COURSE OUTCOMES

SCIENCE-6

(June 2011)

The Science 6 course is designed for the 6-Year-Old Class. This course is designed for the student who has mastered the Elementary Science-5 Essential Units or the equivalent thereof. In this course students will be actively involved in using the scientific process to learn about life science, physical science, and earth science. Essential components and criteria for mastery of the scientific process should include question/problem/purpose, prediction or hypothesis, planning (data collection device), data/observations, claims/evidence/reasoning, conclusions and next steps/new questions.

Children are scientists by nature with inherent curiosity and enthusiasm. This course builds on that interest by combining hands-on experiences, with reflective discussions, reading, writing and drawing. We encourage them to discover new horizons in their learning experiences with a view to nurturing their natural interest in the study of science. We want them to observe, measure, collect, categorize, predict, record, and interpret, emphasizing ideas and thinking.

The normal pace for this course is one unit per quintile, which leads to mastery of the five essential units during the school year. This course is designed to be taught for the equivalent of 15-18, forty-five minute periods per unit. One option would be to alternate the teaching of science and cultural studies so they are not taught simultaneously. The first unit E01 (Investigative Science) is designed to be opened and taught at the beginning of the year and then should remain open all year. This will be recorded as one period a week. The other units would then be recorded as 4 periods a week. There are five essential units that must be taught and two optional selective units. Each unit contains "*Essential Outcomes"*, which are assessed for mastery.

This course is correlated to all "Success Orientations" competencies, and knowledge noted in the Science Program Outcomes. Furthermore, whenever possible the Science-6 course should be integrated with the other courses in the 6-Year-Old curriculum. The teacher can change the order of the units to better align with the rest of the age level curriculum.

The Selective Unit, Science Project/Fair, is intended to be an independent student project that could be used in a science fair at classroom, age or school wide level.

Essential units:

E01 - Investigative Science (to be opened all year)

E02 - My Body

E03 - Dirt, Sand and Water

E04 - Solids, Liquids and Gases

E05 – Magnets-Physical Science

Selective Units:
S01 - Science Project or Fair

S02 - Gardening

Suggested Materials:
Science Companion
2011 Edition, 2004 Chicago Science Group.

Science Companion is correlated with National standards for science and literacy.

More information on following pages……..

The 5E Instructional Model is an effective way to engage students in learning; it provides a format for lessons that builds on what students already know. The 5E's sequence the learning experience so that learners construct their understanding of a concept across time. Each phase of the learning sequence can be described using five words that begin with "E": Engage, Explore, Explain, Extend, and Evaluate. The following chart explains the role of both the teacher and the student within each "E" that it encourages.

Learning Phase	Student's Role	Teacher's Role
Engage/Excite	• Students are introduced to the concept. • Students make connections to prior knowledge and what is to be studied. • Student thinking is clarified. • Students become mentally engaged in the new learning experience.	• Teachers ask questions of students and engage them in the guided inquiry lessons. • They use strategies such as KWL inquiry that create connections between the past and present learning experiences. • Teachers set a level of anticipation.
Explore	• Students explore or experiment at this point. • They engage in observations, use science tools and materials or manipulatives, collect data, and record data.	• Teachers set up the investigation and guide students in inquiry, asking probing questions to clarify understanding.
Explain	• Students verbalize their understandings from the "explore" phase. • They look for patterns in their data, and describe what they observed. • This can be done in small and/or whole groups	• Teachers ask probing questions that encourage students to look for patterns or irregularities in their data.
Extend	• Students expand their learning, practice skills and behavior. • They should make connections or applications to related concepts and in the world around them.	• Teachers provide learning opportunities for students to apply their knowledge and to gain a deeper understanding. • Activities can include reading articles and books, writing, designing other experiments, and exploring related topics on the Internet.
Evaluate	• Students answer questions, pose questions, and illustrate their knowledge (understandings) and skill (abilities).	• Teachers diagnose student understanding through an ongoing process. • Assessment can be both formative (ongoing and dynamic) and summative (end-of-lesson final test or product).

ENGAGE: The idea of "engage" is to get the students excited about and interested in the lesson and learning that will follow. It might be a demonstration, a quick activity, an interesting reading, or maybe even a discussion centered on what the students already know about the topic. The idea is to "engage" the student's curiosity about the topic. The engagement activity can also help the teacher learn what the students already know about a topic and even reveal some misconceptions.

EXPLORE: After the engagement activity, there follows an "explore" activity. The idea of "explore" is to allow the students to experience some of the concepts involved in the lesson. Too much teacher intervention should be avoided. Students will work together to investigate and question the concepts. Through exploration, students begin to develop an understanding of the ideas involved in the lesson or unit.

EXPLAIN: During the "explain" stage, the teacher may provide more information for the students so that they can begin to explain the concepts in more depth and in their own words. The activities during the "explain" stage might involve further discussions, videos, interactive notes, or further reading. The "explain" stage is often what teachers jump to first without doing the "engage" and "explore" stages. Once students have been engaged and have had a chance to explore, they are much more interested in dealing with explanations.

EXTEND: The "extend" or "elaborate" stage is where students apply their knowledge to new situations. Students might do further lab investigations or solve similar related problems. They might carry out projects or get involved in decision-making (bioethical debates, for example). During this stage students are refining and deepening their understanding of the concepts by seeing new applications and perhaps even exceptions.

EVALUATE: In the "evaluate" stage, the teacher assesses the learning that has occurred. Although teachers tend to think of traditional tests, evaluation can take many other forms, both formal and informal. Evaluation may involve lab reports, presentations, or discussions where the teacher is looking for students' ability to apply new concepts and skills. It is valuable to have students evaluate their own knowledge by assessing how well they can apply their learning to related situations.

Integrating Writing in Science

Science is not a collection of facts to be memorized. It is a thoughtful, active process. By encouraging students to write as part of their science lessons, it helps them to think through what they have seen or experienced and remember what they have learned. By giving students an organized way of collecting data, we help them to think in a more logical way. What follows are three templates that can help you give your students a means of expressing the data they have collected.
At the five and six year old level, students should be able to draw a picture of what they are doing and if need be, with the help of a "scribe", explain their thinking. Here are two possible templates to do this:

My prediction	What happened
(The student draws a picture of what he/she thinks will happen.)	(The student draws a picture of what actually did happen.)

Or…
My question/prediction is _____
(This is what you are doing in class.)
(A student drawing would go in the middle of these two sentences.)
I saw _____
(The sentence would be the child's explanation of what happened.)
At the seven and eight year old level, students should be able to write and reason more clearly. Their work in science should reflect their maturity. Here are the steps that children of this age should be introduced to and given guidance in using in their science writing.

1. Question/problem/purpose
   Ideally this should be written in the student's own words in clear language.
2. Prediction
   Student gives a reason or potential explanation for the problem/question.
   I think/predict _____ because _____.
   If _____ then_____ because_____.
3. Observation/data collection
   The student will write about his/her observations (include sensory experiences when appropriate) or draw a picture with labels to show what he/she observed or make a graph.
4. Conclusion
   Today I learned…
5. Reflection (optional)
   I wonder…

At the nine and ten year old level, students are growing in their logic skills and the way they organize science investigations should reflect that. A notebook dedicated to science would be appropriate. Here is a template to guide students through scientific explorations:

1. Focus question
   What is the problem that needs to be solved or investigated?

2. Prediction
   What is the possible solution to the focus question?
   (It must include an explanation.)

3. Gather materials and plan for investigation. (preferably as a team)
   A) What materials do you need?
   B) Who does what? (Assign investigative roles.)
   C) Address safety procedures as needed.

4. How will you collect and display data?
   A) What will your format be?
   B) How many trials will you do?
   C) What data will be recorded?
   D) How will you organize your data?

5. Do the investigation.
   A) Follow the plan your team decided upon.
   B) Collect your data and label your pictures, if one or more picture is included.

6. Analyze the data.
   A) The evidence supported or confirmed the prediction that/because…
   B) The evidence did not support or confirm the prediction that/because…

7. Conclusion (choose one of the following)
   Refer to your focus question and make a claims and evidence statement.
   I claim that…because…
   I claim that …because the evidence shows…

8. Reflection
   A) What did you learn?
   B) What worked?
   C) What did not work?
   D) What would you change?