

## COURSE UNIT PLAN

**Title of Unit:** Food Chemistry – Simple CHO's  
**Curriculum Area:** Food Science I

**Grade Level:** 11  
**Time Frame:** 3 weeks

### DESIRED RESULTS

Common Core State Standards	College and Career Readiness Standards
<p><b><i>What standards are you specifically targeting in this lesson?</i></b></p> <p><b>LITERACY</b>  <u>RST.1.</u>            Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.</p> <p><u>RST.3</u>            Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p> <p><u>L.7.3a.</u>            Choose language that expresses ideas precisely and concisely, recognizing and eliminating wordiness and redundancy.</p> <p><b>MATH</b>  <u>S-IC.5</u>            Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.</p> <p><u>NQ.1</u>            Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p>	<p><b><i>What standards are you specifically targeting in this lesson?</i></b></p> <p>Creativity, critical thinking, communication and coloration.</p> <ul style="list-style-type: none"> <li>• Has a focus on creativity, and innovative problem solving and creative thinking used to formulate sound judgement, to communicate and collaborate to accomplish task and develop solutions.</li> <li>• Apply appropriate academic and technical skills.</li> <li>• Employ valid and reliable research strategies.</li> </ul> <p>Information, Media and Technology</p> <ul style="list-style-type: none"> <li>• Has a focus on information and media literacy to improve productivity, solve problems and create opportunities.</li> </ul> <p>Career Development</p> <ul style="list-style-type: none"> <li>• Has a focus on personal and social, academic, career content and employability skills.</li> <li>• Work productively in teams while using cultural/global competence</li> </ul> <p>Leadership            Has a focus on applying leadership skills in real-world, business and industry applications</p>

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<p>SCIENCE <u>SCI.CC2.h</u> Students understand empirical evidence is required to differentiate between cause and correlation and to make claims about specific causes and effects. They suggest cause and effect relationships to explain and predict behaviors in complex natural and designed systems. They recognize changes in systems may have various causes that may not have equal effects.</p> <p><u>SCI.SEP3.A.h</u> Students plan and carry out investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models</p> <p><u>SCI.PS1.B.h</u> Chemical processes are understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.</p> <p>CAREER &amp; TECHNICAL <u>WCCTS 4C1.a.9.h</u> Apply past experiences to current problems in developing innovative solutions.</p> <p><u>WCCTS LE1.b.7.h</u> Capitalize on team members' individual talents and skills in a project.</p> <p><u>ANFR FPP3.a.16.h</u> Explain how the chemical and physical properties of food influence nutritional value and eating quality.</p>	
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<p><u>ANFR FPP3.a.19.h</u> Formulate and explain incorporation of food additives into food products</p>	
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<b>Understandings/Knowledge/Skills</b>	<b>Essential Questions</b>
<p><b><i>What do you want students to understand, know, and/or be able to do at the end of this unit?</i></b></p> <ul style="list-style-type: none"> <li>• Understand sweetness equivalents and use mathematical concepts to reformulate foods to incorporate specific guidelines.</li> <li>• Distinguish between mono and di saccharides and understand the chemical reactions of hydrolysis and dehydration that causes them to interact in foods.</li> <li>• Compare and contrast alternative sweeteners and how they are used in the food industry.</li> <li>• Utilize proper procedures to encourage or prevent enzymatic and non-enzymatic browning in foods.</li> <li>• Produce candy-using principals of temperature elevation and solubility to get the desired end product.</li> </ul>	<p><b><i>What questions will foster inquiry, understanding, and transfer of learning?</i></b></p> <ul style="list-style-type: none"> <li>• What is the difference between sugar &amp; honey?</li> <li>• How is sugar utilized by the body?</li> <li>• What is Stevia? Sucralose? Are they sugars? Why do products that use these sweeteners have less calories?</li> <li>• Are artificial sweeteners “bad” for you?</li> <li>• What is “high-fructose” corn syrup? Why do companies advertise “no high fructose corn syrup” on their products? Is there something wrong with it?</li> <li>• What is hidden sugar?</li> <li>• I brown sugar better for you than white sugar?</li> <li>• Does sugar cause obesity and diabetes?</li> <li>• Why does meat turn brown when you cook it? Why does an apple turn brown after you bite into it? Same reaction?</li> </ul>

### ASSESSMENT EVIDENCE

<b>Performance Task</b>	<b>Other Evidence</b>
<p><b><i>What criteria will you use to assess the levels of mastery?</i></b></p> <ul style="list-style-type: none"> <li>• Students will build models of monosaccharides and demonstrate the dehydration reaction that occurs by working with another group to create a di-saccharide.</li> <li>• Based on their knowledge of sugar concentration by heat,</li> </ul>	<p><b><i>Tests, quizzes, independent practice, journals, formative assessments, etc.</i></b></p> <ul style="list-style-type: none"> <li>• Think Cerca – Persuasive Essay</li> <li>• Written Tests – Multiple Choice, TorF, Essay</li> <li>• Computer Based Tests – Quiizz.com</li> </ul>

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<p>students will create various types of candy.</p> <ul style="list-style-type: none"> <li>Students will demonstrate their understanding of alternative sweeteners, by modifying a recipe to reduce the sugar content, while maintaining the desired characteristics of the product.</li> </ul>	<ul style="list-style-type: none"> <li>Research Project – Alternative Sweeteners</li> </ul> <p><b><i>How will students reflect upon and self-assess their learning?</i></b></p> <ul style="list-style-type: none"> <li>Students will record their experiences in their AET record books. Students will complete chapter review exercises.</li> </ul>
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### LEARNING PLAN

Focus of the Week	Learning Activities	Assessments (Formal and Informal)
<p>Mono &amp; Di Saccharides</p>	<p>Interest Approach – Discussion of High Fructose Corn Syrup. What do students know about it? What have they heard about it? Simple explanation and diagram of mono and di saccharides to show the difference.</p> <p>Conduct lab to determine whether foods have mono or di-saccharides (qualitative). Samples could include milk, sugar water, honey water, High Fructose Corn Syrup, regular corn syrup, maple syrup, cookies, bread.</p> <p>Reading Assignment – Principles of Food Science, Ward, 3<sup>rd</sup> Edition, pgs. 210 – 233 Prepare 2 column notes as reading.</p> <p>Lecture Discussion – Power Point Reteach concepts scoring poorly on</p>	<p>Labs will be graded for accuracy of technique and questions graded for understanding.</p> <p>Check for completion of 2 column notes</p> <p>Multiple Choice Quiz to check for understanding</p> <p>Quizizz.com – quiz to check for comprehension.</p>

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<p>Alternative Sweeteners</p>	<p>Quizzes.</p> <p>Lab – Building CHO's – Students will work in groups of 2 to build monosaccharides and then join with another group to form a disaccharide through dehydration reactions</p> <p>Think Cerca – “Is Sugar Really that Bad for You” Write evidence-based opinion piece after completing the reading.</p> <p>Discussion: Why do we need alternative sweeteners and what types are available?</p> <p>Handout: Relative Sweetness and Chemical Formulas of common artificial sweeteners (saccharin, sucralose, aspartame, etc.)</p> <p>Alternative Sweetener Research Project: Students will work in groups of 3 to prepare a slide show to present to the class containing the following information about their assigned sweetener:</p> <ul style="list-style-type: none"> <li>• Name and Chemical Structure – Does it resemble a carbohydrate, protein, fat or none of the above. Is it an artificial sweetener, a sugar alcohol, a Novel sweetener, or a natural sweetener?</li> <li>• History – When was it discovered? How? By whom? When was it first</li> </ul>	<p>Models and worksheets graded for accuracy and understanding.</p> <p>Essays graded using Reading comprehension/writing rubric</p> <p>Project graded using the Informational Presentation Rubric.</p>
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<p>The Role of Sugar in Foods</p>	<p>used in foods? What foods? Is it still used in foods? Approved or banned?</p> <ul style="list-style-type: none"> <li>• Sweetness equivalent compared to sucrose, Kcal/g.</li> <li>• Pros &amp; Cons – List at least 2 of each. How does it react in foods? Can it withstand baking? Freezing? What happens to it in the body? Who could benefit from using it?... anything else that comes up in your research from REPUTABLE sources!!!</li> </ul> <p>Sugar Cookie lab – Students will test alternative sweeteners to see if they can produce an acceptable end product and reduce the calorie content of a cookie enough to make it worth it.</p> <p>Video- Enzymatic and non-enzymatic browning, CHO role</p> <p>Handout: The Science of Candy – technical explanations of how sugars are manipulated through heat, pH or physical processes to produce various types of candy such as caramels, fudge, taffy, fondant, and hard candy.</p>	<p>Students will sample all recipes and complete a data chart rating the taste, texture, and appearance of each. Data charts will be checked for completion.</p> <p>Quizzes to check for understanding of reading.</p>
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	<p>Candy lab – Students work in groups to produce various types of candy.</p> <p>Product Development Lab – Based on the results of their previous labs and information they learned during the unit, students will work in groups to modify a recipe of their own choosing to:</p> <ul style="list-style-type: none"> <li>• Reduce the amount of sugar in a recipe using a blend of natural and artificial sweeteners</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Change the type of sugar used to satisfy the “natural” trend in the food industry.</li> </ul> <p>Review of unit</p>	<p>Product graded for accuracy. Students' whose candy does not come out as expected, must complete a scientific analysis to explain their results. Students must turn in the original recipe, the modified recipe and an explanation of what they did and why. These products will be judged by a panel of 3 food “experts” who will rate them on characteristics of taste, appearance, creativity, and nutritive value.</p> <p>Students will complete review sheets using notes and “hints” from classmates.</p> <p>Written Exam – Multiple Choice, TorF, Essay, Problem Solving</p>
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