

Science of Food Preparation Lab (HNFE 3024) Spring 2025

Final Exam Study Guide

As shown in the syllabus, the final is comprehensive and it's worth 100 out of 700 possible total points, which is 14.3% of your final grade. **It is an in-person exam in our regular classroom (Wallace 244) on Monday, May 12th, 7:45-9:45 am.** (I'm sorry it's so early, but that is the time assigned to our class by VT.) **Please bring your Hokie ID and a pen and/or pencil.** This test will be on paper; not online.

This final is not an open-resource exam. To prepare, please use this study guide and the supporting resources published in our Canvas site. **There will be a combination of multiple choice and true/false questions, a few fill-in-the-blanks, matching, and a few short-answer questions.** Since I would like to share this study guide with you well in advance, I have created this document before working on the exam. **The exam will cover the most important concepts and related terminology that we addressed during our weekly lectures and then applied in our food lab.**

If you are accommodated for extra-time and/or a reduced-distraction environment and we have not yet scheduled your final exam, please email me, Nicolin, as soon as possible at ngirmes@vt.edu. Thank you.

If you have questions, please use the **Canvas Discussion board** that we have created for this exam or email me, Nicolin (ngirmes@vt.edu) or my two GTAs: Brad (brhorton@vt.edu) and Jamie (jamieliang@vt.edu).

[As you may know, I will be in Columbia on Friday, May 9th - Sunday, May 11th for my daughter's graduation from the University of South Carolina, so I will not be able to respond to your email and/or discussion post as quickly as I would like. You may also want to study with one or more HNFE 3024 classmate, like your lab partner or anyone else. "Quizzing each other" is a great way to learn and apply the content and skills we covered in this course. 😊

As you review each content area, please focus on the major principles and concepts related to food preparation and food chemistry. Don't worry about the detailed information that was part of each unit. When it comes to ingredients or food components, think of their structure/chemical composition and how this relates to their function in the food product which in turn determines and predicts the quality attributes and sensory characteristics of that food. That has been the foundation for HNFE 3024's content and it has served as the organizational structure of each unit. Recall that in the main HNFE 3024 units (carbohydrates, proteins, lipids), we first reviewed the molecular organization/level, then we looked at how this impacts the structure and function of that food component (or key ingredient) and how this in turn affects the food product's characteristics. We then applied this content in the lab, where we made the food product; assessed it visually as well as by tasting it (whenever possible); and sometimes we also took objective measurements to compare the results of different treatment methods or different key ingredients (e.g., Splenda vs. sucrose yellow cakes; chocolate cake batters' pH manipulation; nigari vs. vinegar to make tofu).

Below are the terms and concepts that are important to know. I've put them in the same order as they appear in your syllabus/weekly course schedule. I'm giving you this study guide as a Word document so that you can easily rearrange the order of the terms/concepts and can insert definitions, notes, (etc.). If you know, understand, and can apply everything that is in this document, you will be well prepared. Please keep in mind that I have not listed each ingredient-substitution that we made and each type of recipe that we explored. It would make this study guide too long. While you don't need to worry about memorizing everything we did in the lab and why we did it, I do recommend that you reflect on your lab work (i.e., the kitchen assignments) as you utilize this study guide and prepare for the exam.

All of this information is located in the respective Modules of your Spring 2025 HNFE 3024 Canvas site:

Week 1 Lecture: 1/20/2025 - No Lecture (MLK Day)

Week 1 Lab: There was no in-person lab. Instead, you read/signed/submitted several documents on Canvas to prepare for the lab orientation and our food labs this spring.

Week 2 Lecture: 1/27/2025

We covered the general outline of this course, including the labs.

- Introduction of the syllabus and course design/organization
- Introduction of GTAs and course instructor

Week 2 Lab: Orientation/Background Information

- Orientation & Cleaning/Sanitation Procedures - Know the basics as described in the "Food Lab Cleaning & Sanitation Procedures" and the "Food Lab Conduct & Guidelines" documents. This is hopefully intuitive since you have practiced these guidelines throughout the semester including our composting procedure. The documents are located in the Module "HNFE 3024 Lab Week 2".

Week 3 Lecture: 2/3/2025

- Background information related to "food selection and food preparation".
- Food Supply Chain (Farmer >> Processor >> Distributor >> Retailer >> Consumer)
- Trends in Food and Nutrition (recall the "mega trends": 1) Weight Wellness & Metabolic Health; 2) Fragmentation of Health Beliefs (due to social media platforms and social media influencers, as well as a growing mistrust of government institutions); 3) Naturally Functional (less UPF); 4) Food Sustainability (including the intersection between human health and planetary health)
- The 4 main categories of foods' sensory characteristics (aroma, flavor, texture, and appearance)
- The 5 primary tastes
- Examples of objective evaluations of foods and food products

Week 3 Lab: Knife Skills

- Chef Moritz from VT Dining Services demonstrated knife skills, including different cuts, etc. You don't need to study anything from this lab since it was designed to assist with practicing basic culinary skills which you've been applying in our food lab throughout this spring.

Week 4 Lecture: 2/10/2025

- Volume vs. weight (and why this distinction is so important in the context of measuring ingredients accurately, especially when baking something)
- Demo of measuring techniques for different dry and liquid ingredients
- Unit conversions
- Water temperatures including boiling point definition and considerations (Know the boiling point temperature in Blacksburg and how this affects cooking, canning, etc.) How can the boiling point temperature of water be raised significantly?

Week 4 Lab: Honing Measuring Skills through Baking

- Measuring skills - be able to describe proper measuring techniques to measure ingredients like flours, sugars, fat, and other dry or liquid ingredients. Know which method and which utensils to use in each case.

- Know why it is so important to measure accurately and precisely when it comes to baking (rather than cooking, where correctly measuring is not nearly as important, or perhaps not even needed).
- Equivalent units - know how to convert teaspoons (tsp.) into tablespoons (Tbs.), cups, pints, quarts, gallons, etc.
- Water temperatures - What is the temperature of water when it simmers; when it's "lukewarm"; comes to a gentle boil or a vigorously boil? Refer to page 7 in your lab manual and resources provided in the Module "Week 4 Lab". Be able to explain what the boiling point is, including the relationship between vapor pressure and atmospheric pressure, and why the boiling point temperature in Blacksburg is 208-209 degrees Fahrenheit instead of 212 degrees Fahrenheit, which is the official boiling point temperature at sea level.

Week 5 Lecture: 2/17/2025

- We covered "Food Safety, Food Preservation & Canning".
- Temperature danger zone - what is the actual range and what does it mean?
- Types of microorganisms in foods (mold, yeast, bacteria, viruses)
- Prebiotic vs. probiotic
- Low-acid foods [pH of food is ≥ 4.6 , which makes the food a "time and temperature control for safety (TCS) food" because pathogenic bacteria can grow/replicate more rapidly and spoil the food; be able to give examples of foods that are low-acid foods]
- High-acid foods (pH of food is <4.6) - these foods can be processed safely using a boiling water bath. This is why we used fruits to make jams, jellies and fruit preserves in our canning lab, as all of these foods are considered to be "high-acid foods".
- 4 simple steps for food safety (clean, separate, cook and chill)
- Don't worry about knowing the 12 different pathogenic microbes.
- Canning - what is "canning" and what's the purpose of canning?
- 4 factors that determine the "processing time" (size of jar, type of jar/container, type of food and density of food, type of packing method: raw vs. hot)
- What determines the "processing process" (i.e., whether we can use a "boiling water bath" or need to use a "pressure canner")?

Week 5 Lab: Food Preservation through Canning & Blanching/Freezing

- What is "headspace"?
- Why did we add 5 additional minutes to the processing time for each of the recipes that we "processed" or "canned"? (We made canned pears, apples, strawberry jam and grape jelly.)
- What was the purpose of the "Fresh Fruit" (ascorbic acid) that was added to the water where we submerged the peeled, sliced apples or pears? [Hint: Think of "polyphenol oxidase enzymes".]
- Why did we add lemon juice to the sugar-water solution that was used for the "hot pack method" of canning our apples and pears?
- Differentiate between the hot pack and raw pack method
- What is pectin and how was it used in the jam and jelly recipes?
- How does the size of the saucepan (i.e., surface area) and the duration of heating/boiling the grape juice solution affect the viscosity of the light grape jelly?
- What is blanching and why are vegetables typically blanched before freezing them?

Week 6 Lecture: 2/24/2025

- We covered "Part 1 - Overview of Sugars & Carbohydrates".
- Monosaccharides, disaccharides, polysaccharides