

BIO 495: Special Topics: Methods of Teaching Secondary Science (3 units)

Spring, 2019

Instructor: Jennifer Evarts Lineback, Ph.D.
Tuesday 1:30-4:30pm
1/7/18-5/3/18
Latter 1

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Office Hours: T/Th, 9-noon
Additional hours by appointment

This 3-unit course meets for 45 clock hours. In addition to the 15 weeks of scheduled classes, additional hours of instructional time will be designated by the instructor to fulfill this requirement. Additionally, two (2) hours of homework is customary for every hour of seat time to fulfill the requirements of this course.

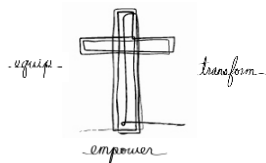
PLNU Mission Statement

To Teach • To Shape • To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

School of Education Mission Statement

Equip • Transform • Empower



PLNU School of Education is a vital Christian learning community that exists to develop high-performing, reflective educators of noble character who impact the lives of learners to influence the broader community.

Conceptual Framework

- **Equip** the candidate with a deep and coordinated understanding of the knowledge, skills, and dispositions demonstrated by effective educators.
- **Transform** the candidate's ongoing development and competence to apply the knowledge, skills, and dispositions of effective educators in supportive diverse environments.
- **Empower** the candidate to sustain a high level of mastery and demonstration of continual transformation in their professional practice.

Course Description

This methodology course is designed to prepare students to teach secondary-level (Grades 7- 12) and college-level science. This course includes lesson planning, intentional practice of classroom management, micro-teaching, classroom observation, group and self-evaluation, active and equitable participation for culturally, ethnically, linguistically, and academically diverse learners, and formative assessment to differentiate instruction for all learners. Topics include the following: pedagogical content knowledge, curriculum selection and design, methods and modalities of science teaching, assessment, classroom application of various forms of technology, safe laboratory management and operation, integration of language arts and mathematics in the science curriculum, and professional organizations. Instruction is aligned to the NGSS (7-12) and the English Language Development Standards, and relevance to college course teaching is incorporated. Modifications for diverse learners and learners with exceptionalities are researched. Equivalent to EDU434 (undergraduate level) or EDU624 (graduate level). PLNU students who complete this course are exempt from taking EDU 434 or EDU 624 for their preliminary single subject credential. [NOTE: Future Course Number: **BIO 463**]

Candidate Learning Outcomes

| Candidate Learning Outcome (CLO) | | TPE | Activities/Assignment |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Designs instruction using state-adopted content standards and applicable ELD Standards for maximum student achievement. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • Lesson Plan Assignment <ul style="list-style-type: none"> ○ Plan, Presentation, Reflection • Written Assignment #12 |
| 2 | Analyzes instruction to promote a balance among science information, concepts, and engineering principles as outlined in the NGSS. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • [Observed] Lesson ASET and Analysis • Lesson Comparison Assignment • In-class Analysis of LPs • “Good” Activity Posts |
| 3 | Designs instruction that serves to illustrate science concepts, principles, scientific investigation, and experimentation. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • Lesson Plan Assignment <ul style="list-style-type: none"> ○ Plan, Presentation, Reflection • Unit Sequence |
| 4 | Understands the nature of science, the integration of engineering design, and the connections between society, technology and the environment. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • NGSS Scavenger Hunt • Lesson Plan Assignment <ul style="list-style-type: none"> ○ Plan, Presentation, Reflection • SLC Reflections |
| 5 | Designs instruction that focuses on mathematical concepts, including the importance of accuracy, precision, and estimation, and the uses and limitations of media and technology as tools. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • Paper Towel In-Class Activity • Written Assignment #2 • Lesson Plan Assignment <ul style="list-style-type: none"> ○ Plan, Presentation, Reflection |
| 6 | Examines methods that encourage students to pursue science interests, especially students from groups underrepresented in science careers. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • [Observed] Lesson ASET and Analysis • Written Assignment #11 |
| 7 | Understands the practices that provide ethical care when live animals are present in the classroom. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • Safety Handbook In-class Discussion • Science Safety Plan |
| 8 | Designs instruction that engages students in discourse that fosters evidence-based explanations and arguments in speaking and writing. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • Written Assignment #2 • Written Assignment #3 • Lesson Plan Assignment <ul style="list-style-type: none"> ○ Plan, Presentation, Reflection |
| 9 | Designs science instruction that supports students in reading increasingly complex texts. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • Written Assignment #12 • Lesson Plan Assignment <ul style="list-style-type: none"> ○ Plan, Presentation, Reflection |

| | | | |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10 | Understands how to lead students during investigations and experiments, teaching them multiple ways to record, scientific data, including the use of mathematical symbols. Establishes safe practices and procedures for safe use and care of equipment and materials. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • Paper Towel In-Class Activity • “Talking Science” Activity • Safety Handbook In-class Discussion |
| 11 | Develops a plan to promotes safe practices and procedures for safe use and care of equipment and materials in the science classroom. | Subject Specific Pedagogical Skills for Science | <ul style="list-style-type: none"> • Safety Handbook In-class Discussion • Science Safety Plan |

COURSE TEXTS

Windschitl, M., Thompson, J., & Braaten, M. (2018). *Ambitious Science Teaching*. Cambridge, Massachusetts: Harvard Education Press. 304pp. ISBN: 978-1-68253-162-4

Course Expectations

Incomplete and Late Assignments

All assignments are to be submitted/turned in when they are due—including assignments posted in Canvas. Late assignments will have point deductions.

Incomplete Grades

All work is due by the last day of the quad. Grades will be calculated accordingly. A grade of incomplete is given for work which has been partially completed in a satisfactory manner, but which, for valid reasons such as illness or death in the family, is not finished. (Instructor must be notified and an action plan for completion is developed.) The grade of incomplete must be made up by the end of the next regular semester. Until the work is completed, a grade of Incomplete is considered an F in determining the student’s grade point average and eligibility for financial assistance.

Final Exam Policy

Successful completion courses with final exam/signature assessments requires taking the final examination on its scheduled day. No requests for early examinations or alternative days will be approved.

Method of Evaluation

Assignments in this class are assigned a point value. Point values are shown on the assignment chart.

At the end of the semester, a letter grade for the course will be based on the following scale:

| A | A- | B+ | B | B- | C+ | C | C- | D | F |
|----------|-----------|-----------|----------|-----------|-----------|----------|-----------|----------|-----------|
| 93-100% | 90-92% | 87-89% | 83-86% | 80-82% | 76-79% | 73-75% | 70-72% | 60-69% | Below 59% |

Course Evaluation

Toward the end of this course, you will be receiving an email on your Point Loma account from IDEA asking you to log into the course evaluation system. This evaluation is totally confidential, and **it is crucial that ALL candidates complete the evaluation** so that the School of Education has the feedback needed to improve the course and the program in which you are enrolled.

COURSE CALENDAR:

The following suggested timeline shows the main themes, readings, topics, activities, and assignments that may be planned for each class session. The schedule is **subject to modifications** at the discretion of the professor to meet the needs of the class.

| Session/ Week: | Theme & Topics: | Reading(s): | Assignment(s) [due by next week]: |
|----------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| 1/15 | How People Learn | <ul style="list-style-type: none"> • AST*: Ch. 1 • Llewellyn: Ch. 4 | 1. WA #1 |
| 1/22 | Argumentation in Science Introduction to the NGSS | <ul style="list-style-type: none"> • AST: Ch. 11 • Framework: Chapter 2 • Osmosis and Diffusion Lab Activity | 1. WA #2 |
| 1/29 | “Taking” in Science | <ul style="list-style-type: none"> • AST: Ch. 3 & 4 | 1. WA #3 2. NGSS - Scavenger Hunt |
| 2/5 | Assessments: Part I | <ul style="list-style-type: none"> • Britton (2011) | 1. WA #4 2. Interview Assignment |
| 2/12 | What does it mean to DO science? Lesson Planning (LP): Part I | <ul style="list-style-type: none"> • AST: Ch. 5 • Johnson & Luft (2001) | 1. WA #5 2. Lesson Comparison Assignment |
| 2/19 | Lesson Planning (LP): Part II | <ul style="list-style-type: none"> • AST: Ch. 2 | 1. WA #6 2. [Observed] Lesson ASET and Analysis |
| 2/26 | Lesson Planning (LP): Part III | <ul style="list-style-type: none"> • AST: Ch. 8 | 1. WA #7 2. LP (with ASET) draft |
| Spring Break March 4-8 | | | |
| 3/12 | Decision Making | <ul style="list-style-type: none"> • AST: 9 & 10 | 1. WA #8 2. Revised LP (and ASET) |
| 3/19 | Reading in Science Unit Planning | <ul style="list-style-type: none"> • AST: Ch. 12 portion | 1. WA #9 2. Unit Outline (group) |
| 3/26 | Assessments: Part II | <ul style="list-style-type: none"> • AST: Ch. 6 & 7 • Science Safety Plan | 1. WA #10 2. Science Safety Plan |
| 4/2 | Embracing all learners in a science classroom | <ul style="list-style-type: none"> • To Be Determined... | 1. WA #11 2. PLAN SLC for next week |
| 4/9 | Implementing technology in the classroom | <ul style="list-style-type: none"> • NONE | 1. SLC reflection 2. “Good” activity posts |
| 4/16 | Writing in Science Lesson Plan Presentations | <ul style="list-style-type: none"> • Rockow, 2008 | 1. WA #12 2. LP Reflections (Rd 1) |
| 4/23 | Don’t Lose the Biology! Lesson Plan Presentations | <ul style="list-style-type: none"> • Tang & Coffey 2008 • Ford, 2006 | 1. LP Reflections (Rd 2) |
| FINAL EXAM Thursday, May 2, 1:30-4:30pm | | | |

* **ABT** = Windschitl, M., Thompson, J., & Braaten, M. (2018). *Ambitious Science Teaching*. Cambridge, Massachusetts: Harvard Education Press. 304pp. ISBN: 978-1-68253-162-4

Institutional Policies

PLNU ACADEMIC ACCOMMODATIONS POLICY

While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See [Academic Policies](#) in the Undergraduate Academic Catalog.

Because lab sessions are 2.5 hours, missing a lab counts as 2 absences. Since we only meet twice a week for 100 minutes each time, arriving late or leaving early is considered a ½ absence. There are no allowed or excused absences except when absences are necessitated by certain university-sponsored activities and are approved in writing by the Provost.

PLNU COPYRIGHT POLICY

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU ACADEMIC HONESTY POLICY

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

These links and policies provide additional information.

Catalog Policies

[Education Records \(FERPA\) and Directory Information](#)

FERPA is the federal law regarding the privacy of student records.

[Spiritual Care/Resources](#)

PLNU strives to be a place where you grow as a whole person. This link provides you with resources and email contacts in this regard.

[Cell Phones and Computers](#)

Appropriate use of cell phones and computers is expected during class time.

Course Policies

Please find the complete School of Education policy on the following topics by clicking the links:

[Required Resources:](#)

Proficient use of Canvas, Task stream and PLNU email is a requirement.

[Student IT Expectations](#)

[Display of Student Work](#)

Student work may be displayed or shared.