	SINGLE SUBJECT CREDENTIAL PROGRAM **SCIENCE LESSON PLAN TEMPLATE Revised 4.15**

For directions on how to complete this form, see EDSC Lesson Plan Directions and Scoring Guide in the SSCP Handbook at www.sscphandbook.org.

Name	CWID	Subject Area
Survivors		Biology

Class Title	Lesson Title	Unit Title	Grade Levels	Total Minutes
Biology	Eating to Stay Alive	Surviving the Extreme	9-10th grade	45 minutes

Next Generation Science Standards	Common Core State Standard Connections
HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	CCSS.ELA-LITERACY.RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).

Lesson Objective(s)	Evidence
Using their models, SWBAT demonstrate how the digestive system and the circulatory system interact and affec each other	Poster/drawing/model of the digestive and circulatory system interacting with detailed descriptions of how thi is accomplished. Graded formative assessment

Type	Purpose/Focus of Assessment	Implementation	Feedback Strategy	How Informs Teaching
EL	**Assess prior knowledge by what the student contributes to the model design**	**Teacher walks around the room, listens to what student is contributing, all notes are given to the student beforehand, videos with subtitles in Spanish. Student is grouped with another student who is proficient in English and hopefully can communicate with them in their native tongue**	**informal, verbal, rubric**	**The teacher uses slowed speech. Directions are given verbally and in written form.**
SSN	**Teacher assesses knowledge by their contribution to modeling**	Student works with a group who will demonstrate patience and tact	informal, verbal, rubric	Teacher gives students notes and sentence frames for writing.

Instructional Strategies		
Student-centered modeling, students are interacting and engaging in content while making sense of their prior knowledge, project-based learning		
Lesson Introduction/Anticipatory Set		
Time	**Teacher Does**	**Student Does**
10 min	Day 1 1. The teacher will greet each student as they come in and learn about their personal lives. After the bell rings, the teacher will play a Youtube clip (https://youtu.be/9Wmn-U01b_Q) about Haitian earthquake survivor. After the video, the teacher will facilitate informal, open classroom discussion of the video. 1. What country did the earthquake occur in? 2. Who did they find? 3. How long was she there? 4. Why was it so amazing that she survived for so long? 5. How did she survive (and the other survivor too)? 6. How long can a human survive without water? The teacher does not have these questions on the board, but is trying to approach this phenomenon in the most organic way. The answers are written on the board as the students respond. 2. The teacher puts students into groups of 4 if the tables are not already that way and then poses the question, "When you think of someone who survived for this long, what do you think are the biggest problems they encountered to survive?" Students work with their groups/partners to write everything down. The teacher writes EVERYTHING on the board by calling on each group to give ONE PROBLEM AREA until there are no new problem areas and then says, "These are all serious potential problems. This week, we will focus on food and water." 3. The teacher introduces the objective. "Our objective for this week is "Using their models, SWBAT demonstrate how their digestive and circulatory systems interacts and affect each other."" 3. DRIVING QUESTION FOR THE WEEK: How does your body gain nutrition from the external environment? Day 2 The teacher will place 2 crackers on each student's desk before the class begins. This will be part of a demonstration to introduce the concept of digestion. It will also serve as an anticipatory set to focus on students' attention and allow students to become physically and mentally ready for the lesson. This demonstration is to show how saliva does 2 things: 1. How saliva breaks apart the bonds holding the cracker together	1. Students enter the room and sit at their assigned seats. During the video, they are engaged. After the video, students respond openly to the questions. 1. 1.What country did the earthquake occur in? 2. Who did they find? 3. How long was she there? 4. Why was it so amazing that she survived for so long? 5. How did she survive (and the other survivor too)? 6. How long can a human survive without water? 2. Students work in groups and write down their answers on a paper. When it is their turn to answer, they answer with one of the issues that have not already been shared by another group. Hopefully students groups will respond to the last questions with food and water, but probably with other answers as well (like excretion) Day 2 Students complete a lab activity using crackers, where they investigate how saliva works with the digestive system. Once students are seated, they will see the 2 crackers on their desk and become instantly curious. The students are instructed to not eat it right away. The students are to place one cracker into their mouths and chew. Students are to write down what it tastes like. Then students are to place the second cracker in their mouths and leave it in their for 90 seconds before chewing. Students are to write down how the cracker felt and tasted initially compared to how it felt 90 seconds after. They should answer the question: How did the textures contrast? The teacher will facilitate classroom discussion to explain their observations while eating the 2 crackers. Students are to talk about their individual observations and are guided by the teacher towards the topic of digestion. The students learn misconceptions of the digestive system. Students show their prior knowledge during the discussion and allow the teacher to see whether the lesson needs to be modified (e.g. pacing, areas of weakness). The students are able to connect the activity to real world applications, making the

	2. How saliva mixes with the food to make it easier to swallow and digest. Once students are seated, they will see the 2 crackers on their desk and become instantly curious. The teacher will inform the students to not eat it right away. The teacher will then instruct the students to place one cracker into their mouths and chew. Teacher will ask students to write down what it tastes like. For instance, was it sweet, salty, plain, hard, soft, etc. The teacher will then ask the students to place the second cracker in their mouths and leave it in their for 90 seconds before chewing. Teacher will again ask students to write down how the cracker felt and tasted initially compared to how it felt 90 seconds after. How did the textures contrast? The teacher will facilitate classroom discussion to explain their observations while eating the 2 crackers. The teacher will allow students to talk about their individual observations and guide them towards the topic of digestion. The teacher will use this time to also clarify any misconceptions of the digestive system. During this discussion, the teacher can check for depth of prior knowledge and gauge whether lesson plan needs to be modified (e.g. pacing, areas of weakness). It also serves as an activity that can be connected to real world applications, making the lesson more meaningful for the students. The discussion serves as a tool to transition to the driving question of the day: **How does my body break down food?** http://www.teachwithfergy.com/the-crackers-bread-in-a-bag-digestive-system-demonstrations/ Day 3 The teacher will instruct the students to get back into their same flexible grouping as day one. With what the students learned from day 2, the teacher will allow time for the students to utilize their newly acquired information to revise initial models. Students should begin to make connections between the digestive system and how the Haitian survivor would live through so many days without food and limited water. As the groups work on revising their models, the teacher will walk around the classroom to check for understanding and clarify any confusion. The teacher can use this time to focus on English learners and students with learning disabilities. After the students have finished revising, the teacher will reinforce the anchoring questions:	lesson more meaningful for them. The discussion serves as a tool to transition to the driving question of the day: **How does my body break down food?** http://www.teachwithfergy.com/the-crackers-bread-in-a-bag-digestive-system-demonstrations/ Day 3 students revise their initial model of the digestive and circulatory system interactions Day 4 Students are greeted by the teacher and directed to the opening question for the day: Describe homeostasis. students are given 4 minutes to respond in their notebooks. The students participate in a class discussion sharing their response of definitions and descriptions of homeostasis. The teacher writes their responses on the board to assist students that struggling with finding meaningful words to describe homeostasis. Day 5 Students are greeted by the teacher. Students are then numbered 1-6, and grouped together so that a person of each number is represented in each group. The teacher rolls a die to choose a numbered student, and the whole group works together to come up with a response to the question. the teacher rolls the die again and the corresponding numbered group is the one that responds. The students must prepare answers for the following questions: Describe the portion of digestion happening in the stomach. Describe the brain's role in feedback mechanisms to maintain homeostasis. At what points does the circulatory system and digestive system interact?

	How did the Haitian survivor live 15 days without any food and water? The teacher will facilitate classroom discussion to have students make connections of what they learned to a real world event in order to make the learning more meaningful and engaging for the students. The teacher will use the discussion to gauge the comprehension level of the class and will use that to adjust teaching strategies. Day 4 The teacher greets students as they enter the classroom. After the bell rings, the teacher directs students to the opening question of the day written on the board or projected onto the screen: Describe homeostasis. The teacher allows time for the students to write in their notebooks. After about 4 minutes, the teacher facilitates a classroom discussion. Students share examples of homeostasis or define it. The teacher aids students who may be struggling with putting meaningful words down on their paper by writing down bits of what students shared to create a class consensus description of what homeostasis is. Day 5 The teacher greets students as they enter the classroom. After the bell rings, the teacher organizes a quick numbered heads game. In this game, students are numbered between 1 and 6. Students are then grouped together in groups of 6 (each group contains someone numbered 1-6). Each group is given a number. Teacher rolls the die, the persons numbered with that number prepare a response to the question. Everyone in the group help their person prepare to respond. The teacher rolls the die again. The person from that group number responds. Questions: Describe the portion of digestion happening in the stomach. Describe the brain's role in feedback mechanisms to maintain homeostasis. At what points does the circulatory system and digestive system interact?	
Lesson Body		
Time	**Teacher Does**	**Student Does**

25 min	Day 1 The teacher passes out a handout with two separate organ systems - the digestive system and the circulatory system. The teacher says, “We all know that the body gains nutrition from food. How does this happen? The teacher will give each group a large piece of paper and gives minimal instructions to the students to draw out all the areas they know of of how these two systems interact. The teacher walks around the room to check for understanding, to monitor work, and to further engage the students in the assignment. Sample questions 1. Explain what is happening 2. Explain why you think that way 3. What is happening here? Questions must be kept very general where the students are explaining. The teacher is NOT hinting or giving any type of instruction. Day 2 The teacher will use a powerpoint presentation with several video clips to teach the process of the digestive system. The powerpoint presentation will appeal to the 4 types of learners: auditory, visual, kinesthetic, reading/writing. The presentation will give students a detailed map of the process of digestion from start to finish. The digestive system powerpoint will include each of the major digestive tracts: mouth, throat, esophagus, stomach, small intestine, large intestine, rectum, anus. During each digestive tract, the presentation will be paused and students will engage in cooperative learning, specifically they will be using think-pair-share. They will work in pairs to go over what they learned from each section and answer a question or 2 provided by the teacher. For example, the question for the section on the esophagus will be “explain peristalsis”. It is important that the questions are ambiguous and open-ended enough to generate discussion. The teacher will also ensure that students with learning disabilities or English learners be paired with students that are proficient in both science and English. Students with learning disabilities will benefit from this as more proficient students will keep them on pace with the lesson and explain any questions they will have. Also, by working in groups, the students with disabilities will have opportunities to teach and reinforce the learning content which will lead to better understanding of the material. English learners will benefit from working with proficient partners in English and science as they will be able to stay on pace with the lesson. They can ask their partners to explain key terms or main ideas of the lesson. The teacher will give English learners a journal to write in key vocabulary	Day 1 Students work in groups to model at the microscopic cellular level of how the circulatory system and the digestive system work together. Students engage in conversations together as they try to model their understandings of this specific interaction. They try to explain to each other and to the teacher their reasoning behind their models. Students answer questions teacher poses. Day 2 Students are to pay attention to a Powerpoint presentation lecture that incorporates auditory, visual, kinesthetic, and reading/writing types of learning. The presentation teaches the process of the digestive system. Students will see each of the major digestive tracts: mouth, throat, esophagus, stomach, small intestine, large intestine, rectum, anus. During each tract, the lecture will be paused and students will participate in cooperative learning techniques, by conducting a think-pair-share. They will think about what they just learned and then pair up to discuss the question posed by the teacher. Students with learning disabilities or English learners be paired with students that are proficient in both science and English. English learners can ask their partners to explain key terms or main ideas of the lesson. English learners are given a journal to write in key vocabulary in both languages. They would also be able to write down any questions that they may have or any main ideas of the lesson. There will be a pause and break imbedded in the lecture in order for students to have time to process the information and better be able to retain it. At the end of the lesson, students will listen to the teacher reiterate the important ideas, and participate in a discussion about them, as well as ask any underlying questions. Day 3 Students will complete a kinesthetic simulation game showing how the body systems work to assist with homeostasis. Students will represent parts of the systems in relation to insulin production. students will be given a “monomer” to represent the passing along of the digestive system and usage of insulin. Day 4 Students will take out their notebooks and write about the digestive and circulatory systems from the lecture/pictoral. Students will remain engaged and answer questions from their partners and prompts the teacher provides. Students will remain engaged in their note taking. Day 5 Students will work in their original groups and use their newly obtained evidence from the activities and create a

	in both languages. They would also be able to write down any questions that they may have or any main ideas of the lesson. The use of the journals will improve academic language, which will translate to better understanding of the lesson. The teacher will pause during each part of the digestive system to help student retention and to reinforce main ideas during the break. As students work in pairs, the teacher will walk around the classroom to check for understanding. The teacher can also use this time to help with English learners or students with learning disabilities. At the end of the power point presentation, the teacher will quickly go over main ideas of the lesson. Teacher will facilitate classroom discussion to go over any confusion of the content and to have students reinforce main points. Teacher can check for understanding and also determine if the teacher needs to adjust learning pedagogy. Teacher will determine if they need to change pacing of the lesson or focus on areas of weakness. Day 3 To prepare for the lesson activity, the teacher will create "game pieces" to replicate the human digestive system. It will also lightly introduce the circulatory system as well. This activity will help students understand how the human body digest food regulates blood sugar levels. The driving questions of this activity are: 1. What happens in our bodies after we eat? 2. What types of nutrients are in those foods? The teacher will briefly go over the previous lesson and reinforce the digestive system. The teacher will also explain the importance of glucose in relation to the production of ATP. A flowchart outlining the feedback loop mechanism of blood sugar will be presented to the students. Students will be asked to identify the following: stimulus, receptor, integrating center, effector, and response to increase/decrease in blood sugar. The teacher will then engage students in a kinesthetic learning activity in which the class imitates a human body and goes through homeostasis. Students are divided into groups and given a piece of paper with a specific structure or a function.	final revised model/poster presentation of the relation and interaction between the circulatory and digestive systems. They will verbalize with each other their ideas and do their best in portraying their ideas in their models.

	The teacher will instruct the students to line up from chronological order to set up the process of homeostasis. The order will go as follows: 1. The group representative the mouth will be given a polymer of starch. They will be informed to tear it in half and give the halves to the stomach. 2. The stomach will then break the remaining pieces into monomers and pass them to the small intestine. 3. The small intestine passes the glucose to the circulatory runners. 4. The circulatory runners will around the room. 5. The pancreas will count out how many runners pass with glucose until there are 5. 6. The beta cells will deliver insulin to circulatory runners without glucose. 7. The insulin runners will then pass their insulin to the target cells (brain, liver, muscle). 8. When the target cells have the insulin, they can take glucose from the glucose runners. 9. The pancreas will call out "stop insulin production" when there are no more glucose monomers to be passed This kinesthetic activity will be very engaging and fun for students. Because it has a game-type feel to it, it might be easier for students to comprehend the learning content. Students will be engaging in inquiry-based learning as they critically think through the different phases of the process. During the activity, teachers will be able to check for understanding by observing if students are able to identify the different parts of the process. Also during the activity, the teacher will mainly be observing and embracing more of the facilitator role, only helping when students need assistance. The teacher will determine level of comprehension and use it to change individual pedagogical strategies. http://outreach.mcb.harvard.edu/teachers/Summer09/KarynCoulon/TeacherNotes.pdf Day 4 The teacher lectures on the circulatory system using Powerpoint or other visual device. The teacher instructs students to write down notes in their notebook. She shows a picture of the circulatory system and begins the lecture by stating, "Homeostasis is regulated, or monitored, and controlled by the circulatory system." The teacher will use a pictoral to allow students to visualize the lecture as the teacher speaks. The teacher will talk about parts of the circulatory system (heart, arteries, veins, blood and its components) and about the function of the circulatory system and its organs (pumping blood, transport nutrients, hormones, wastes, immune cells). As the teacher	

	lectures, the teacher will allow for time for students to reiterate what they just heard and learned from her. They will turn to each other to answer questions like, “What is the function of the heart?” and “What types of substances does the circulatory system transport?” The teacher will then lecture on the interaction of the digestive system and the circulatory system. Specifically, the teacher will talk about the brain’s role in collecting information from all parts of the body about what the body needs (water/dehydration, food/blood sugar). The teacher will talk about the messages and hormones the pancreas and kidneys send to the brain to make us hungry and thirsty. The teacher will lecture on how different energy sources (lipids, carbohydrates, protein) provide different amounts of energy. Day 5 The teacher assigns the students to create a final model representing how the circulatory system and the digestive system work together. Students are working in the same group as Day 1. The main components the teacher would like to see are how the circulatory systems gains nutrients from the small intestines, water from the large intestines, the kidneys and pancreas’ role in sending messages to the brain to influence decisions. The teacher will walk around the room and this time will try to stimulate the students’ memories by asking questions about the various activities of the week that would allow for a more full and complete picture. Questions like, “Remember the game from two days ago? How can you incorporate that into your model?” or “How does your model show where the circulatory system picks up water and filters it?” Students will be asked to verbalize what they are drawing.	

Lesson Closure

Time	Teacher Does	Student Does
10 min	Day 1 The teacher gains the attention of the students. The teacher informs the students that the mini presentations are about to begin. The teacher instructs the students to take notes on aspects that other groups have that their own group does not have. Groups are given about a minute each to point out important elements in their models. Day 2 The teacher will then engage students in an exit slip strategy in which students write in sticky notes to answer the following: Exit slip: What is your favorite food? Does your food require a lot of physical breakdown in your mouth. Defend your reasoning	Day 1 the students will get settled and quiet in order to listen to the mini presentations. students are to take notes on the details that their own groups do not have in their presentation. groups are given about a minute to present the important elements of their model. Students present their models in a concise and clear way. The students take notes on their peers’ models. Day 2 Students are to complete an exit slip prior to leaving class, where they answer the questions: What is your favorite food? Does your food require a lot of physical breakdown in your mouth. Defend your reasoning Day 3

	Students will write their responses and stick it on white board before leaving classroom. The teacher can use the responses to check for understand and to adjust individual pedagogical strategies. Day 3 The teacher will go over lesson and reinforce main concepts. If any misconceptions persist, the teacher will clarify and direct students to further understanding of the learning content. The teacher will instruct students to engage in an exit slip strategy before leaving class. Students are to critically think through the following question: Exit slip: What role did you play in the game and why were you important? Day 4 The teacher will have students write a paragraph on the types of food they mostly eat and how their body gains energy from those food sources. For students who have difficulty in writing, the teacher will provide the following sentence frames. Generative sentences: 1st sentence. I get the most energy from _____ 2nd sentence. This food is considered a _____ (carb, protein, lipid) 3rd sentence. Sentence has 7 words and starts with "Contrary" and contains the word "energy." 4th sentence. Sentence has 12 words and starts with "Despite the fact" and has the word energy in it. Day 5 Students are to write answers to exit questions. What types of food would you recommend an individual who is trying to lose weight versus someone who needs to gain weight?	Students are to complete an exit slip after ther cracker activity, answering the question:What role did you play in the game and why were you important? Day 4 students are to complete a writing using the sentence frames: 1st sentence. I get the most energy from _____ 2nd sentence. This food is considered a _____ (carb, protein, lipid) 3rd sentence. Sentence has 7 words and starts with "Contrary" and contains the word "energy." 4th sentence. Sentence has 12 words and starts with "Despite the fact" and has the word energy in it. Day 5 students discuss what food they would recommend to an individual who is trying to lose weight versus someone who is trying to gain weight. They will write their answers on their exit slip.

Instructional Materials, Equipment, and Multimedia
Powerpoint lectures, computers, colored pencils and writing utensils, poster paper, activity handouts, crackers
Co-Teaching Strategies

English Learners	**Striving Readers**	**Students with Special Needs**	**Advanced Students**

Students will be given a handout with simple and clear instructions on the days assignment. Also, we are utilizing flexible grouping to accommodate the strengths and weaknesses of all students.	There is no reading in this lesson. We are focusing on speaking and listening. Also, we are utilizing flexible grouping to accommodate the strengths and weaknesses of all students.	Students will be working in groups. Students who do not want to work in groups can work on their own. They must present to the class or one-on-one with the teacher. They must remain engaged and take notes when other students are presenting.	Students are challenged to access their prior knowledge in a meaningful way to communicate their knowledge. Also, we are utilizing flexible grouping to accommodate the strengths and weaknesses of all students.