Science Leaders’ Handbook

A Practical Guide for Science Coaches
Elementary Science Leaders
Secondary Science Department Chairs
(Updated 2015)

Department of Mathematics and Science
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Mission Statement

Vision

Improve science teaching and learning for all.

Mission

Provide high quality science education and empower teachers to deliver instruction that will develop responsible, scientifically literate, globally competitive, life-long learners.

Goals

- Empower teachers to deliver high-quality instruction utilizing pedagogical strategies that effectively allow for the implementation of a standards-based curriculum.
- Provide District-wide scientific curriculum leadership.
- Encourage scientifically rich classroom environments.
- Promote the rigor, relevance, and integration of other disciplines in the science classrooms.
- Involve the community, businesses, universities, informal science institutions, and parents in supporting science competence throughout the District.

Underlying Principles

- We foster instructional programs and teaching strategies that serve all students and accommodate diverse needs and learning styles to eliminate the achievement gap.

- We share a commitment with teachers, students, parents, administrators, and the community at large to enhance and improve scientific teaching and learning.

- We believe that learning is a lifelong process and that successful learners are lifelong learners.
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Introduction

Welcome to a leadership position in the field of science!

The positions of Science Coaches, Elementary Science Leaders, and Secondary Science Department Chairpersons are leaders in the field of science and your effectiveness and success depends to a great extent on the collaboration among all science leaders in the District.

The Science Leaders’ Handbook was designed with the intent of providing you with the necessary tools, knowledge, and information that science leaders need to run an effective science program at their school. This handbook offers a range of background materials, ideas, strategies, research, and other resources to better align science teaching and learning. It is a resource for the preparation of professional development, department and grade level meetings, and coaching and instruction.

The underlying goal of this document is to create a framework of support for inquiry-based instruction and pedagogical content knowledge in science. This document seeks to facilitate the development and understanding of scientific thinking and aligns with the District’s goals of promoting scientific literacy and research-based instructional strategies through the use of a standards-based curriculum and effective assessments. The view of science in M-DCPS is not only as a body of knowledge, but as a way to process information globally.

The handbook provides information on:

• Science leadership
• Science coaching
• Exemplary science practices
• Instructional materials, resources, and strategies
• Science programs and competitions

Additionally, this handbook contains embedded tasks for Data-Driven Decision Making and practical assessment ideas. Teachers and administrators may use these materials as a guide for:

• leading a school-based science program.
• leading Science Professional Learning Communities (PLC).
• providing teacher support.
• enhancing science teaching and learning.

Section I-Introduction
The Division of Mathematics, Science, and Advanced Academic Programs believes that all students need and deserve an enriching science education. The importance of relevant experiences in science is essential for students to develop problem-solving skills in order to empower them to participate in an increasingly scientific and technological global society.

The science classroom must provide students with opportunities to develop scientific skills and conceptual understanding. Therefore, science educators must include the following experiences in the science instruction:

- First-hand explorations and investigations;
- Inquiry and process skills;
- Interdisciplinary skills and basic science concepts;
- Conceptual knowledge development;
- Problem solving skills Identify and solve problems, formulate hypotheses, analyze data, and draw conclusions.

It is essential that the learning environment fosters a positive attitude towards science, supports differentiated instruction, and gives students ample opportunities to share ideas. In addition, it is important to support teachers through professional development that promotes skill development, provides content support, and encourages a positive teaching and learning environment. Parents play an essential role in ensuring a quality science education by encouraging their children to participate in science activities through various science programs and competitions.

We hope that you take this handbook as your companion in your journey through science leadership. Thank you for accepting this challenge!
Science Leaders undertake roles and responsibilities that are integral in the coordination of effective teaching and learning. All instructional leaders have the inherent responsibility to establish professional learning communities (PLC), reflect on instructional practices, and maintain collaborative discourse among members of the science department.

**Professional Learning Communities**

In education circles, the term *Professional Learning Communities* (PLC) has become commonplace and there are several variations of this model. However, in science education we refer to the type of activity where the teachers in a school and its administrators continuously seek and share learning and then act on what they learn. The goal of their actions is to enhance their effectiveness as professionals for the benefit of all teachers and students. As an organizational arrangement, the professional learning community is seen as a powerful staff development approach and a potent strategy for school change and improvement.

Professional Learning Communities provide a powerful way for teachers and administrators to work together to affect the practices of schools and improve student achievement. The core principles of a professional learning community ensure students learn, provide a culture of collaboration in the school, and focus on the results of continuous improvement efforts of learning teams. (DuFour, 2005)

School and department missions promise that “all students can learn”. In order to achieve this mission, teachers and administrators engage in ongoing dialogues with each other exploring the critical questions of “what do we want our students to learn,” “how will we know when the students have learned it,” and most importantly, “how will we respond when a student experiences difficulty in learning?” (DuFour, 2005).

The answer to the third question separates traditional school cultures from the collaborative culture of a learning community. As a school or group of teachers begin to
function as a learning community, strategies are designed to ensure that the struggling learners receive additional time and support. Learning communities develop strategies in which the intervention/response to the student is timely and provides help for the student as soon as the student begins to struggle rather than relying on remediation, retention, or summer school. This intervention is required for the student until they have mastered the necessary content.

Recognition that the faculty must work together to achieve the goal of “all students can learn,” is necessary in building a professional learning community. Teachers work in teams analyzing their data, develop student interventions, and engage in an ongoing dialogue that promotes a collective learning experience and improves student achievement. This result-focused culture moves teachers beyond their individual knowledge and experience to embrace a shared culture of instruction.

Professional Learning Communities determine their successes by looking at their team’s results. Learning teams continually identify the current level of student achievement, establish goals to improve the current status, work together toward achieving the goal that was set, and provide evidence of progress. These learning communities turn their data into useful and relevant information. As learning teams begin to develop common assessments, teachers begin to identify how their students are doing as compared to other students and ask their colleagues to help them reflect on areas of concern. Ideas, strategies, materials, and talents of the entire team are shared. This represents the most potent professional learning available for teachers, improving content knowledge and pedagogy.

As educators collaborate in promoting an environment of scientific inquiry, they stimulate a positive change in the instructional practice of the school. Implementation of learning communities increases student achievement and the love of learning.

**Data Driven Decision Making**

Data Driven Decision Making is the practice of using data to update instruction in the classroom.

In Miami-Dade County Public Schools, all fourth, fifth, seventh, eighth, tenth and eleventh grade students take a science Baseline Benchmark Assessment and two science Interim Assessments (IA) each year. Data collected from the science Interim Assessments provides science teachers with meaningful and timely information about the academic achievement and needs of their students. The goal is to improve the quality of student learning and enhance instructional practices by using data to make curricular decisions. These tests also provide valid, reliable information regarding content mastery of the Sunshine State Standards.

In elementary and middle school, the assessments are aligned to the District Pacing Guides. For senior high schools, the tenth grade is aligned to the Biology Pacing Guides and the eleventh grade to the Integrated Science III and Physical Science Pacing Guides. The Interim Assessments also include an item bank that can be used to monitor
student progress for intervention. For more information on the item bank, please visit: [http://oada.dadeschools.net/IAP/ItemBankNewsletter.pdf](http://oada.dadeschools.net/IAP/ItemBankNewsletter.pdf)

Examples of useful data

- FCAT test results
- Interim assessments results
- Performance assessment results
- Samples of student work
- Teacher surveys on classroom practice
- Teacher surveys on concerns and needs
- Surveys on student aspirations
- Records of the use of the Scott Foresman science kits and materials
- Demographic breakouts of students
- Demographic breakouts of students taking advanced or gifted science
- Interviews with teachers, administrators, students, parents
- Science classroom observations

**Questions we want data tools to answer:**

- Who are the students who are not achieving, and why not?
- What are the contributing causes of their lack of proficiency
- Which fourth and fifth grade students may not pass the Science FCAT?
- Do we have instructional coherence?
- Are we adding value to our students learning?
- Which programs are most effective for all students?

Data can be either quantitative or qualitative. Data are quantitative when they take numerical form and are collected using standardized instruments. Whether the data come from test scores, course enrollments, interviews, observations, or surveys, they are considered quantitative if they are analyzed and reported in this way. Data are qualitative when unstructured interviewing or observational techniques are used and analysis and reporting take the shape of narrative rather than numbers.

One of the most powerful uses of data is to disaggregate findings according to specific groups. This means taking a look at how specific subgroups of students perform in addition to looking at the group as a whole.

“Data enable us to be educational detectives. We are ‘Columbos.’ We get clues as to how students are doing. We look at how to improve.” Joe O’Reilly
Disaggregating the Data

- By class, schools, feeder patterns
- Grade levels
- Proficiency in English
- Length of time in District
- Race
- Gender
- Quartiles
- Socioeconomic status
- Course-taking experience
- Teacher professional development
- ESE, Bilingual, and Title I

A science leader is key to the success of the data-driven decision-making process and learning communities. Therefore, the science leader must communicate effectively with colleagues and administrators at the school-site, Regional Centers, and District offices. In some instances, an Elementary Science Leader and/or Department Chairperson may assume the role of Science Coach as well. The following pages describe these individual roles and responsibilities in further detail.

“Disaggregation is a practical, hands-on process that allows a school’s faculty to answer the two critical questions: ‘Effective at what? Effective for whom?’ It is not a problem-solving but a problem-finding process.” Lezotte and Jacoby
SCIENCE COACH

ROLE
A science coach is usually a fellow-teacher with strong science content, organizational skills, and pedagogical knowledge in order to support the more experienced peers in a non-threatening, reflective approach that accommodates all learning styles.

RESPONSIBILITIES
The science coach is responsible for providing peer support to improve teaching and learning through the analysis of data, student support, and professional development. The routine monitoring and documentation of teacher support is an integral responsibility of the science coach (see sample report templates).

Peer Support
1. Work with teachers to analyze their areas of instructional need (i.e., content, pedagogy, knowledge of standards).
2. Provide daily peer support to teachers in the area of science.
3. Provide resources to teachers (i.e., expertise, materials, etc.).
4. Assist in creating a “professional learning team” through individual guidance and group meetings.
5. Meet with teachers on a regular basis in learning teams for professional development and collaboration.
7. Conduct peer observations of classroom instruction and provide prompt feedback to teachers regarding the lessons that are observed.
8. Consult and offer feedback about classroom observations.
9. Model “best practices” in a classroom setting. The coach teaches one or two classes while the teacher being coached observes. This is followed by a “debriefing” with the teacher.
10. Maintain peer support logs and weekly coaching calendar.
11. Collaborate with Reading and Mathematics Coaches and the Science Department Chairperson.

Data Analysis
1. Analyze and assist teachers with the analysis of informal and formal data to include student, teacher, department, and/or school data.
2. Analyze data to target student achievement, lower-performing subgroups in an ongoing effort to close the achievement gap, bubble groups in an effort to attain level 3 and higher, and high performing to ensure continued success and growth.
3. Assist the administrative team in developing corrective action plans based on data analyses.

**Student Support**
1. Conduct individualized or small group instruction to students in various settings (pull-out or in classroom differentiated instruction model) for remediation or enrichment.

**Professional Development**
1. Encourage participation in and conduct staff development activities that help the teachers improve their ability to teach science.
2. Ensure that teachers are utilizing and implementing District and State adopted instructional materials and standards.
3. Develop and conduct professional development sessions that target teacher deficiencies in content, instructional strategies, and/or data analysis.
4. Professional development provided should include but not be limited to:
   a. Effective Instructional Strategies
   b. Unwrapping the benchmarks
   c. Content
   d. Strategies to facilitate student’s depth of knowledge and understanding
   e. Differentiated instruction
   f. High-order questioning strategies
   g. Data-driven instruction
   h. Formative Assessment
   i. The Continuous Improvement Model
5. Disseminate information and knowledge gained through participation in professional development activities and monthly meetings to the science staff.

A science coach **SHOULD NOT:**
1. Perform a teacher evaluation.
2. Become the primary instructor in the classroom of a teacher that is being coached.
3. Have a full-time classroom teaching assignment.
ELEMENTARY SCIENCE LEADER

ROLE
Every elementary school has a science leader. This person may be the designated science coach, lab teacher, department chair, grade level chair, or science enthusiast designated by the principal. This individual is usually the guiding force and advocate for excellence in the science curriculum, instruction, teaching and learning. Science Leaders attend professional development inservices and carry lessons learned back to the school site to share with colleagues and school site administrators.

RESPONSIBILITIES
The Science Leader focuses on the implementation of best practices in science and is usually at the forefront of Science Professional Learning Communities (PLC). The Science PLC are forums in which science teachers are able to collaborate and share personal experiences in science, build on their own knowledge of the change process in science education and become experienced practitioners under the guidance of the Science Leader. The responsibilities of the Science Leader include the following:

1. Coordinate the development and implementation of the science program.
2. Review science test scores and use data-driven decision-making practices to recommend instructional strategies needed to meet requirements and improve test scores.
3. Assess professional development needs and make recommendations to the school site administration about appropriate development activities via inservices or peer instruction.
4. Inventory the science materials at the school site and suggest replacement of any missing or needed materials to the school site administration.
5. Interact and communicate with parents, coworkers, administrators, committees, teachers, and the District Science Department.
6. Attend grade level meetings, inservices, science meetings, science competitions and conferences.
7. Host *Science Nights* for parents and students.
8. Disseminate information and knowledge gained through participation in professional development activities and monthly meetings to the science staff.
SECONDARY SCIENCE DEPARTMENT CHAIRPERSONS

ROLE
The Secondary Science Department Chairperson plays an extremely important role in the school. The success of a great science program is in a greater extent due to the dedication and leadership of the Science Department Chairperson. It is the Department Chairperson’s role as the science leader to set the standards of high expectations for teachers and students and an invigorating professional learning environment.

RESPONSIBILITIES
The main roles and responsibilities of the Secondary Science Department Chair can be classified into the following three categories:

1. **Liaison**
   As the liaison, the Secondary Science Department Chairperson communicates on a regular basis with the school administration and the District Science office. The Chairperson is informed of all rules regulations, education updates from the State and the Nation, and conferences and Professional Development available for science teachers.

   The Secondary Science Department Chairperson meets periodically with the science teachers to communicate information from the school, the District, and the State and to keep teachers updated in recent educational research and developments in science education, professional development, and new science programs.

2. **Communication Facilitator**
   One of the main roles of the Secondary Science Department Chairperson is to ensure that course-alike teachers or teachers of the same grade level meet on a regular basis to map and plan the curriculum and activities and share Best Practices.

   The Secondary Department Chairperson’s professional learning community consists of teacher leaders who meet as a community of learners to share ideas and reflect on their current practice. The department chairperson engages in strategies to build learning communities as modeled by district staff at learning community gatherings. This process provides the conduit for communication and continued learning among teacher leaders. They continue this dialogue with colleagues at their home schools developing a learning community within their departments. These collaborative conversations allow community members to:

   - collectively analyze individual teacher and school data;
   - set common goals and actions;
   - discuss instructional strategies and materials;
   - discuss pacing of content and courses;
   - share questions and concerns about content and procedures; and
   - review results.

Section II-Roles and Responsibilities
These discussions provide every science teacher with someone to turn to and talk to, and are explicitly structured to improve the classroom practice of teachers both individually and collectively.

3. **Resource Provider**

The Secondary Science Department Chairperson makes sure that all teachers have all the resources need to conduct an effective science classroom and program. Science teachers must have the following:

- The updated *District Pacing Guides*
- The *State Standards*. Due to the present transition from the 1996 Sunshine State Standards (SSS) to the 2008 Next Generation Sunshine State Standards (NGSSS), all teachers must be aware and have copies of both sets of standards.
- *Item Specifications*. This is a very important document from the State which states the specific topics that every teacher must cover in reference to each one of the standards.
- Other State documents such as *Lessons Learned* and *Florida Inquires!* Are highly recommended tools for teachers.
- Adopted *Science textbooks* with its ancillary materials.
- The *Essential Labs* documents.
- *Laboratory materials* such as glassware, chemicals, microscopes, dissection equipment, etc. The Secondary Science Department Chairperson must ensure that all equipment needed is available and in good working conditions. Also, the stockrooms must be kept clean and organized. It is the role of the science leader to work with teachers and collaboratively assign and delegate responsibilities such as establishing a way to keep all lab materials clean, in working conditions, and available to all teachers.
- *Instructional materials*. A sufficient number of science instructional materials are vital to a good science program. When funds allow, order additional instructional materials per subject area to account for lost materials and/or new students. During March, project instructional materials needed for the following year by conducting a “Textbook Inventory Day.” When funds for state-adopted instructional materials or funds from student laboratory fees are available, individual student laboratory books can be ordered with prior approval for advanced honors science classes. Require all students to cover textbooks. This will decrease the number of new books that need to be purchased. Instructional materials adoption cycles occur every six years.
- *Technology*. The Secondary Science Department Chair must ensure that all teachers are embedding technology in their science classrooms. All teachers must have access to computers, projectors, and/or SMART Boards and passwords needed to effectively access technology programs available from the District for science.
**Other Responsibilities**
The science department chairperson performs other responsibilities as necessary for the coordination of a successful science program at the school.

**SCIENCE DEPARTMENT CHAIRPERSON PROCEDURES FOR MATERIALS INVENTORY AND FEES**

**Instructional Materials Inventory Procedures**
While procedures vary from school to school, the following suggested procedures will assist with the maintenance of an effective instructional materials inventory:

1. Use a master departmental/teacher instructional materials inventory record form to record the number of instructional materials issued to each member of the science department. Update this form whenever a teacher requests additional materials.

2. Get the assistance of students to place "the teacher's" name in "x" number of "biology" textbooks. This is time-consuming; however, it will assist with the tracking of materials. At the completion of this process, issue materials to teacher #1.

3. New materials should be numbered by the department chairperson or designee, prior to issuing texts to teachers.

4. Supply teachers with a class instructional materials inventory form. Teachers should complete the form and provide the science department chairperson with a copy.

5. Instructional materials should be stored in a secure location while they are being issued.

6. If class sets of materials are issued, use the same procedures, following numbers 1, 2, and 3 above 7. When instructional materials are issued to students, teachers should instruct their students to print their name, the date, condition, and their teacher's name in the margin.

7. Have students enter NEW for the condition of new materials and expect them to be returned in good condition. Provide a copy of the instructional materials inventory list with the quantities issued to each teacher. When instructional materials are collected at the end of the year, have teachers balance their instructional materials issued against the instructional materials returned and the lost textbook payment form.

**Disposal of Obsolete Instructional Materials**
[http://im.dadeschools.net/obsolete_disposal.htm](http://im.dadeschools.net/obsolete_disposal.htm)

Instructional materials that have become unserviceable or obsolete and are no longer on State contract may be disposed of as stated in Board Rule 6Gx13-6A-1.26 Section VII as follows:

1. Offered to teachers to cut up or otherwise use as resource materials;
2. Given free to Miami-Dade County Public Schools students;

*Section II-Roles and Responsibilities*
3. Offered to private and parochial schools in Miami-Dade County;
4. Made available to any governmental agency, charitable organization or any individual;
5. Sold to used book dealers, recycling plants, pulp mills or other persons or firms, at the discretion of the Superintendent of Schools, or designee. Funds received will be added to the school’s instructional materials allocation; or
6. Returned to the Stores and Mail Distribution used textbook warehouse for disposal.

To request for pick-up of used or unserviceable textbooks to the surplus materials warehouse, forward a memorandum to S&MD identifying the number of boxes to be removed. See Appendix J [Instructional Materials Handbook] for a sample copy of this type of request. Items that have been disposed of must be removed from the school's inventory by making the necessary adjustments in the **Student Textbook Automated Inventory Reporting System (STAIRS)**.

**Special Fees and Charges**

Any consideration of new strategies for acquiring funds for the science department should be fully discussed with the principal and/or his/her designee. The cost per student per year is a key figure that you can use to focus attention on your budget problems. An informal assessment throughout the district revealed the following:

1. The amount of money spent in science departments ranged from $0 to $17,000 per year. The cost per student per year increases over the years depending on the amount of activities done in the classroom.
2. Schools charged students in honors science classes and in some non-honors classes from $0 to $15.00 in fees for special materials.
3. Some schools engaged in approved fund-raising drives to place money in a special fund for science department expenditures.

**Board Rules Governing Student Fees In Secondary Schools (Fees/Materials - 6GX13 -3B-I.04)**

The Board will make every effort to provide all instructional equipment, books, materials, and services needed to maintain the desired instructional program so that pupils, parents, or school fund-raising activities are not used to provide such items. However, should it be necessary to collect fees from pupils enrolled in certain academic subjects or engaged in certain activities to maintain the desired instructional and activities program in each school center, a schedule setting the maximum fee which can be charged for any subject area, activity, or service, shall be developed, approved by the Superintendent of Schools, and submitted to the Board as a report.
Fees/School-Level Determination - 6GX13 -3B-I.OS
Fees charged to students should be kept to an absolute minimum. Where school centers find it necessary to charge student fees to maintain the desired instructional program, provide necessary services, or maintain the desired program of activities, such fees shall not exceed the maximum established by the Superintendent of Schools.

REFERENCES


SAMPLE TEMPLATES
### CHECKLIST OF BEST PRACTICES IN SCIENCE

**School**: ___________________________  **Teacher/Class**: ___________________________

*For TEACHER Reflection Purposes Only*  **Date**: ___________  **Per.**: ______

- Capturing and maintaining student’s attention
- Instilling motivation and purpose in students
- Using cooperative learning strategies
- Using the scientific method of problem solving (Inquiry Approach)-(Constructivist Approach)
- Students identifying problem to be solved
- Students hypothesizing or predicting solution and results
- Students experimenting and testing trial solutions
- Students organizing data
- Students analyzing and interpreting information
- Students discussing results
- Students writing and communicating conclusions
- Students maintaining a daily journal
- Using manipulatives and hands-on investigations

**Comments**: 
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<th>Action</th>
<th>Details</th>
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<td>Communicating with and involving parents</td>
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<td>Providing for real-life applications</td>
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<td>Problem Experimental Design by students</td>
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<td>High teacher expectations</td>
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<td>Delivering standards-based curriculum using appropriate pedagogy/instructional materials.</td>
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<td>The teacher shows a constructivist instructional approach to inquiry methods the students use.</td>
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<td>The students test solutions to problems with each group member highly involved.</td>
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<td>During the investigative activities, the teacher constantly moves around the room guiding the cooperative learning groups in formulating their solutions and in the appropriate use of manipulatives and technology that she has provided thereby keeping everyone engaged in productive work.</td>
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<tr>
<td>Helps all students explore career opportunities that use the science that they are learning.</td>
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<td>Uses assessments that focus on problem solving and understanding rather than on memory.</td>
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<td>Communicates with other teachers to improve themselves and make connections between disciplines.</td>
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### Professional Learning Communities

**Best Practices:**
- Teachers work together, plan together, and share best practices.
- Develop a focus calendar and come to departmental consensus on the instruction of the benchmark of the week.
- Teachers participate in professional development that can be immediately implemented in the classroom, such as differentiated instruction, reading in the content area, data analysis, and science content and pedagogy.
- Data chats: All teachers in the science department should meet periodically to look at data trends and adjust instruction accordingly.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Topic(s) of Meeting</th>
<th>Teachers Present</th>
<th>Description of Topics Covered and Comments</th>
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Lab Coordination

Best Practices:

- Lab coordination is in place to assure that everyone is doing the required labs (Essential Labs) on a weekly basis.
- All labs must adhere to the Safety Handbook (see Appendix A)
- All the teachers of each course collaborate and map all the lab activities for the school year.

Lab coordination model samples:
- Model 1: A lab Assistant. Hired specifically to do this work.
- Model 2: One teacher who is pro-active in lab work and is given a one-period supplement to set-up all the labs.
- Model 3: Once the labs for the year are planned, a rotation schedule is prepared to have each teacher in charge to set-up and put away each lab.

Which Lab Coordination Model Is Used at Your School?:

<table>
<thead>
<tr>
<th>Week</th>
<th>Teacher #1</th>
<th>Teacher #2</th>
<th>Teacher #3</th>
<th>Teacher #4</th>
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</table>
**Bell Ringers**

**Best Practices:**
- Bell ringers are more effective when they are done in the context of the topic being discussed.
- The recommended tool is the Glencoe Science FCAT Transparencies Grade 11.
- Bell Ringers/Do Now activities implemented at the beginning of class.
- Science FCAT Transparencies are incorporated.
- Bell Ringers/Do Now activities are aligned to the Sunshine State Standards and in context with the topics being discussed.

<table>
<thead>
<tr>
<th>Week</th>
<th>Teacher #1</th>
<th>Teacher #2</th>
<th>Teacher #3</th>
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</table>

*Section II-Sample Templates*
**Suggested activities:**
- Conduct reviews that are exciting and ongoing throughout the year.
- Weekly competitions among students on the benchmark of the week.
- Students are rewarded for achievement in the weekly competitions.
- Motivate students through explorations, science field trips, and competitions.
- Plan extra activities that enhance the learning and the excitement for the benchmark of the week. (Example: Have student prepare a video where they act, somehow, the benchmark of the week.)
- FCAT Saturday reviews - motivated with food and extra credit for attendance.
- Review sessions are no longer than two hours.
- Gizmos are used for FCAT review.
- Low performing students that do not attend Saturday reviews are identified and pulled, once in a while, from other elective classes or activities and conduct his review using the Explorelearning Gizmos.
- Constant, immediate incentives are available to students scoring 3 and above (Nintendo Wii, IPODs, Homecoming tickets, laptops, etc.).
- Conduct assemblies several times a year and prior to FCAT.

<table>
<thead>
<tr>
<th>Date</th>
<th>Is this Saturday or After School?</th>
<th>Time</th>
<th># of Students Attending (attach Sign-in Sheet)</th>
<th>What percentile of achievement for targeted student group (lowest 25%, 50%, 75%)</th>
<th>Type of Review (Explain)</th>
</tr>
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</table>

**FCAT Review Sign-In**

*Section II-Sample Templates*
## Section II - Sample Templates

<table>
<thead>
<tr>
<th>Print Name</th>
<th>Student ID #</th>
<th>Dates of Attendance</th>
</tr>
</thead>
<tbody>
<tr>
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</table>
### Reading In Science

**Best Practices:**

Evidence of weekly implementation of reading strategies in science  
Recommended strategies: Anticipation Guide, Jigsaw, Concept Map, Highlighting, Marginal Notes

<table>
<thead>
<tr>
<th>Week</th>
<th>Teacher #1</th>
<th>Teacher #2</th>
<th>Teacher #3</th>
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- **Anticipation Guide** - Consists of a list of statements that are related to the topic of the text your students will be reading.  
- **Jigsaw** - A group activity in which each member is dependent on the others for part of the information.  
- **Concept Map** - A graphical tool and diagram showing the relationships among concepts.  
- **Highlighting** - Students use a highlighter to highlight as they read, identify the important points, and are pay close attention to what they are reading.  
- **Marginal Notes** - Marginal annotations that are simple pencil notes in the blank spaces of the text that promote interactive reading.
### Writing in Science

**Best Practices:**

Evidence of implementation of weekly writing assignments in science. Some of the recommended strategies are: Lab Report using Power Writing Science Conclusions, Journal Writing, etc.

<table>
<thead>
<tr>
<th>Week</th>
<th>Teacher #1</th>
<th>Teacher #2</th>
<th>Teacher #3</th>
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*Section II-Sample Templates*
BEST PRACTICES OF EFFECTIVE SCIENCE CLASSROOMS

An effective science program must provide appropriate instruction, high expectations, and the same standards for all students. The content must be challenging, stimulating for everyone, and based on the assumption that all students can achieve these standards if given adequate opportunities to learn. The science program must be responsive to the demands of a technological society and the needs of an increasingly diverse population. Innovative, active learning experiences for the students are desired over the more traditional, passive learning. The program should foster conceptual convergence of the sciences, mathematics, and technology with other disciplines. Current research delineates specific instructional strategies that should be present for exemplary science programs. The following Essential Science Components are appropriate for all grade levels.

Preparing Students for Learning and Prior-Knowledge Assessment
Teachers should inquire about students’ understandings of concepts before sharing their own understanding about the topic. The technique of “frontloading” to elicit prior knowledge related to real-life experiences and applications can create a direct connection to the content for students. Strategies: Using graphic organizer, e.g., Concept Mapping, KWL, showing a video clip, conducting a demonstration, using literature.

Developing Active Learners
Students can become active learners by providing opportunities for them to construct their own understanding. These situations should require students to organize, classify, interpret, and draw conclusions about real-life mathematical and scientific problems. Students must communicate their ability to problem-solve through oral, written, and physical demonstrations. Strategies: Posing open-ended questions, real-life scenarios to solve, or situations requiring higher order thinking skills.

Teaching to Diversity
Teachers, as the facilitators of the learning should provide a variety of activities that address learning, language, and cultural differences. Activities within the classroom should reflect a variety of cultures, learning styles, and multiple intelligences. This will help students become aware that there are different ways of knowing and learning. Strategies: Using graphic organizers such as concept mapping or KWL; incorporating verbal/linguistic, logical/mathematical, body/kinesthetic, visual/spatial, and musical/rhythmic activities; providing opportunities to work individually as well as in small and large groups.

Orchestrating Collaborative Discourse
There should be encouragement of student discourse within the classroom through students engaging in dialogue, both with the teacher and especially with one another.
Teachers should encourage and accept student autonomy and initiative by allowing student responses to drive lessons, shift instructional strategies, and alter the lesson plans. The manner in which students apply process skills to support their ideas is central to their understanding of science. **Strategies:** Posing questions and tasks that elicit, engage, and challenge thinking; asking students to clarify and justify issues; encouraging elaboration during discussions.

**Vary the Instructional Format**

A variety of instructional formats should be used in classrooms to make sense of the content and to construct meanings from new situations. Science classrooms should provide the opportunity for inquiry-based instruction. Instead of traditional lecture-type instruction, opportunities should be provided for small-group work, individual exploration, peer instruction, and whole class discussion. **Strategies:** Using scientific laboratory equipment, hands-on activities, and technology-based activities.

**Use of the Learning Cycle Instructional Model**

Teachers need to develop techniques that move their students from concrete to abstract concepts through frequent use of the learning-cycle model. First, the teacher provides an opportunity for students to generate questions and hypotheses through an open-ended discovery activity. This is followed by the concept-introduction lesson(s) provided by the teacher. Finally, students must be provided with opportunities to demonstrate their understanding of the learned concept by transferring it successfully to other situations through solving a scenario, or by doing a demonstration or project. **Strategies:** Posing scenarios to be solved.

**Integrated Teaching**

Multi- and interdisciplinary activities should be included within the classroom that provides connections for students. Students must recognize the various roles that science plays in real life. The connection and application of science will motivate, give meaning to, and reinforce student learning. These activities should involve students in critical thinking, process skills, and product development. **Strategies:** Posing authentic problems to solve; bridging.

**Critical Thinking and Higher-Order Questioning**

Use effective, open-ended questioning techniques that encourage student inquiry. Encourage students to pose their own questions, evaluate the information presented, and make informed decisions about the information. Examples would include, “How would you solve a similar situation?” or “What criteria would you use to . . . ?” **Strategies:** Elaborating, analyzing, hypothesizing, and evaluating.

**Continuous Assessment of the Learning**

Assessment should reflect how and what is being taught. It should be embedded at various points in the lesson to guide the instructional planning and pacing. There is a clear alignment between curriculum, instruction, and how students are assessed. **Strategies:** Using performance tasks, essays, portfolios, video presentations, and demonstrations.
Promotion of Collegiality
Teacher collaboration is essential for effective teaching practices. Teachers should collaborate to establish long-range plans, prioritize curriculum, share best practices, mentor, and model lessons for each other. **Strategies:** Participating in team, departmental and grade-level planning; study groups; peer coaching; and mentoring.

**TEACHER ROLE IN INQUIRY**

**Plan an Inquiry-Based Science Program for Students**
- Inquiry into authentic questions generated from student experiences is the central strategy for teaching science.
- Teachers focus inquiry on real phenomena, in classrooms, outdoors, or in laboratory settings, where students are given investigations or guided toward investigations that are demanding but within their capabilities.
- Activities provide a basis for observations, data collection, reflection, and analysis of events and phenomena and encourage the critical analysis of secondary sources, including media, books, and journals.

**Guide and Facilitate Learning**
- Teachers guide, challenge, and encourage student learning and inquiry.
- Successful teachers are skilled observers of students, as well as knowledgeable about science and how it is learned.
- Teachers continually create opportunities that challenge students and promote inquiry by asking questions.
- Although open exploration is useful for students when they encounter new materials and phenomena, teachers need to intervene to focus and challenge the students, or the exploration might not lead to understanding.
- A teacher who engages in inquiry with students models the skills needed.
- An important stage of student science learning is the oral and written discourse that focuses the attention of students on how their knowledge connects to larger ideas and the world beyond the classroom.
- Teachers promote many different forms of communication (e.g., spoken, written, pictorial, graphic, mathematical, and electronic).
- Teachers give students opportunities to make presentations of their work and to engage with their classmates in explaining, clarifying, and justifying what they have learned.

**Engage in Ongoing Assessment of own Teaching and Student Learning**
- Teachers observe and listen to students as they work individually and in groups.
- They examine portfolios of student work, performance tasks, as well as more traditional paper-and-pencil tests.
**Instruction**

The successful science classroom begins with effective science instruction. The effective science teacher has the ability to plan and prepare for the delivery of engaging lessons to the diverse elementary students of Miami-Dade County Public Schools in order to improve student achievement and understanding.

It is essential that students are engaged in activities that support inquiry-based teaching and learning and translates to student understanding of science concepts. Lessons must be differentiated and supported by clear learning goals. Responding to the learning needs of students leads to understanding the developmental needs of all students. The science curriculum supports the achievement of scientific literacy. This is done seamlessly through the incorporation of the Five E Instructional Model.

**Five E Instructional Model**

The science curriculum will be taught utilizing the Five E Instructional model of learning cycle (Trowbridge, Bybee, & Powell, 2000), which is a constructivist model that has five essential phases of instruction:

![Five E Instructional Model Diagram](image)

**Engage**

Before starting a lesson or unit capture the students’ attention by “engaging” them. This can be achieved in a variety of ways, such as KWL charts or by reading fiction or nonfiction stories related to the subject. This is also the time to begin uncovering student conceptions, misconceptions, prior knowledge and experiences.

**Explore**

Once you have your students excited put that energy to work for you. Let them “explore”. This is the time for labs designed to “show, not tell” how things work. They will be amazed and full of questions about their results.
Explain
Students, not the teacher explain. The teacher is the facilitator, the guide to knowledge, not the giver. Lead open-ended discussions; provide web sites and periodicals, which lead to not only the answers, but to many more questions.

Elaborate
After students complete an inquiry-lab activity, sometimes they still may not have a clear understanding of what they were to learn. This is when the teacher needs to "elaborate". Design your inquiry-activity or project so that it will require more practice with the skills that you are aiming for, or want to expand upon.

Evaluate
There are a myriad of ways in which to evaluate students. There are times when paper and pencil are absolutely the best mode, but knowledge can be shown just as clearly with other authentic assessments such as a diorama, a flip and fold booklet, or a letter written to a friend to explain how to conduct an experiment.
Lab Roles and Their Descriptions

Cooperative learning activities are made up of four parts: group accountability, positive interdependence, individual responsibility, and face-to-face interaction. The key to making cooperative learning activities work successfully in the classroom is to have clearly defined tasks for all members of the group. An individual science experiment can be transformed into a cooperative learning activity by using these lab roles.

<table>
<thead>
<tr>
<th>Project Director (PD)</th>
<th>Materials Manager (MM)</th>
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<tbody>
<tr>
<td>The project director is responsible for the group.</td>
<td>The materials manager is responsible for obtaining all necessary materials and/or equipment for the lab.</td>
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<tr>
<td>Roles and responsibilities:</td>
<td>Roles and responsibilities:</td>
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<tr>
<td>A. Reads directions to the group</td>
<td>E. Picks up needed materials</td>
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<td>B. Keeps group on task</td>
<td>F. Organizes materials and/or equipment in the work space</td>
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<td>C. Is the only group member allowed to talk to the teacher</td>
<td>G. Facilitates the use of materials during the investigation</td>
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<tr>
<td>D. Assists with conducting lab procedures</td>
<td>H. Assists with conducting lab procedures</td>
</tr>
<tr>
<td>Shares summary of group work and results with the class</td>
<td>I. Returns all materials at the end of the lab to the designated area</td>
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<table>
<thead>
<tr>
<th>Technical Manager (TM)</th>
<th>Safety Director (SD)</th>
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<tbody>
<tr>
<td>The technical manager is in charge of recording all data.</td>
<td>The safety director is responsible for enforcing all safety rules and conducting the lab.</td>
</tr>
<tr>
<td>Roles and responsibilities:</td>
<td>Roles and responsibilities:</td>
</tr>
<tr>
<td>J. Records data in tables and/or graphs</td>
<td>N. Assists the PD with keeping the group on-task</td>
</tr>
<tr>
<td>K. Completes conclusions and final summaries</td>
<td>O. Conducts lab procedures</td>
</tr>
<tr>
<td>L. Assists with conducting the lab procedures</td>
<td>P. Reports any accident to the teacher</td>
</tr>
<tr>
<td>M. Assists with the cleanup</td>
<td>Q. Keeps track of time</td>
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<td>R. Assists the MM as needed.</td>
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</table>

When assigning lab groups, various factors need to be taken in consideration:
A. Always assign the group members, preferably trying to combine in each group a variety of skills. For example, you can place an “A” student with a “B”, “C”, and a “D” and or “F” student.
B. Evaluate the groups constantly and observe if they are on task and if the members of the group support each other in a positive way. Once you realize that a group is dysfunctional, re-assign the members to another group.

Section III – Instructional Strategies
**Instructional Science Block**

Miami-Dade County Public Schools (M-DCPS) elementary teachers will be able to enhance the District’s science curriculum by providing students with differentiated instruction opportunities in the science classroom. Elementary students will be able to enhance their conceptual understanding of the science standards via varying entry points of instruction, learning tasks, and outcomes that are tailored to the individual needs of students throughout the District.

In addition, the teachers will also be able to differentiate science content and pedagogical instruction in order to meet the needs of students. This type of instruction will allow students to explore the elementary science benchmarks through inquiry-based explorations, expanded research skills, and scientific reflection.

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### Instructional Elementary Science Block

*(Scott Foresman)*

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>15 Minutes</td>
<td>Teacher Guided Engagement</td>
<td>Teacher Guided Engagement</td>
<td>Benchmark Assessment (30 Mins)</td>
<td>Social Studies</td>
<td>Social Studies</td>
</tr>
<tr>
<td>30 Minutes</td>
<td>Group Instruction <em>(Explore and Explain)</em></td>
<td>Group Instruction <em>(Explore and Explain)</em></td>
<td>Social Studies</td>
<td>Social Studies</td>
<td>Social Studies</td>
</tr>
<tr>
<td>15 Minutes</td>
<td>Whole Group Instruction <em>(Elaborate and Evaluate)</em></td>
<td>Whole Group Instruction <em>(Elaborate and Evaluate)</em></td>
<td>Social Studies</td>
<td>Social Studies</td>
<td>Social Studies</td>
</tr>
</tbody>
</table>

*This is a sample instructional science block*

The focus of differentiated instruction in science will be in the following:

- Group Instruction (Tiered Instruction)
  - Directed Inquiry
  - Guided Inquiry
  - Full Inquiry

---

Section III – Instructional Strategies
### Core Science Instruction

<table>
<thead>
<tr>
<th>Engage</th>
<th>Teacher Guided Engagement (15 Minutes)</th>
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<tbody>
<tr>
<td>- Discuss with students how to describe the kind of investigation they could conduct to answer the question in the activity title.</td>
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<tr>
<td>- Engage students with scientific questions and/or defining problems about an event or phenomenon.</td>
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<tr>
<td>- Encourage students to make connections with what they already know.</td>
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<tr>
<td>- Set the ground work for the day’s activities.</td>
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<table>
<thead>
<tr>
<th>Explore and Explain</th>
<th>Group Instruction (30 Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Directed Inquiry</strong></td>
<td><strong>Guided Inquiry</strong></td>
</tr>
<tr>
<td>A Directed Inquiry activity begins each chapter.</td>
<td>A Guided Inquiry activity closes each chapter.</td>
</tr>
<tr>
<td>- Teacher guides students to <strong>explore</strong> science concepts through hands-on experiences, formulate and test hypotheses, and solve problems.</td>
<td></td>
</tr>
<tr>
<td>- Teacher guides students to <strong>analyze</strong> and <strong>interpret</strong> data, <strong>synthesize</strong> ideas, <strong>build</strong> models and <strong>explain</strong> their conceptual understanding of scientific knowledge gained.</td>
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</tr>
<tr>
<td>- Students <strong>explore</strong> science concepts through hands-on experiences, formulate and test hypotheses, and solve problems in cooperative group(s).</td>
<td></td>
</tr>
<tr>
<td>- Students <strong>analyze</strong> and <strong>interpret</strong> data, <strong>synthesize</strong> ideas, <strong>build</strong> models and <strong>explain</strong> their conceptual understanding of scientific knowledge gained in cooperative group(s).</td>
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<table>
<thead>
<tr>
<th>Evaluate (15 Minutes)</th>
<th>Whole Group Instruction</th>
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</thead>
<tbody>
<tr>
<td>- Students will <strong>evaluate</strong> and <strong>elaborate</strong> on the concepts they learned in their perspective inquiry sessions, make connections to related concepts and the teacher will be able to continue to assess student learning through one or more of the following methods.</td>
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<tr>
<td>o Whole group open forums</td>
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<tr>
<td>o Science Journaling</td>
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<tr>
<td>o Research</td>
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<tr>
<td>o Inquiry-based lab report</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Extend</th>
<th>Extend through Home Learning</th>
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<tbody>
<tr>
<td><strong>Structured Independent Extension</strong></td>
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<tr>
<td>- Students <strong>extend</strong> their new conceptual understanding and apply what they learned through the home learning assignment</td>
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</tbody>
</table>

*This is a sample instructional model*

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**Section III – Instructional Strategies**
### Instructional Block for Secondary Science with Essential Features of Classroom Inquiry Variations

<table>
<thead>
<tr>
<th>5E Model *</th>
<th>Student Role</th>
<th>Inquiry Variations **</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engagement</strong> (10 minutes)</td>
<td>Learner engages in scientifically oriented questions</td>
<td>Learner poses a question</td>
</tr>
<tr>
<td><strong>Exploration</strong> (40 minutes)</td>
<td>Learner gives priority to evidence in responding to questions</td>
<td>Learner determines what constitutes evidence and collects it</td>
</tr>
<tr>
<td><strong>Explanation</strong></td>
<td>Learner formulates explanations from evidence</td>
<td>Learner formulates explanation after summarizing evidence</td>
</tr>
<tr>
<td><strong>Extension, Expansion, &amp; Elaboration</strong> (10 minutes)</td>
<td>Learner connects explanations to scientific knowledge</td>
<td>Learner independently examines other resources and forms the links to explanations</td>
</tr>
<tr>
<td><strong>Evaluation</strong></td>
<td>Learner communicates and justifies explanations</td>
<td>Learner forms reasonable and logical arguments to communicate explanations</td>
</tr>
</tbody>
</table>

**Adapted from National Academy of Science (2000). Inquiry and the National Science Education Standards, Washington, D.C. National Academy Press.**


Section III – Instructional Strategies
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Each Science Department Leader should have, maintain, and annually distribute to faculty, a copy of the District’s science curriculum. The latest versions of the Curriculum Pacing Guides and resources can be found at the following District websites:

**Curriculum and Instruction**  
http://curriculum_materials.dadeschools.net/pacing_guides/

**Division of Mathematics, Science, and Advanced Academic Programs**  
Science Department  
http://science.dadeschools.net/

Additionally, teachers can access the Next Generation Sunshine State Standards and other valuable instructional resources at:

- State of Florida Department of Education Florida Comprehensive Assessment Test Information for Educators:  
  The Florida Comprehensive Assessment Test Information for Educators website provides access to all the FCAT/FCAT 2.0/EOC publications for educators (i.e., released tests, items, Item Specifications, Lessons Learned, etc.).  
  http://fcat.fldoe.org/

- State of Florida Department of Education Office of Mathematics and Science:  
  The State of Florida Department of Education Office of Mathematics and Science provides resources for teachers, students, school districts and policy makers.  
  http://www.fldoe.org/bii/oms.asp

- CPALMS  
  CPALMS is a portal built for Florida’s science and mathematics educators offering customized resources and tools aligned and linked to the Next Generation Sunshine State Standards (NGSSS).  
  www.cpalms.org

- Official website for the Next Generation Sunshine State Standards  
  This is the official website for the Next Generation Sunshine state Standards.  
  http://www.floridastandards.org/index.aspx

- Florida PROMiSE  
  Florida PROMiSE uses a 3-Tier approach to its work that will span the 3-year development and implementation period of the Next Generation Sunshine State Standards (NGSSS). Tier 1, the focus on Year 1, addressed the need to increase teachers’ understanding of the NGSSS for mathematics and science (M/S), and their implications for instruction, and raise teacher awareness and use of available curriculum resources for planning standards-based M/S instruction.  
  http://flpromise.org/
District Approved Instructional Materials (through 2016)

ELEMENTARY SCHOOL

Elementary Science Grades K – 5


MIDDLE SCHOOL

M/J Comprehensive Science I, II, and III

A. Comprehensive Science I – Regular and Advanced

B. Comprehensive Science II – Regular and Advanced

C. Comprehensive Science III – Regular and Advanced

HIGH SCHOOL

Biology

A. Biology 1

B. Biology 1 Honors

C. Advanced Placement Biology

Section IV – Materials and Instructional Resources
Chemistry
A. Chemistry 1
B. Chemistry 1 Honors
C. Advanced Placement Chemistry

Earth Space Science
A. Earth and Space Science
B. Earth and Space Science Honors

Integrated Science
A. Integrated Science I – III, Series

Physical Science
A. Physical Science
B. Physical Science Honors
Physics
A. Physics 1
B. Physics 1 Honors
C. Advanced Placement Physics 1
D. Advanced Placement Physics 2
E. Advanced Placement Physics C: Mechanics
F. Advanced Placement Physics C: Electromagnetism

Marine Science
A. Marine Science 1
B. Marine Science 1 Honors

Environmental Science
A. Environmental Science
B. Advanced Placement Environmental Science
Anatomy and Physiology
A. Anatomy and Physiology

B. Anatomy and Physiology – Honors

Zoology

For more in depth information on the District policies on instructional materials, please visit [www.dadeschools.net](http://www.dadeschools.net) then click on e-handbooks then click on Instructional Materials Handbook.
THE FLORIDA
NEXT GENERATION SUNSHINE STATE STANDARDS

The following lists the Annually-Assessed NGSSS Benchmarks that will be tested each year on the Grades 5, 8 and 11 Science FCAT starting in 2012. It should be noted that within specific benchmarks other benchmarks are embedded and could be tested annually.

The NGSSS Benchmarks are grouped by Bodies of Knowledge (BOKs):

N: NATURE OF SCIENCE
E: EARTH AND SPACE SCIENCE
P: PHYSICAL SCIENCE
L: LIFE SCIENCE

Grade 5 Annually Assessed Benchmarks for the FCAT 2.0 Science Assessment

<table>
<thead>
<tr>
<th>Annually Assessed Benchmarks (AA)</th>
<th>Description of Benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.5.N.1.1</td>
<td>SC.5.N.1.1 - Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions (Also assesses SC.3.N.1.1, SC.4.N.1.1, SC.4.N.1.6, SC.5.N.1.2, SC.5.N.1.4) (See Item Specifications for more details)</td>
</tr>
<tr>
<td>SC.5.N.2.1</td>
<td>SC.5.N.2.1 - Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence (SC.3.N.1.7, SC.4.N.1.3, SC.4.N.1.7, SC.5.N.1.5, SC.5.N.1.6)</td>
</tr>
<tr>
<td>SC.5.N.2.2</td>
<td>SC.5.N.2.2 - Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others (Also assesses: SC.3.N.1.2, SC.3.N.1.5, SC.4.N.1.2, SC.4.N.1.5, SC.5.N.1.3)</td>
</tr>
<tr>
<td>Annually Assessed Benchmarks (AA)</td>
<td>Description of Benchmarks</td>
</tr>
<tr>
<td>----------------------------------</td>
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</tr>
<tr>
<td>SC.5.E.5.1</td>
<td>SC.5.E.5.1 - Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way (Also assesses: SC.3.E.5.1, SC.3.E.5.2, SC.3.E.5.3)</td>
</tr>
<tr>
<td>SC.5.E.5.3</td>
<td>SC.5.E.5.3 - Distinguish among the following objects of the Solar System -- Sun, planets, moons, asteroids, comets -- and identify Earth's position in it. (Also assesses: SC.5.E.5.2)</td>
</tr>
<tr>
<td>SC.5.E.7.1</td>
<td>SC.5.E.7.1 - Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another. (Also assesses: SC.5.E.7.2)</td>
</tr>
<tr>
<td>SC.5.E.7.3</td>
<td>SC.5.E.7.3 - Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time. (Also assesses: SC.5.E.7.4, SC.5.E.7.5, SC.5.E.7.6,)</td>
</tr>
<tr>
<td>SC.4.E.5.4</td>
<td>SC.4.E.5.4 - Relate that the rotation of Earth (day and night) and apparent movements of the sun, moon, and stars are connected. (Also assesses: SC.4.E.5.1, SC.4.E.5.2, SC.4.E.5.3)</td>
</tr>
<tr>
<td>SC.4.E.6.2</td>
<td>SC.4.E.6.2 - Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks (Also assesses: SC.4.E.6.1)</td>
</tr>
<tr>
<td>SC.4.E.6.3</td>
<td>SC.4.E.6.3 - Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable. (Also assesses: SC.4.E.6.6)</td>
</tr>
<tr>
<td>SC.4.E.6.4</td>
<td>SC.4.E.6.4 - Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).</td>
</tr>
<tr>
<td>SC.5.P.8.3</td>
<td>SC.5.P.8.3 - Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction. (Also assesses SC.5.P.8.2)</td>
</tr>
<tr>
<td>SC.5.P.9.1</td>
<td>SC.5.P.9.1 - Investigate and describe that many physical and chemical changes are affected by temperature. (Also assesses SC.3.P.9.1, SC.4.P.9.1)</td>
</tr>
</tbody>
</table>

Section V – Test Preparation
<table>
<thead>
<tr>
<th>Annually Assessed Benchmarks (AA)</th>
<th>Description of Benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.5.P.10.2</td>
<td>SC.5.P.10.2 - Investigate and explain that energy has the ability to cause motion or create change. (Also assesses SC.3.P.10.2, SC.4.P.10.2, SC.4.P.10.4)</td>
</tr>
<tr>
<td>SC.5.P.10.4</td>
<td>SC.5.P.10.4 - Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion (Also assesses SC.3.E.6.1, SC.4.P.11.1, SC.4.P.11.2, SC.5.P.10.3, SC.5.P.11.1, SC.5.P.11.2)</td>
</tr>
<tr>
<td>SC.5.P.13.1</td>
<td>SC.5.P.13.1 - Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects. (Also assesses SC.3.E.5.4, SC.4.P.8.4)</td>
</tr>
<tr>
<td>SC.5.P.13.2</td>
<td>SC.5.P.13.2 - Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object. (Also assesses SC.4.P.12.1, SC.4.P.12.2, SC.5.P.13.3, SC.5.P.13.4)</td>
</tr>
<tr>
<td>SC.5.L.14.1</td>
<td>SC.5.L.14.1 - Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.</td>
</tr>
<tr>
<td>SC.5.L.14.2</td>
<td>SC.5.L.14.2 - Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support -- some with internal skeletons others with exoskeletons -- while some plants have stems for support. (Also assesses SC.3.L.15.1, SC.3.L.15.2)</td>
</tr>
<tr>
<td>SC.4.L.16.4</td>
<td>SC.4.L.16.4 - Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.</td>
</tr>
<tr>
<td>SC.4.L.17.3</td>
<td>SC.4.L.17.3 - Trace the flow of energy from the sun as it is transferred along the food chain through the producers to the consumers. (Also assesses SC.3.L.17.2, SC.4.L.17.2)</td>
</tr>
</tbody>
</table>
### Annually Assessed Benchmarks (AA)

<table>
<thead>
<tr>
<th>Description of Benchmarks</th>
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</thead>
<tbody>
<tr>
<td>SC.5.L.17.1 - Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics (Also assesses SC.3.L.17.1, SC.4.L.16.2, SC.4.L.16.3, SC.4.L.17.1, SC.4.L.17.4, SC.5.L.15.1)</td>
</tr>
</tbody>
</table>

### Grade 8 Annually Assessed Benchmarks for the FCAT 2.0 Science Assessment

<table>
<thead>
<tr>
<th>Description of Benchmark</th>
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</thead>
<tbody>
<tr>
<td>SC.8.N.1.1 Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. (Also assesses SC.6.N.1.1, SC.6.N.1.3, SC.7.N.1.1, SC.7.N.1.3, SC.7.N.1.4, SC.8.N.1.3, and SC.8.N.1.4.)</td>
</tr>
<tr>
<td>SC.7.N.1.2 Differentiate replication (by others) from repetition (multiple trials). (Also assesses SC.6.N.1.2, SC.6.N.1.4, and SC.8.N.1.2.)</td>
</tr>
<tr>
<td>SC.7.N.1.5 Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics. (Also assesses SC.7.N.3.2, SC.8.N.1.5, and SC.8.E.5.10.)</td>
</tr>
<tr>
<td>SC.6.N.2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. (Also assesses SC.7.N.1.6, SC.7.N.1.7, SC.7.N.2.1, and SC.8.N.1.6.)</td>
</tr>
<tr>
<td>SC.7.N.3.1 Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. (Also assesses SC.6.N.3.1 and SC.8.N.3.2.)</td>
</tr>
<tr>
<td>Annually Assessed Benchmark (AA)</td>
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<tr>
<td><strong>SC.8.E.5.3</strong></td>
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<tr>
<td><strong>SC.8.E.5.5</strong></td>
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<td><strong>SC.8.E.5.7</strong></td>
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<td><strong>SC.8.E.5.9</strong></td>
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<td><strong>SC.7.E.6.4</strong></td>
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<tr>
<td><strong>SC.7.E.6.5</strong></td>
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<tr>
<td>Annually Assessed Benchmark (AA)</td>
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<tr>
<td>SC.6.E.7.5</td>
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<tr>
<td>SC.8.P.8.4</td>
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<tr>
<td>SC.8.P.8.5</td>
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<tr>
<td>SC.7.P.10.1</td>
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<tr>
<td>SC.7.P.10.3</td>
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<tr>
<td>SC.7.P.11.2</td>
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<td>SC.7.P.11.4</td>
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<tr>
<td>SC.6.P.13.1</td>
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<tr>
<td>Annually Assessed Benchmark (AA)</td>
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<tr>
<td>SC.6.P.13.3</td>
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<tr>
<td>SC.6.L.14.1</td>
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<td>SC.6.L.15.1</td>
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<td>SC.7.L.15.2</td>
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<td>SC.7.L.16.1</td>
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<tr>
<td>SC.7.L.17.2</td>
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<tr>
<td>Annually Assessed Benchmark (AA)</td>
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</tbody>
</table>

**Biology 1 End-of-Course (EOC) Annually Assessed Benchmarks by Reporting Category**

### Molecular and Cellular Biology (35%)

<table>
<thead>
<tr>
<th>Benchmark Code</th>
<th>Biology EOC Benchmark Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.L.14.1</td>
<td>Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science. (Also assesses SC.912.N.1.3, SC.912.N.2.1, SC.912.N.3.1, and SC.912.N.3.4)</td>
</tr>
<tr>
<td>SC.912.L.14.3</td>
<td>Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells. (Also assesses SC.912.L.14.2.)</td>
</tr>
<tr>
<td>SC.912.L.16.3</td>
<td>Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information. (Also assesses SC.912.L.16.4, SC.912.L.16.5, and SC.912.L.16.9)</td>
</tr>
<tr>
<td>SC.912.L.18.1</td>
<td>Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules. (Also assesses SC.912.L.18.11)</td>
</tr>
<tr>
<td>SC.912.L.18.9</td>
<td>Explain the interrelated nature of photosynthesis and cellular respiration. (Also assesses SC.912.L.18.7, SC.912.L.18.8, and SC.912.L.18.10)</td>
</tr>
<tr>
<td>SC.912.L.18.12</td>
<td>Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.</td>
</tr>
</tbody>
</table>
### Classification, Heredity, and Evolution (25%)

<table>
<thead>
<tr>
<th>Benchmark Code</th>
<th>Biology EOC Benchmark Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.L.15.1</td>
<td>Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change. (Also assesses SC.912.N.1.3, SC.912.N.1.4, SC.912.N.1.6, SC.912.N.2.1, SC.912.N.3.1, SC.912.N.3.4, and SC.912.L.15.10)</td>
</tr>
<tr>
<td>SC.912.L.15.6</td>
<td>Discuss distinguishing characteristics of the domains and kingdoms of living organisms. (Also assesses SC.912.N.1.3, SC.912.N.1.6, SC.912.L.15.4, and SC.912.L.15.5)</td>
</tr>
<tr>
<td>SC.912.L.15.8</td>
<td>Describe the scientific explanations of the origin of life on Earth. (Also assesses SC.912.N.1.3, SC.912.N.1.4, and SC.912.N.2.1)</td>
</tr>
<tr>
<td>SC.912.L.15.13</td>
<td>Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success. (Also assesses SC.912.N.1.3, SC.912.L.15.14, and SC.912.L.15.15)</td>
</tr>
<tr>
<td>SC.912.L.16.1</td>
<td>Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance. (Also assesses SC.912.L.16.2)</td>
</tr>
</tbody>
</table>

### Organisms, Populations, and Ecosystems (40%)

<table>
<thead>
<tr>
<th>Benchmark Code</th>
<th>Biology EOC Benchmark Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.L.14.7</td>
<td>Relate the structure of each of the major plant organs and tissues to physiological processes.</td>
</tr>
<tr>
<td>SC.912.L.14.26</td>
<td>Identify the major parts of the brain on diagrams or models.</td>
</tr>
<tr>
<td>SC.912.L.14.36</td>
<td>Describe the factors affecting blood flow through the cardiovascular system.</td>
</tr>
<tr>
<td>SC.912.L.14.52</td>
<td>Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics. (Also assesses SC.912.L.14.6, HE.912.C.1.4, and HE.912.C.1.8)</td>
</tr>
<tr>
<td>SC.912.L.16.10</td>
<td>Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.</td>
</tr>
<tr>
<td>Benchmark Code</td>
<td>Description</td>
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</tr>
<tr>
<td>SC.912.L.16.13</td>
<td>Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.</td>
</tr>
<tr>
<td>SC.912.L.17.5</td>
<td>Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity. (Also assesses SC.912.N.1.4, SC.912.L.17.2, SC.912.L.17.4, and SC.912.L.17.8)</td>
</tr>
<tr>
<td>SC.912.L.17.9</td>
<td>Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels. (Also assesses SC.912.E.7.1)</td>
</tr>
<tr>
<td>SC.912.L.17.20</td>
<td>Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability. (Also assesses SC.912.N.1.3, SC.912.L.17.11, SC.912.L.17.13 and HE.912.C.1.3)</td>
</tr>
</tbody>
</table>

**Can be Addressed in All Reporting Categories**

## Biology EOC Benchmark Clarification

<table>
<thead>
<tr>
<th>Benchmark Code</th>
<th>Description</th>
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</thead>
</table>
| SC.912.N.1.1  | Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:  
1. pose questions about the natural world;  
2. conduct systematic observations;  
3. examine books and other sources of information to see what is already known;  
4. review what is known in light of empirical evidence;  
5. plan investigations;  
6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs);  
7. pose answers, explanations, or descriptions of events;  
8. generate explanations that explicate or describe natural phenomena (inferences);  
9. use appropriate evidence and reasoning to justify these explanations to others;  
10. communicate results of scientific investigations; and evaluate the merits of the explanations produced by others. (Also assesses SC.912.N.1.4, SC.912.N.1.6, SC.912.L.14.4, LA.910.2.2.3, LA.910.4.2.2, MA.912.S.1.2, and MA.912.S.3.2) |
Next Generation Sunshine State Standards (NGSSS) and End-of-Course (EOC) Assessments

The NGSSS were added to the Curriculum Pacing Guides in 2008 to provide a correlation between the existing FSSS Benchmarks to the new science standards. These new standards will be assessed in 2012.

The Department of Education recognized the need for a systematic approach to review and revise all of the academic standards, and on January 17, 2006, the State Board of Education adopted a six-year cycle that set forth a schedule for the regular review and revision of all K-12 content standards. This move set the stage for higher levels of rigor and higher academic achievement for years to come. Eighteen Big Ideas thread throughout all grade levels and build in rigor and depth as students advance. Each grade level includes benchmarks from the four Bodies of Knowledge (Nature of Science, Life Science, Earth Science, and Physical Science). The rollout of the new standards for M-DCPS will occur over a three year cycle 2008-2011. Year one will be awareness of the new standards, followed by the replacement of the old SSS at targeted grade levels each year as described below:

- 2008 - 2009 - Awareness for all grades
- 2009 - 2010 - Grades K, 1, 2, 3, 6, 9 (Earth/Space Science and Physics)
- 2010 - 2011 - Grades 4, 7, 10
- 2011 - 2012 - Grades 5, 8, 11

The Biology End-of-Course (EOC) assessments are computer-based, criterion referenced assessments developed by the state of Florida “for the purpose of increasing student achievement and improving college and career readiness.” They are intended to measure attainment of the Next Generation Sunshine State Standards for specific courses, as outlined in their course descriptions. The first administration of the Biology 1 EOC Assessment is May 2012.
Safety First!

Safety comes first, in the all K-12 science classrooms. Teachers need to establish and maintain a safe working and learning environment. Rules must be explained and discussed at the beginning of each school year and reinforced during each activity all year long. Teachers should allow plenty of time to discuss why each one of these rules and regulations are extremely important. Zero tolerance for safety violations need to be stressed in all science classrooms. To prevent injuries, teachers must attempt to foresee problems, address them immediately and concentrate on safe practices for teaching science. Adequate supervision is needed during all hands-on, inquiry and process-based science investigations and equipment items need to be properly maintained.

A Safety Contract must be signed by all students and their parents/guardians and placed in the classroom file. This reinforces the expectations of conduct and safety procedures in the science laboratory setting.

**Elementary Classroom:** Use the bookmarks provided on the next page to ensure your school is using Safety First.

**Secondary Science Classroom:** Refer to Appendix A
The tips listed below are general safety rules for students. Always review these rules with students before a science investigation begins.

1. Never do any experiment without the approval and direct supervision of your teacher.
2. Always wear safety goggles when your teacher tells you to do so. Never remove your goggles during an activity.
3. Know the location of all safety equipment in or near your classroom. Never play with safety equipment.
4. Tell your teacher immediately if an accident occurs.
5. Tell your teacher if a spill occurs.
6. Tell your teacher immediately about any broken, chipped, or scratched glassware so it may be properly cleaned up and disposed of correctly.
7. If instructed to do so, wear your laboratory apron or smock to protect your clothing.
8. Never taste anything during a laboratory activity.
9. Clean up your work area upon completion of your activity.
10. Wash your hands with soap and water upon completion of an activity.

The tips listed below are safety tips for the teacher in an elementary science classroom setting.

1. Find out if any students have allergies that might raise serious health concerns, such as allergies to latex or to plant or animal specimens.
2. Be sure that equipment and supplies needed for foreseen emergencies are available in or near the classroom.
3. Establish procedures for the notification of appropriate authorities and response agencies in the event of an emergency.
4. Take necessary and appropriate precautions and safety measures for all science investigations.
5. Do not allow “horse play” or practical jokes.
6. Review the teacher’s edition of the textbook for safety information on the activities.
7. Teachers should wear safety goggles whenever there is a possibility of flying objects or projectiles, such as when working with rubber bands.
8. Never tell, encourage, or allow students to place any materials in or near their mouth, nose, or eyes.
9. Clean up any spill immediately and properly as soon as it occurs.
10. Wash hands after working with seeds and plants. Many store-bought seeds have been coated with insecticides and/or fertilizers.
11. Teachers should wash their hands upon completion of any experimental activity or at the end of the instructional session.
12. Make sure students are dressed appropriately. Make sure long hair, loose clothing, or jeweler do not cause any safety concerns.
## Programs and Competitions

### Curriculum Enhancement Programs

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<tr>
<th>PROGRAM</th>
<th>DESCRIPTION</th>
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<tr>
<td><strong>Elementary Science Fair</strong></td>
<td>The Elementary Science Fair is celebrated every year and sponsored by Miami-Dade County Public Schools. There is a school-site fair, in which K-5 students are asked to participate. One fourth grade and one fifth grade winner’s project is submitted to the District Fair. The student projects include charts, experiments, demos, diagrams, and collections with a scientific objective. <em>(See Appendix D)</em></td>
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<tr>
<td><strong>Science Fair</strong></td>
<td>The Regional Science, Mathematics, and Engineering Fair is celebrated every year sponsored by Miami-Dade County Public Schools. All students submit projects which undergo a scrutiny process for acceptance. Projects are then judged by qualified professionals from local universities, research institutions, and corporations. Secondary school winners of this competition have the opportunity to participate in the State Science and Engineering Fair and in the International Science and Engineering Fair (ISEF). <em>(See Appendix C)</em></td>
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<td><strong>SECME</strong></td>
<td>SECME is a strategic alliance with SECME, Inc., government agencies, private engineering companies, Florida International University (FIU), Miami Dade College (MDC), St. Thomas University, and the University of Miami (UM). It supports K-12 education for science, technology, engineering, and mathematics (STEM) as well as the Engineering Departments of UM and FIU through professional-development activities, District pre-engineering competitions, $500 mini-grants from NASA, Saturday Engineering Design Seminars for students, and workshops for parents. <em>(See Appendix B)</em></td>
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<td><strong>Science Made Sensible</strong></td>
<td>Science Made Sensible is a 4-year grant (2007 – 2011) awarded to the University of Miami that partners graduate fellows in ecological disciplines with middle school science teachers. Graduate fellows and participating teachers attend a two-week summer workshop on effective communication and how students learn. Teachers participating in the program will deepen their science content knowledge, increase the rigors of the science curriculum, and change their practices; therefore, increasing teacher capacity through quality instruction. Additionally, teachers are encouraged to take advantage of a Masters/Specialist degree in science education through the University of Miami at a reduced tuition. The program also supports a seamless coordination of services from middle to high school.</td>
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### Professional Organizations

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<th>PROGRAM</th>
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<tr>
<td>National Science Teachers Association (NSTA)</td>
<td>The National Science Teachers Association (NSTA) mission is to promote excellence and innovation in science teaching and learning for all. NSTA is the largest organization in the world committed to promoting excellence and innovation in science teaching and learning for all. The organization's membership of 60,000 includes science teachers, science supervisors, administrators, scientists, business and industry representatives, and others involved in and committed to science education. <a href="http://www.nsta.org">http://www.nsta.org</a></td>
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<tr>
<td>Florida Association of Science Teachers (FAST)</td>
<td>The Florida Association of Science Teachers (FAST) is the state's largest non-profit professional organization dedicated to improving science education at all levels, pre-school through college. The association's membership includes science teachers, science supervisors, administrators, scientists, representatives of business and industry, and others interested in science education. They host an annual conference in the Fall (October) and provide awards for excellence in science teaching at the elementary, middle and senior high school levels. <a href="http://www.fastscience.org/Default.aspx">http://www.fastscience.org/Default.aspx</a></td>
</tr>
<tr>
<td>Dade County Science Teachers Association (DCSTA)</td>
<td>The Dade County Science Teachers Association is the local organization for science teachers whose purpose is to provide into the program of education any and all essential elements of the science fields and to develop the principles, methods and attitudes by which they are promoted. The organization offers professional growth opportunities, grants, an annual conference and awards teachers at the elementary, middle and senior high levels. <a href="http://science.dadeschools.net/dcsta/default.htm">http://science.dadeschools.net/dcsta/default.htm</a></td>
</tr>
<tr>
<td>American Educational Research Association (AERA)</td>
<td>AERA is the most prominent international professional organization, with the primary goal of advancing educational research and its practical application. Its more than 25,000 members are educators; administrators; directors of research; persons working with testing or evaluation in federal, state and local agencies; counselors; evaluators; graduate students; and behavioral scientists. <a href="http://www.aera.net/">http://www.aera.net/</a></td>
</tr>
<tr>
<td>National Association of Research in Science Teaching (NARST)</td>
<td>National Association of Research in Science Teaching (NARST) is a worldwide organization of professionals committed to the improvement of science teaching and learning through research. Since its inception in 1928, NARST has promoted research in science education and the communication of knowledge generated by the research. The ultimate goal of NARST is to help all learners achieve science literacy. <a href="http://www.narst.org/">http://www.narst.org/</a></td>
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Section IX – Contact Information
Appendix A
Safety and Animal Use Guidelines
Please visit the District Science Website for latest documents:

Laboratory Safety Handbook

Guidelines for the Use of Animals

Please complete your Science Leaders Handbook by attaching listed documents to the appropriate Appendix.
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Appendix B
SECME
Please visit the District Science Website for latest documents:

SECME

Please complete the Science Leaders Handbook by attaching listed documents to the appropriate Appendix
Appendix C
Elementary Science Fair
Please visit the District Science Website for latest documents:

Elementary Science Fair

Please complete the Science Leaders Handbook by attaching listed documents to the appropriate Appendix
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Appendix D
South Florida Regional Science and Engineering Fair
Please visit the District Science Website for latest documents:

South Florida Regional Science and Engineering Fair

Please complete the Science Leaders Handbook by attaching listed documents to the appropriate Appendix