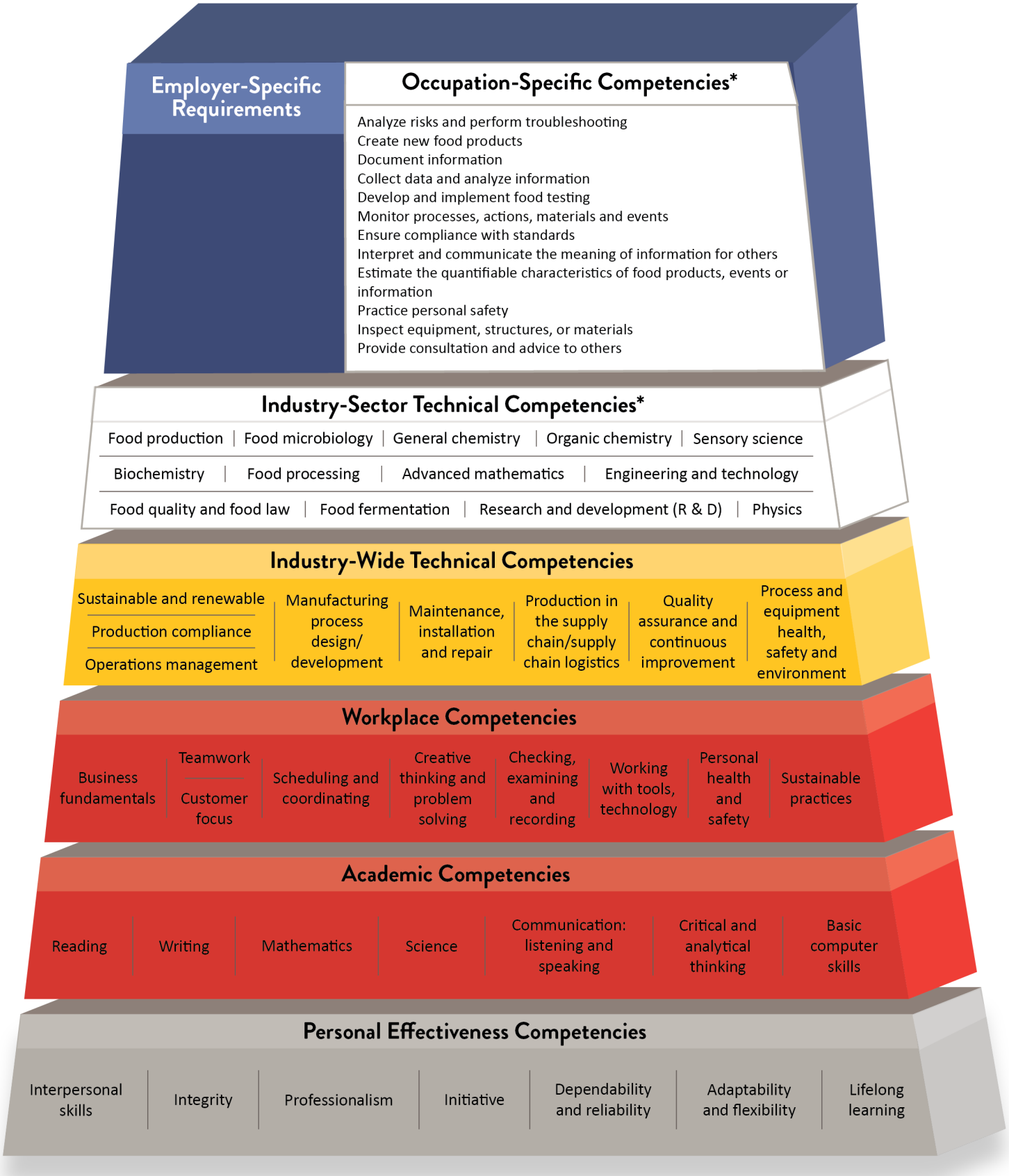
Minnesota Dual-Training Pipeline
Competency Model for Advanced Manufacturing
Occupation: Food Scientist/Technologist



Based on: Advanced Manufacturing Competency Model, Employment and Training Administration, United States Department of Labor, February 2025. For more detailed information about competency model creation and sources, visit dli.mn.gov/business/workforce/advanced-manufacturing.

Competency Model for Food Scientist/Technologist

Food Scientist /Technologist – This position uses chemistry, microbiology, engineering, and other sciences to study the principles underlying the processing and deterioration of foods; analyzes food content to determine levels of vitamins, fat, sugar, and protein; and discovers new food sources. The individual in this role will also conduct research and development (R&D) to make processed foods safe, palatable, and healthful, and applies food science knowledge to determine best ways to process, package, preserve, store, and distribute food.

*Pipeline recommends the Industry-Sector Technical Competencies as formal training opportunities (provided through related instruction) and the Occupation-Specific Competencies as on-the-job (OJT) training opportunities.

Industry-Sector Technical Competencies

Related Instruction for dual training means the organized and systematic form of education resulting in the enhancement of skills and competencies related to the dual trainee's current or intended occupation.

- **Food production** – Knowledge of techniques and equipment for planting, growing, and harvesting food products (both plant and animal) for consumption, including storage and handling techniques.
- **Food microbiology** – Knowledge of plant and animal organisms that are used for food production and an understanding of their tissues, cells, functions, interdependencies, and interactions with each other and the environment.
- **General chemistry** – Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.
- **Organic chemistry** – Knowledge of the chemistry of carbon compounds.
- **Sensory science** – Understanding of the five senses of taste, smell, sight, touch, and sound, and the impact they have on how people perceive and relate to a food product.
- **Biochemistry** – Knowledge of the chemical and physicochemical processes and substances that occur within living organisms.

- **Food processing** – Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacturing and distribution of food products.
- **Advanced mathematics** – Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications for food science.
- **Engineering and technology** – Knowledge of the practical application of engineering science and technology in the food industry. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- **Food quality and food law** – Knowledge of risk assessment, hazard analysis critical control point (HACCP), quality management and the laws that govern food and drug products sold in Minnesota.
- **Food fermentation** – Knowledge of how microbes can be used to create and/or change the properties of food used in production.
- **Research and development (R & D)** – Know how to research new technology and analyze new scientific information to develop new food products and/or new ways to safely produce food.
- **Physics** – Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic, and sub-atomic structures and processes and how they relate to food production.

Occupation-Specific Competencies

On-the-Job Training (OJT) is hands-on instruction completed at work to learn the core competencies necessary to succeed in an occupation. Common types of OJT include job shadowing, mentorship, cohort-based training, assignment-based project evaluation and discussion-based training.

- **Analyze risks and perform troubleshooting** – Know how to analyze information and evaluate results to choose the best solution and be able to think through new ways to solve problems in the food processing facility.
- **Create new food products** – Understand how to use relevant information, research, and input from others in the facility to be able to develop new food products.
- **Document information** – Know how to enter, transcribe, record, store, or maintain information in written or electronic form.

- **Collect data and analyze information** – Understand how to gather data from testing and observations and then be able to interpret how the underlying principles, reasons, or facts can be used to obtain an appropriate result.

- **Develop and implement food testing** – Understand how to create tests to study and gather information on the food product and then be able to conduct those tests in the processing facility.

- **Monitor processes, actions, materials, and events** – Know how to monitor and review information from actions taken in the facility, materials, events, or the environment, to detect, assess and address problems and work towards continuous improvement.

- **Ensure compliance with standards** – Understand how to use relevant information and individual judgment to determine whether events or processes comply with food and drug laws, regulations, or standards.

- **Practice personal safety** – Know how to operate tools and equipment in the food production facility in a manner that ensures safe handling and takes steps to avoid accidents and injuries.

- **Interpret and communicate the meaning of information for others** – Be able to translate or explain what information means and how it can be used to improve the food production system at the facility.

- **Estimate the quantifiable characteristics of food products, events, or information** – Know how to estimate sizes, distances, and quantities. Also know how to determine time allocation, costs, resources, or materials needed to perform a work activity.

- **Inspect equipment, structures, or materials** – Know how to inspect equipment, structures, or materials to identify the cause of errors or other problems or defects with the food product.

- **Provide consultation and advice to others** – Be able to provide guidance and expert advice to management or other groups on technical, systems-, or process-related topics. Know how to conduct a wide range of consultation from the sales team to the production floor workforce.

Updated December 2025