

LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		08-59	App-2/17/09	App-3/24/09

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

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Proposing Department/Unit Biology	Phone 357-2359

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply) ☐ New Course ☐ Course Prefix Change ☐ Course Deletion ☒ Course Revision ☐ Course Number and/or Title Change ☐ Catalog Description Change		
EDUC 451 Teaching Science in the Secondary School		
<u>Current</u> Course prefix, number and full title		<u>Proposed</u> course prefix, number and full title, if changing
2. Additional Course Designations: check if appropriate ☐ This course is also proposed as a Liberal Studies Course. ☐ Other: (e.g., Women's Studies, Pan-African) ☐ This course is also proposed as an Honors College Course.		
3. Program Proposals ☐ New Degree Program ☐ Program Title Change ☐ Program Revision ☐ New Minor Program ☐ New Track ☐ Other		
<u>Current</u> program name		<u>Proposed</u> program name, if changing
4. Approvals		
Department Curriculum Committee Chair(s)	Sandra Newell	12/5/08
Department Chair(s)	April Luciano	12/5/08
College Curriculum Committee Chair	[Signature]	12/18/08
College Dean	John D. Sch	12/18/08
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)	Joseph Domaradski TECC	1-26-09
	May Ann Rafeth Dean COE-ET	1-26-09
UWUCC Co-Chairs	Gail Schuch	2-17-09

* where applicable

Received

FEB 16 2009

Liberal Studies

Received

JAN 29 2009

Liberal Studies

1. New Syllabus of Record

I. Catalogue Description

EDUC 451 Methods of Teaching Science in the Secondary Schools

Prerequisite: Admission to Student Teaching 2c-2l-3cr (2 hours lecture, 2 hours lab, 3credits)

Provides the background to help science majors meet the problems of teaching science. Various inquiry approaches useful in meeting the objectives of a contemporary science class, including special needs students and English-language learners, are taught and exemplified.

II. Course outcomes

Students will be able to:

1. Construct effective lesson and unit plans that depict appropriate applications of performance objectives.
2. Demonstrate awareness of and appreciation for the student centered, constructivist teaching philosophy advocated by the new standards.
3. Develop classroom lessons based on one or more of the criteria of the new educational standards.
4. Assess individual differences among students and plan learning experiences appropriate for exceptional as well as multi-cultural students.
5. Assess textbooks for potential use consistent with the new standards and the student's instructional choices.
6. Examine and apply appropriate evaluation strategies that match intended learning outcomes.
7. Demonstrate an understanding of potential classroom management problems and establish consistent practices for resolving such problems.
8. Examine computer applications for classroom instructional use as well as planning applications
9. Develop and demonstrate skills in using telecommunications to exchange and retrieve information.
10. Develop and demonstrate expertise in selecting appropriate science activities and laboratories.

III. Course Outline

Date Due	Topics	Number of Points
Week 1	Basic Needs for the Course	
	Initial Philosophy of Education	10
Week 2	Critiqued Article on Couch Potatoes	10
Week 3	Critiqued Article on Special Needs Students	10
Week 4	Presentation of Teacher-Centered Lesson	10
	Peer Evaluation of Teacher-Centered Lesson	14
Week 5	Lesson Plan and Video critique of Teacher-Centered Lesson	20
	Critiqued Article on Learning Cycle	10

Week 6	Critiqued Article on Cooperative Learning or Concept Maps	10
	Critiqued Article on Constructivist Teaching	10
Week 7	Computer session in Davis (Portfolio Construction)	
	Computer session in Davis (Web-lesson Construction)	
<u>First Review of Disk of Students' Portfolio and other ancillaries</u>		
Week 8	Student's Web-based, constructivist lesson	10
	Peer Evaluation of Web-based, Constructivist Lesson	14
Week 9	Lesson Plan & video critique of Student's Web-based lesson	20
	Critique on the TIMSS Article	10
Week 10	Text and Lab Book Evaluation	10
Week 11	Presentation of Constructivist Lesson	10
	Peer Evaluation of Constructivist Lesson	14
Week 12	Lesson Plan & video critique of Constructivist Lesson	20
Week 13	Unit Plan for one of the lessons that was taught during class	10
Week 14	Presentation on Student's Philosophy of Education	10
<u>Finals week -Completed Student Portfolio & other ancillaries</u>		<u>20</u>
		252 pts

IV. Evaluation methods

Your grade in EDUC 451 will be derived from a number of different assignments including critiques of journal reprints, evaluations of peer lessons, development and presentation of class activities, problem sets, writing assignments, and construction of lesson and unit plans. Points will be awarded to students for each assignment (see list above).

V. Grading Scale

Point totals will determine student grades based on the following scale:

A= 90% (227-252 pts.) B= 80-89% (202-226 pts.) C= 70-79% (176-201 pts.)

D= 60-69% (151-175 pts.) F= <59% (0-150 pts)

VI. Attendance Policy

As a teacher in your own classroom, you will expect that your students will be in regular attendance, will be prepared for class and will be willing to participate actively in learning. Your instructor in this course has the same expectations. As a teacher, you will soon realize the negative impact which frequent student absences can have both on the successful implementation of your lessons and on the progress of the entire class. This is a participatory course. Participation by each of you – in asking questions, providing constructive feedback, contributing teaching ideas, and serving as “students” for the presentations of your peers – will contribute greatly to the quality and meaningfulness of the learning experiences in this class. With this premise in mind, please note the following policies for this course:

Students are expected to be in regular attendance and to be ready to participate for each class. Attendance is taken at each class. If you must miss class due to an illness or personal emergency, please contact the instructor as early in the episode as possible. If your situation necessitates your missing more than one class, please contact the instructor as soon as possible upon your return. This will permit us to make an appointment to discuss missed work and reschedule presentations, if necessary. 1½ classes may be missed without question. However, if you are scheduled to make a presentation during either of these times, you are expected to let me know as far ahead as possible so other arrangements can be made. Keep in mind, you may cause another class member to be “put on the spot” by such an absence. Since attendance and participation at each class are worth a specific number of points, repeated absences will jeopardize your grade. Please realize that multiple classes missed will result in a loss of attendance/participation points. Five points will be lost from a student’s score for each class for non-participation and each unexcused absence.

Written work during unexcused missed classes will be accepted but will be penalized a percentage point for each day the assignment is late. Work due during an “allowed” absence will be accepted without penalty.

VII. Required textbooks, supplemental books and readings

Lord, T.L. Methods of Teaching Science in the Secondary Schools. Indiana, PA: Pro-packet. (Updated annually)

VIII. Special resource requirements

N/A

IX. Bibliography

Abd-El-Khalick, F., Bell, R. L. and Lederman, N. G. “The nature of science and instructional practice: Making the unnatural natural.” Science Education 36 (1998): 404-420.

Bell, R. L., Binns, I., and Smetana, L. “Simplifying inquiry instruction.” The Science Teacher (2005): 30-33.

Brickhouse, N. W. “Teachers’ beliefs about the nature of science and their relationship to classroom practice.” Journal of Teacher Education 41.3 (2007): 53-62.

Collette, A., and Chiappetta, E. Science instruction in the middle and secondary schools. New York: Macmillan, 1994.

Davies, M. A., and Wavering, M. “Alternative assessment: New directions in teaching and learning.” Contemporary Education 71.1 (1999).

Deming, J. and Cracolice, M. “Learning how to think.” The Science Teacher 71.3 (2004): 42-47.

Eisenkraft, A. “Expanding the 5E model.” The Science Teacher 70.6 (2003): 56-59.

Schwartz, R. S., Lederman, N. G. and Crawford, B. A. “Developing views of nature of science in an authentic context: An explicit approach to bridging the gap between nature of science and scientific inquiry.” Science Education 88 (2004): 610-645.

Travis, H. J. and Lord, T. R. “Traditional and constructivist teaching techniques: comparing two groups of undergraduate non-science majors in a biology lab.” Journal of College Science Teaching 34.3 (2004):12-18.

Trowbridge, L. and Bybee, R. Becoming a secondary school science teacher (5th ed.) Englewood Cliffs, NJ: Merrill, 1990.

Volkman, M. and Abell, S. “Seamless assessment.” Science and Children 40.8 (2003): 41-5.

NCATE Assessment Matrix

Course Objective	COEET Conceptual Framework Standard/ Danielson Domains	INTASC Standard (undergrad only)	Discipline Specific Standard	Course Assessment Measuring Objective*
1	Scholar-practitioner/ Danielson Domains: 1a, 1b, 1c, 1d, 1e, 1f, 2c, 3a, 3b, 3c, 3d, 4a, 4b	1, 2, 4, 5, 6, 7	1a,1b,2b,3a,3b,4a,4b,5a,5b,6a	Students prepare and teach 2-3 lessons (5-E model) to the class and prepare a unit plan. The second lesson plan will be used as a KARS assessment for the class
2	Scholar-practitioner/ Danielson Domains: 1a, 1e, 2d, 3b, 3e, 4a, 4e	1, 2, 4, 5, 6, 7	1a,1b,2b,3a,3b,4a,4b,4c,5a,6a,6b	Journal readings/ critiques, STAM evaluation, paradigm comparison
3	Scholar-practitioner/ Danielson Domains: 1a, 1b, 1c, 1d, 1e, 4a	1, 2, 3, 4, 5, 6, 7	1a,1b,2b,3a,3b,4a,4b,4c,5a,6a,6b	Students prepare and teach 2-3 lessons based on teaching standards to the class, Step 2 portfolios. The third lesson plan will be used as a KARS assessment for the class
4	Scholar-practitioner/ Danielson Domains: 1a, 1b, 1c, 1d, 1e, 1f, 2a, 2b, 2c, 2d, 2e	2, 3,4, 5, 8	3b, 5a, 5b, 5c, 6c, 8a,8b,8c	Article critique on special needs students, lesson plan adaptations in lessons prepared for class
5	Scholar-practitioner/ Danielson Domains:1a, 1b, 1c, 1d, 1e, 4a, 4d, 4e	4, 5, 6	1a,1b,2a,3a,3b,6a	Evaluation of current textbook in discipline
6	Scholar-practitioner/ Danielson Domains: 1a, 1b, 1c, 1e, 1f, 3a, 3d. 4a, 4b	3, 4, 8	8a,8b,8c	Assignment on assessment/test construction
7	Scholar-practitioner/ Danielson Domains: 1b, 2a, 2b, 2c, 2d, 3c, 3e, 4a, 4f	2, 5, 6	9a,9b,9c	Article critique about management and discipline issues in the classroom
8	Scholar-practitioner/ Danielson Domains: 1a, 1b, 1c, 1d, 1e, 1f, 3c	1, 2, 6, 9	5a,5d,10a,10c	Lesson development around computer activity search
9	Scholar-practitioner/ Danielson Domains: 1a, 1d, 3a, 4b, 4c, 4e, 4f	2, 3, 4, 9,	5d,10a,10c	Computer activity search, portfolio building and assessment
10	Scholar-practitioner/ Danielson Domains: 1a, 1b, 1c, 1d, 1e, 1f, 2c, 2e, 3c	6, 7, 9	1c,3a,3b,5a,5c,5d,5e6b,9b,9c	Article critique on laboratory management & safety, computer activity search

2. Summary of proposed revisions

Changes were made in the wording of the objectives to include special needs students and English language learners. These were also reworded to better reflect measurable outcomes.

The assessments listed in the NCATE Assessment Matrix were reworded in order to be clearer, and the Danielson Domains were added to reflect the expectations of the College of Education and Educational Technology.

Clarification of the hour designation (2c-21-3cr) was made to ensure agreement between the catalogue description and the new course syllabus of record. Apparently, the course hours were changed on the syllabus many years ago by faculty no longer at the university, but the correct hour distribution was listed in the catalogue.

3. Justification/rationale for the revision

Changes were made in the wording of the objectives and the course description to indicate that special needs students and English language learners (ELL) are addressed in the course. While this has always been covered the Methods course through reading assignments, lesson plans and class discussions throughout the semester, it needed to be specifically noted in the course description and the objectives to meet the new requirements from the Pennsylvania Department of Education (PDE). The Chairman of the TECC Curriculum Committee assisted with these changes in wording to ensure that PDE requirements were met. Suggestions for language to clarify objectives were also made by members of the TECC Curriculum Committee.

The NCATE Assessment Matrix was updated to better reflect the assessment used to meet each of the objectives, and the Danielson Domains met by various assignments were also included. This meets the College Of Education and Educational Technology requirements for teacher preparation programs. Suggestions for language to clarify these items were also made by members of the TECC Curriculum Committee.

In addition, there was a discrepancy between the hour designations listed on all syllabi available for review and the catalogue description. In discussions with other faculty, it was determined that the hour designation should be 2c-21-3cr, as currently listed in the catalogue, rather than the 3c-01-3cr designation that was found on the syllabi from the last several years. This is now reflected on the new syllabus for EDUC 451. The course is run as a combination of classroom/discussion time and hands-on activities such as teaching lessons to peers over a two-hour period two days each week, which merits the lecture/lab designation.

4. Old syllabus of record

The old syllabus of record could not be located, so the oldest version available (from 2004) is included here.

Methods of Teaching Science in the Secondary Schools - EDUC 451 Course Syllabus

Instructor: Thomas R. Lord
Office: Rm 12 Weyandt

Phone: (724) 357-2484

Email: trlord@IUP.EDU

Office hours: MWF 2:30-4:30

Class meeting time: M&W 10:30-12:30

Fall: 2004

Required Text: Methods of Teaching Science in the Secondary Schools, T.R. Lord, Pro-packet, Indiana, Pennsylvania

I. Course Description:

Prerequisite: Admission to Student Teaching

Background to help science majors meet the problems of teaching science. Various inquiry approaches useful in meeting objectives of a contemporary science class are taught and exemplified. 3 cr.

II. Course Objectives: At the conclusion of Teaching of Science in the Secondary Schools students will be able to:

1. construct effective lesson and unit plans that depict appropriate applications of performance objectives.
2. fully understand and appreciate the student centered, constructivist teaching philosophy advocated by the new standards.
3. develop classroom lessons base on one or more of the criteria of the new educational standards.
4. assess individual differences among students and plan learning experiences appropriate for exceptional as well as multi-cultural students.
5. assess textbooks for potential use consistent with the new standards and the student's instructional choices.
6. examine and apply appropriate evaluation strategies that match intended learning outcomes.
7. understand the potential classroom management problems and establish consistent practices for resolving such problems.
8. examine computer applications for classroom instructional use as well as planning applications
9. gain facility in using telecommunications to exchange and retrieve information.
10. gain some expertise in selecting appropriate science activities and laboratories.

III Course NCATE Assessment Matrix

College Conceptual Framework Standard	INTASC Standard (undergrad only)	Discipline Specific Standard	Course Objective	Course Assessment Measuring Objective*
scholar/practitioner	1, 2, 4, 5, 6, 7	1a,1b,2b,3a,3b,4a,4b,5a,5b,6a	1	student's prepare 2-3 lessons (5 Es) and 1 unit plan. The second lesson plan will be aggregated for the class!

scholar/practitioner	1, 2, 4, 5, 6, 7	1a,1b,2b,3a,3b,4a,4b,4c,5a,6a,6b	2	3-4 journal readings, 2-3 teachings, STAM evaluation, paradigm comparison
scholar/practitioner	1, 2, 3, 4, 5, 6, 7	1a,1b,2b,3a,3b,4a,4b,4c,5a,6a,6b	3	2-3 lessons based on teaching standards, portfolios. The third lesson plan will be aggregated for the class!
scholar/practitioner	2, 3,4, 5, 8	3b, 5a, 5b, 5c, 6c, 8a,8b,8c	4	readings/discussions on special students
scholar/practitioner	4, 5, 6	1a,1b,2a,3a,3b,6a	5	evaluation of current textbook in discipline
scholar/practitioner	3, 4, 8	8a,8b,8c	6	assignment & discussion of assessment/test construction
scholar/practitioner	2, 5, 6	9a,9b,9c	7	assignment & discussion of management and discipline
scholar/practitioner	1, 2, 6, 9	5a,5d,10a,10c	8	lesson development around computer activity search
scholar/practitioner	2, 3, 4, 9,	5d,10a,10c	9	computer activity search, portfolio building and assessment
scholar/practitioner	6, 7, 9	1c,3a,3b,5a,5c,5d,5e6b,9b,9c	10	discuss laboratory management & safety, computer activity search

* **Assignments/products chosen for aggregation should be bolded.**

IV. Attendance: Just as you as a teacher in your own classroom will expect that your students will be in regular attendance, will be prepared for class and will be willing to participate actively in learning, I too have the same expectation. As a teacher, you will soon realize the negative impact which frequent student absences can have both on the successful implementation of your lessons and on the progress of the entire class. This is a participatory course. Participation by each of you – in asking questions, providing constructive feedback, contributing teaching ideas, and serving as “students” for the presentations of your peers – will contribute greatly to the quality and meaningfulness of the learning experiences in this class. With this premise in mind, please note the following policies for this course:

1. I expect each of you to be in regular attendance and to be ready to participate for each class. I do take attendance at each class and I do note those who do not participate.
2. If you must miss class due to an illness or personal emergency, I would appreciate the courtesy of a phone call as early in the episode as possible. If your situation necessitates your missing more than

one class, please contact me as soon as possible upon your return. This will permit me to make an appointment to discuss missed work with you and reschedule your presentation, if necessary.

3. One and one-half classes may be missed without question. However, if you are scheduled to make a presentation during either of these times, I would appreciate your letting me know as far ahead as possible so other arrangements can be made. Keep in mind, you may cause another class member to be "put on the spot" by such an absence. Since attendance and participation at each class are worth a specific number of points, repeated absences will jeopardize your grade. Please realize that the classes missed in #2 above, will result in a loss of attendance/participation points. Five points will be lost from a student's score for each class for non-participation and each unexcused absence
4. Written work during unexcused missed classes will be accepted but will be penalized a percentage point for each day the assignment is late. Work due during an "allowed" absence will be accepted without penalty.

V: Grading: Your grade in EDUC 451 will be derived from a number of different assignments including critiques of journal reprints, evaluations of peer lessons, development and presentations of class activities and construction of lesson and unit plans. Points will be awarded to students for each assignment. Point totals will determine student grades based on the scale below: problem sets and several writing assignment. The breakdown of the sources of your grade is given below.

Course Grading Scale

252 to 240 A
239 to 225 B
224 to 210 C
210 to 190 D
190 to 0 F

Assignments and Point Value for Science Methods – Spring 2004

Date Due	Topics	Amount of Points
Jan 12	Basic Needs for the Course	required
Jan 14	Initial Philosophy of Education	10
Jan 21	Critiqued Article on Couch Potatoes	10
Jan 28	Critiqued Article on Special Needs Students	10
Feb 2-11	Presentation of Teacher-Centered Lesson	10
Feb 2-11	Peer Evaluation of Teacher-Centered Lesson	14
Feb 16	Lesson Plan and Video critique of Teacher-Centered Lesson	20
Feb 18	Critiqued Article on Learning Cycle	10
Feb 23	Critiqued Article on Cooperative Learning or Concept Maps	10
Feb 25	Critiqued Article on Constructivist Teaching	10
Mar 1	Computer session in Davis (Portfolio Construction)	
Mar 3	Computer session in Davis (Web-lesson Construction)	

Mar 15	<u>First Review of Disk of Students Portfolio and other ancillaries</u>	
Mar 15-24	Student's Web-based, constructivist lesson	10
Mar 15-24	Peer Evaluation of Web-based, Constructivist Lesson	14
Mar 29	Lesson Plan and Video critique Student's Web-based lesson	20
Mar 31	Critique on the TIMSS Article	10
Apr 7	Text and Lab Book Evaluation	10
Apr 12-21	Presentation of Constructivist Lesson	10
Apr 12-21	Peer Evaluation of Constructivist Lesson	14
Apr 26	Lesson Plan and video critique of Constructivist Lesson	20
Apr 26	Unit Plan for one of the lessons that were taught during class	10
Apr-May (finals)	Presentation on Student's Philosophy of Education	10
Apr-May (finals)	<u>Disk of Completed Student Portfolio and other ancillaries</u>	<u>20</u>
		252 pts

Ed 451 – Methods in Science Teaching – Schedule for Spring, 2004

Date	Topics	Page in Text
Jan 12	Factors affecting educational outcomes, learning philosophy, portfolios	6-12
Jan 14	Behavioral Objectives, National/ State/ NCATE Standards & Generic/Departmental Competencies	111-181
Jan 19	Ideas for managing a classroom and maintaining discipline in the classroom	18-20
Jan 21	Safety in the Laboratory – What every Science Teacher should know	14-17
Jan 26	Discussion of Special Needs Students	13
Jan 28	Review Bloom's Taxonomy, making a good presentation/lecture	21-24
Feb 2	Students' Teacher-Centered Lesson Presentations	25
Feb 4	Students' Teacher-Centered Lesson Presentations	25
Feb 9	Students' Teacher-Centered Lesson Presentations	25
Feb 11	Students' Teacher-Centered Lesson Presentation	25
Feb 16	Learning Cycle, 5 E model, and Concept Maps	41-45
Feb 18	Cooperative Learning – Noncompetitive group learning	26-29
Feb 23	Inquiry-based teaching and Constructivism	46-52
Feb 25	Planning and evaluating a Constructivist-Based Lesson - STAM, -	37-40
Mar 1	Computer Enhanced Electronically Assessable Portfolio	70-71

Mar 3	Computer Enhanced Instruction – Creating a Web-Based lessons from Computer links	53–69
Mar 15	Students’ Transforming Web Ideas to Constructivist-Based Science Lessons	72-76
Mar 17	Students’ Transforming Web Ideas to Constructivist-Based Science Lessons	72-76
Mar 22	Students’ Transforming Web Ideas to Constructivist-Based Science Lessons	72-76
Mar 24	Students’ Transforming Web Ideas to Constructivist-Based Science Lessons	72-76
Mar 29	The Third International Math and Science Study ---- TIMSS	
Mar 31	Investigation of US Science and Math Education	
Apr 5	Text and Lab book evaluation	87-89
Apr 7	Developing a Unit Plan for several weeks of lessons	104
Apr 12	Students constructivist-based lesson,	91-98
Apr 14	Students constructivist-based lesson	91-98
Apr 19	Students constructivist-based lesson	91-98
Apr 21	Student constructivist-based lesson	91-98
Apr 26	Constructing and Evaluating different style tests	99-102
Apr-May (over finals)	report on your Philosophy of Education	108