Gustavus Adolphus College

8710.4500 TEACHERS OF Life Science FORM I-D GRID

8710.4500 Teachers of Life Science: Standards	**Course ID Number**	**Any and all referenced experiences must be verifiable in the course syllabi submitted. Use specific references to activities* in the syllabi that evidence learning opportunities & assessments that align to the standard. (*readings, activities, topics of discussion, assignments, experiences, etc.)**
Subp. 6. **Subject matter standards for teachers of life science.** A candidate for licensure as a teacher of life science in grades 9 through 12 must complete a preparation program under subpart 2, item C, that must include the candidate's demonstration of the knowledge and skills in items A to C.		
A. A teacher of life science must demonstrate a conceptual understanding of life science. The teacher must:		
(1) use sources of information to solve unfamiliar quantitative problems and communicate the solution in a logical and organized manner as evidenced by the ability to:		
(a) describe, using appropriate alternative forms including pictorial, graphical, or written descriptions, the known and unknown quantities of a given problem; and	BIO 101, BIO 102, BIO 201	Labs: Scientific method and hypothesis testing, Enzymes, Respiration and Photosynthesis, Natural selection, Microevolution, Soil ecology Lectures: Data wrangling Labs: adopt a tree phenology project; compost columns, arthropod senses (How do termites follow a trail?) Assessment: phenology written report, compost column written report, arthropod written report Laboratory Exercise 4: Enzyme Kinetics. Measure enzyme activity, graph results and calculate Km and Vmax.
(b) describe, in terms of the relevant numerical and algebraic quantities and	BIO 374	Genetics is the science of learning general principles and applying such principles to make predictions about new situations. Students are

equations required to solve the problem, the relevant numerical and algebraic quantities and equations required to solve a given problem mathematically;		required to engage in problem solving activities using experimental data.
(2) use computers to display and analyze experimental and theoretical data as evidenced by the ability to:		
(a) describe data graphically using a computer; and	BIO 101, BIO 102,	Labs: Scientific method and hypothesis testing, Enzymes, Respiration and Fermentation, Photosynthesis, Natural selection, Microevolution, Soil ecology Lab: adopt a tree phenology project; compost columns; computer tutorial; arthropod senses (How do termites follow a trail?) Assessment: phenology written report, compost column written report, arthropod written report
(b) design a mathematical model to provide a reasonable fit to a given set of data;	BIO 101, BIO 202, BIO 201	Lab: Mendelian genetics Linear regression in Lab 4, Assessed in Quiz 2 Laboratory Exercise 9: Restriction Mapping and Sequence Analysis. Isolate DNA, digest with restriction enzymes and create a map of the gene sequences.
(3) use mean, standard deviation, chi-squared, linear regression, and correlation to describe and analyze experimental and theoretical data; and	BIO 101, BIO 202, BIO 374	Labs 2-10 Covered in Lab 4, Assessed in Quiz 2, Independent Research Project paper and Duck Imprinting Report Readings, class lecture and discussion, and assigned problems from the text. The standard is assessed by in class written examination
(4) develop a plan to ensure a safe environment and practices in all life science learning activities.	BIO 101, BIO 201	First lab: Laboratory Rules and Safety are covered in lab week 1 Laboratory Exercise 1: SDS-PAGE. The first lab is used to review all safety precautions taken within the cell BIOlogy laboratory. Students are required to sign a form indicating that they have understood and will follow all safety regulations.
B. A teacher of life science must demonstrate knowledge of BIOlogical concepts. The teacher must:		
(1) understand structural and functional relationships as evidenced by the ability to:		
(a) perform observations to describe the structures of a given common organism;	BIO 101, BIO 102,	Text readings; Lect. – Membranes, Cell structure & function Labs: Phylogeny (Fungi, Protista, Plantae, Animalia, Protostomes, Deuterostomes); pig dissection; compost column

		Assessment: Lab exams, compost column written report
(b) describe, using words, descriptions of appropriate experimental procedures, and diagrams, the characteristics of what determines life in a given common organism;	BIO 101, BIO 102,	Text readings; Lect. – Membranes, Cell structure & function Lectures: Life on land (Feb 17); Eubacteria and Archaebacteria (Feb 11) Labs: Phylogeny (Fungi, Protista, Plantae, Animalia, Protostomes, Deuterostomes); pig dissection; Assessment: lecture exams, lab exams
(c) predict, using structure-function relationships, the system function from which a given set of plant and animal tissue samples is derived;	BIO 102,	Lectures: Plant Body Labs: Phylogeny (Fungi, Protista, Plantae, Animalia); Protostomes, Deuterostomes; pig dissection; Angiosperms: roots, stems, leaves Assessment: lecture exams, lab exams
(d) describe, using words, diagrams, and pictures, immune system responses that take place in human cells, tissues, organs, and organ systems throughout the progression of a given viral, bacterial, fungal, and parasitic disease; and	BIO 102,	Lectures: Protozoa – Animal Like protests; Defense Assessment: lecture exam
(e) design a personal course of action to prevent a given human disease;	BIO 102,	Lectures: Defense Assessment: lecture exam
(2) understand molecular and cellular life processes as evidenced by the ability to:		
(a) perform measurements to describe cellular structures and physiological processes;	BIO 101, BIO 201	Lab: Photosynthesis; Metabolism & Nutrition; Osmosis Laboratory Exercise 5: Organelle Fractionation. Students are required to homogenize and subsequently separate organelles on a sucrose gradient. The organelle fractions are analyzed for their enzyme content.
(b) describe, using words, chemical formulas and equations, and diagrams, the cellular processes of a given plant or animal cell;	BIO 101, BIO 201	Lab: Respiration and Fermentation, Photosynthesis; Text readings; Lect. – Membranes; Cell Struct. & Funct; Cells convert energy; Cells convert chemical energy; Some cells use light energy Lectures 1 through 9. Material covered includes the structure and function of membrane systems in the cell with emphasis on transport and signaling. Assessment is covered on the first lecture exam of the course
(c) explain, using the structure-function relationship of the chloroplast, conservation of energy, and the fundamental nature of light, how solar energy is transformed during	BIO 101, BIO 201	Text readings; Lect. – Some cells use light energy Lectures 15. Review of light dependent and light independent aspects of photosynthesis in C3 and C4 plants.

photosynthesis into cellular energy in a given plant cell;		
(d) explain, using the structure-function relationship of the mitochondria and molecular energy transformations involving ATP, how energy stored in food molecules is released during cellular respiration in a given cell;	BIO 101	Text readings; Lect. – Cells convert energy; Cells convert chemical energy
(e) qualitatively predict, using structure-function relationships and relationships between organelles and the cellular environment, the effect of a given natural and applied physical and chemical change in the environment of a cell on photosynthesis and cellular respiration;	BIO 101, BIO 201	Text readings; Lect. – Cells convert energy; Cells convert chemical energy; Some cells convert light energy Lectures 15 through 187. Structure and functional changes in cell shape dependent on cytoskeleton components (microtubules, microfilaments and intermediate filaments).
(f) design experiments to test the properties of structure-function relationships in photosynthesis or cellular respiration;	BIO 101, BIO 201	Laboratory: Photosynthesis Laboratory Exercise 11: Experimental Design. Students are asked to use the information gathered throughout the semester and design an experiment to answer questions regarding significant aspects of cell physiology.
(g) explain, using the processes of replication, transcription, and translation, how proteins are synthesized in a cell; and	BIO 101, BIO 201	Text readings; Lect. – DNA & nature of genes; Transcription; Translation Lectures 22 through 23 and 30 through 40. Coverage of basic DNA, RNA and protein structure with transcription and translation. Also covered in Laboratory Exercise 8: DNA Isolation.
(h) predict the amino acid sequence of a protein from a given codon sequence;	BIO 101, BIO 201	Text readings; Lect. – Transcription, incl. homework/peer-mentor exercise Lecture 31. Genetic code and protein sequences.
(3) understand molecular reproduction and heredity as evidenced by the ability to:		
(a) perform measurements and statistical analyses to describe the results from a given plant and animal breeding experiment;	BIO 101, BIO 374	Laboratory: Mendelian genetics Readings, class lecture and discussion, and assigned problems from the text. The standard is assessed by in class written examination
(b) describe, using words, pictures, and diagrams, and models, the changes in the visibility, arrangement, and number of chromosomes at each given state of mitosis	BIO 101, BIO 201	Laboratory: Mitosis & meiosis Laboratory Exercise 7: Chromosomes. Visualizing chromosomes and determination of a karyotype. Plus Lectures 24 through 26. Mitosis and regulation of cell division. Material assessed on Exam 3.

and meiosis;		
(c) explain, using the Laws of Segregation and Independent Assortment, why fertilization and the production of sperm and eggs through meiosis is necessary for species variability;	BIO 101, BIO 374	Text readings; Lect. – Mendel and genes Laboratory: Mendelian genetics Readings, class lecture and discussion, and assigned problems from the text 6. The standard is assessed by in class written examination
(d) describe, using words, diagrams, and charts, how a given trait is inherited and expressed;	BIO 101, BIO 374	Text readings; Lect. – Mendel & genes; Human genes Laboratory – Mendelian genetics Readings, class lecture and discussion, and assigned problems from the text throughout the semester; this is the principle focus of this class. The standard is assessed by in class written examination.
(e) explain and predict qualitatively and quantitatively, using rules of probability and heredity, the genotype and phenotype of the offspring of parents with given genotypic traits to include dominant-recessive traits, incomplete and co-dominant traits, polygenic traits, and sex-linked and sex-influenced traits;	BIO 101, BIO 374	Text readings; Lect. – Mendel & genes; Human genes; Chromosomes & genes Laboratory: Mendelian genetics Readings, class lecture and discussion, and assigned problems from the text, chapters 2 through 6. The standard is assessed by in class written examination
(f) explain, using the Laws of Segregation and Independent Assortment, how the sex is determined in humans;	BI0 101, BIO 374	Text readings; Lect. – Chromosomes & genes Readings, class lecture and discussion, and assigned problems from the text. The standard is assessed by in class written examination.
(g) describe, using words, diagrams, and charts, how a mutation occurs;	BIO 101, BIO 201	Text readings; Lect. – Mutation & variation Laboratory Exercise 8: Mutagenesis. Induced nutritional mutations in bacteria are analyzed for frequency and rate of repair. Also covered in Lectures 26,31,36 through 40 on gene regulation. Material assessed on final exam
(h) explain and predict, using the relationship between genes and their expression, the effect an environmental change will have on the expression of a given genetic trait;	BIO 101, BIO 374	Text readings; Lect. – Mutation & variation, Microevolution Readings, class lecture and discussion, and assigned problems from the text. The standard is assessed by in class written examination.
(i) describe, using words, diagrams, and charts, the process of producing recombinant DNA; and	BIO 201	Laboratory Exercise 10: Complementation and Lectures 28 through 29, covering bacterial recombination.
(j) describe, using words, pictures, and diagrams, how genetic technology is used in treatment of human disease and development	BIO 374	Readings, class lecture and discussion, and assigned problems from the text. The standard is assessed by in class written examination.

of agriculture products;		
(4) understand diversity and BIOlogical evolution as evidenced by the ability to:		
(a) describe in words, pictures, and diagrams the range of physical, behavioral, and BIOchemical adaptations that can occur in response to environmental stresses for a given species;	BIO 101, BIO 202,	Text readings; Lect. – Natural selection Covered in lecture weeks 1, 7 and 10; Discussion of *Beak of the Finch*, Assessed exam 1, 2 and final
(b) explain, using the principles of mutation and natural selection, how a specific adaptation of a given species might have developed in response to environmental stresses;	BIO 101, BIO 202,	Text readings; Lect. – Natural selection; Microevolution Covered in lecture weeks 1-3; Discussion of *Beak of the Finch*, Assessed exam 1
(c) describe, using words, diagrams, charts, and statistical relationships, the range of phenotypes of a given species in a given environment;	BIO 101, BIO 202	Text readings; Lect. – Ecology Lecture weeks 1 and 2, discussion, readings (text, Beak of the Finch)
(d) explain and predict, using the principles of mutation, recombination, and natural selection, changes in the range of phenotypes of a species when a given change occurs in the environment of the species;	BIO 101, BIO 202,	Laboratory – Natural selection; Text readings; Lect. – Microevolution; Origin of species Covered in lecture weeks 1-3; Discussion of *Beak of the Finch*, Assessed exam 1
(e) explain, using the principles of mutation, recombination, and natural selection, why certain species are found in the fossil records relatively unchanged while others are not and others are extinct;	BIO 101, BIO 102, BIO 202,	Text readings; Lect. – Emergence of evolutionary thought; Origin of species Lectures: Invert I, Vert II Assessment: lecture exam, class activity: identify animal Covered in lecture weeks 3-4; Discussion of *Beak of the Finch*, Assessed exam 1
(f) explain and predict, using the evolutionary tree, morphological variations between two or more given species; and	BIO 101, BIO 102,	Text readings; Lect. – Emergence of evolutionary thought; Origin of species Lectures: Classification / Phylogeny
(g) explain the variations in morphological characteristics and DNA composition of two or more given species;	BIO 101, BIO 202,	Text readings; Lect. – Microevolution; Origin of species Covered in lecture week 3 and Labs 1 and 3, Assessed exam 1
(5) understand the interdependence among living things as evidenced by the ability to:		

(a) perform measurements and statistical analyses to describe results of a study investigating the relationship between a given common organism and its environment;	BIO 101, BIO 202,	Laboratory: Natural selection Covered in Labs 3-4; Assessed on final exam
(b) perform measurements and statistical analyses to describe the diversity and number of species in a given ecosystem;	BIO 202,	Covered in lecture weeks 12-13 and independent research; Assessed on final exam
(c) describe, using words, pictures, and diagrams, the cycling of a given substance among living and nonliving components of the BIOsphere;	BIO 101, BIO 202,	Text readings; Lect. – Ecology; Ecosystems; Community interactions Covered in lecture weeks 13-14; Assessed on final exam
(d) describe, using words, pictures, diagrams, and simple mathematical relationships, the cycling of matter and the flow of energy both within a given system, and between the system and the BIOsphere;	BIO 101, BIO 202,	Text readings; Lect. – Ecology; Ecosystems; Community interactions Covered in lecture weeks 13-14; Assessed on final exam
(e) explain, using the relationships between BIOtic and aBIOtic components of that system, why the population size and diversity of species is different between two different niches, habitats, ecosystems, or BIOmes;	BIO 101, BIO 202,	Text readings; Lect. – Community interactions Covered in Lecture weeks 10-12; Assessed on final exam
(f) explain and predict, using population growth dynamics and interspecific and intraspecific interactions, changes in population size of organisms in an ecosystem for a given change in the BIOtic and aBIOtic components of the ecosystem; and	BIO 101, BIO 202,	Text readings; Lect. – Community interactions Covered in lecture weeks 10-12; Assessed on final exam
(g) design an experiment to investigate relationships within and among species in a simple ecosystem; and	BIO 102, BIO 202,	Lab: Compost Column Assessment: written report on interaction between fungi, bacteria and substrate Covered in lecture weeks 7-9 and 11; Assessed on exam 2; Independent research project paper
(6) understand behavior of organisms as evidenced by the ability to:		
(a) perform measurements and statistical analyses to describe the physical behavior of animals in a given natural and perturbed	BIO 102, BIO 202,	Lab: Arthropod senses (termites) Assessment: written report on termite behavior Covered in lecture weeks 6-9 and Lab 6; Assessed on exam 2 and duck

situation;		imprinting report
(b) describe, using words, pictures, and diagrams, behaviors of a given animal that allow it to interact with organisms of its own and other species and to respond to environmental changes;	BIO 102, BIO 202,	Lab: Arthropod senses (termites) Assessment: written report on termite behavior Covered in lecture weeks 6-9 and Lab 6; Assessed on exam 2 and duck imprinting report
(c) explain and predict, in terms of the principles of animal communication and adaptation, the behavioral responses of an animal to a given set of interactions or environmental changes; and	BIO 102, BIO 202,	Lab: Arthropod senses (termites) Assessment: written report on termite behavior Covered in lecture weeks 5-8; Assessed on exam 2
(d) explain behavioral responses of a given animal in terms of natural selection.	BIO 202,	Covered in lecture weeks 5-9; ;Discussion of *Beak of the Finch*, Assessed exam 2
C. A teacher of life science must demonstrate an advanced conceptual understanding of life science and the ability to apply its fundamental principles, laws, and concepts by completing a full research experience. The teacher must:		
(1) identify various options for a research experience including independent study projects, participation in research with an academic or industry scientist, directed study, internship, or field study;	BIO 202,	Labs 6, Discussion of *Beak of the Finch* and other discussion readings every week throughout the semester
(2) select an option and complete a research experience that includes conducting a literature search on a problem;	BIO 102, BIO 202,	Lab: Tree Phenology Assessment: written report including literature, methods, results, discussion Lab 2, Papers related to Labs 6 (Independent Research Project paper)
(3) design and carry out an investigation;	BIO 101, BIO 102, BIO 202,	Lab: Respiration and Fermentation Lab: Tree Phenology Assessment: written report including literature, methods, results, discussion Labs 6; assessed in independent research project paper
(4) identify modes for presenting the research project; and	BIO 202,	Labs 4,6
(5) present the research project in the selected mode.	BIO 202,	Final Lab – Assessed during the Research symposium

Standards that integrate knowledge of science with knowledge of pedagogy, students, learning environments, and professional development were articulated in subpart 3 E of rule 8710.4750. These pedagogy standards need to be evidenced in addition to the specific content science standards.

Subpart 3E. A teacher of science must have a broad-based knowledge of teaching science that integrates knowledge of science with knowledge of pedagogy, students, learning environments, and professional development. A teacher of science must understand:	**Course ID Number**	**Any and all referenced experiences must be verifiable in the course syllabi submitted. Use specific references to activities* in the syllabi that evidence learning opportunities & assessments that align to the standard. (*readings, activities, topics of discussion, assignments, experiences, etc.)**
(1) curriculum and instruction in science as evidence by the ability to:		
(a) select, using local, state, and national science standards, appropriate science learning goals and content;	EDU 351 EDU 358	Students develop a year plan and an entire unit based on curricular goals and the central concepts of the subject area while incorporating the MN Academic Standards and applying instructional strategies and materials that will provide for student achievement.
(b) plan a coordinated sequence of lessons and instructional strategies that support the development of students' understanding and nurture a community of science learners including appropriate inquiry into authentic questions generated from students' experiences; strategies for eliciting students' alternative ideas;	EDU 351 EDU 358	Students develop a year plan and an entire unit based on curricular goals and the central concepts of the subject area while incorporating the MN Academic Standards and applying instructional strategies and materials that will provide for student achievement.

strategies to help students' understanding of scientific concepts and theories; and strategies to help students use their scientific knowledge to describe real-world objects, systems, or events;		
(c) plan assessments to monitor and evaluate learning of science concepts and methods of scientific inquiry; and	EDU 351 EDU 358 EDU 399	The lesson planning and micro teaching processes require students to incorporate assessment strategies. The "Teacher Impact on Student Learning Project" is an extensive assessment project that students complete as part of their student teaching experiences in the science classroom.
(d) justify and defend, using knowledge of student learning, research in science education, and national science education standards, a given instructional model or curriculum;	EDU 351/368	Students read and apply research on effective classroom practices by reading Marzano's 'Classroom instruction that Works' and implementing these research-based strategies in their microteaching (EDU 368) and lesson planning (EDU 351).
(2) safe environments for learning science as evidenced by the ability to:		
(a) use required safety equipment correctly in classroom, field, and laboratory settings;	EDU 358 Chem 107, 141	Chapters 14 & 17 in the text "Teaching Secondary School Science: Strategies for Developing Scientific Literacy specifically addresses how to create and maintain effective and safe science laboratory environments. Students are required to develop a lab safety policy document that includes the handling and management of all lab materials and specimens, and a list of the equipment and basic materials required to do so. Students are introduced to the safety components of the laboratory on the first day of class and laboratory. Laboratory instructors discuss the laboratory safety policies and location of various safety equipment in the laboratory. Students are required to watch a lab safety video and must obtain 100% on a lab safety quiz prior to entry into the 2nd

	Chem 255	experiment of the semester. Students are introduced to the safety components of the laboratory on the first day of class and laboratory. Laboratory instructors discuss the laboratory safety policies and location of various safety equipment in the laboratory (pages III-XV in lab manual). Students are required to fill out and turn in a map (and keep a copy for their reference, pg XV lab manual) describing the location of the safety equipment. Students are required to watch a lab safety video and must obtain 100% on a lab safety quiz prior to entry into the 2nd experiment of the semester
(b) describe, using knowledge of ethics and state and national safety guidelines and restrictions, how to make and maintain a given collection of scientific specimens and data;	EDU 358	Chapters 14 & 17 in the text "Teaching Secondary School Science: Strategies for Developing Scientific Literacy specifically addresses how to create and maintain effective and safe science laboratory environments. Students are required to develop a lab safety policy document that includes the handling and management of all lab materials and specimens, and a list of the equipment and basic materials required to do so.
(c) describe, using knowledge of ethics and state and national safety guidelines and restrictions, how to acquire, care for, handle, and dispose of live organisms;	EDU 358 Chem 255	Chapters 14 & 17 in the text "Teaching Secondary School Science: Strategies for Developing Scientific Literacy specifically addresses how to create and maintain effective and safe science laboratory environments. Students are required to develop a lab safety policy document that includes the handling and management of all lab materials and specimens, and a list of the equipment and basic materials required to do so. Students are introduced to working with live organisms (i.e. yeast) during experiment 3 of the laboratory. The laboratory instructors discuss how the yeast were acquired, genetically modified, grown, handled, and disposed of following the experiment. Information about work with live cultures is discussed (and is present within the lab manual, page XIII). Questions about work with live

		cultures may be asked on Exam 2 or the final exam.
(d) describe, using state and national guidelines, how to acquire, care for, store, use, and dispose of given chemicals and equipment used to teach science;	EDU 358 Chem 107 Chem 255	Chapters 14 & 17 in the text "Teaching Secondary School Science: Strategies for Developing Scientific Literacy specifically addresses how to create and maintain effective and safe science laboratory environments. Students are required to develop a lab safety policy document that includes the handling and management of all lab materials and specimens, and a list of the equipment and basic materials required to do so. Each week, students are reminded of the dangers of the chemicals and equipment used in laboratory that week during pre-laboratory lecture. SDS forms for all of the chemicals used in the lab are posted on the chemistry dept safety website for reference. Students are informed about where to dispose of chemical waste on a weekly basis. Students are introduced to the chemicals and equipment used in each laboratory period during the pre-laboratory lecture. Laboratory instructors discuss the disposal of chemicals and proper use of equipment immediately prior to the lab period. Detailed information regarding MSDS, chemical and laboratory safety are discussed based on lab manual readings (pages VI-XII lab manual). SDS forms for all of the chemicals used in the lab are posted on the chemistry dept safety website for reference. Questions about chemicals and laboratory equipment may be asked on Exams 1-4 and the final exam.
(e) implement safe procedures during supervised science learning experiences in the public schools; and	EDU 368 Student Teaching Handbook	During all field experiences, students are required to implement the policies of the schools in which they are placed.

(f) develop a list of materials needed in an elementary science safety kit;	\EDU 358	Chapters 14 & 17 in the text "Teaching Secondary School Science: Strategies for Developing Scientific Literacy specifically addresses how to create and maintain effective and safe science laboratory environments. Students are required to develop a lab safety policy document that includes the handling and management of all lab materials and specimens, and a list of the equipment and basic materials required to do so.
(3) how to apply educational principles relevant to the physical, social, emotional, moral, and cognitive development of preadolescents and adolescents;	EDU 330 EDU 340	Unit on Development (Cognitive, Personal, Social, and Emotional) Chapters 2-3 Learner Project (See Class #22) Unit on Learning (Chapters 6-9), Chapter 13 Principles of Instruction Students view 'Teen Species; Boys and Girls' to provide knowledge of preadolescent and adolescent physical, social, emotional, moral, and cognitive development and apply their understanding of these principles in their unit plan and exploratory lesson.
(4) how to apply the research base for and the best practices of middle level and high school education;	EDU 351, EDU 368	Students read and apply research on effective classroom practices by reading Marzano's 'Classroom instruction that Works' and implementing these research-based strategies in their microteaching (EDU 368) and lesson planning (EDU 351).
(5) how to develop curriculum goals and purposes based on the central concepts of science and how to apply instructional strategies and materials for achieving student understanding of the discipline;	EDU 351 EDU 362	Students develop a year plan and an entire unit based on curricular goals and the central concepts of the subject area while incorporating the MN Academic Standards and applying instructional strategies and materials that will provide for student achievement. Alan J. Singer & the Hofstra New Teachers Network, *Social Studies for Secondary Schools* (2nd edition). Readings distributed in class or through Moodle
(6) the role and alignment of district, school, and department mission and	EDU 351	Students discuss the structure of the school community and environment and the relationship to departmental goals and

goals in program planning;	 EDU 362	planning. See calendar for specific date. Alan J. Singer & the Hofstra New Teachers Network, *Social Studies for Secondary Schools* (2nd edition). Readings distributed in class or through Moodle
(7) the need for and how to connect students' schooling experiences with everyday life, the workplace, and further educational opportunities;	EDU 330 EDU 351 EDU 389	Chapter 8- Contructivism. Meaningful learning occurs in real-world tasks. Connecting content to real world. Chapter 10- Motivation. Personalization: Links to Students' lives Student unit plans include lessons that must identify the purpose for each lesson; emphasis is placed on connections to everyday life, the workplace and ongoing learning. The students study and implement the strategies in Chapter 14 - Helping All Students Succeed from Teaching Exceptional, Diverse, and At-Risk Students in the General Education Classroom by Vaughn, Bos and Schumm (2006). Students use the following concepts and strategies in designing lesson plans for their Virtual Classrooms: establishing appropriate goals, providing appropriate instruction, providing practice, strategies for helping all students acquire basic skills, strategies for helping all learners, strategies for cueing students, helping students move from concrete to abstract learning, and promoting positive attitudes toward learning
(8) how to involve representatives of business, industry, and community organizations as active partners in creating educational opportunities;	EDU 340 EDU 351	Students read and reflect on the opportunities service learning provides students and participate in a service learning activity at the middle school to experience the value of creating partnerships. Students' unit plans must include a community linkage or service learning opportunity that provides partnership connections for students and their community.

(9) the role and purpose of cocurricular and extracurricular activities in the teaching and learning process;	EDU 394	Students will meet all requirements of student teaching with Best Practice and MN Standards applied. Through the student teaching experience all aspects of schools and teaching and learning process.
(10) the impact of reading ability on student achievement in science, recognize the varying reading comprehension and fluency levels represented by students, and possess the strategies to assist students to read science content more effectively; and	EDU 350	In regard to reading ability on student achievement, candidates read and discuss: • "Hiding out in secondary content classrooms" by W.G. Brozo • "Every American a strong reader," U.S. Dept. of Education Issue Paper • chapters in Reiss, *Teaching Content to English Language Learners* • *Teaching Reading in the Content Areas* (McREL publication) In regard to reading comprehension and fluency, candidates read and discuss: • "Creating fluent readers" by T. Rasinski • "Assessing readers and their texts" by N. Unrau • chapters in Reiss, *Teaching Content to English Language Learners* In regard to strategies for reading mathematical content, candidates learn and practice a variety of content literacy strategies, drawn in part from *Teaching Reading in Mathematics*, 2nd ed. (a McREL publication). These are distributed as handouts when there are mathematics candidates in the class that semester. To build skills in strategies, candidates also read and discuss: • "Using textbooks with students who cannot read them" by J. Ciborowski • "Vocabulary lessons" by Blachowicz and Fisher • chapters in Reiss, *Teaching Content to English Language Learners* • Teaching Reading in the Content Areas (McREL publication), especially specific reading strategies at the back of the book.
(11) how to apply the standards of	EDU 268	Freshman experience designed to have students examine

effective practice in teaching through a variety of early and ongoing clinical experiences with middle level and high school students within a range of educational programming models.		schools, teachers, and students in a wide range of program models.
	EDU 340	Students participate in a service learning experience at the local middle school and also teach an exploratory lesson in another middle school setting.
	EDU 368	Students teach for two – two and a half weeks in a local secondary setting; they develop and implement all lessons for one block course in their content area; all lessons must reflect the standards of effective practice.
	EDU 399	The senior seminar requires students to develop a portfolio that documents their competence across all the Standards of Effective Practice.