College of Education
Signature Page

Science Education (Chemistry) B.S.

New Program: _________ Revised Program: X
Name of Faculty Sponsor: Dana Zeidler e-mail: zeidler@coedu.usf.edu

APPROVALS
List appropriate Department Chair, Committee Chair, Faculty Council Chair and
Associate Dean Approving:

Stephen Thornton ____________________________ 11/24/08
Name of Department Chair SIGNATURE DATE

Patty McHatton ______________________________ 1/16/09
Name of Committee Chair SIGNATURE DATE

Erwin Johanningmeier __________________________
College Council Chair SIGNATURE

Michael Stewart, Ph.D. ____________________________ 1/30/09
Name of Associate Dean SIGNATURE DATE

CONCURRENCE
List other units and department of the University that have been consulted, comments
and supporting remarks:

UNIT RECOMMENDATION

Name/Title ________________________________ Signature ____________________________ Date

CHOSE ONE: CONCURRENCE, NON-CONCURRENCE or DEFER

UNIT RECOMMENDATION

Name/Title ________________________________ Signature ____________________________ Date

CHOSE ONE: CONCURRENCE, NON-CONCURRENCE or DEFER

COUNCIL/DEAN APPROVALS
Recommendation of Undergraduate Council: Approved: ____ Disapproved: ____

Signature of Undergraduate Council Chair: ________________________________
Date_________________

Action by the Undergraduate Studies Dean of: Approved: ____ Disapproved: ____

Signature of Dean: ________________________________
Date_________________

Effective Date (Term): ________________________________
Overview of Program Change Request for the Science Education Program (Chemistry)

In order to comply fully with the State of Florida mandate that undergraduate programs not be allowed to exceed 120 credit hours, the science education program faculty are requesting an updated planned program of study in Science Education – Chemistry. Rather than continuing to require BCH 3023 Introductory Biochemistry with lab (5 semester hours) in the College of Arts and Sciences, we recommend that students have three semester hours of electives. The three hours of electives would be designed to meet the student’s individual needs and areas of specific interest. Recommended prefixes would include but not limited to BCH, CHM, SCE.

This change would not affect any of the accomplished practices for the science education (chemistry) program. Forms; A, B and D are attached and have been updated to reflect the current language of the undergraduate catalog for course descriptions and accurate course numbers.
DEPARTMENT: Secondary Education

PROGRAM TITLE: Science Education - Chemistry        DEGREE LEVEL: B.S.

I. PURPOSE OF NEED

Why does the program exist? What need does it fulfill?

See Generic Form A for College-wide purpose and need. For this program,

There is a severe need for qualified secondary chemistry science teachers in the State of Florida, and across the nation. The state of Florida has recently, again, identified science as an area of critical teacher shortage. School districts in the surrounding counties are having to hire long term substitute teachers to teach their middle and high school science classes because there are not enough secondary science teachers available. The Science Education program contributes to the College of Education's purposes and goals by having a program that is designed to produce highly skilled science teachers for the profession. The purposes of the program are: (1) to provide opportunities for the prospective teacher to attain competencies needed to be an effective teacher, and (2) to prepare prospective teachers who exceed the existing state certification requirements.

II. PHILOSOPHY

What assumptions underlie the program? How do they relate to each other and/or the identified needs? How do they related to the value statements in the College's conceptual framework?

See Generic Form A for College-wide philosophy. For this program,

The teaching/learning process is complex and dynamic. To be an effective science teacher in the secondary schools requires a liberal arts education with special emphasis in science, science education (teaching emphasis) and other professional studies (learning, curriculum and instruction, current issues, etc.). The Science Education program is designed to provide students with opportunities to acquire this knowledge base and to synthesize and apply it within a problem solving context in secondary school science classrooms. In addition, we wish our graduates to be confident in their abilities to practice critical thinking and problem solving skills, to become reflective practitioners, and to maintain a healthy interest in intellectual inquiry.

III. RATIONALE

Upon what knowledge bases (professional literature on research and best practice) does it draw?

See Generic Form A for College-wide knowledge base. For this program,
The Science Education program has three components: liberal arts general education, additional extensive liberal arts course work in science, and professional education studies. The science teaching emphasis is operationally defined as the intersection of the three components. Programs based on this model prepare students to be problem solvers in an educational setting. The science education program had been cited as an example of a sound program after its last accreditation study. This program already reflected the identified needs of students preparing to become science teachers as compiled from research.

### VIII. EXIT CRITERIA

Specify the exit criteria for program completion, including both the category and the criterion. The matrix has been partially completed.

<table>
<thead>
<tr>
<th>Category</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>Minimum of 2.5</td>
</tr>
<tr>
<td>FTCE (initial preparation programs only)</td>
<td>Passing score on all three subtests (GK, Professional, and Science - Chemistry)</td>
</tr>
<tr>
<td>Internship</td>
<td>Successful Completion</td>
</tr>
</tbody>
</table>
| Evidence of Attainment of Accomplished Practices (initial preparation programs only) | AP 1: ________  
AP 2: ________  
AP 3: ________  
AP 4: ________  
AP 5: ________  
AP 6: ________  
AP 7: ________  
AP 8: ________  
AP 9: ________  
AP 10: ________  
AP 11: ________  
AP 12: ________ |

### IX. PROGRAM EVALUATION

What process is used to evaluate the program? (What? When? How often? By whom?) How do the faculty and stakeholders determine if program goals are achieved, i.e., if alumni have attained the knowledge and skills necessary to meet role/task requirements? What procedures are used to translate student assessments to data for use in program modification and improvement?

See Generic Form A for College-wide strategies, including alumni survey, principals' survey, exit survey, cooperating teacher and university supervisor intern evaluations, and rehire study. For this program, 1. Informal feedback from current supervising teachers as well as graduate students, who are teaching in the area and are frequently working with our intern teachers and recent graduates of the program. This information is discussed at least each semester at a science education program faculty meeting.
2. At the completion of the senior seminar students complete a questionnaire or several reflective journal entries. This information is used by science education faculty during program area meetings to reflect on the overall program.

3. Each course and professor is evaluated by students at the end of each semester.
Form A Matrix

Program specific goals begin with goal #12, since goals 1-11 are common across most programs and are provided in the Generic Form A Matrix. The eleven college-wide goals may include program specific additions, which should be added to the Generic Form A matrix.

<table>
<thead>
<tr>
<th>IV. GOALS</th>
<th>V. ACCOMPLISHED PRACTICES</th>
<th>VI. OBJECTIVES</th>
<th>VII. COURSES &amp; EXPERIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the desired results (general areas of knowledge and skill preparation)? (Note: Begin numbering goals with 12.0.)</td>
<td>Accomplished practices: #8 Knowledge of subject Matter.</td>
<td>Chemistry(6-12) Subject Matter content Standards</td>
<td>CHM 2210, CHM 2211, CHM 2045, CHM 2046, CHM 3120, CHM 3400, CHEM 3610</td>
</tr>
<tr>
<td>12.0 The program will ensure that teachers of science understand the concepts and depth, to support student learning as defined by state or national standards developed by the science education community. content refers to:</td>
<td></td>
<td>12.0 The nature of matter</td>
<td>Written exams</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.0.1 Matter has observable, non-observable and measurable properties</td>
<td>Quizzes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.2 The basic principles of atomic theory</td>
<td>Laboratory assignments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.3 Energy</td>
<td>Experiments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.3.1 Energy may be changed in form with varying efficiency</td>
<td>Laboratory Quizzes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.3.2 Interaction of matter energy and force is part of all systems</td>
<td>Laboratory exams</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.4 How Living Things Interact with their environment</td>
<td>Writing assignments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.4.1 Competitive, interdependent and cyclic nature of living things in the environment</td>
<td>Class Presentations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.4.2 Limits on natural resources and fossil fuels</td>
<td>Secondary science education students understand unifying concepts and relationships in science.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| domains | Accomplished practices: #8 Knowledge of subject matter | SCE 4330  
Obj. The student will be able to identify common unifying themes in science. |  |
|---|---|---|---|
| Process of investigation in science discipline. | • STS Curricular Final project  
• Process of investigation in science discipline.  
Accomplished practices: #8 Knowledge of subject matter | SCE 4237  
Obj. 12.2 The participant will be able to construct an understanding of the nature of the scientific enterprise including the role of the interactions among science, technology, and society, and generate a grounded theory of STS. |  |
| Application of mathematics in science research. | • Science/teacher related projects  
Accomplished practices: #8 Knowledge of subject matter | SCE 4320  
Obj. 12.3 The student will be able to demonstrate skill in performing the process of science. | Secondary science education students utilize scientific inquiry processes. |
| 13  
The Nature of Science  
The program ensures that teachers of science can interpret the nature of science, can engage | Portfolio assignment  
Journals  
Original final Project  
E-mail communication  
Accomplished practices | SCE 4237  
Obj. 13 Students will be able to describe the nature of science from both current and historical perspectives. | • Videos on paradigms  
• Science vs. Pseudoscience  
• Class Discussions  
Discussing & Reviewing:  
• The nature of science |
| #3 Continuous improvement  
#4 Critical Thinking  
#8 Knowledge of subject matter |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution to class seminars and completion of in-class assignments. Reflective Summary of Field-based observations.</td>
</tr>
</tbody>
</table>
| Accomplished practices  
#7 Human Development and Learning  
#8 Knowledge of subject matter |
| **SCE 4330**  
**Obj. 13.1** Students will derive and apply a basic understanding of scientific literacy and the nature of science relative to the enterprise of science and their field of specialization.  
**SCE 6634**  
**Obj. 13.2** Students will develop a personal model of scientific literacy that reflects the nature of science and its effect on classroom pedagogy. |

| • Scientific Literacy  
• Theory Development  
• Conceptual Change Theory  
• Black Box Activities  
• Myths of Science and Science Education  
• A brief introduction into the Nature of Science |

| 14  
**Teaching Through Inquiry**  
The program ensures that teachers of science can engage students effectively in science-related exploration of the natural environment. Inquiry refers to:  
Accomplished practices:  
#8 Knowledge of subject matter  
• Experiment Semester Project |
|---|
| • Portfolio Requirement  
• Summative presentation |
| **SCE 4237**  
**Obj. 14.0** Students will be able to use STS as the context to help learners construct basic science concepts.  
**SCE 4320**  
**Obj. 14.1** Students will be able to demonstrate skills in performing the processes of science. |

| • Constructive modeling  
• Cooperative Problem Solving  
• Theory construction  
• Application of Science Process Skills  
• Application of Mathematics and Language Skills  
Theory Development  
Constructivism |
<table>
<thead>
<tr>
<th>Questioning and formulating solvable problems. Reflecting on and constructing, knowledge from data. Collaborating and exchanging information while seeking solutions. Developing concepts and relationships from empirical experience.</th>
<th>Accomplished practices: #2 Communication #4 Critical Thinking #8 Knowledge of subject matter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Detailed Lesson plan</td>
</tr>
<tr>
<td></td>
<td>- Portfolio Assignment</td>
</tr>
<tr>
<td></td>
<td>- (Reflection of Class I Inquiry Activities)</td>
</tr>
<tr>
<td></td>
<td>- Mini Lesson Presentation</td>
</tr>
<tr>
<td>Accomplished practices: #1 Assessment #5 Diversity</td>
<td>Obj. 14.2 Students will be sensitive to multiple forms of knowing, inquiring, and evaluation in science teaching</td>
</tr>
<tr>
<td></td>
<td>Alternative Assessment Planning &amp; Teaching Science Lessons Selected Class Inquiry activities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>15 The Context of Science</th>
<th>The program ensures that teachers can relate science to the daily lives and interests of students, as well as to a larger framework of human endeavor and understanding. The context of science refers to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>* Relationships among systems of human endeavor including science</td>
</tr>
<tr>
<td></td>
<td>Accomplished practices #8 Knowledge of subject matter #12 Technology</td>
</tr>
<tr>
<td></td>
<td>- Journals</td>
</tr>
<tr>
<td></td>
<td>- E-mail Communications</td>
</tr>
<tr>
<td></td>
<td>- Original Final Project</td>
</tr>
<tr>
<td>SCE 4237 Obj 15 Students will be able to describe the nature of technology from both current and historical perspectives.</td>
<td>Obj. 15.1 Students will be able to describe the interaction of science and technology with each other and society.</td>
</tr>
<tr>
<td>Obj. 15.2 Students will be able to construct an understanding of the nature of the scientific enterprise including the role of the interactions</td>
<td>Video Series – History of Science and Technology Evolution.</td>
</tr>
<tr>
<td></td>
<td>- Computer simulation on societal Environmental Issues.</td>
</tr>
<tr>
<td></td>
<td>- Academic perspectives on STS</td>
</tr>
<tr>
<td></td>
<td>- Site Exploration</td>
</tr>
<tr>
<td></td>
<td>- AIDS Dilemma</td>
</tr>
<tr>
<td></td>
<td>- Science, Technology and Society.</td>
</tr>
<tr>
<td></td>
<td>- Integration of Moral and Ethical Issues in the Science and Curriculum</td>
</tr>
<tr>
<td></td>
<td>- Moral Development</td>
</tr>
</tbody>
</table>
| and technology.  
* Relationships among scientific, technological, personal, social and cultural values.  
* Relevance and importance of science to the personal lives of students. | Project  
- Review of Databases  

* Accomplished practices  
#12 Technology  
- Journals  
- E-mail Communications  
- Original Final Project  
- Action Plan  

* Accomplished practices:  
#4 Critical Thinking  
#8 Knowledge of subject matter  
- Portfolio assessment  
- Optional Mid Term  

* Accomplished practices:  
#4 Critical Thinking  
#8 Knowledge of subject matter  
#10 Planning | among science, technology and society and generate a grounded theory of STS.  

**SCE 4330**  
**Obj. 15.3** Students will incorporate the role of ethical issues in science and society. |

| • Dilemma Examples |  |


| 16 Pedagogy  
The program ensures teachers of science can create a community of diverse learners, help | Journals  
E-mail communications  
Constructivist Approach Based Final Project  

**SCE 4237**  
**Obj. 16** Students will be able to use a constructivist approach to teach diverse student audiences about the nature of the scientific enterprise and the interaction of science, technology,  
  |

| • Constructivism modeling  
• STS Teaching to Diverse Audiences  
• Piagetian Theory  
• Lesson Styles theory  
• Misconceptions |
<table>
<thead>
<tr>
<th>Accomplished practices:</th>
<th>and society.</th>
</tr>
</thead>
<tbody>
<tr>
<td>#2 Communication</td>
<td><strong>SCE 4320</strong></td>
</tr>
<tr>
<td>#5 Diversity</td>
<td><strong>Obj. 16.1</strong> Students will be able to understand the relation of science instruction and the cognitive development of children.</td>
</tr>
<tr>
<td>#10 Planning</td>
<td><strong>Obj. 16.2</strong> Students will be able to integrate science with other content areas.</td>
</tr>
<tr>
<td>Class Reports</td>
<td><strong>SCE 4330</strong></td>
</tr>
<tr>
<td>Examinations</td>
<td><strong>Obj. 16.3</strong> Students will utilize their understanding of developmental learning theory as it pertains to teaching</td>
</tr>
<tr>
<td>Accomplished practices:</td>
<td><strong>Obj. 16.4</strong> Students will be able to identify possible misconceptions and formulate conceptual change strategies appropriate for the students they will instruct.</td>
</tr>
<tr>
<td>#5 Diversity</td>
<td><strong>Obj. 16.5</strong> Students will be able to observe, compare, contrast, analyze and evaluate various content specific and generic science teaching</td>
</tr>
<tr>
<td>#7 Human Development and Learning</td>
<td><strong>SCE 6634</strong></td>
</tr>
<tr>
<td>Lesson Plan evaluation</td>
<td><strong>Obj. 5.0</strong> Students will evaluate the efficacy of the above goals and trends</td>
</tr>
</tbody>
</table>

- Process Skills
- Lesson Plan development
- Integration of technology
- Cognition, Reasoning and Learning
- Misconceptions
- Critical thinking
- Implications for Science Teaching
- Selected class inquiry activities
- Misconceptions
- The learning cycle
- Conceptual change theory
- Selected class inquiry
- Activities
- Content-specific strategies
- Generic teaching strategies
- Museum of science & industry
- Field trip
- Florida center for instructional
- Technology visit
- Introduction and historical perspectives of science trends
- Myths of science and science education
| 17 Science Curriculum | #1 Assessment | with respect to their areas of classroom teaching | • A brief introduction into the nature of science  
• Analyses of contemporary Research  
• Related to current trends  
• Establishing a personal  
• Research Agenda for field based science education observations. |
|-----------------------|--------------|-------------------------------------------------|--------------------------------------------------|
|                      | #8 Knowledge of subject matter | Local school systems.  
**Obj. 17.0** students will critically examine observe analyze and reflect on current trends in the research and related literature base and in the classroom.  

**SCE 4237**  
**Obj. 17.1** The students will be able to use STS as the context to help learners construct basic science concepts. |                      |                                           |
|                      | #9 Learning environments | Accomplished practices:  
#1 Assessment  
#4 Critical thinking  
#5 Diversity  
#7 Human development and learning  
#9 Learning Environments  
#10 planning |                      |                                           |
|                      | Accomplished practices | **SCE 4305**  
**Obj. 17.1** The students will be able to identify student appropriate reading materials for classroom use including articles graphs or other materials in current events  

**SCE 4330**  
**Obj. 17.2** The students will be able to demonstrate comprehension and application of the sunshine state standards |                      |   
• STS Issues  
• Academic perspectives  
• Cognitive development theory  
• Age appropriate content  
• Analysis  
• National Science education standards  
• AAAS Projects |
| Development and Learning #10 Planning Accomplished practices #3 Continuous Improvement #8 Knowledge of subject Accomplished practices: #3 Continuous Improvement Accomplished practices #3 Continuous improvement #12 Technology Accomplished Practices #3 Continuous improvement #12 Technology | And contemporary recommendations of goal from learned societies.

**SCE 6634**
**Obj. 17.3** Students will demonstrate comprehension of contemporary recommendations and goals of the American Association for the Advancement of science.

**Obj. 17.4** students will demonstrate comprehension of contemporary recommendations of the national science education standards.

**Obj. 17.5** students will demonstrate comprehension of the sunshine state standards.

**Obj. 17.6** students will correlate |
| --- | --- |
| 18 The Social Context of Science Teaching
The program ensures that teachers of science can relate science to the community and make effective use of human and institutional resources to advance the education of students in science. The social context of science teaching refers to: | Accomplished practices:
#8 Knowledge of subject matter
#10 Planning Accomplished Practices
#1 Assessment
#5 Diversity Accomplished practices
#4 Critical Thinking
#10 Planning Accomplished |
| **SCE 4237**
**Obj. 18** The students will be able to use STS as the context to help learners construct basic science concepts. |
| **SCE 4330**
**Obj. 18.1** Students will be sensitive to multiple forms of knowing inquiring and evaluation in science teaching. |
| **SCE 4936**
**Obj. 18.2** students will analyze their |
| --- | --- |
| - Florida science curriculum frameworks
- Directions and goals of secondary science teaching
- Selected class activities
- Reform Issues trends and goals at the National level and impact on Classroom pedagogy
- Reform Issues trends and goals at the national level and impact on classroom pedagogy
- Introduction and Historical |
| Social and community support network within which science teaching and learning occurs. Relationship of science teaching and learning to the needs and values of the community. Involvement of people and institutions from the community in the teaching of science. | practices:  
#2 Communication  
#5 Diversity  
#9 Learning Environments | own teaching behaviors  
SCE 6634  
Obj. 18.3 students will assume the role of a community of scholars as they interact in class with other teachers, guest speakers and in schools. | of contemporary science education goals reports and dissemination of field-based science education observations. |
|---|---|---|---|
| **19**  
**Assessment**  The program ensures that teachers of science can use a variety of contemporary assessment strategies to | Accomplished practices  
#1 Assessment  
#2 Communication  
Accomplished practices  
#1 Assessment | SCE 4305  
**Obj. 19** Students will be able to develop assessment strategies related to student outcomes in science the relate to language/mathematical concepts within curriculum. | • Student outcome evaluation strategies  
• Content Evaluation Strategies  
• Theory development constructivism  
• Alternative Assessment |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCE 4320</td>
<td></td>
<td>Obj. 19.1</td>
<td>Students will be able to develop assessment strategies related to student outcomes in science that relate to language/mathematical concepts within the curriculum.</td>
</tr>
<tr>
<td>SCE 4330</td>
<td></td>
<td>Obj. 19.2</td>
<td>Students will be sensitive to multiple forms of knowing, inquiry and evaluation in science teaching.</td>
</tr>
<tr>
<td>SCE 4330</td>
<td></td>
<td>Obj. 20.0</td>
<td>Students will utilize their understanding of development learning theory as it pertains to teaching secondary science lessons.</td>
</tr>
<tr>
<td>SCE 4940</td>
<td></td>
<td>Obj. 20.1</td>
<td>Students will be able to demonstrate professional behaviors related to attendance, record-keeping, responsibility, enthusiasm, emotional balance, and positive role modeling.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obj. 20.2</td>
<td>Students will be able to engage in continuous reflection, respond to critical feedback, and refine individual performance on the basis of feedback and reflection.</td>
</tr>
</tbody>
</table>

**20 The Environment for Learning**

The program insures that teachers of science can design and manage safe and supportive learning environments, which nurture high expectations for the success of all students. Learning environment refers to:
- Physical spaces within which learning of science occurs.
- Psychological and social environment of students.

<table>
<thead>
<tr>
<th>Detailed Lesson Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optional Mid-Term Paper</td>
</tr>
<tr>
<td>Mini lesson Presentation</td>
</tr>
<tr>
<td>Portfolio Assignment</td>
</tr>
</tbody>
</table>

Accomplished practices:
- #4 Critical Thinking
- #5 Diversity
- Internship Interim evaluation by Cooperating Teacher
- Internship final Evaluation by

- Planning and teaching science lessons
- Museum of Science & industry field trip
- Florida Center for Instructional Technology visit

- Cognition, Reasoning, and Learning
- Misconceptions
- Critical thinking
- Implications for Science Teaching
- Selected Inquiry Activities
- Planning
- Management of Student Conduct
- Instructional Organization and Development
- Presentation of Subject Matter
- Communication (Verbal and Nonverbal)
- Testing
- Professional Behaviors
| 21 Professional practice | Accomplished practices
- #5 Critical Thinking
- #8 Knowledge of subject matter
- #9 Learning Environments | SCE4330
**Obj. 21** Students will be able to observe, compare, contrast, analyze and evaluate various content specific and generic science teaching strategies.

SCE 4936
**Obj. 21.1** Students will think through what they did, why they did it and |

- Content-Specific Strategies
- Generic Teaching Strategies
- Evaluating Own Teaching
- Professional Organizations and Their Offerings

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* Maintenance and ethical use of living organisms.
* Assurance of safety in all areas related to science instruction.

Cooperating Teacher
- Field Observation by USF supervisor
- Conference among participants

* Accomplished practices:
  - #9 Learning Environment
    - Internship Interim evaluation by Cooperating teacher
    - Internship final Evaluation by Cooperating Teacher
    - Field Observation by USF supervisor
    - Conference among participants

* Accomplished practices:
  - #3 Continuous improvement
  - #4 Critical Thinking
education and development
Professional practice refers to:
Knowledge of, and participation in the activities of the professional community.

Ethical practices consistent with the best interests of students and the community.
Reflection on professional practices and continuous efforts to ensure the highest quality of science instruction willingness to work with students and new colleagues as they enter the profession.

<table>
<thead>
<tr>
<th>Practices</th>
<th>Identify additional options hence study their own practice by the process of reflective thinking.</th>
</tr>
</thead>
<tbody>
<tr>
<td>#3 Continuous improvement</td>
<td>Obj. 21.2 Students will construct a teaching portfolio</td>
</tr>
<tr>
<td>Accomplished practices</td>
<td>SCE 4940</td>
</tr>
<tr>
<td>#11 Role of the teacher</td>
<td>Obj. 21.3 Student will be able to demonstrate adherence to the Code of Ethics and Principles of Profession in Florida.</td>
</tr>
<tr>
<td>#12 Technology</td>
<td>Obj. 21.4 Student will be able to work with various educational professionals parents and members of the community to improve educational experiences at school.</td>
</tr>
<tr>
<td>Accomplished practices</td>
<td>Obj. 21.5 Students will be able to engage in continuous reflection respond to critical feedback and refine individual performance on basis of feedback and reflection</td>
</tr>
<tr>
<td>#6 Ethics</td>
<td></td>
</tr>
<tr>
<td>Accomplished practices</td>
<td></td>
</tr>
<tr>
<td>#9 Learning Environments</td>
<td></td>
</tr>
<tr>
<td>#11 Role of the Teacher</td>
<td></td>
</tr>
<tr>
<td>Accomplished practices</td>
<td></td>
</tr>
<tr>
<td>#3 Continuous Improvement</td>
<td></td>
</tr>
<tr>
<td>#10 Planning</td>
<td></td>
</tr>
<tr>
<td>Accomplished practices:</td>
<td></td>
</tr>
<tr>
<td>#2 Communication</td>
<td></td>
</tr>
<tr>
<td>#3 Continuous Improvement</td>
<td></td>
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<tr>
<td>#4 Critical Thinking</td>
<td></td>
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<tr>
<td>#9 Learning Environments</td>
<td></td>
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<tr>
<td>#10 Planning</td>
<td></td>
</tr>
<tr>
<td>#11 Role of the Teacher</td>
<td></td>
</tr>
</tbody>
</table>

- Creating a job Portfolio
- Obtaining Community support
- Financial Technical Emotional Considerations
- Selecting a Teaching Position
- Professional Behaviors
- Planning
- Instructional Organization and Development
- Establishing a personal research agenda
- For Field-Based Science Education Observations
- Reports and Dissemination of Field-Based Science education Observations.
REVIEW FORM B
REQUIRED COURSES
YEAR 2008 UPDATE

PROGRAM TITLE: Secondary Science (Chemistry) Education
DEPARTMENT/COLLEGE: Secondary Education / Education
DEGREE LEVEL Bachelor's

USF General Education Requirements:
31 semester hours
(must be selected from approved USF courses)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition:</td>
<td>6</td>
</tr>
<tr>
<td>Quantitative Methods:</td>
<td>7</td>
</tr>
<tr>
<td>Social Sciences:</td>
<td>6</td>
</tr>
<tr>
<td>Historical Perspectives:</td>
<td>6</td>
</tr>
<tr>
<td>Fine Arts:</td>
<td>3</td>
</tr>
<tr>
<td>African, Latin American, Middle Eastern Or Asian Perspectives:</td>
<td>3</td>
</tr>
</tbody>
</table>

Common Statewide Prerequisites for All Education Majors:
9 semester hours

EDF 2005 INTRODUCTION TO EDUCATION AND FIELD EXPERIENCE (3) ED EDC
Introductory survey course required for admission to the College of Education. A broad overview of the history, sociology and philosophy of education in the United States focuses on education as a field of study and teaching as a profession. Includes lecture and field experience.

EDG 2701 TEACHING DIVERSE POPULATIONS AND FIELD EXPERIENCE (3) ED EDC
Introductory survey course required for admission to the College of Education. Places schools and teaching within the context of the U.S. as a pluralistic society. Topics include the demographics of diversity; prejudice; elements of culture; American heritage of diversity and its value; and barriers to cultural understanding. Includes lecture and field experiences.

EME 2040 Introduction to Computers in Education (3) ED EDK
Designed as an introduction to computer technology and its role in teaching and learning processes. Topics include educational software, ethical and social issues, hardware, interactive multimedia, models for integrating technology into instruction, productivity tools and telecommunications.
Common Statewide Prerequisites for All Science (Chemistry) Education Majors:
16 semester hours

CHM 2045 GENERAL CHEMISTRY I (3) PR: One year of high school chemistry and two years of high school mathematics including algebra; or, completion of CHM 2040 with grade of C or better Principles and applications of chemistry including properties of substances and reactions, thermochemistry, atomic-molecular structure and bonding, periodic properties of elements and compounds.

CHM 2045L GENERAL CHEMISTRY I LABORATORY (1) (Hours in General Education Requirements)
CR: CHM 2045. Laboratory portions of General Chemistry I. Introduction to laboratory techniques; study of properties of elements and compounds; synthesis and analysis of natural and commercial materials.

CHM 2046 GENERAL CHEMISTRY II (3)
PR: CHM 2041 or CHM 2045 or equivalent. Continuation of General Chemistry. Lec.-Dis.

CHM 2046L GENERAL CHEMISTRY II LABORATORY (1)
PR: CHM 2045L. Laboratory portion of General Chemistry II. Continuation of chemistry laboratory.

BSC 2010 Biology I - Cellular Processes NS (3) (Hours under General Education Requirements)
CP: BSC 2010L and CHM 2045. The course is designed for majors and has a laboratory associated with the lecture. An analysis of biological systems at the cellular and subcellular levels: cell structure and function, respiration, photosynthesis, mitosis and meiosis, genetics and gene expression.

BSC 2010L Biology I Cellular Processes Laboratory (1) (Hours under General Education Requirements)
CR: BSC 2010. Laboratory portion of Biology I Cellular Processes relating to cellular and subcellular structure and function. Mitosis, meiosis, and Mendelian genetics will be stressed.

AND

BSC 2011 Biology II - Diversity NS (3)

BSC 2011L Biology II Diversity Laboratory (1)
CR: BSC 2011. Laboratory portion of Biology II Diversity relating to organismal structure and function. Microscopy, as well as, plant and animal development will be stressed.

OR

PHY 2053 General Physics I NS (3)
PR: MAC 1140 and MAC 1114, or MAC 1147. Must be taken concurrently with lab and, if dropped, then dropped simultaneously. May not receive credit for both the PHY 2053 and PHY2048 PHY 2048 courses. First semester of a two semester sequence of non-calculus-based general physics (mechanics, heat, wave motion, sound, electricity, magnetism, optics, modern physics) for science students.

PHY 2053L General Physics I Laboratory (1)
Must be taken concurrently with lecture and, if dropped, then dropped simultaneously. May not receive credit for both the PHY 2053L and PHY 2048L courses. First semester of a two semester sequence of general physics (mechanics, heat, wave motion, sound, electricity, magnetism, optics, modern physics) laboratory for science students.

AND
PHY 2054 General Physics II NS (3) AS PHY
PR: PHY 2053, PHY 2053L. Must be taken concurrently with lab and, if dropped, then dropped simultaneously. May not receive credit for both the PHY 2054 and PHY 2049 courses. Second semester of non-calculus-based general physics for science students.

PHY 2054L General Physics II Laboratory (1) AS PHY
PR: PHY 2053, PHY 2053L. Must be taken concurrently with lecture and, if dropped, then dropped simultaneously. May not receive credit for both the PHY 2054L and PHY 2049L courses. Second semester of general physics lab for science students.

Other Lower Division Specialization Requirements:
19 semester hours

CHM 2210 ORGANIC CHEMISTRY I (3)
PR: CHM 2046, CHM 2046L. Fundamental principles of organic chemistry. Lec.

CHM 2210L ORGANIC CHEMISTRY I LABORATORY (2)
PR: CHM 2046, CHM 2046L. Laboratory portion of organic chemistry

CHM 3120C ELEMENTARY ANALYTIC CHEMISTRY (4)

CHM 3400 ELEMENTARY PHYSICAL CHEMISTRY I (3)
PR: CHM 2046, CHM 2046L, MAC 2281 or MAC 2311, PHY 2054, PHY 2054L
Introduction to thermodynamics. Properties of solutions with emphasis on biological applications.

CHM 3610 INTERMEDIATE INORGANIC CHEMISTRY (3)
PR: CHM 2046, CHM 2046L. Fundamental principles of inorganic chemistry including atomic structure, bonding theories, and structural consequences, transition metal chemistry and illustrative laboratory work.

CHM 3610L INTERMEDIATE INORGANIC CHEMISTRY LABORATORY (1)
CR: CHM 3610. Illustrative laboratory work concerning the fundamental principles of organic chemistry including atomic structure, bonding, transition metal chemistry, structural consequences and spectroscopic methods.

CHM 4070 HISTORICAL PERSPECTIVES IN CHEMISTRY (3)
PR: One year one college chemistry; or senior standing and CI. A study in depth of the historical and philosophical aspects of outstanding chemical discoveries and theories. Lec.-dis.

Upper Division Content Specialization Requirements:
4 semester hours

SCE 4863 SCIENCE, TECHNOLOGY, SOCIETY INTERACTION MW (4)
PR: None. Achieve a historical and philosophical understanding of (1) the nature of the scientific enterprise: interaction of science, technology and society (STS), (2) how to teach STS including the use of computers and related technologies, and (3) intricacies of sample STS topics.

“Supporting Science" Requirements
21 semester hours
SCE 4305 COMMUNICATION SKILLS IN THE SCIENCE CLASSROOM (3)
PR: None. Reading and communication skills important in understanding scientific literature and communicating findings to others.

SCE 4320 TEACHING METHODS IN MIDDLE GRADE SCIENCE (3)
PR: Completion of 25 semester hours of science or CC. Survey techniques and materials unique to science, grades 5-9. Not designed for high school certification purposes.

SCE 4330 TEACHING METHODS IN THE SECONDARY SCHOOL SCIENCES (3)
PR: Completion of 26 semester hours in approved science areas, EDG 4620 or CP, and CC Techniques and materials of instruction in secondary school sciences.

SCE 4936 SENIOR SEMINAR IN SCIENCE EDUCATION (2)
PR: Senior standing; CR: SCE 4940. Synthesis of teacher candidate's courses in complete college program.

SCE 4940 INTERNSHIP: SCIENCE EDUCATION (10)
CR: SCE 4936. One full semester of internship in a public or private school.

<table>
<thead>
<tr>
<th>Professional Studies Core Courses:</th>
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<tr>
<td>17 semester hours</td>
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</table>

EDF 3214 HUMAN DEVELOPMENT AND LEARNING (3) EDF
PR: General psychology and Admission to College of Education Application of respondent and operant learning principles to classroom learning, teaching models for different instructional goals, analysis of teaching behavior, micro-teaching.

EDF 3604 SOCIAL FOUNDATIONS OF EDUCATION MW (3) EDF
PR: Upper level standing Social, economic and political context within which schools function and the values which provide direction for our schools

EDF 4430 MEASUREMENT FOR TEACHERS (3) EDQ
PR: Upper level standing Concepts and skills related to designing and developing classroom tests; evaluating tests, instruction, and student progress; and communicating student achievement. Including application of performance assessment techniques and computer applications for measuring and assessing pupil progress.

EEX 4070 INTEGRATING EXCEPTIONAL STUDENTS IN THE REGULAR CLASSROOM (2) EDS
No credit for department majors. Designed for non-special education majors. Includes basic identification techniques and strategies to promote the academic and social integration and interaction of "mainstreamed" exceptional students. Concurrent field experience projects are included.

TSL 4324 ESOL Competencies and Strategies (3) EDX
Designed to enable participants to meet the special limitations and cultural educational needs of LEP students in content area classes. Designed to provide a theoretical and practical foundation for ESOL competencies and strategies.

ESE 4322 Classroom Management for Diverse School and Society (3) EDI
Focuses on classroom management in secondary schools including classroom climate, specific strategies to address management issues, school safety, violence, diversity, ethics, and educational law.

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<tr>
<th>Electives:</th>
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<tr>
<td>3 semester hours</td>
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The three hours of electives would be designed to meet the student's individual needs and areas of specific interest. Recommended prefixes would include but not limited to BCH, CHM, SCE.
# College of Education

**REVIEW FORM D**

**RECOMMENDED COURSE SEQUENCE FOR FULL TIME STUDENTS**

**DEPARTMENT:** Secondary Education  
**PROGRAM TITLE:** Science Education-Chemistry  
**DEGREE LEVEL:** Bachelor's

## FULL-TIME

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Term</th>
<th>Spring Term</th>
<th>Summer Term</th>
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</table>
| I    | ENC 1101 Composition I (3 )  
Social Science (3)  
Quantitative Methods (3)  
Historical Perspectives (3)  
Fine Arts (3) | ENCI102 English Composition II (3 )  
Social Science (3)  
MAC 2311 Calculus I (4)  
EME 2040 Introduction to Computers in Education (3) | EEX 4070 Integrating Exceptional Students in the regular Classroom (2)  
EDF 3604 Social Foundations of Education (3) |
| II   | EDF 2005 Introduction to Education (3)  
CHM 2045 General Chemistry I w/lab (4)  
PHY 2053 General Physics I w/lab or BSC 2210 General Biology I w/lab (4)  
ALAMEA (3) | EDG 2701 Diverse Populations (3)  
PHY 2054 General Physics II w/lab or BSC 2211 General Biology II w/lab (4)  
CHM 2046 General Chemistry II w/lab (4)  
Historical Perspectives (3) |  |
| III  | CHM 3120C Elementary Analytical Chemistry (4)  
CHM 2210 Organic Chemistry w/lab (5)  
EDF 3214 Human Development and Learning (3)  
TSL 4324 ESOL Competencies and Strategies (3) | SCE 4330 Teaching Methods in the Secondary School Sciences (3)  
CHM 3610 Intermediate Inorganic Chemistry w/lab (4)  
EDF 4430 Measurement for Teachers (3)  
ESE 4322 Classroom Management (3)  
CHM 4070 Historical Perspectives Chemistry (3) | Elective (recommend BCH, CHM, SCE) (3) |
| IV   | SCE 4320 Teaching Methods in Middle Grade Science (3)  
CHM 3400 Elementary Physical Chemistry I (3)  
SCE 4305 Communication Skills in the Science Classroom (3)  
SCE 4863 Science, Technology, Social Interaction (4) | SCE 4936 Senior Seminar in SSE (2)  
SCE 4940 Student Teaching (10) |  |

**TOTAL 120 SH**
F. Student Population

i. The science education program was developed for those students who wanted to become teachers of science at the secondary (middle grades or high school) level. Students take the science classes in the Science Department in the College of Arts and Sciences, and the pedagogy and foundations classes in the College of Education.

ii. The entry requirements are those established by the state for admission to the science education program as majors. Students also have their GPA checked prior to admission.

iii. Retention policies are those common to the College.

iv. All of the student advising is through the Pre-Education Advising office until they are admitted to the program. After admission, the Student Academic Services undergraduate advisor takes over all of the advising duties.

G. Program Faculty

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elaine Howes</td>
<td>Assistant</td>
</tr>
<tr>
<td>Barbara Spector</td>
<td>Full</td>
</tr>
<tr>
<td>Dana Zeidler</td>
<td>Full</td>
</tr>
</tbody>
</table>