

Science Content & Standards for K-6 Teachers

SCE 4113 Honors Compact Section 000 | CRN 00000 | 2 Credit Hours (3 contact)
Fall 20xx | Jupiter SR 290 | Day Time

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Course Description

In-depth review of content required to effectively teach science K-6. Emphasizes relevant Florida science standards and competencies.

Prerequisites: 7 credits of college level science including 3 credits in physical science, 3 credits in biological science and at least one science laboratory, all with minimum grades of "C"; Elementary Education majors only.

Course Objectives & Learning Outcomes

1. Cover Florida Teacher Certification Examinations (FTCE) Elementary Education K-6 Science Subtest content.
2. Cover Florida State Science Standards (NGSSS) for Science K-6.
3. Connect science content to local environmental education providers.

Standards & Guidelines Used for Developing Course Objectives

Florida Teacher Certification Examinations (FTCE) Elementary Education K-6 Science Subtest at: <http://www.fl.nesinc.com/testPage.asp?test=060>

Next Generation Sunshine State Standards (NGSSS) for Science K-6 (when relevant) at: <http://www.cpalms.org/Public> (Collaborate Plan Align Learn Motivate Share)

Next Generation Science Standards (NGSS) at: <http://www.nextgenscience.org/>
Disciplinary Core Ideas K-6 (7-8 when relevant)
Crosscutting Concepts (K-6, K-12 when relevant)
Practices (K-6, K-12 when relevant)

National Science Teachers Association (NSTA) at: <http://www.nsta.org>

North American Association for Environmental Education Guidelines for Excellence (<https://naaee.org/>)
Professional Development of Environmental Educators (2017)
Learning K-12 (2018)

A Framework for K-12 Science Education

<http://www.nextgenscience.org/framework-k%E2%80%9312-science-education>

Required Text

Trefil, J. & Hazen, R. (2012). *The sciences: An integrated approach* (8th ed.). John Wiley & Sons, Inc. Note: Students may also use 6th or 7th editions which are usually much cheaper.

Recommended Text/Readings:

National Research Council. (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Free PDF or print version (\$40) available from:

<http://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts>

NAAEE. (2018). *K-12 environmental education: Guidelines for Excellence*. Washington, DC: North American Association for Environmental Education.

Other Course Requirements

- Familiarity with and access to FAU's Canvas course management system.

Assignments & Course Requirements

Participation & Presentations		Points
Participation, Conduct		20
Science News Talk		5
Big Idea Presentation		10
Chapter Discussion		4
Written Assignments		
Chapter Quizzes		15
Weekly Science Journal		13
Chapter Study Guide		9
Notes Check		4
Final Exam		20
Total		100

Bonus point in participation for perfect attendance – get 21 out of 20!

Honors Compact Assignment 20

Honors students will become familiar with the Palm Beach County school district Field Research Ranger Program (<https://www.palmbeachschools.org/ec/science/>), and make at least two visits to district-approved environmental education providers. They will interview local environmental education providers there and write a paper on how field trips could be used to help teach the state standards-based science content they are learning in this course.

Participation, Conduct 20

Class participation refers to regular involvement and active engagement in class projects and activities. It includes attendance, punctuality (see tips and reminders), completing assignments and required readings before class, as well as writing, speaking, and listening. If you must miss a class, please tell me in advance.

- 20 no more than one unexcused absence, punctual, regularly contributes to discussions & activities
- 1+ missing classes (sliding scale)
- 1 social networking etc. during class time
- 1-3 disruptive or inconsiderate to other students, guest speakers, or professor

Bonus Points!

- +1 perfect attendance!

Science News Talk

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You will give a brief (5-10 minute) report to the class on one article relating to science from a recent (this semester) newspaper, news website or news magazine. Once you've found a science story you like, you'll tell us:

1. Where you found the article.
2. What the science issues involved are.
3. How it relates to topics we have discussed in class.
4. Which Florida State Standards Big Idea and Florida Teacher Certification Exam (FTCE) Knowledge of the Nature of Science (NOS) standards could apply to it, and how (look in the Information Module for lists of both).
5. How it might affect the lives of you, your peers, or your future students.

You can use a BRIEF computer presentation (bring it on a thumb drive), or any other props or visual aids if you like. Controversial issues and/or "messy" science are encouraged. To avoid duplication, you'll sign up for your topic on a Canvas discussion list (put the article title and source in the subject line). Once somebody chooses a topic, you'll need to find a different one, so check the list before you pick something, and be sure to put yours on the list. You'll find great sources of science news in the Resources section of this syllabus; just ask if you have questions.

Table 1: News Talk Rubric

(5 possible)	Exemplary (1)	Satisfactory (.85)	Emerging (.75)
Logistics	Signed up on discussion board, cited source, well timed, engaging visuals.	Missing one of the previous.	Missing two of the previous.
Science Issues	Explained underlying science in clear and engaging way.	Addressed underlying science accurately.	Science explanation was partially inaccurate or confusing.
Connection to class topics	Connected story to class in an interesting and engaging way.	Connected to something we covered in class.	Connection superficial or tenuous.
Standards	Clearly connected to relevant standard(s).	Connected to standard(s).	Connection to standard tenuous.
Connection to Florida students and citizens	Clearly connected story to the lives of peers, future students, or other Floridians.	Made adequate connection(s) to Floridians.	Connection tenuous or superficial.

Big Idea Presentation

10

You'll be presenting on a Florida State Standard Big idea, and how the concepts weave their way through K-6 education standards. See Rubric 1.

Chapter Discussion

4

You'll be leading a discussion of one of the Chapters from the textbook, the one you were assigned for your Chapter Study guide. Have some notable points to bring up, including local examples of key concepts, common misconceptions people might have, and areas you or others could find confusing. Remember to make it a discussion; encourage the participation of your peers.

Table 2: Chapter Discussion Rubric

(4 possible)	Exemplary	Satisfactory	Emerging
Local examples	1	.85	.75
Misconceptions	1	.85	.75

(4 possible)	Exemplary	Satisfactory	Emerging
Confusing concepts	1	.85	.75
Discussion is organized	1	.85	.75

Chapter Quizzes 15

Most weeks at the beginning of class there will be a brief quiz on the required chapter readings. Bring a device, as these will typically be on Canvas. The questions will be designed to assess whether or not you engaged with material meaningfully, not whether you have become an expert on the subject.

Weekly Science Journal 13

Each week (twice weekly in summer), you will explain how you used one science skill and one science attitude (see the PDF's under Information for lists and explanations). These will be in the form of a Canvas quiz, due the evening of class (and no longer available after that, so don't procrastinate!). At the end of the ten weeks there will be three reflection questions.

Chapter Study Guide 9

For your assigned chapter, create a one page study guide that you and your peers can use. See [Rubric 2](#).

Notes Check 4

Throughout the course you will be expected to take notes on the topics, the discussions, and other things that emerge each class. On the last day, you will gather these notes (paper or digital) and show them to me in class. This is the best way to learn – take good notes and review them!

Final Exam 20

A standardized final exam on the concepts presented in the textbook chapters and Big Ideas.

Grading

I want every student to succeed in my courses. However, I don't need every student to get an A. That is up to you! See *How to Get an A* below if you want an A in this course.

A 91-100 Excellent work and performance;
No more than 1 unexcused absence.

B+ 86-90 Evidence of good work and performance. No more than 2 unexcused absences.

B 80-85 Evidence of satisfactory work and performance.

C+ 76-79 Fair or emerging work, or good work with inconsistencies.

C 70-75 Fair or emerging work, with considerable room for improvement.

D 60-70 Failed to fulfill essential criteria for the course, must retake for education.

F <60 Failed to fulfill essential criteria for the course.

F (penalty) You do NOT want this. Punishment for academic dishonesty will depend on the seriousness of the offense, beginning with receipt of an "F" with a numerical value of zero on the assignment and rapidly scaling to a penalty grade of F in the course. Don't cheat, and don't plagiarize. Penalty grades cannot be removed by drop, withdrawal, or forgiveness policy. Students should be aware that, in some Colleges/programs, failure in a course or a finding of dishonesty may result in other penalties, including expulsion or suspension from the College/program. In addition, the following notation will be included on both your official transcript and your internal record: "Violation of Code of Academic Integrity, University Regulations 4.001"

How to Get an A

1. Try not to miss any classes. Get the perfect attendance bonus point!
2. Pay attention and participate in class. This means put away your phone/computer unless you are taking notes with it.
3. Take lots of scribbly notes, and review them repeatedly for assignments and the exam.
4. Don't get behind. Draft your assignments before they are due. Reread and edit your draft before you submit. Don't wait until the last minute.
5. Show off! Use the assignments to show me how you have engaged with the textbook readings, class discussions, and the topics we cover in class.
6. Many assignment rubrics are based on the following scheme: C is emerging work, B is satisfactory work, and A is exemplary work. If you want an A in the course, do exemplary work, which is more than the minimum required.

Late assignments will lose 1 point per day unless an acceptable reason is provided ON or BEFORE the due date. This is a senior level class, so:

- Don't procrastinate; there aren't many acceptable reasons for late assignments.
- Be responsible for your learning and grade; the professor will generally not track down individuals who do not turn in assignments.
- You will not be given a chance to "make up" work you did not do.
- One missed assignment may be turned in for up to ½ the points.
- Grades and associated feedback will be posted on Canvas, so if you didn't get a grade and others did, ask in class or send me an email.

The Standard Stuff

Disability policy statement In compliance with the Americans with Disabilities Act Amendments Act (ADA AA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/

Counseling and Psychological Services (CAPS) Center Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to <http://www.fau.edu/counseling/>

Code of Academic Integrity policy statement. Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

Academic Dishonesty: Plagiarism consists of the unattributed quotation of the exact words of a published text, or the unattributed borrowing of original ideas by paraphrase from a published text. On written papers for which the student employs information gathered from books, articles, or oral sources, each direct quotation, as well as ideas and facts that are not generally know to the public at large must be attributed to its author by means of the appropriate citation procedure. Citations may be made in footnotes or within the body of the text. Plagiarism also consists of passing off as one's own, segments or the total of another person's work. Punishment for Academic Dishonesty will depend on the seriousness of the offense and may include receipt of an "F" with a numerical value of zero on the item submitted, and the "F" shall be used to determine the final course grade. It is the option of the instructor to assign the student a grade of F or FF (the latter indicating dishonesty) in the course.

Tips & Reminders

The point of this course is to learn science concepts, practices, and attitudes, particularly those that pertain to standards-based K-6 classrooms in Florida. We will learn these concepts, including the more challenging or counterintuitive ones, as a group during class, so don't feel bad if you are initially confused by the textbook. Bring your questions to class so your peers and instructor can help build your knowledge.

Science full of misconceptions; by the end of the course we will make sure you are confident about having up to date, accurate science knowledge, as well as at least a basic level of science literacy.

This course involves co-learning and group work, so **attendance is crucial**. If you are unable to regularly attend, take the course in a semester when you can. Consistently late arrivals or early departures may be counted as an absence at instructor's discretion. Missed classes will count against your participation grade. Please notify me in advance if you are going to miss a class.

All students must have access to a computer and **computer skills** that are sufficient to allow them to participate. This includes a basic familiarity with the Canvas learning management system; written assignments will be submitted to Canvas.

If you send me an important message by **email**, don't assume I got it until you get a response, and feel free to email me once a day until you get one.

For consistency, assignments should adhere to the formatting guidelines of the American Psychological Association (**APA**). I'm not super-strict about the details, and if you don't have the APA Handbook, don't worry, there is plenty of information available online. Look under information on Canvas for a cheat sheet that includes minor variations I would like you to follow (e.g., 1.5 line spacing).

Beware of **plagiarism** – your assignments may be put through FAU's plagiarism detection tool(s). Do NOT cut and paste when writing assignments for class, it's a recipe for disaster, even if you think you're going to change some of the words. Write it yourself, in your own words. Check out the plagiarism tutorials at the FAU library site, and **when in doubt, give props or ask**.

Using basic **electronics etiquette**. We'll talk about effective note taking, but numerous studies suggest that off-task electronic use can be distracting to both you and the students around you, and that your awesome multi-tasking is really just doing several things badly. Computers and tablets may be helpful at times, but as this is a participatory class that features active teaching methods, group discussions and potentially messy activities, students will often be asked to close or put away devices. The professor likes to wander, and students observed working on unrelated material (e.g., social networking, shopping, watching the game) during class will lose participation points.

If you are going to include a computer presentation for your chapter or news talk, bring it to class on a USB thumb drive and **load it before** the class begins. You may email it to yourself as a backup only.

Presentations will be graded based on what you do in class; there are no **submissions** required for them. Written assignments should be submitted through the appropriate assignment links on Canvas; I don't need or want paper versions.

The length of written assignments will be in **word counts**, not numbers of pages. If you're not accustomed to word counts, it's very easy; you typically just select the section you want a count for and look for the number in the status bar. Please include a word count in your assignments for the body of your writing (not including things like cover pages, references and supplemental materials you pasted in). If you have questions or technical issues, I'll be happy to help.

Good writing can be challenging. No one likes to plow through never-ending blocks of text with no headings or even paragraph breaks, including the person grading your paper, which is me. One of the best ways to organize an unruly assignment is to break it into headings and make sure that what you're writing about belongs under its heading. Review or relearn what a **coherent paragraph** is; you will lose points for overlong, unorganized writing blobs. One of the simplest ways to improve your writing is to first design your headings based on the rubric or your goals, write a rough draft, and then organize your writing into coherent paragraphs. If your paragraphs are more than 150 words, read this to make sure you're writing clearly: <https://owl.english.purdue.edu/owl/resource/606/1/>

Resources

Science Standards

CPALMS (official site for Florida Standards) <http://www.cpalms.org/Public/>
Next Generation Science Standards (NGSS 2013) <http://www.nextgenscience.org/>
North American Association for Environmental Ed Guidelines on Canvas under info

APA & Other Style Resources

Good APA workshop <http://owl.english.purdue.edu/workshops/hypertext/apa/index.html>
Official APA site (not as helpful as it should be) <http://apastyle.apa.org/>
And be sure to check out the APA cheat sheet on Canvas.

Associations

National Science Teachers Association (NSTA – excellent resource) <http://www.nsta.org/>
American Association for the Advancement of Science (AAAS) <http://www.aaas.org/>
North American Association For Environmental Education <http://www.naaee.net/>
Florida Association of Science Teachers (FAST) <http://www.fastscience.org/>

Science News Websites for Children

Student Science <https://student.societyforscience.org/sciencenews-students>
Eurekalert Kids News <http://www.eurekalert.org/kidsnews/>
National Geographic Kids <http://news.nationalgeographic.com/kids/>
Dogo News <https://www.dogonews.com/>

Science News for Grownups

Science Daily (*excellent roundup of new research*) <http://www.sciencedaily.com/>
Science Now (*from the AAAS*) <http://news.sciencemag.org/>
New York Times Science Pages www.nytimes.com/pages/science/index.html
Science A GoGo (*irreverent young Australians*) <http://www.scienceagogo.com/>
Science of Us <http://nymag.com/scienceofus/>
National Geographic Latest Stories <http://www.nationalgeographic.com/latest-stories/>

Science Literacy Resources

Our textbook
State standards <http://www.cpalms.org/Public/>
The Magic of Reality (Dawkins, 2012) ; engaging popular science book.

Course Topical Outline

Class	Topics / Chapters	Big Ideas	Assignments Due
1	Practical Science	Intro to Standards	
2	01. Science: A Way of Knowing 02. The Ordered Universe	Into to Big Ideas	
3	03. Energy 04. Heat & 2 nd Law	10. Forms of Energy 18. Matter & Energy Transform	
4	05. Electricity & Magnetism 06. Waves & Radiation	09. Changes in Matter 11. Energy Transfer & Transform	
5	08. Atom 10. Atoms in Combination	12. Motion of Objects 13. Forces & Changes in Motion	
6	11. Material Properties 12. Nucleus	08. Properties of Matter	
7	14. Stars 16. Earth & Planets	05. Earth in Space & Time	
8	17. Plate Tectonics 18. Earths Many Cycles	06. Earth Structures 07. Earth Systems Patterns	
9	19. Ecology Environments 20. Strategies of Life	14. Living Organisms 17. Interdependence	
10	21. Living Cell 22. Molecules of Life	02. Characteristics of Knowledge 03. Role of Theories Laws	
11	23. Genetics 24. New Science of Life	01. Practice of Science 16. Heredity & Reproduction	
12	25. Evolution	15. Diversity & Evolution 04. Science & Society	Weekly Science Journals Notes Check
13	Final Exam		Final Exam

- Timed chapter quizzes will be given near the beginning of each class session.
- Chapter Presentations and Big Idea Presentations are randomly assigned and due each week.
- Chapter summaries are due on the discussion board by the beginning of class each week.
- Two science news talks will be given each week, by volunteers from the previous week.
- Honors students will be assigned a Big Idea (Theme) from the NAAEE Guidelines for Excellence K-12 to present to the class.

Rubric 1: Big Idea Presentation

Each student will be assigned one of the 18 Big Ideas from the Florida State Science Standards (cpalms.org). You will prepare a presentation for the rest of the class on your Big Idea, explaining it, and showing how the standards it includes develop from kindergarten through to Grade 5. You should also briefly cover how the Big Idea progresses through middle and high school.

When appropriate, link the Big Idea to topics we have covered in class, and/or material from the textbook. Use any images, diagrams, etc. that you feel would be helpful.

Be sure to highlight at least one area where you think students (and teachers) might have trouble, so we can discuss it in class. Be sure to use the resources included under the Information module on canvas, especially the progression charts Polk County put together.

Aim for about a 10-15 minute presentation, with some time for discussion points that you raise or questions that your classmates might have.

10 points total

Common Problems to Avoid

- 1+ missing important standards from progression
- 1-3 science content weak, inaccurate, or missing
- 1 poor time management (overly short or long)
- 1+ rote reading or otherwise unengaging

Table 3: Big Idea Presentation Rubric

Rubric	Exemplary	Satisfactory	Emerging
K-5 progression of standards under the Big Idea displayed and explained	4	3.4	3
6-12 progression of standards briefly displayed and explained	2	1.7	1.5
Links of the Big Idea to textbook and class topics discussed.	1	.85	.75
Potentially problematic standards or progressions examined.	2	1.7	1.5
Discussion points raised and coordinated.	1	.85	.75

Rubric 2 Chapter Study Guide

The details are up to you and your creativity, but your guide should be well organized, easy to read, and include the critical concepts from your chapter. You will post this to the Chapter Study Guides discussion list; make it something that will help your classmates!

Justify your choice of concepts to include by how they link to K-8 Florida State Science Big Ideas and Standards, and how they relate to the lives of Florida children and other residents. You may include diagrams (preferably your own) or other figures, but keep it to a page. Fonts should be no smaller than 10pt. Make it as helpful as possible!

9 points total

Table 4: Chapter Study Guide Rubric

Rubric	Exemplary	Satisfactory	Emerging
Organized, easy to read, engaging.	1	.85	.75
One page, fonts 10+	1	.85	.75
Critical content covered concisely.	3	2.5	2.25
Links to FL Big Ideas and standards.	2	1.7	1.5
Links to lives of FL children and other residents.	2	1.7	1.5