FERMENTED FOODS AND BEVERAGES, CERTIFICATE

The Certificate in Fermented Foods and Beverages is open to all UW–Madison undergraduates, providing the opportunity to develop skills and knowledge in the science, development, production, and marketing of fermented foods and beverages. The program introduces all students to the theoretical and practical aspects of food and beverage fermentation through required introductory coursework. Experiential learning courses emphasize an exciting, hands-on approach to learning. Beer, wine, spirits, sourdough, kimchi, sauerkraut, cheese, and yogurt are among the food products explored in required coursework. The certificate also allows students to engage with cutting-edge developments in the use of precision fermentation for food and non-food applications. Students interested in finding solutions to global environmental challenges can examine the role of fermentation in the development of sustainable feedstocks, renewable materials, and biofuels.

While all students will receive a foundation in the science of fermentation, the certificate allows students to personalize their coursework to explore their own interests and advance individual career goals. Students can choose to deepen their scientific knowledge with a focus on chemistry, genetics, or microbiology or enhance their business acumen with a focus on marketing, supply chains, or management.

HOW TO GET IN

HOW TO GET IN

Undergraduate students in any major from any school or college may earn this certificate. There are no prerequisites for declaring the certificate; however, there may be prerequisites for individual courses in the certificate. Students will be informed of these prerequisites through Guide and advised to fulfill those requirements. Students pursuing the program are encouraged to declare as early as possible so that they can best align the coursework with their interests and plan their field experience.

Students wishing to declare the Certificate in Fermented Food and Beverages should meet with one of the advisors (listed in the Contact Information box) to declare the certificate.

REQUIREMENTS

REQUIREMENTS

Code	Title	Credits
Certificate Requirements		
Core		5
Experiential Learning		1-2
Electives		6
Total Credits		**12-13**

CORE

Complete the following courses:

Code	Title	Credits
FOOD SCI 150	Fermented Food and Beverages: Science, Art and Health	3
FOOD SCI 550	Fermented Foods and Beverages	2

EXPERIENTIAL LEARNING

Complete one of the following courses:

Code	Title	Credits
FOOD SCI 551	Food Fermentation Laboratory	1
FOOD SCI 378	Precision Fermentation for Sustainable Foods and Products	2

ELECTIVES

Complete at least 6 credits from one of the following two thematic areas:

Business Theme

Code	Title	Credits
A A E 246	Climate Change Economics and Policy	3
A A E/C&E SOC/ SOC 340	Issues in Food Systems	3-4
A A E/ECON/ ENVIR ST 343	Environmental Economics	3-4
A A E 335	Introduction to Data Analysis using Spreadsheets	2
FOOD SCI/ AN SCI 321	Food Laws and Regulations	1
SOC/C&E SOC 222	Food, Culture, and Society	3
A A E 101	Introduction to Agricultural and Applied Economics	4
SOC/C&E SOC 365	Data Management for Social Science Research	3-4
A A E 320	Agricultural Systems Management	3
A A E 322	Commodity Markets	4
LSC 270	Marketing Communication for the Sciences	3
LSC 435	Brand Strategy for the Sciences	3
A A E 419	Agricultural Finance	3
A A E 422	Food Systems and Supply Chains	3
A A E/ECON 421	Economic Decision Analysis	4

Science Theme

Code	Title	Credits
FOOD SCI/ MICROBIO 325	Food Microbiology	3
FOOD SCI 410	Food Chemistry	3
FOOD SCI 301	Introduction to the Science and Technology of Food	3
MICROBIO 101	General Microbiology	3
MICROBIO 303	Biology of Microorganisms	3
MICROBIO 450	Diversity, Ecology and Evolution of Microorganisms	3
MICROBIO 526	Physiology of Microorganisms	3
BIOCHEM 301	Survey of Biochemistry	3
BIOCHEM 501	Introduction to Biochemistry	3

BIOCHEM 507	General Biochemistry I	3
BIOCHEM 508	General Biochemistry II	3-4
BIOLOGY/BOTANY/ ZOOLOGY 151	Introductory Biology	5
ZOOLOGY/ BIOLOGY/ BOTANY 152	Introductory Biology	5
ZOOLOGY 153	Introductory Biology	3
PLANTSCI 230	Wines and Vines of the World	2
PLANTSCI 340	Plant Genome Engineering and Editing	3
SOIL SCI 211	Soils and Climate Change	2
AGROECOL 377	Global Food Production and Health	3
DY SCI 471	Food Production Systems and Sustainability	3
MICROBIO/ BOTANY 335	The Microbiome of Plants, Animals, and Humans	3
AN SCI 366	Concepts in Genomics	3
AN SCI 420	Microbiomes of Animal Systems	3
DY SCI 471	Food Production Systems and Sustainability	3
BSE 249	Engineering Principles for Biological Systems	3
BSE 460	Biorefining: Energy and Products from Renewable Resources	3
M E 331	Computer-Aided Engineering	3
M E 361	Thermodynamics	3
M E 363	Fluid Dynamics	3
M E 364	Elementary Heat Transfer	3
CBE 250	Process Synthesis	3
CBE 310	Chemical Process Thermodynamics	3
CBE 426	Mass Transfer Operations	3
COMP SCI 540	Introduction to Artificial Intelligence	3
COMP SCI 571	Building User Interfaces	3

Additional Requirements:

- 2.000 GPA in certificate courses.
- At least 50% of certificate courses taken in-residence (i.e. at UW-Madison or through a UW-Madison sponsored study abroad program.)
- Courses taken on a pass/fail (satisfactory/unsatisfactory) basis will not count toward the certificate.

CERTIFICATE COMPLETION REQUIREMENT

This undergraduate certificate must be completed concurrently with the student's undergraduate degree. Students cannot delay degree completion to complete the certificate.

LEARNING OUTCOMES

LEARNING OUTCOMES

1. Design and produce fermented foods and/or beverages that meet specified quality standards.
2. Discuss the general characteristics of fermentative organisms and the role of metabolic engineering in precision fermentation.
3. Describe the wider sustainability features of fermentation and its emerging role in decarbonizing the economy and addressing climate change
4. Describe the concepts of branding, business management, and labeling that are relevant to marketing fermented foods and beverages.
5. Identify the components and roles of information technology and computer interfaces in largescale traditional and precision fermentative processes.

ADVISING AND CAREERS

ADVISING AND CAREERS

ADVISING

Advising is essential for student success in the Fermented Foods and Beverages Certificate. There are many individual pathways through the certificate allowing students to explore their interests and individual educational goals. Students are encouraged to meet with a Certificate Advisor to ensure that they are enrolled in appropriate coursework to complete certificate requirements on time as well as to become aware of new opportunities and events within the certificate program.

Please contact the certificate advisor listed in the contact box with questions or to set up an advising appointment.

CAREERS

Careers that support the fermentation industry are numerous and varied in focus and discipline. The Certificate in Fermented Foods and Beverages prepares all students to have a foundational knowledge to enter the fermentation industry from a variety of career entry points. Students may seek business or marketing-oriented careers in the food and beverage industry or leverage their knowledge of fermentation to pursue a career in scientific research or product development. Others may go on to post-secondary work in the field.

An interest in fermentation can lead to many different careers. Students are encouraged to begin the career exploration process early in their UW–Madison journey by working with advisors, faculty, and CALS Career Services. These resources can help students reflect on their values, identify career goals, and outline strategies to achieve them.

WISCONSIN EXPERIENCE

WISCONSIN EXPERIENCE

Opportunities to apply classroom learning to real-world experiences are integral to the Certificate in Fermented Foods and Beverages. Connections with local brewers, cheesemakers, winemakers, bakers, engineering firms, and entrepreneurs ranging from small to large-scale operations, allow students to learn from local experts and apply their knowledge to help industries solve problems. Students are able to benefit from the rich history of Wisconsin in the fermented food and beverage industry while exploring the latest developments in the field such as precision fermentation.

Our instructors as well as our industry and campus partners encourage curiosity and exploration by allowing students to experiment with ingredients such as wild yeasts and winter hardy grapes as well as future-

focused biotechnological advancements. Students can see their work make an immediate contribution to food and beverage products that are launched into the Wisconsin marketplace and economy. These experiences and connections create a lasting impact on students in their post-graduate studies and/or careers.

RESOURCES AND SCHOLARSHIPS

RESOURCES AND SCHOLARSHIPS

Financial support such as scholarships, part-time employment, paid internships, and work-study programs is available to qualified undergraduate students enrolled in the certificate. We express our appreciation to Leinenkugel family in support of fermentation programming. Students with a primary major in the College of Agricultural and Life Sciences receive more than $1.25 million in scholarships annually.