

## Curriculum Standard for Brewing, Distillation and Fermentation

**Career Cluster:** Agriculture, Food & Natural Resources\*\*

**Cluster Description:** The production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources..

**Pathway:** Food Products and Processing Systems

**Effective Term:** Fall 2015 (2015\*03)

### Program Majors Under Pathway

Program Major / Classification of Instruction Programs (CIP) Code	Credential Level(s) Offered	Program Major Code
Brewing, Distillation and Fermentation	CIP Code 01.0401	AAS/Diploma/Certificate A15250

**Pathway Description:**

This curriculum is designed to prepare individuals for various careers in the brewing, distillation and fermentation industry. Classroom instruction, practical laboratory applications of brewing, distillation and fermentation principles and practices are included in the program of study.

Course work in brewing, distillation and fermentation includes production, operations, safety and sanitation, and associated process technologies. Related course work is offered in fermentation production, safety and sanitation, applied craft beverage microbiology, agriculture, marketing, management, equipment, packaging, and maintenance.

Graduates should qualify for employment opportunities in the brewing, distillation and fermentation industry. Students may be eligible to sit for the professional Institute of Brewing and Distilling (IBD) certification exams which correspond to the program of study.

*Program Major Description: Choose one of the following 4<sup>th</sup> paragraphs to use in conjunction with the first three paragraphs of the pathway description above for documentation used to identify each Program Major:*

**Brewing, Distillation and Fermentation:** A program that prepares individuals to apply technical knowledge and skills to brew, distill and ferment various products, including beverages. Includes instruction in production of fermented products, cultivating, marketing, management, legal issues, inspection, maintenance, service and repair of equipment, facility operations, packaging, sanitation, and welding.

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\*Within the degree program, the institution shall include opportunities for the achievement of competence in reading, writing, oral communication, fundamental mathematical skills, and basic use of computers.

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## I. General Education Academic Core

[Curriculum Requirements for associate degree, diploma, and certificate programs in accordance with 1D SBCCC 400.10]: Degree programs must contain a minimum of 15 semester hours including at least one course from each of the following areas: humanities/fine arts, social/behavioral sciences, and natural sciences/mathematics. Degree programs must contain a minimum of 6 semester hours of communications. Diploma programs must contain a minimum of 6 semester hours of general education; 3 semester hours must be in communications. General education is optional in certificate programs.

### Plant Systems: Brewing, Distillation and Fermentation

Recommended General Education Academic Core	AAS	Diploma	Certificate
Minimum General Education Hours Required:	15 SHC	6 SHC	0 SHC
<p>Courses listed below are recommended general education courses for this curriculum standard. Colleges may choose to include additional or alternative general education courses to meet local curriculum needs.</p> <p><i>*Recommended certificate and diploma level curriculum courses. These courses may <u>not</u> be included in associate degree programs.</i></p> <p><b>Communication:</b></p> <ul style="list-style-type: none"> <li>*COM 101 Workplace Communication 3 SHC</li> <li>COM 120 Intro Interpersonal Com 3 SHC</li> <li>COM 231 Public Speaking 3 SHC</li> <li>*ENG 101 Applied Communications I 3 SHC</li> <li>*ENG 102 Applied Communications II 3 SHC</li> <li>ENG 110 Freshman Composition 3 SHC</li> <li>ENG 111 Expository Writing 3 SHC</li> <li>ENG 112 Argument-Based Research 3 SHC</li> <li>ENG 114 Prof Research &amp; Reporting 3 SHC</li> <li>ENG 115 Oral Communication 3 SHC</li> <li>ENG 116 Technical Report Writing 3 SHC</li> </ul> <p><b>Humanities/Fine Arts:</b></p> <ul style="list-style-type: none"> <li>*HUM 101 Values in the Workplace 2 SHC</li> <li>HUM 110 Technology and Society 3 SHC</li> <li>HUM 115 Critical Thinking 3 SHC</li> <li>HUM 230 Leadership Development 3 SHC</li> <li>PHI 230 Introduction to Logic 3 SHC</li> <li>PHI 240 Introduction to Ethics 3 SHC</li> </ul> <p><b>Social /Behavioral Sciences:</b></p> <ul style="list-style-type: none"> <li>ECO 151 Survey of Economics 3 SHC</li> <li>ECO 251 Prin of Microeconomics 3 SHC</li> <li>GEO 110 Introduction to Geography 3 SHC</li> <li>GEO 111 World Regional Geography 3 SHC</li> <li>*PSY 101 Applied Psychology 3 SHC</li> <li>*PSY 102 Human Relations 2 SHC</li> <li>PSY 118 Interpersonal Psychology 3 SHC</li> <li>PSY 135 Group Processes 3 SHC</li> <li>PSY 150 General Psychology 3 SHC</li> <li>*SOC 105 Social Relationships 3 SHC</li> <li>SOC 210 Introduction to Sociology 3 SHC</li> <li>SOC 215 Group Processes 3 SHC</li> </ul> <p><b>Natural Sciences/Mathematics:</b></p> <ul style="list-style-type: none"> <li>BIO 111 General Biology I 4 SHC</li> <li>BIO 140 Environmental Biology 3 SHC</li> </ul>	<p>6 SHC</p> <p>3 SHC</p> <p>3 SHC</p> <p>3 SHC</p>	<p>3-6 SHC</p> <p>0-3 SHC</p> <p>0-3 SHC</p> <p>0-3 SHC</p>	<p>Optional</p> <p>Optional</p> <p>Optional</p> <p>Optional</p>

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BIO	160	Introductory Life Science	3 SHC			
BIO	175	General Microbiology	3 SHC			
CHM	130	Gen, Org, & Biochemistry	3 SHC			
CHM	131	Introduction to Chemistry	3 SHC			
CHM	132	Organic and Biochemistry	4 SHC			
CHM	151	General Chemistry I	4 SHC			
CHM	152	General Chemistry II	4 SHC			
MAT	110	Math Measurement & Literacy	3 SHC			
MAT	121	Algebra and Trigonometry I	3 SHC			
MAT	143	Quantitative Literacy	3 SHC			
MAT	152	Statistical Methods I	4 SHC			
MAT	171	Precalculus Algebra	4 SHC			
PHY	110	Conceptual Physics	3 SHC			

**II. Major Hours.** AAS, diploma, and certificate programs must include courses which offer specific job knowledge and skills. Work-based learning may be included in associate in applied science degrees up to a maximum of 8 semester hours of credit; in diploma programs up to a maximum of 4 semester hours of credit; and in certificate programs up to a maximum of 2 semester hours of credit. Below is a description of each section under Major Hours.

- A. Technical Core.** The technical core is comprised of specific courses which are required for all Program Majors under this Curriculum Standard. A diploma program offered under an approved AAS program standard or a certificate which is the highest credential level awarded under an approved AAS program standard must include a minimum of 12 semester hours credit derived from the curriculum core courses or core subject area of the AAS program.
- B. Program Major(s).** The Program Major must include a minimum of 12 semester hours credit from required subjects and/or courses. The Program Major is in addition to the technical core.
- C. Other Major Hours.** Other major hours must be selected from prefixes listed on the curriculum standard. A maximum of 9 semester hours of credit may be selected from each prefix listed, with the exception of prefixes listed in the core.

<b>Plant Systems: Brewing, Distillation and Fermentation</b>	<b>AAS</b>	<b>Diploma</b>	<b>Certificate</b>
<b>Minimum Major Hours Required:</b>	<b>49 SHC</b>	<b>30 SHC</b>	<b>12 SHC</b>
<b>A. Technical Core:</b> <i>Courses required for the diploma are designated with an asterisk (*).</i> <ul style="list-style-type: none"> <li>* BDF 110 Fermentation Production 4 SHC</li> <li>* BDF 111 BDF Safety and Sanitation 2 SHC</li> <li>* BDF 115 Applied Craft Bev Microbiology 4 SHC</li> <li>* BDF 125 Bev Tech &amp; Calculations 2 SHC</li> </ul> <b>*Agriculture/Sustainability (Choose one)</b> <ul style="list-style-type: none"> <li>AGR 139 Intro to Sustainable Ag 3 SHC</li> <li>AGR 160 Plant Science 3 SHC</li> <li>HOR 245 Hor Specialty Crops 3 SHC</li> <li>SST 110 Intro to Sustainability 3 SHC</li> </ul> <b>*Business/Entrepreneurship (Choose one)</b> <ul style="list-style-type: none"> <li>BDF 261 Bev Marketing &amp; Sales 3 SHC</li> <li>BUS 110 Introduction to Business 3 SHC</li> <li>BUS 137 Principles of Management 3 SHC</li> </ul>	<b>29-33</b>	<b>20-21</b>	

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<p>ETR 210 Intro to Entrepreneurship 3 SHC</p> <p><b>*Facility Operations (Choose one)</b></p> <p>HRM 135 Facilities Management 3 SHC</p> <p>ISC 112 Industrial Safety 2 SHC</p> <p>MNT 110 Intro to Maint Procedures 2 SHC</p> <p>MNT 165 Mechanical Industrial Systems 2 SHC</p> <p><b>Required Subject Areas: Select one pathway</b></p> <p><b>Specialty Agriculture for Fermentation</b></p> <p>BDF 210 Hops Selection and Production 4 SHC</p> <p>HOR 162 Applied Plant Science 3 SHC</p> <p>HOR 166 Soils &amp; Fertilizers 3 SHC</p> <p><b>Brewing Production, Marketing and Management</b></p> <p>BDF 215 Legal Issues-Fermentation 3 SHC</p> <p>HRM 220 Cost Control-Food &amp; Bev 3 SHC</p> <p>HRM 225 Beverage Management 3 SHC</p> <p><b>Brewing Equipment, Packaging and Maintenance</b></p> <p>BDF 236 Brewing/Packaging Maintenance 4 SHC</p> <p><b>Choose One:</b></p> <p>ATR 112 Intro to Automation 3 SHC or</p> <p>ELC 128 Intro to PLC 3 SHC or</p> <p>ELN 260 Prog Logic Controllers 4 SHC</p> <p><b>Choose One:</b></p> <p>HYD 110 Hydraulics/Pneumatics I 3 SHC or</p> <p>WLD 214 Sanitary Welding 4 SHC</p> <p><b>B. Program Major: Not Applicable</b></p>			
<p><b>C. Other Major Hours.</b></p> <p><b>To be selected from the following prefixes:</b></p> <p>ACC, AGR, AHR, ALT, ATR, BDF, BIO, BPA, BPM, BTC, BUS, CHM, CIS, CSV, CTS, CUL, DBA, ECO, EGR, ELC, ELN, ENV, ETR, FPR, FST, HOR, HRM, HYD, ISC, LBT, LOG, MAC, MEC, MKT, MNT, OMT, PCI, PKG, PLU, REF, SST, TAT, VEN, WBL, WEB, and WLD</p> <p><i>Up to two semester hour credits may be selected from ACA.</i></p> <p><i>Up to three semester hour credits may be selected from the following prefixes: ARA, ASL, CHI, FRE, GER, ITA, JPN, LAT, POR, RUS and SPA.</i></p>			

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### III. Other Required Hours

*A college may include courses to meet graduation or local employer requirements in a certificate (0-1 SHC), diploma (0-4 SHC), or an associate in applied science (0-7 SHC) program. These curriculum courses shall be selected from the Combined Course Library and must be approved by the System Office prior to implementation. Restricted, unique, or free elective courses may not be included as other required hours.*

### IV. Employability Competencies

Fundamental competencies that address soft skills vital to employability, personal, and professional success are listed below. Colleges are encouraged to integrate these competencies into the curriculum by embedding appropriate student learning outcomes into one or more courses or through alternative methods.

- A. Interpersonal Skills and Teamwork** – The ability to work effectively with others, especially to analyze situations, establish priorities, and apply resources for solving problems or accomplishing tasks.
- B. Communication** – The ability to effectively exchange ideas and information with others through oral, written, or visual means.
- C. Integrity and Professionalism** – Workplace behaviors that relate to ethical standards, honesty, fairness, respect, responsibility, self-control, criticism and demeanor.
- D. Problem-solving** – The ability to identify problems and potential causes while developing and implementing practical action plans for solutions.
- E. Initiative and Dependability** – Workplace behaviors that relate to seeking out new responsibilities, establishing and meeting goals, completing tasks, following directions, complying with rules, and consistent reliability.
- F. Information processing** – The ability to acquire, evaluate, organize, manage, and interpret information.
- G. Adaptability and Lifelong Learning** – The ability to learn and apply new knowledge and skills and adapt to changing technologies, methods, processes, work environments, organizational structures and management practices.
- H. Entrepreneurship** – The knowledge and skills necessary to create opportunities and develop as an employee or self-employed business owner.

*\*An **Employability Skills Resource Toolkit** has been developed by NC-NET for the competencies listed above. Additional information is located at: <http://www.nc-net.info/employability.php>*

*\*\*The North Carolina Career Clusters Guide was developed by the North Carolina Department of Public Instruction and the North Carolina Community College system to link the academic and Career and Technical Education programs at the secondary and postsecondary levels to increase student achievement. Additional information about Career Clusters is located at: [http://www.nc-net.info/NC\\_career\\_clusters\\_guide.php](http://www.nc-net.info/NC_career_clusters_guide.php) or <http://www.careertech.org>.*

*Summary of Required Semester Hour Credits (SHC) for each credential:*

	<b>AAS</b>	<b>Diploma</b>	<b>Certificate</b>
Minimum General Education Hours	15	6	0
Minimum Major Hours	49	30	12

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Other Required Hours	0-7	0-4	0-1
<b>Total Semester Hours Credit (SHC)</b>	<b>64-76</b>	<b>36-48</b>	<b>12-18</b>