College of Education & Human Development Mission Statement
The College of Education and Human Development is a world leader in discovering, creating, sharing, and applying principles and practices of multiculturalism and multidisciplinary scholarship to advance teaching and learning and to enhance the psychological, physical, and social development of children, youth, and adults across the lifespan in families, organizations, and communities.

Course Objectives: Conceptual Framework for P-12 Professional Education Programs
The central themes of the Conceptual Framework are:
1. Promoting inquiry, research, and reflection;
2. Honoring the diversity of our communities and learners; and
3. Fostering a commitment to lifelong learning and professional development.

The purpose of this course is to examine science teaching and help you inquire and reflect about your own teaching practice and its impact on you and your students understanding of the history and nature of science. Throughout this course we will collaboratively inquire about teaching and learning the history and nature of science, observe and analyze instruction, and design a historical case study for use in your classroom.

Prerequisite: Must be enrolled as in the initial/additional licensure program in science education; or completing M.Ed. for students who started prior to AY2013.

Course format will include: discussion of literature in nature of science research, examination and creation of historical nature of science case studies, and lesson plan design.

Course Goals (Students will…)
1. Develop a knowledgeable and compelling rationale for portraying the nature of science (NOS) in daily science instruction.
2. Describe teacher behaviors and strategies for explicitly instructing and scaffolding learning about the nature of science.
3. Identify and Explain explicit nature of science (NOS) content, materials, and activities that can be embedded into unit plans.
4. Accurately assess the facets of nature of science instruction (or lack thereof) in a lesson plan.
5. Develop an historical case study that represents a new or modified science unit/lesson so that it accurately, explicitly, and effectively addresses the nature of science.
Science Education: Curriculum and Instruction Statement
The science education initial licensure program at the University of Minnesota is designed to help you become an accomplished professional science educator. The program seeks to prepare inquiring, analytical, and reflective educators who can teach in the classroom and lead in the schools.

Course Expectations (Standards for External Review):

Minnesota Standards of Effective Practice for Beginning Teachers

The Minnesota Board of Teaching has mandated that all teacher education programs need to assess their pre-service teachers according to their actual performance based on a set of specific standards. In this performance based approach, rather than simply passing courses or writing quality essays, students in our programs need to demonstrate their knowledge, dispositions, and skills as effective pre-service teachers. The following are the standards adapted by the Teacher Education Council that have been used to develop performance assessment tasks in different foundations and methods courses. You will be evaluated for readiness to obtain licensure based on meeting the following ten standards.

**Standard 1 – Subject Matter.** The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

**Standard 2 – Student Learning.** The teacher understands how students learn and develop, and can provide learning opportunities that support their intellectual, social and personal development.

**Standard 3 – Diverse Learners.** The teacher understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to learners from diverse cultural backgrounds and with exceptionalities.

**Standard 4 – Instructional Strategies.** The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.

**Standard 5 – Learning Environments.** The teacher uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive interaction, active engagement in learning, and self motivation.

**Standard 6 – Communication.** The teacher uses knowledge of effective verbal, nonverbal and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.

**Standard 7 – Planning Instruction.** The teacher plans and manages instruction based upon knowledge of subject matter, students, the community, and curriculum goals.

**Standard 8 – Assessment.** The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the learner.

**Standard 9 – Reflection and Professional Development.** The teacher is a reflective practitioner who continually evaluates the effects of his/her choices and action on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.

**Standard 10 – Collaboration, Ethics, and Relationships.** The teacher communicates and interacts with school colleagues, parents/guardians, families, and the community to support students' learning and well-being.

Textbooks/ Materials/Fees:
- Other course materials and readings will be available on Moodle and Course Reserves.
Grading in CI 5541 will be based upon the following five components; detailed information for each assignment is available on Moodle:

25% = Weekly Reading Assignments and Preparation for Class. These weekly notes will be checked in each class. Please bring an electronic or hard copy of your notes and responses to the readings. The most relevant notes are those that you have written in response to the readings, perhaps in addition to important quotes from sources or the text. Minimum of 1 page (about 500 words) per week. Due each week. (BOT Standards 1-10)

5% = Timeline of Important Historical Events. This assignment will be co-created in class as well as individually after you’ve done your own reading and research. Please keep an updated version of your timeline available for each class period. The final version is due the last day of class, December 9. (BOT Standards 1-8, 10)

10% = Rationale of Teaching Nature of Science. Details for this assignment will be provided on Moodle and in class. Please submit an electronic version to Moodle by the due date, December 2. (BOT Standards 1-5)

40% = Historical Case Study/ Lesson Plan Presentation: Presented in class. (BOT Standards 1-8, 10)

20% = Class Discussion Participation. It is expected that you will attend class and participate in class discussions and activities. Missing more than two classes will result in a decrease in your grade by a full letter grade. (BOT Standards 1-10)

Course Outline and Schedule for CI 5541

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic/ Activities</th>
<th>Assignment – Due by class time unless otherwise noted.</th>
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<tbody>
<tr>
<td>Sept. 9</td>
<td>What is the Nature of Science?</td>
<td>Complete the VNOS before class TODAY. Bring in a copy of your responses to discuss in small groups.</td>
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<td></td>
<td>VNOS</td>
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<td></td>
<td>NGSS – Scientific Practices</td>
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<td></td>
<td>NSES</td>
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<tr>
<td>Sept. 16</td>
<td>Review of the VNOS</td>
<td>A. Readings due this week:</td>
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<tr>
<td></td>
<td>The NOS Matrix (NGSS)</td>
<td>1. Lederman &amp; Lederman (2002) ☺</td>
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<td></td>
<td>3. Scientific Knowledge is Open to Revision in Light of New Evidence</td>
<td>B. Make a cheat sheet of the 8 NGSS NOS Matrix.</td>
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<td></td>
<td>5. Science is a Way of Knowing</td>
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<tr>
<td></td>
<td>6. Scientific Knowledge Assumes an Order and Consistency in Natural Systems</td>
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<td></td>
<td>7. Science is a Human Endeavor</td>
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<td></td>
<td>8. Science Addresses Questions About the Natural and Material World</td>
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Technology
Students in this course will need to have access to university e-mail, as some assignments will be turned in electronically. Course assignments, updated syllabi, & readings will be available through Moodle. Students will also explore instructional technology and web-based technology that supports science instruction. Visit our Course Reserves page by accessing this page: https://rd.lib.umn.edu/

Accessing Moodle:
To find the course website visit http://www1.umn.edu/current-students/ log into MyU and go to “My Courses”. You will be asked to sign in using your University ID and password. You will need to make sure your browser is properly configured to use Moodle.

Diversity
Preparing educators to work with diverse student populations is an important part of this course. Consideration of diversity is found throughout the readings in this course and will be explicitly addressed in Moodle course website postings and the portfolio. I’ll keep an open mind if you will too.

Disability
The University of Minnesota is committed to providing all students equal access to learning opportunities. Disability Services is the campus office that works with students who have disabilities to provide and/or arrange reasonable accommodations. Student registered with Disability Services, who have a letter requesting accommodations, are encouraged to contact the instructor early in the semester. Students who have, or think they may have a disability (e.g. psychiatric, attentional, learning, vision, hearing, physical, or systemic), are invited to contact Disability Services for a confidential discussion at 612-626-1333 (V/TYY) or ds@umn.edu. Additional information is available at the DS website http://ds.umn.edu.

**Participation**
Attendance is essential in order to experience the practical and social nature of science teaching in schools. Reflection of your learning and peers is critical to the success of this course. Illness or other emergencies may prevent you from attending classes. If you miss two of the class sessions, the highest grade you can receive is a B. If you miss four of the class sessions, the highest grade you can receive is a C. Please email me, if you are unable to attend a session.

**Late Work**
All late assignments will be reduced one letter grade for every day late. For example if the assignment was due on Monday and turned in on Wednesday, the assignment will be reduced two letter grades. Grades will not be reduced more than 50%; however, no work will be accepted if it is over one week late. Extensions by the course instructor are only granted in writing for extenuating medical or family problems. Extensions will be granted when a medical doctor provides written documentation. If you do NOT have an extension granted in writing by the instructor, the late assignment will be marked down accordingly.

**Incompletes**
Incompletes are highly discouraged but may be granted under extenuating circumstances such as family medical problems or illness. Incompletes are only granted in writing and will involve a written agreement with a specified completion date. Incompletes in CI 5541 must be made up by May 15, 2014.

**University of Minnesota Policy on Sexual Misconduct**
University policy prohibits sexual harassment as defined in the 1998 policy statement. Copies of the policy statement on sexual harassment are available at 419 Morrill Hall. Complaints about sexual harassment should be reported to the University Office of Equal Opportunity at 419 Morrill Hall.

**University of Minnesota Policy on Scholastic Misconduct**
Scholastic misconduct is broadly defined as any act that violates the rights of another student in academic work or that involves misrepresentation of your own work.” Scholastic dishonesty includes, (but is not necessarily limited to): cheating on assignments or examinations; plagiarizing, which means misrepresenting as your own work any part of work done by another; submitting the same paper, or substantially similar papers, to meet the requirements of more than one course without the approval and consent of all instructors concerned; depriving another student of necessary course materials; or interfering with another student's work.

**Support Services**
During the semester we will be engaged in writing several times. Students who are interested in receiving assistance with their writing may receive help through the following University services: The Center for Writing 227 Lind Hall 612 626-7579. Offers all University of Minnesota students free, individualized writing instruction. The Department of Rhetoric's Online Writing Center http://www.owc.umn.edu/ Provides personalized online tutoring, a grammar hotline, and support for distance learners, especially in science and tech writing.
How to Access Your Grades
Grades will be distributed in class and available from your supervisor. End of the term grades are available on OneStop for Students (http://onestop.umn.edu/Student/), click on Grades & Transcripts, then click on View or Print your Unofficial Transcript.)

The University of Minnesota is an equal opportunity employer and educator.

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<thead>
<tr>
<th>Grading:</th>
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<tr>
<td>Final Grades will be determined using the following scales. The numbers represent percentages of possible points earned. Grades will be rounded to the nearest integer.</td>
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<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>100-94</td>
<td>Achievement that is outstanding relative to the level necessary to meet course requirements</td>
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<tr>
<td>A-</td>
<td>93-90</td>
<td>meet course requirements</td>
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<tr>
<td>B+</td>
<td>89-87</td>
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<tr>
<td>B</td>
<td>86-84</td>
<td>Achievement that is significantly above the level necessary to meet course requirements</td>
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<tr>
<td>B-</td>
<td>83-80</td>
<td>meet course requirements</td>
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<tr>
<td>C+</td>
<td>79-77</td>
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<tr>
<td>C</td>
<td>76-74</td>
<td>Achievement that meets the course requirements in every respect</td>
</tr>
<tr>
<td>C-</td>
<td>73-70</td>
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<tr>
<td>D+</td>
<td>69-67</td>
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<tr>
<td>D</td>
<td>66-64</td>
<td>Achievement that is worthy of credit even though it fails to meet fully the course requirements</td>
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<tr>
<td>D-</td>
<td>63-60</td>
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<tr>
<td>F</td>
<td>&lt;60</td>
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Nature of Science and Science Education Resources used to prepare for this course:


**Online Resources:**

Benchmarks for Science Literacy

Minnesota State Science Standards:
http://education.state.mn.us/MDE/EdExc/StanCurri/K-12AcademicStandards/

Nationals Science Education Standards
http://www.nap.edu/openbook.php?record_id=4962

Next Generation Science Standards
http://www.nextgenscience.org/next-generation-science-standards

ROSE (The Relevance of Science Education) Project
http://roseproject.no/?page_id=4

**Other Interesting Books and Resources:**


