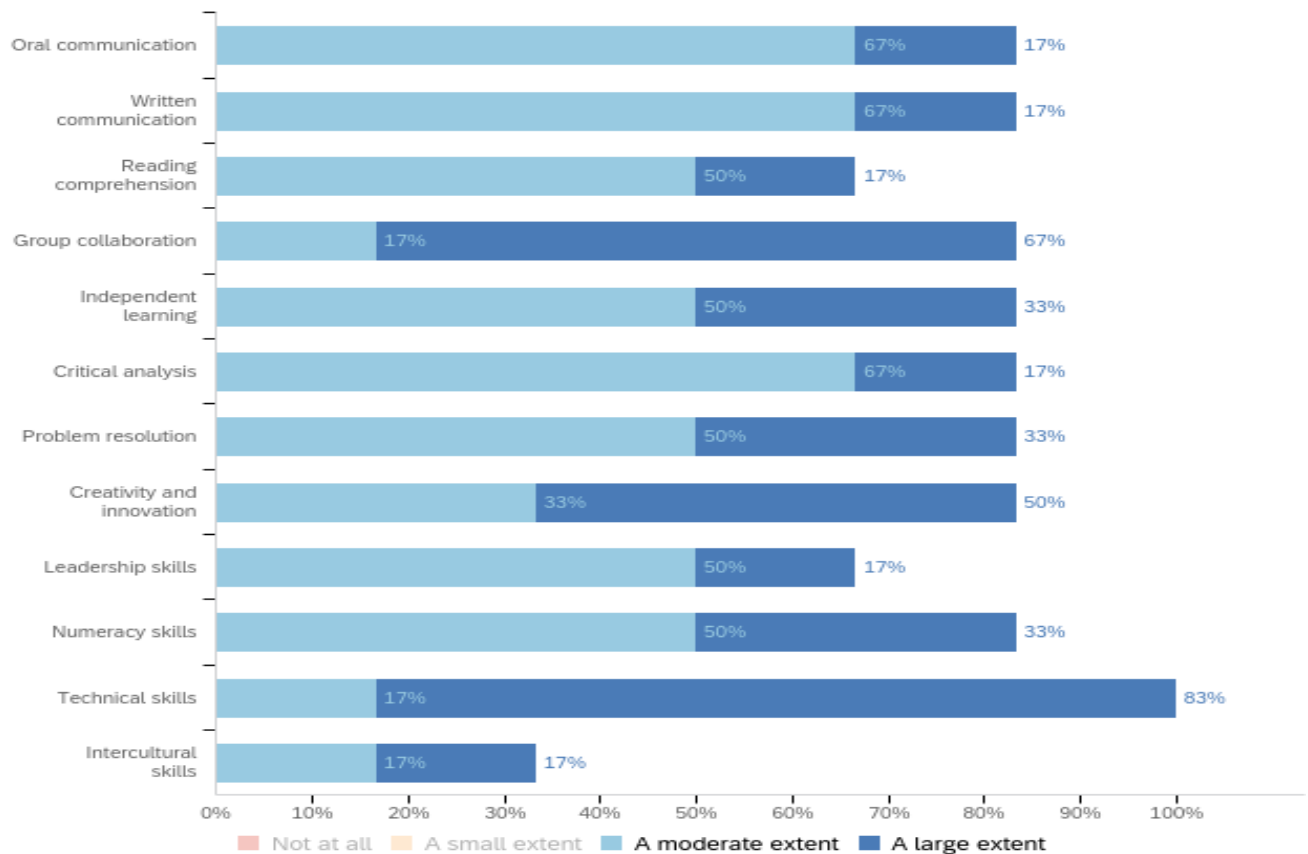


Note that “not at all” and “a small extent” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all” and “a small extent” categories

| # | Question | Not at all | A small extent | A moderate extent | A large extent | Total |
|---|--|------------|----------------|-------------------|----------------|-------|
| 1 | Demonstrate and evaluate safe work practices based on hazard analysis. | 0% | 0% | 50% | 50% | 6 |
| 2 | Demonstrate the fundamental techniques of beer production. | 0% | 0% | 17% | 83% | 6 |
| 3 | Apply knowledge of beer chemistry and microbiology in brewery operations. | 0% | 0% | 67% | 33% | 6 |
| 4 | Evaluate appropriate process technology practices in brewery operations. | 0% | 0% | 67% | 33% | 6 |
| 5 | Evaluate and control the consistency and quality of beer using chemical, microbiological and sensory analysis. | 0% | 17% | 50% | 33% | 6 |
| 6 | Relate the history and evolution of the beer industry to today's market, beer styles and regulations. | 0% | 33% | 33% | 33% | 6 |
| 7 | Develop a product portfolio that addresses consumer needs. | 0% | 17% | 33% | 50% | 6 |
| 8 | Discuss and apply business principles and strategies related to running a brewing company. | 0% | 17% | 33% | 50% | 6 |

Are appropriate opportunities provided to help students acquire the essential skills?

7 - To what extent is KPU's Brewing and Brewery Operations program helping students develop the following essential skills?

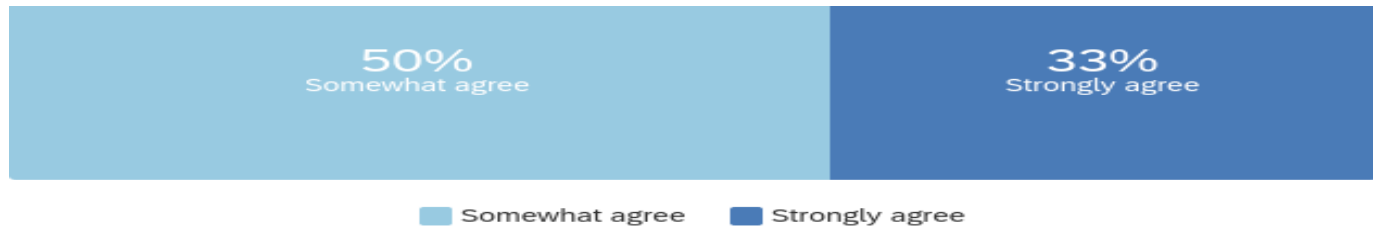


Note that “not at all” and “a small extent” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all” and “a small extent” categories.

| # | Question | Not at all | A small extent | A moderate extent | A large extent | Total |
|----|---------------------------|------------|----------------|-------------------|----------------|-------|
| 1 | Oral communication | 0% | 17% | 67% | 17% | 6 |
| 2 | Written communication | 0% | 17% | 67% | 17% | 6 |
| 3 | Reading comprehension | 0% | 33% | 50% | 17% | 6 |
| 4 | Group collaboration | 0% | 17% | 17% | 67% | 6 |
| 5 | Independent learning | 0% | 17% | 50% | 33% | 6 |
| 6 | Critical analysis | 0% | 17% | 67% | 17% | 6 |
| 7 | Problem resolution | 0% | 17% | 50% | 33% | 6 |
| 8 | Creativity and innovation | 0% | 17% | 33% | 50% | 6 |
| 9 | Leadership skills | 0% | 33% | 50% | 17% | 6 |
| 10 | Numeracy skills | 0% | 17% | 50% | 33% | 6 |
| 11 | Technical skills | 0% | 0% | 17% | 83% | 6 |

Does the program design ensure students are prepared for subsequent courses?

8 - Thinking of KPU's Brewing and Brewery Operations program as a whole, to what extent do you agree that the prerequisites offered prepare students for more advanced courses within the Brewing and Brewery Operations program?

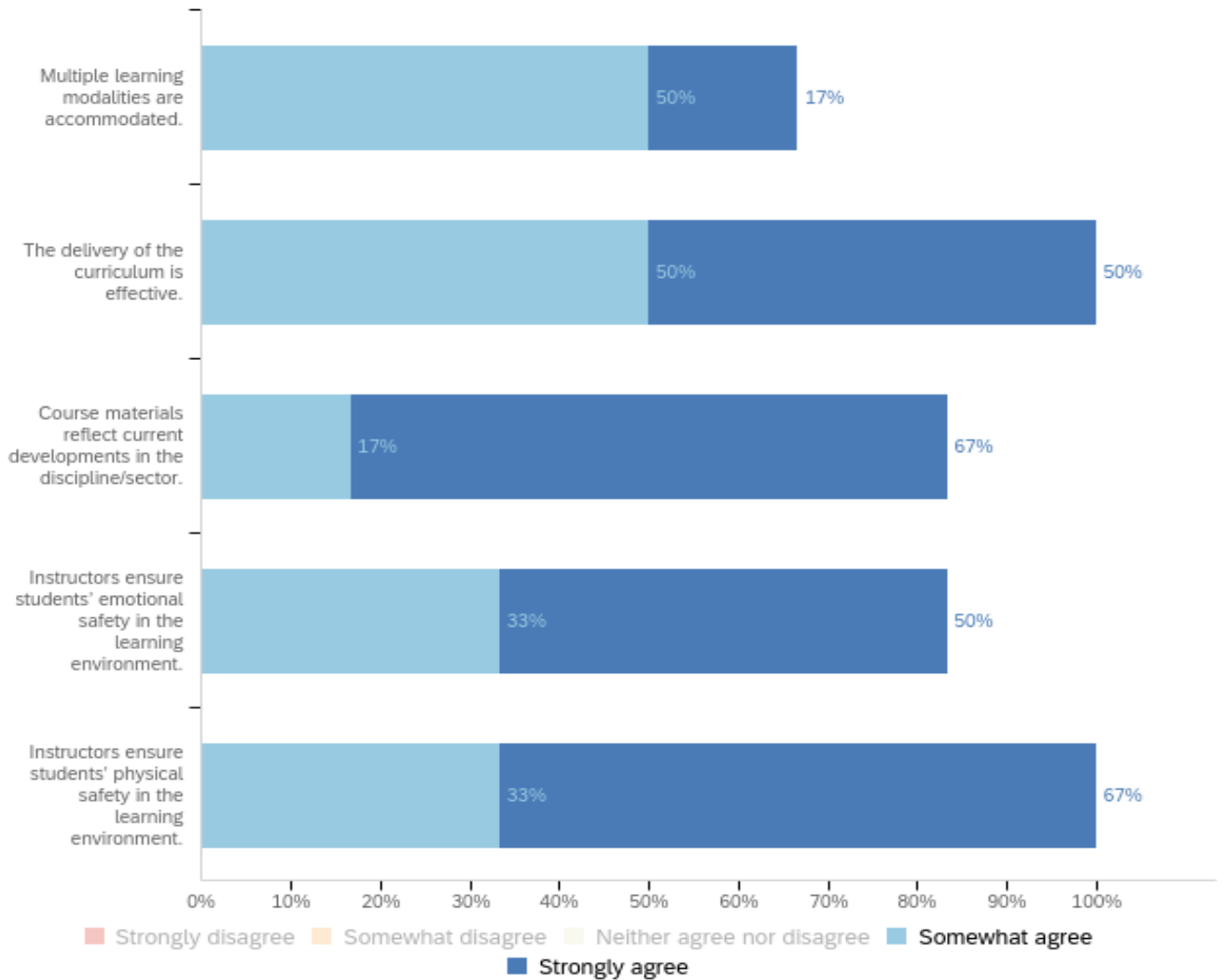


Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Thinking of KPU's Brewing and Brewery Operations program as a whole, to what extent do you agree that the prerequisites offered prepare students for more advanced courses within the Brewing and Brewery Operations program? | Percentage |
|---|---|------------|
| 1 | Strongly disagree | 0% |
| 2 | Somewhat disagree | 0% |
| 3 | Neither agree nor disagree | 17% |
| 4 | Somewhat agree | 50% |
| 5 | Strongly agree | 33% |
| | Total | 6 |

Does the instruction meet the needs of diverse learners?

9 - Thinking of how the program is delivered, please indicate your agreement with the following.



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories to enable quick comparisons between items. For items with low positive percentages, use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Question | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree | Total |
|---|---|-------------------|-------------------|----------------------------|----------------|----------------|-------|
| 1 | Multiple learning modalities are accommodated. | 0% | 0% | 33% | 50% | 17% | 6 |
| 2 | The delivery of the curriculum is effective. | 0% | 0% | 0% | 50% | 50% | 6 |
| 3 | Course materials reflect current developments in the discipline/sector. | 0% | 0% | 17% | 17% | 67% | 6 |

| | | | | | | | |
|---|--|----|----|-----|-----|-----|---|
| 4 | Instructors ensure students' emotional safety in the learning environment. | 0% | 0% | 17% | 33% | 50% | 6 |
| 5 | Instructors ensure students' physical safety in the learning environment. | 0% | 0% | 0% | 33% | 67% | 6 |

10 - Overall, how satisfied are you with the quality of instruction across the program?



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories. Use the frequency table below to review the proportion of "neutral" versus "negative" responses.

| # | Overall, how satisfied are you with the quality of instruction across the program? | Percentage |
|---|--|------------|
| 1 | Very dissatisfied | 0% |
| 2 | Somewhat dissatisfied | 0% |
| 3 | Neither satisfied nor dissatisfied | 0% |
| 4 | Somewhat satisfied | 67% |
| 5 | Very satisfied | 33% |
| | Total | 6 |

11 - Thinking of how instruction is delivered across the program as a whole, please indicate the strengths of the program instruction.

A blend of theory and practical labs build students skills

The students are exposed to the many different facets of the brewing industry during the program. Students are taught by faculty, staff and guest lecturers that have a broad range of experience and expertise. Students get to brew beer in the brewery and make the connections with what is being taught in lectures. Students also get to apply/showcase the knowledge that they have gained in the diploma program with the production of a Student Signature Series beer.

Passion of instructors.

Instructors are knowledgeable and skilled with the delivery of their course curriculum. They have a willingness to support UDL as part of their day to day course delivery. Through COVID, they have showcased a willingness to learn, adapt and provide the best curriculum solutions to deliver the desired learning outcome for their students.

- Caring - Engaging - Organized

12 - Thinking of how instruction is delivered across the program as a whole, please provide any suggestions you have for improvements in program instruction.

More collaboration between faculty so that courses build upon each other more and are more interconnected for a more rounded learning experience

Increase the amount of learning activities that require the students to make the links between what is being taught in the different HOPS courses.

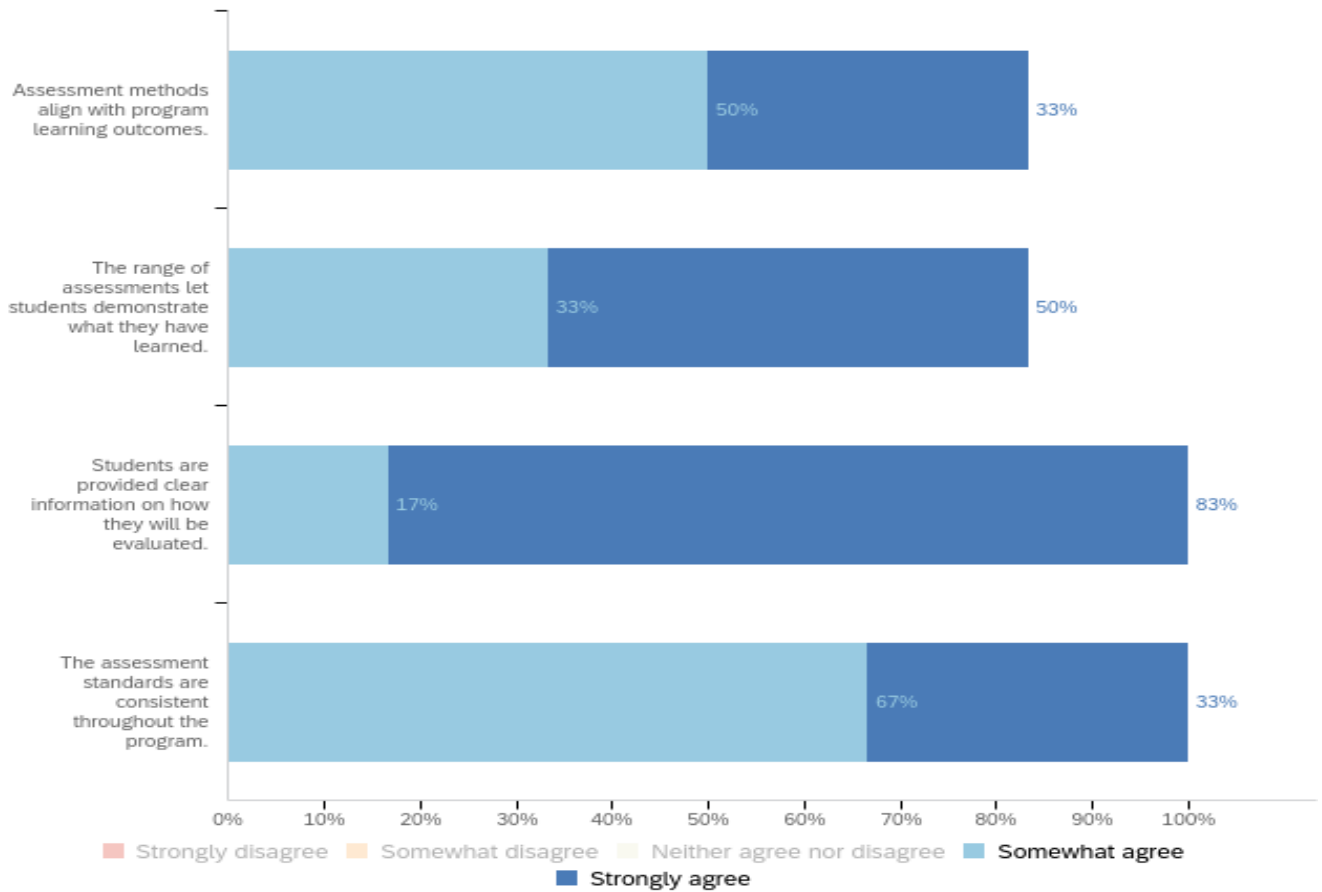
We need the equipment and staff time to demonstrate best industry / brewing practice in our brewery. Students notice that we teach one thing and then do another in the brewery because we don't have the equipment or the staff resources to do what should be done in any well managed brewery. It sends the wrong message to the world.

Each instructor is very strong within their own teaching area...continued communications between instructors to reinforce the key learning outcomes and integration of applicable knowledge...and how it relates to the real world of brewing and brewery operations.

- All the instructors could have a more similar format for the Moodle courses to make it easier for students to familiarize with each course.

Do the assessment methods allow students to demonstrate to what extent they have achieved the learning outcomes?

13 - Thinking of how learning is assessed in the program as a whole, indicate your agreement with the following.



Note that "neutral" and "negative" categories are excluded from the chart, leaving only the "positive" categories to enable quick comparisons between items. For items with low positive percentages, use the frequency table below to review the proportion of "neutral" versus "negative" responses.

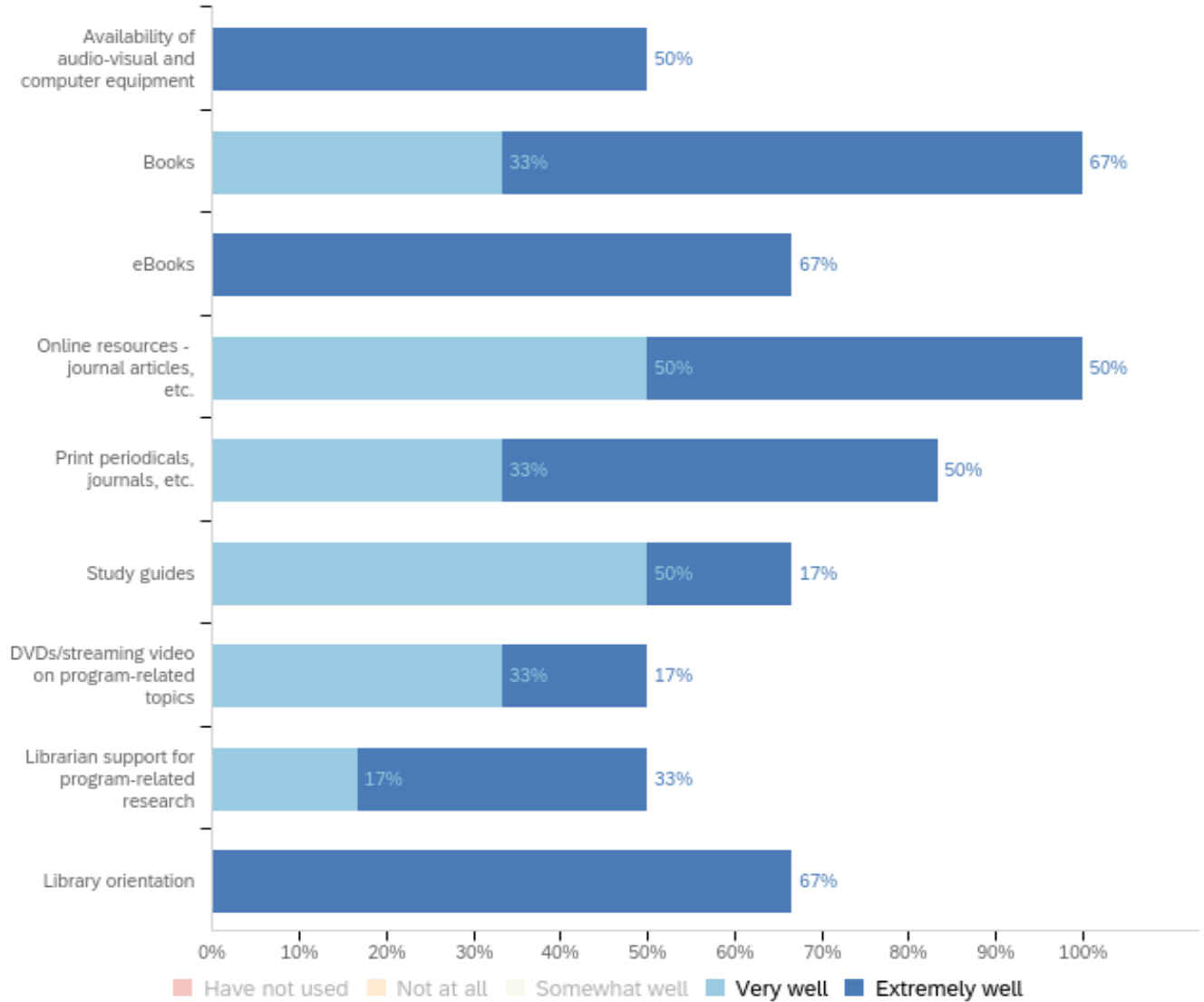
| # | Question | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree | Total |
|---|---|-------------------|-------------------|----------------------------|----------------|----------------|-------|
| 1 | Assessment methods align with program learning outcomes. | 0% | 0% | 17% | 50% | 33% | 6 |
| 2 | The range of assessments let students demonstrate what they have learned. | 0% | 0% | 17% | 33% | 50% | 6 |
| 3 | Students are provided clear information on how they will be evaluated. | 0% | 0% | 0% | 17% | 83% | 6 |
| 4 | The assessment standards are consistent throughout the program. | 0% | 0% | 0% | 67% | 33% | 6 |

QUESTIONS ON CHAPTER 5: RESOURCES, SERVICES AND FACILITIES

Program Resources, Services and Facilities

Does the program have the library and learning resources needed to deliver the curriculum?]

14 - How well are the following library resources meeting the program’s needs?



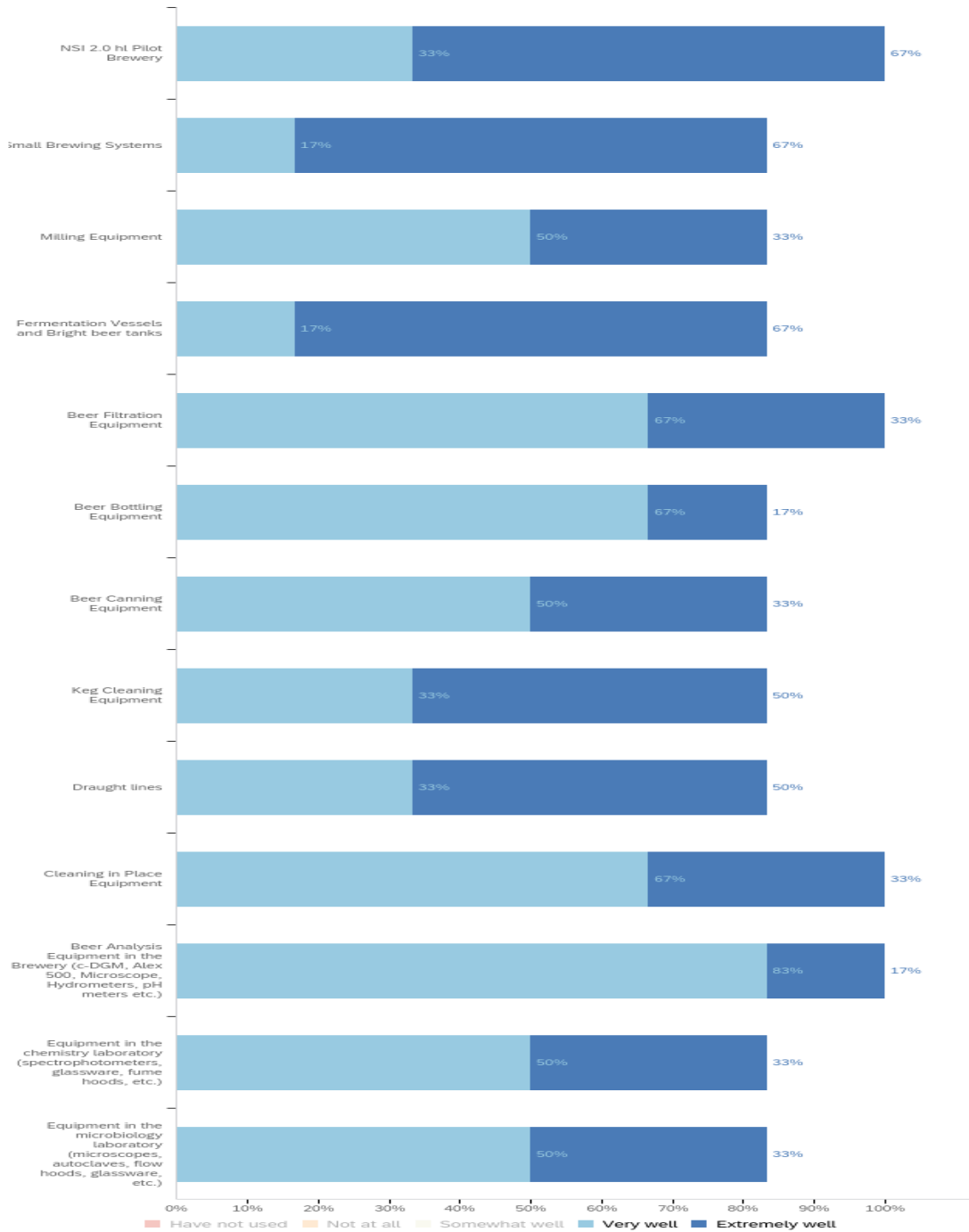
Note that “not at all” and “Somewhat well” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all” and “Somewhat well” categories.

| # | Question | Have not used | Not at all | Somewhat well | Very well | Extremely well | Total |
|---|---|---------------|------------|---------------|-----------|----------------|-------|
| 1 | Availability of audio-visual and computer equipment | 17% | 0% | 33% | 0% | 50% | 6 |

| | | | | | | | |
|---|--|-----|----|-----|-----|-----|---|
| 2 | Books | 0% | 0% | 0% | 33% | 67% | 6 |
| 3 | eBooks | 33% | 0% | 0% | 0% | 67% | 6 |
| 4 | Online resources - journal articles, etc. | 0% | 0% | 0% | 50% | 50% | 6 |
| 5 | Print periodicals, journals, etc. | 17% | 0% | 0% | 33% | 50% | 6 |
| 6 | Study guides | 33% | 0% | 0% | 50% | 17% | 6 |
| 7 | DVDs/streaming video on program-related topics | 50% | 0% | 0% | 33% | 17% | 6 |
| 8 | Librarian support for program-related research | 50% | 0% | 0% | 17% | 33% | 6 |
| 9 | Library orientation | 17% | 0% | 17% | 0% | 67% | 6 |

Does the program have the specialized technology needed to deliver the curriculum?

15 - How well are the following specialized technologies meeting the program's needs?

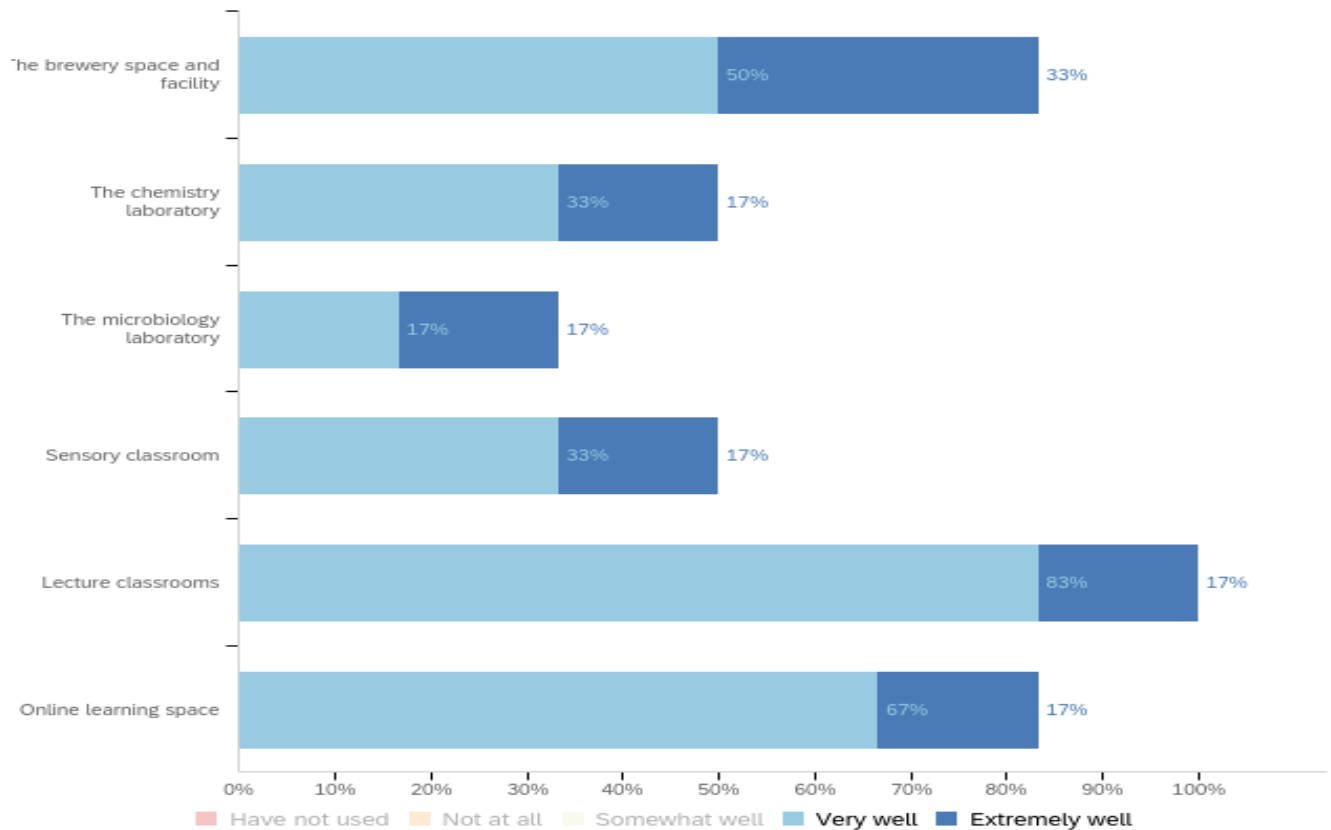


Note that “not at all” and “Somewhat well” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all” and “Somewhat well” categories.

| # | Question | Have not used | Not at all | Somewhat well | Very well | Extremely well | Total |
|----|---|---------------|------------|---------------|-----------|----------------|-------|
| 1 | NSI 2.0 hl Pilot Brewery | 0% | 0% | 0% | 33% | 67% | 6 |
| 2 | Small Brewing Systems | 0% | 0% | 17% | 17% | 67% | 6 |
| 3 | Milling Equipment | 0% | 0% | 17% | 50% | 33% | 6 |
| 4 | Fermentation Vessels and Bright beer tanks | 0% | 0% | 17% | 17% | 67% | 6 |
| 5 | Beer Filtration Equipment | 0% | 0% | 0% | 67% | 33% | 6 |
| 6 | Beer Bottling Equipment | 17% | 0% | 0% | 67% | 17% | 6 |
| 7 | Beer Canning Equipment | 17% | 0% | 0% | 50% | 33% | 6 |
| 8 | Keg Cleaning Equipment | 17% | 0% | 0% | 33% | 50% | 6 |
| 9 | Draught lines | 17% | 0% | 0% | 33% | 50% | 6 |
| 10 | Cleaning in Place Equipment | 0% | 0% | 0% | 67% | 33% | 6 |
| 11 | Beer Analysis Equipment in the Brewery (c-DGM, Alex 500, Microscope, Hydrometers, pH meters etc.) | 0% | 0% | 0% | 83% | 17% | 6 |
| 12 | Equipment in the chemistry laboratory (spectrophotometers, glassware, fume hoods, etc.) | 17% | 0% | 0% | 50% | 33% | 6 |
| 13 | Equipment in the microbiology laboratory (microscopes, autoclaves, flow hoods, glassware, etc.) | 0% | 0% | 17% | 50% | 33% | 6 |

Does the program have the facilities needed to deliver the curriculum?

16 - How well are the following facilities meeting program’s needs?

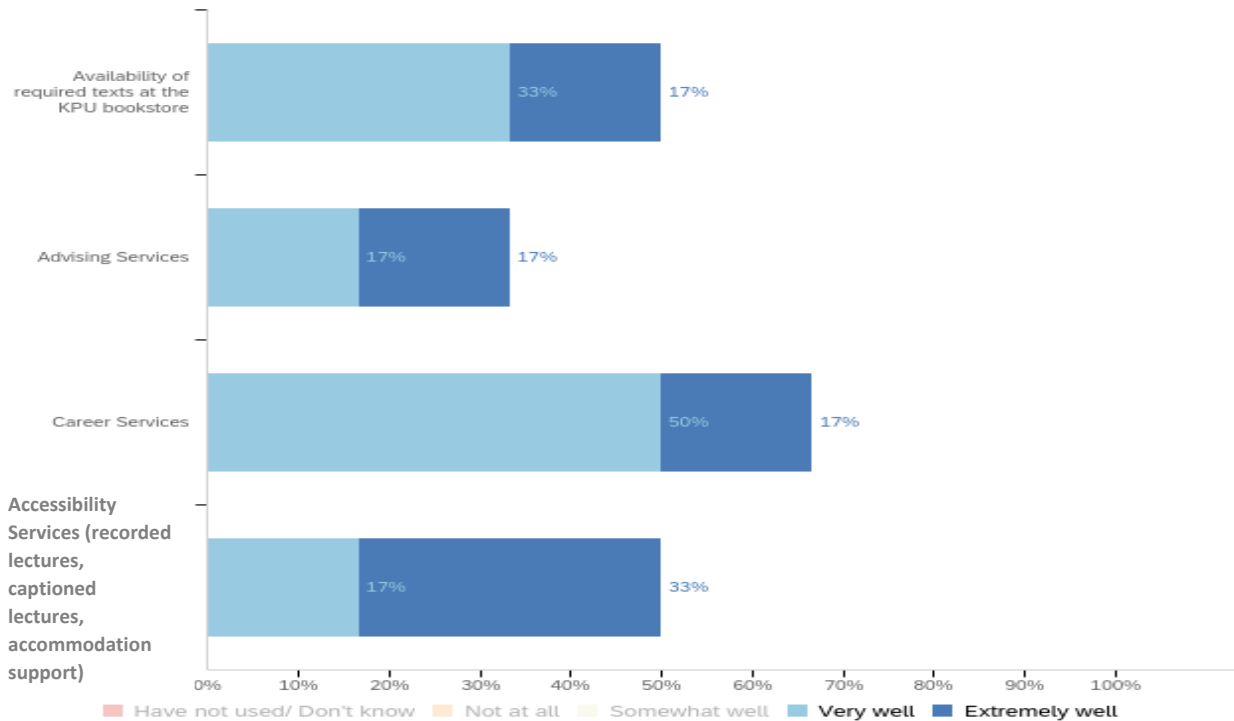


Note that “not at all” and “Somewhat well” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all” and “Somewhat well” categories.

| # | Question | Have not used | Not at all | Somewhat well | Very well | Extremely well | Total |
|---|--------------------------------|---------------|------------|---------------|-----------|----------------|-------|
| 1 | The brewery space and facility | 0% | 0% | 17% | 50% | 33% | 6 |
| 2 | The chemistry laboratory | 0% | 0% | 50% | 33% | 17% | 6 |
| 3 | The microbiology laboratory | 0% | 0% | 67% | 17% | 17% | 6 |
| 4 | Sensory classroom | 0% | 0% | 50% | 33% | 17% | 6 |
| 5 | Lecture classrooms | 0% | 0% | 0% | 83% | 17% | 6 |
| 6 | Online learning space | 0% | 0% | 17% | 67% | 17% | 6 |

Does the program have the support services needed to deliver the curriculum?

17 - How well are the following services meeting the program’s needs?



Note that “not at all” and “Somewhat well” categories are excluded from the chart for quick comparisons between items. Please use the frequency table below for the percentages for the “not at all” and “Somewhat well” categories.

| # | Question | Have not used/ Don't know | Not at all | Somewhat well | Very well | Extremely well | Total |
|---|---|---------------------------|------------|---------------|-----------|----------------|-------|
| 1 | Availability of required texts at the KPU bookstore | 33% | 0% | 17% | 33% | 17% | 6 |
| 2 | Advising Services | 67% | 0% | 0% | 17% | 17% | 6 |
| 3 | Career Services | 33% | 0% | 0% | 50% | 17% | 6 |
| 4 | Accessibility Services (recorded lectures, captioned lectures, accommodation support) | 17% | 0% | 33% | 17% | 33% | 6 |

Appendix K Department Qualifications

The Brewing and Brewery Operations program is currently taught by 2 full time faculty instructors (2 FTEs) teaching a total of 13 courses, 4 part time NR1 contract faculty teaching a total of 4 courses, 3 full time BCGEU instructional staff (3 FTEs) and is supported by administration assistance and an events and communication coordinator from the Faculty of Science and Horticulture. It should also be noted that the Introduction to Professional Communication (CMNS 1140), Business Problem Solving with Spreadsheets (CBSY 1110) and Business Ethics (PHIL 3033) courses are taught by other faculties within KPU.

Within the regular and non-regular teaching faculty of the Brewing Department, four of the instructors hold a masters level education. These include: MSc. Brewing and Distilling, MSc. Food Science, MSc. Microbiology and MA. Most importantly many of the instructors have decades of experience within the brewing industry.

Within the instruction staff there is an MSc. Microbiology, two Diplomas in Brewing and Brewery Operations and a Diploma in Chemical Production & Power Engineering.

The faculty and staff in the Brewing and Brewery Operations program maintains currency by attending professional brewing conferences held by organizations such as Master Brewers Association of the Americas, American Society of Brewing Chemist, European Brewery Convention, Canadian Brewing Conference and the British Columbia Craft Brewers Conference. The faculty and staff also attend many local brewing festivals.

The faculty and staff also keep current by attending educational workshops from Teaching and Learning. One member of staff is also taking courses within the provincial instructor diploma program (PIDP)

There is a broad expertise within the department members and a willingness to support the students to achieve educational career goals.

Appendix L Other Brewing Programs

Degree programs

1. Appalachian State University Fermentation Sciences
<https://dcfs.appstate.edu/academics/fermentation>
2. Central Washington University Craft Brewing <http://www.cwu.edu/craft-brewing/>
3. Colorado State University Fermentation Science and Technology
<https://www.chhs.colostate.edu/fshn/programs-and-degrees/b-s-in-fermentation-science-and-technology/>
4. Eastern Michigan University Fermentation Science
<https://www.emich.edu/chemistry/programs/undergraduate-programs/fermentation.php>

5. Metropolitan State University of Denver Beer Industry Program
<https://www.msudenver.edu/beer/>
6. Oregon State University Food Science & Technology <https://foodsci.oregonstate.edu/>
7. Southern Illinois University Fermentation Science <https://fermentation.siu.edu/>
8. University of California, Davis Bachelor of Science Program in Food Science, Brewing Option
<https://foodscience.ucdavis.edu/about/what-food-science>
9. Virginia Tech Fermentation option – Food Science & Technology <https://www.fst.vt.edu/>
10. Western Michigan University Sustainable Brewing <https://wmich.edu/brewing>

Diploma programs

In Canada

1. Niagara College Teaching Brewery Brewmaster and Brewery Operations Management
<https://www.ncteachingbrewery.ca/>
2. Olds College Opens Brewmaster & Brewery Operations Management
<https://www.oldscollege.ca/programs/service-industry/brewmaster/index.html>

In the United States

3. BridgeValley Community and Technical College Brewing Technology
<https://www.bridgevalley.edu/applied-technology/brewing-tech>
4. Central New Mexico Community College Beverage Production and Management, Brewing Concentration
<https://www.cnm.edu/programs-of-study/programs-a-z/beverage-production-management>
5. Cincinnati State Technical and Community College Brewing Science
<https://www.cincinnati-state.edu/academics/degree-certificate/brewing-and-beverage-laboratory-certificate-brewlc/>
6. Craft Beverage Institute of the Southeast® (CBI) at Asheville-Buncombe Technical Community College Brewing, Distillation, and Fermentation A.A.S.
<https://abtech.edu/programs/academic/brewing-distillation-and-fermentation>
7. Flathead Valley Community College Brewing Science and Brewery Operations AAS
http://catalog.fvcc.edu/preview_program.php?catoid=6&poid=1419&returnto=371
8. Kalamazoo Valley Community College Sustainable Brewing
https://www.kvcc.edu/programs/sustainable_food_systems/
9. South Puget Sound Community College Craft Brewing and Distilling
<https://spsc.edu/areas/craft-brewing-distilling/craft-brewing-and-distilling-aas-t>

10. SUNY Schenectady County Community College Craft Beer Brewing
<https://sunysccc.edu/Academics/School-of-Hotel-Culinary-Arts-and-Tourism/Academic-Programs/Craft-Beer-Brewing-AAS.html>

Certificate programs

In Canada

1. CÉGEP de Jonquière <https://www.cegepjonquiere.ca/nouvelles-et-evenements/nouvelle-attestation-detudes-collegiales-en-techniques-de-production-en-microbrasserie.html>
2. North Island College <https://www.nic.bc.ca/programs/continuing-education-and-training/vocational-training/craft-brewing-and-malting/>
3. Bishop's University <https://www.ubishops.ca/academic-programs/faculty-of-arts-and-science/natural-sciences-and-mathematics/chemistry-and-brewing-science/courses-programs/graduate-certificate-brewing-science/>

In the United States

4. Siebel Institute of Technology, Brewing <https://www.siebelinstitute.com/>
5. American Brewers Guild Intensive Brewing Science & Engineering <https://abgbrew.com/>
6. Auburn University Graduate Certificate Program in Brewing Science and Operations <http://humsci.auburn.edu/aubrewing/>
7. Brewing and Distilling Center, Inc. Professional Brewing/Distilling Technology Certificate <https://www.brewinganddistillingcenter.com/>
8. Central Michigan University Fermentation Science Program <https://www.cmich.edu/program/fermentation-science>
9. eCornell Beer Essentials Certificate <https://ecornell.cornell.edu/certificates/hospitality-and-foodservice-management/beer-essentials/>
10. Grand Rapids Community College Craft Brewing, Packaging and Service Operations <https://www.grcc.edu/programs/craft-brewing-packaging-service-operations-certificate>
11. Indiana University and Purdue University at Indianapolis (IUPUI) Essentials of Brewery Operations <https://expand.iu.edu/browse/pdce/courses/essentials-of-brewery-operations-2023>
12. The Journeyman Brewer Academy Journeyman Brewer and Technical Brewer <https://journeymanbreweracademy.com/>
13. MiraCosta College Brewing Technician Certificate <https://commed.miracosta.edu/search/publicCourseSearchDetails.do?method=load&courseid=1023981>

14. Pennsylvania College of Technology Brewing and Fermentation Science
<https://www.pct.edu/academics/bas/brewing-fermentation-science/brewing-fermentation-science>
15. Sacred Heart University Brewing Science <https://www.sacredheart.edu/majors--programs/brewing-science--certificate/>
16. Saint Louis University Brewing Science and Operations <https://catalog.slu.edu/colleges-schools/professional-studies/brewing-certificate/>
17. San Diego Mesa College Fermentation Management Certification Program <https://www.sdmesa.edu/academics/academic-programs/fermentation.shtml>
18. San Diego State University Professional Certificate in the Business of Craft Beer
<https://ces.sdsu.edu/hospitality/professional-certificate-business-craft-beer>
19. Schoolcraft College Brewing and Distillation Technology
<https://www.schoolcraft.edu/academics/culinary-brewing-hospitality/>
20. Trocaire College Brewing, Distilling, and Fermentation Science
<https://trocaire.edu/academics/workforce-development/brewing-distilling-fermentation-science/>
21. UC San Diego Extension Brewing Programs <https://extendedstudies.ucsd.edu/courses-and-programs/brewing-internship>
22. UNC Charlotte Continuing Education Craft Beer Business Essentials Certificate
<https://www.brewersassociation.org/edu/brewing-schools/#tab-certificateprograms>
23. University of New Hampshire Minor in Brewing <https://colsa.unh.edu/agriculture-nutrition-food-systems/program/minor/brewing/>
24. University of Northern Colorado Brewing Laboratory Sciences
<https://extended.unco.edu/programs/brewing-lab-science-certificate/>
25. Saint Joseph's University Certificate in Brewing Science <https://www.sju.edu/degree-programs/brewing-science-certificate>
26. University of Vermont Business of Craft Beer Certificate Program
<https://learn.uvm.edu/program/business-of-craft-beer/>
27. Wake Tech Community College Commercial Craft Brewing
<https://www.waketech.edu/programs-courses/non-credit/enhance-your-career/hospitality-tourism/craft-beer>

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