**Program Report for the**
**Preparation of Physics Education Teachers**

**Education Standards and Practices Board**

# C O V E R   S H E E T

**Institution__University of North Dakota ______________________________State:_ND____**

**Date Submittted _______Jan 4, 2008________________________________**

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**Program documented in this report:**
**Name of Institution's program: __Physics Teacher Education___________________**
**Grade levels for which candidates are being prepared: __9-12___________________**
**Degree or award level:__B.S.Ed in Physics________________________________________**

**Is this program offered at more than one site?** ☐ **Yes** **x No**
If yes, list sites at which the program is offered:____________________________

**Title of the state license for which candidates are prepared**
**Physics**

**Program report status:**
- **x Initial review**
- ☐ **Rejoinder**
- ☐ **Response to national recognition with conditions**

**State licensure requirement for national recognition:**
ESPB requires 80% of the program completers who have taken the test to pass the applicable state licensure test for the content field, if the state has a testing requirement. Does your institution require such a test? Test information and data must be reported in Section II

x **Yes** ☐ **No**

**REPORT**

## I. Contextual Information & Program Response To ESPB Standards

**Program: ___Physics________**

**Descriptive Information About the Program** (In a paragraph or two, describe the program-this is your chance to put your best programmatic foot forward.)

The UND undergraduate physics program, which leads to a B.S. in Physics, covers the standard topics found in physics programs at major U.S. universities and offers flexibility in adding specialties. Students can choose not to specialize in any one area: this allows the student the maximum flexibility to include mathematics or other science courses in their program. The unspecialized degree is an excellent preparation for graduate work in physics. There are also four tracks which students may follow. These are the Applied Physics Track, the Astrophysics Track, the Computers in Physics Track, and the Materials Science Track. Students pursuing a track take courses selected to provide a coherent emphasis on a subfield of physics or allied field. For example, students interested in nanoscience or nanotechnology could choose the Materials Science Track and be well prepared to enter any physics related area of nanoscience or nanotechnology.

The physics undergraduate program is a demanding, rigorous program. About half our graduates go on to graduate school immediately after receiving their B.S. Most of the others seek employment in science and technology based firms or at government supported laboratories. Our ongoing assessment of our graduates indicates that they are well prepared for entry into either the science and technology work force or into graduate school.

### Candidate Information

**Directions:** Provide three years of data on candidates enrolled in the program and completing the program, beginning wit the most recent academic year for which numbers have been tabulated. Please report the data separately for the levels/tracks (e.g., baccalaureate, post-baccalaureate, alternate routes, master's, doctorate) being addressed in this report.

| **Program:** Physics | | |
|---|---|---|
| **Academic Year** | **# of Candidates Enrolled in the Program** | **# of Program Completers** |
| Sum04-Spr05 | 0 | 0 |
| Sum05-Spr06 | 1 | 0 |
| Sum06-Spr07 | 0 | 0 |

**13050.1 PHYSICS**

The physics program requires:

- systematic and quantitative study of physics including modern physics, mechanics, electricity & magnetism, thermodynamics, optics, and electronics (minimum 32 semester hours);

1. This standard is met by the following courses:

Phys 251 (4 credits) **University Physics I/Laboratory** Prerequisite: Math 165. Corequisite: Phys 251L. The university physics sequence is for students majoring in science and engineering. Topics normally covered in Phys 251 include Newtonian mechanics and gravitation, work and energy, rotational dynamics, vibrations and waves, mechanics of solids and fluids, basic kinetic theory, equations of state and the first and second laws of thermodynamics. The laboratory is a corequisite for Phys 251.

Phys 252 (4 credits) **University Physics II/Laboratory** Prerequisites: Math 166, Phys 251 and 251L. Corequisite: Phys 252L. Topics normally covered include electricity, magnetism, electromagnetic waves, light and geometrical optics. The laboratory is a corequisite for Phys 252.

Phys 253 (4 credits) **University Physics III/Laboratory** Prerequisites: Math 265, Phys 252 and 252L. Corequisite: Phys 253L. Modern physics, a survey covering physics of the 20$^{th}$ and 21$^{st}$ centuries. Topics normally covered include theory of relativity, discovery of quantum phenomena, basic quantum mechanics, overview of atomic, nuclear and solid state physics, statistical physics, quantum fluids and superconductivity, fundamental forces and the physics of elementary particles. This course is a prerequisite for most courses in advanced physics. The lab is a corequisite for Phys 253.

Phys 318 (3 credits) **Mechanics II** Prerequisite: Phys 317, or approval of instructor. A continuation of Phys 217. Rigid body motion, Lagrangian and Hamiltonian dynamics, relativity, continuum mechanics.

Phys 324 (3 credits) **Thermal Physics** Prerequisite: Phys 253, or approval of instructor. Thermodynamics with an introduction to statistical physics.

Phys 325 (3 credits) **Optics** Prerequisites: Phys 253 or approval of department. Geometrical and physical optics, with an emphasis on physical optics.

Phys 325L (1 credits) **Optics Laboratory** Corequisite: Phys 325. Laboratory to accompany Physics 325.

Phys 327 (3 credits) **Electricity and Magnetism I** Prerequisites: Phys 253 or approval of instructor. A quantitative treatment of electro-magnetic theory with an introduction to Maxwell's equations.

Phys 328 (3 credits) **Electricity and Magnetism II** Prerequisite: Phys 327. Corequisite: Math 352 or approval of instructor. Maxwell's equations. The scalar potential as a solution to a boundary value problem. The vector potential and its applications. A quantitative treatment of dielectrics, magnetic materials and electromagnetic radiation.

Phys 432 (3 credits) **Quantum Mechanics II** Prerequisite: Phys 431 or consent of instructor. Further development of basic quantum theory with application to atomic, molecular solid state and nuclear physics

2) Assessment is done with
   a. Physics Praxis II Exam
   b. Graded homework
   c. Tests
   d. Final examinations

3 & 4) In the last five years, no students have take the B.S. in Physics and gone on to take the Preparation for Physics Education Teachers. There are no assessment results to report for the target population.

- laws of physics and their application to various areas of physics and modern technology;

  This standard is met by Phys 251, 252, 253, 325 & 325L, 328, and 432. See the above item for more elaboration.

  2) Assessment is done with
     a. Physics Praxis II Exam
     b. Graded homework
     c. Tests
     d. Final examinations

3 & 4) In the last five years, no students have take the B.S. in Physics and gone on to take the Preparation for Physics Education Teachers. There are no assessment results to report for the target population.

- interaction of physics and technology with the ethical and human implications;

  This standard is met by Phys 251, 252, and 253. See the first item where these courses are listed for more elaboration.

  2) Assessment is done with
     a. Physics Praxis II Exam
     b. Graded homework
     c. Tests
     d. Final examinations

3 & 4) In the last five years, no students have take the B.S. in Physics and gone on to take the Preparation for Physics Education Teachers. There are no assessment results to report for the target population.

- chemistry, biology, and earth science (minimum 16 semester hours; at least 4 semester hours in each area);

1)
Chemistry:

Chem 121 (3 credits) **General Chemistry I** Prerequisite: Math 102. Corequisites: Chem 121L, Math 103 or an appropriate score on the Placement Testing Program (PTP). Open to all students, no high school credit in chemistry required. Elementary principles and theories of chemistry' matter, measurement, atoms, ions, molecules, reactions, chemical calculations, thermochemistry, bonding, molecular geometry, periodicity, gasses. Required of all chemistry majors.

Chem 121L (1 credit) **General Chemistry I Laboratory** Corequisite: Chem 121. Laboratory to accompany Chem 121. Required of all chemistry majors.

Chem 122 (3 credits) **General Chemistry II** Prerequisite: Chem 121. Corequisite: Chem 121L. Elementary principles and theories of chemistry; Intermolecular forces, liquids, solids, kinetics, equilibria, acids and bases. Solution of chemistry, precipitation, thermodynamics, electrochemistry. Required of all chemistry majors.

Chem 122L (1 credit) **General Chemistry II Laboratory** Prerequisite: Chem 121L. Corequisite: Chem 122. Laboratory to accompany Chem 121. Required of all chemistry majors.

2, 3, & 4) See chemistry program documentation for syllabi, assessment tools, etc.

Biology:

The B.S. in Physics does not require students to take a biology course. Students wanting to be certified to teach biology in the high schools must take 12 credits of biology. Students wanting to be certified to teach Physics in high schools must take 4 credit hours in biology, generally satisfied by Bio 150 (150L) or Bio 151 (151L) which also meets a general education requirement.

1. Earth science:

Phys 110 (3 credits) **Introductory Astronomy** An introductory study of the universe: The solar system, starts, stellar evolution, galaxies, black holes, big bang cosmology, and the accelerating universe. The astronomy laboratory 110L is optional for 1 credit.

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2)Assessment is done with

a. Physics Praxis II Exam
b. Tests
c. Final examinations

3 & 4) In the last five years, no students have take the B.S. in Physics and gone on to take the Preparation for Physics Education Teachers. There are no assessment results to report for the target population.

- study of mathematics through calculus (minimum 2 semesters) including an introduction to differential equations.

Math 165 (4 credits) **Calculus I** Prerequisites: PTP or Math 112 or completion of Math 107 with a grade of C or better. Limits, continuity, differentiation, Mean Value Theorem, integration, Fundamental Theorem of Calculus.

Math 166 (4 credits) **Calculus II** Prerequisites: Completion of Math 165 with a grade of C or better or permission of the Mathematics Department. Techniques and applications of integration, exponentiation and logarithmic functions, parametric equations, parametric equations and series.

Math 265 (4 credits) **Calculus III** Prerequisite: Math 166. Multivariate and vector calculus including partial derivatives, multiple integration, line and surface integrals, Green's Theorem, Stokes' Theorem, the Divergence Theorem.

2, 3, &4) See mathematics program documentation for syllabi, assessment tools, etc.
ESPB Report Mathematics

**13010.2, 13020.2, 13035.2, 13045.2, 13047.2, 13050.2 NATURE OF SCIENCE**

The program requires study of the history and philosophy of science as well as the interrelationships among the sciences. The program uses varied performance assessments of candidate's understanding and ability to apply that knowledge.

1. This standard is met by the following courses:

Phys 251 (4 credits) **University Physics I/Laboratory** Prerequisite: Math 165. Corequisite: Phys 251L. The university physics sequence is for students majoring in science and engineering. Topics normally covered in Phys 251 include Newtonian mechanics and gravitation, work and energy, rotational dynamics, vibrations and waves, mechanics of solids and fluids, basic kinetic theory, equations of state and the first and second laws of thermodynamics. The laboratory is a corequisite for Phys 251.

Phys 252 (4 credits) **University Physics II/Laboratory** Prerequisites: Math 166, Phys 251 and 251L. Corequisite: Phys 252L. Topics normally covered include electricity, magnetism, electromagnetic waves, light and geometrical optics. The laboratory is a corequisite for Phys 252.

Phys 253 (4 credits) **University Physics III/Laboratory** Prerequisites: Math 265, Phys 252 and 252L. Corequisite: Phys 253L. Modern physics, a survey covering physics of the 20$^{th}$ and 21$^{st}$ centuries. Topics normally covered include theory of relativity, discovery of quantum phenomena, basic quantum mechanics, overview of atomic, nuclear and solid state physics, statistical physics, quantum fluids and superconductivity, fundamental forces and the physics of elementary particles. This course is a prerequisite for most courses in advanced physics. The lab is a corequisite for Phys 253.

2) Assessment is done with
   a. Physics Praxis II Exam
   b. Graded homework
   c. Tests
   d. Final examinations

3 & 4) In the last five years, no students have take the B.S. in Physics and gone on to take the Preparation for Physics Education Teachers. There are no assessment results to report for the target population.

**13010.3, 13020.3, 13035.3, 13045.3, 13047.3, 13050.3 INQUIRY**
The program requires study of the processes of science common to all scientific fields. The program uses varied performance assessments of candidate's understanding and ability to apply that knowledge.

1. This standard is met by the following courses:

Phys 251 (4 credits) **University Physics I/Laboratory** Prerequisite: Math 165. Corequisite: Phys 251L. The university physics sequence is for students majoring in science and engineering. Topics normally covered in Phys 251 include Newtonian mechanics and gravitation, work and energy, rotational dynamics, vibrations and waves, mechanics of solids and fluids, basic kinetic theory, equations of state and the first and second laws of thermodynamics. The laboratory is a corequisite for Phys 251.

Phys 252 (4 credits) **University Physics II/Laboratory** Prerequisites: Math 166, Phys

251 and 251L. Corequisite: Phys 252L. Topics normally covered include electricity, magnetism, electromagnetic waves, light and geometrical optics. The laboratory is a corequisite for Phys 252.

Phys 253 (4 credits) **University Physics III/Laboratory** Prerequisites: Math 265, Phys 252 and 252L. Corequisite: Phys 253L. Modern physics, a survey covering physics of the 20th and 21st centuries. Topics normally covered include theory of relativity, discovery of quantum phenomena, basic quantum mechanics, overview of atomic, nuclear and solid state physics, statistical physics, quantum fluids and superconductivity, fundamental forces and the physics of elementary particles. This course is a prerequisite for most courses in advanced physics. The lab is a corequisite for Phys 253.

2) Assessment is done with

a. Physics Praxis II Exam
b. Graded homework
c. Tests
d. Final examinations

3 & 4) In the last five years, no students have take the B.S. in Physics and gone on to take the Preparation for Physics Education Teachers. There are no assessment results to report for the target population.

**13010.4, 13020.4, 13035.4, 13045.4, 13047.4, 13050.4 CONTEXT OF SCIENCE**

The program requires the study of the effect of social and technological context on the study of science and on the application and valuing of scientific knowledge. The program prepares candidates to relate science to the daily lives and interests of students and to a larger framework of human endeavor and understanding. The program provides the candidate with an understanding of the relationship of science to industry, business, government, and multicultural aspects of a variety of communities. The program uses varied performance assessments of candidate's understanding and ability to apply that knowledge.

1. This standard is met by the following courses:

Phys 251 (4 credits) **University Physics I/Laboratory** Prerequisite: Math 165. Corequisite: Phys 251L. The university physics sequence is for students majoring in science and engineering. Topics normally covered in Phys 251 include Newtonian mechanics and gravitation, work and energy, rotational dynamics, vibrations and waves, mechanics of solids and fluids, basic kinetic theory, equations of state and the first and second laws of thermodynamics. The laboratory is a corequisite for Phys 251.

Phys 252 (4 credits) **University Physics II/Laboratory** Prerequisites: Math 166, Phys 251 and 251L. Corequisite: Phys 252L. Topics normally covered include electricity, magnetism, electromagnetic waves, light and geometrical optics. The laboratory is a corequisite for Phys 252.

Phys 253 (4 credits) **University Physics III/Laboratory** Prerequisites: Math 265, Phys 252 and 252L. Corequisite: Phys 253L. Modern physics, a survey covering physics of the 20th and 21st centuries. Topics normally covered include theory of relativity, discovery of quantum phenomena, basic quantum mechanics, overview of atomic, nuclear and solid state physics, statistical physics, quantum fluids and superconductivity, fundamental forces and the physics of elementary particles. This course is a prerequisite for most courses in advanced physics. The lab is a corequisite for Phys 253.

2) Assessment is done with

a. Physics Praxis II Exam
b. Graded homework
c. Tests
d. Final examinations

3 & 4) In the last five years, no students have take the B.S. in Physics and gone on to take the Preparation for Physics Education Teachers. There are no assessment results to report for the target population.

**13010.5, 13020.5, 13035.5, 13045.5, 13047.5, 13050.5 SKILLS OF TEACHING**

The program requires the candidate to demonstrate proficiency in methods of teaching science. The program uses varied performance assessments of the candidate's understanding and ability to apply that knowledge.

List course number, title and description and any accompanying activities or experiences in which students engage to meet the standard.

T&L 400 Methods and Materials- Science: Through a partnership with departments in the College of Arts and Sciences and the College of Business, candidates may seek secondary licensure in several areas. Requirements may vary depending upon the field of study, so candidates are advised to keep in close and regular contact with academic advisers from both Teaching and Learning and their academic discipline. Secondary education degrees are offered in science and social studies.

A copy of the syllabus from T&L 400, Science Teaching Methods is included that requires students to prepare and present demonstrations, assessments, and lesson plans. Students spend time in class observing various styles of presentation for labs, demonstrations, and assessment. Then they develop and present their own lessons, demonstrations, assessments, and grading (using rubrics and gradepower.com (a free website developed by Dr. Helgeson for teachers to use in grading student progress). The syllabus includes a variety of activities by which students learn how to promote the development and use of a variety of science skills, e.g,, measurement, observation, inference, data analysis, data presentation, etc.

Assessments

a. Course Grades
b. Student Teaching Evaluations

Results

a. Course Grades

| Fall 06 & Fall 07 | Methods and Materials - Science | | | | |
|---|---|---|---|---|---|
| T&L 400 | A | B | C | D | F |
| N=12 | 12/100% | — | — | — | — |

b. Student Teaching Evaluation: No Physics candidates currently in the program.

**13010.6, 13020.6, 13035.6, 13045.6, 13047.6, 13050.6 CURRICULUM**

The program provides candidates with information necessary to identify, evaluate, and apply a coherent, focused science curriculum that is consistent with state and national standards for science education and appropriate for addressing the needs, abilities and interests of students. The program uses varied performance assessments of candidate's understanding and ability to apply that knowledge.

List course number, title and description and any accompanying activities or experiences in which students engage to meet the standard.

T&L 400 Methods and Materials- Science: Through a partnership with departments in the College of Arts and Sciences and the College of Business, candidates may seek secondary licensure in several areas. Requirements may vary depending upon the field of study, so candidates are advised to keep in close and regular contact with academic advisers from both Teaching and Learning and their academic discipline. Secondary education degrees are offered in science and social studies.

Students conduct experiments and activities from three major curriculum projects: Project WET, Project Learning Tree, and SEPUP (Science Education for Public Understanding Program. All these curriculum projects are recognized at the national level as exemplary science education programs and all address the National Science Education Standards. Students are required to become members of the National Science Educators Association (NSTA), for which they receive a quarterly newspaper that addresses recent legislation, new curriculum, content and material evaluation of new books and science supplies. In addition students receive information about regional and national science education conferences.

Assessments

a. Course Grades
b. Student Teaching Evaluations

Results

a. Course Grades

| Fall 06 & Fall 07 | Methods and Materials - Science | | | | |
|---|---|---|---|---|---|
| T&L 400 | A | B | C | D | F |

| | | | | | |
|---|---|---|---|---|---|
| N=12 | 12/100% | — | — | — | — |

b. Student Teaching Evaluation: No Physics candidates currently in the program.

**13010.7, 13020.7, 13035.7, 13045.7, 13047.7, 13050.7 ASSESSMENT**

The program prepares candidates to use a variety of performance assessment strategies to evaluate the intellectual, social, and personal development of the learner in all aspects of science. Where in your program do candidates have the opportunity to address/meet this standard?
T&L 400 Secondary Science Methods syllabus attached that shows the requirement to develop assessments of student content knowledge, skills, and problem solving strategies.

List course number, title and description and any accompanying activities or experiences in which students engage to meet the standard.

T&L 400 Methods and Materials- Science: Through a partnership with departments in the College of Arts and Sciences and the College of Business, candidates may seek secondary licensure in several areas. Requirements may vary depending upon the field of study, so candidates are advised to keep in close and regular contact with academic advisers from both Teaching and Learning and their academic discipline. Secondary education degrees are offered in science and social studies.

T&L 400 Secondary Science Methods syllabus attached that shows the requirement to develop assessments of student content knowledge, skills, and problem solving strategies. Students prepare Multiple Choice exam questions, Open ended exam questions with accompanying rubrics, and Performance Based Assessment and Rubrics. The course includes extensive discussion of National and State testing for teachers and high school and middle school students.

Assessments

a. Course Grades
b. Student Teaching Evaluations

Students are also evaluated by their in-class discussion and performance related to this standard.The professor teaching the course spends a significant amount of time on the problem of relating the type of assessment to the activities in class and to the style of teaching a lesson. In addition students learn how to assign and defend weighted grades using the website gradepower.com. In that web site they learn how to communicate with students about grades, weight and give grades, and student teachers engage in extensive discussion on the philosophies and ideologies related to grades, evaluation, and assessment.

Results

a. Course Grades

| Fall 06 & Fall 07 | | Methods and Materials - Science | | | |
|---|---|---|---|---|---|
| T&L 400 | A | B | C | D | F |

| | | | | | |
|---|---|---|---|---|---|
| N=12 | 12/100% | — | — | — | — |

b. Student Teaching Evaluation: No Physics candidates currently in the program.

**13010.8, 13020.8, 13035.8, 13045.8, 13047.8, 13050.8**
**ENVIRONMENT FOR LEARNING**

The program prepares candidates to design and manage safe and supportive learning environments in the classroom, laboratory, and field. The program reflects high expectations for the success of all students. The program uses varied performance assessments of candidate's understanding and ability to apply that knowledge.

List course number, title and description and any accompanying activities or experiences in which students engage to meet the standard.

T&L 400 Methods and Materials- Science: Through a partnership with departments in the College of Arts and Sciences and the College of Business, candidates may seek secondary licensure in several areas. Requirements may vary depending upon the field of study, so candidates are advised to keep in close and regular contact with academic advisers from both Teaching and Learning and their academic discipline. Secondary education degrees are offered in science and social studies.

T&L 401 School Science Safety - Science: Prepares students to plan for and communicate about a wide variety of classroom and laboratory safety issues. Health and safety issues are examined for the classroom teacher and the students in all science courses, including electrical safety, biological safety, chemical use, storage and disposal, legal issues, liability reduction and cost control are also addressed in detail.

T&L 400 Secondary Science Teaching Methods and T&L 401 School Science Safety address these standards. Syllabi show that students develop observational lists that help them to clarify in their own minds what an ideal laboratory/science environment should be. With regard to safety in the science room students are required to carry out evaluations of classroom in existing schools, assess ventilation within the classroom, assess storage and disposal procedures for chemicals, and to understand the safety requirements in Chemistry, Biology, Physics, Environmental studies, and on field trips. They learn extensively about the law and teacher responsibility in maintaining a safe learning environment.

Students must pass examinations in Safety related to the areas Chemical, Biological, and Physics science safety as part of this course.

Assessments

a. Course Grades
    1. T&L 400
    2. T&L 401
b. Student Teaching Evaluations
c. Safety Exam Results

Results

A.1 Course Grades

| Fall 06 & Fall 07 | Methods and Materials - Science | | | | |
|---|---|---|---|---|---|
| T&L 400 | A | B | C | D | F |
| N=12 | 12/100% | —— | —— | —— | —— |

A.2 Course Grades

| Fall 07 | School Safety - Science | | | | |
|---|---|---|---|---|---|
| T&L 400 | A | B | C | D | F |
| N=5 | 5/100% | —— | —— | —— | —— |

b. Student Teaching Evaluation: No Physics candidates currently in the program.

13010.9, 13020.9, 13035.9, 13045.9, 13047.9, 13050.9 PROFESSIONAL PRACTICE

The program prepares candidates to participate in the professional community, improving practice through their personal actions, education, and development. The program uses varied performance assessments of candidate's understanding and ability to apply that knowledge.

List course number, title and description and any accompanying activities or experiences in which students engage to meet the standard.

T&L 400 Methods and Materials- Science: Through a partnership with departments in the College of Arts and Sciences and the College of Business, candidates may seek secondary licensure in several areas. Requirements may vary depending upon the field of study, so candidates are advised to keep in close and regular contact with academic advisers from both Teaching and Learning and their academic discipline. Secondary education degrees are offered in science and social studies.

Students enrolled in T&L 400 are required to become members of the National Science Teachers Association in order to receive either the journal "Science Scope" or "The Science Teacher" and the NSTA quarterly newspaper, and have access to professional conference information. Students in T&L 400 discuss NSTA journal articles and NSTA newspaper articles that included recent legislation and trends in science education, and these are all discussed in class at great length. The membership in NSTA is in lieu of a textbook for the class as the documents that come with membership provide in-depth reviews of current trends and legislation related to science education. In addition students carry out extensive discussion of their Field Experience (T&L 486) and complete an evaluation of the Laboratory Safety in their schools and make a list of observations in their assigned Field Experience school laboratories and materials (books and equipment) and curriculum.

Assessments

a. Course Grades
b. Student Teaching Evaluations

Results

a. Course Grades

| Fall 06 & Fall 07 | Methods and Materials - Science | | | | |
|---|---|---|---|---|---|
| T&L 400 | A | B | C | D | F |
| N=12 | 12/100% | — | — | — | — |

b. Student Teaching Evaluation: No Physics candidates currently in the program.

**13010.10, 13020.10, 13035.10, 13045.10, 13047.10, 13050.10 TECHNOLOGY**

The program requires the study of current, appropriate instructional technologies. The program uses varied performance assessments of candidates' understanding and abilities to apply that knowledge.

List course number, title and description and any accompanying activities or experiences in which students engage to meet the standard.

T&L 400 Methods and Materials- Science: Through a partnership with departments in the College of Arts and Sciences and the College of Business, candidates may seek secondary licensure in several areas. Requirements may vary depending upon the field of study, so candidates are advised to keep in close and regular contact with academic advisers from both Teaching and Learning and their academic discipline. Secondary education degrees are offered in science and social studies.

Students learn about and use current Vernier and Texas Instruments Computer Based Laboratory technology to gather real time data in experiments. They learn to use Global Positioning Systems and ARCVIEW Geographic Information Systems Software to track sampling sites in data gathering. They learn to use i-movie to film student performance in classroom and testing for the purpose of analysis of student science skills. They learn to use standard laboratory equipment for a variety of tasks including demonstrations, performance tests, and science skill evaluation. They use video cameras to record and analyze assessment procedures.

Assessments

a. Course Grades

Results

a. Course Grades

| Fall 06 & Fall 07 | Methods and Materials - Science | | | | |
|---|---|---|---|---|---|
| T&L 400 | A | B | C | D | F |
| N=12 | 12/100% | — | — | — | — |

Student Work Samples

Samples of Student designed Performance Based Examination is included in the form of an i-movie on CDs available in the Hard Copy exhibits.

**13010.11**
Candidate assessment data are regularly and systematically collected, compiled, aggregated, summarized, and analyzed to improve candidate performance, program quality, and program operations. The program disaggregates candidate assessment data when candidates are in alternate route, off-campus, and distance learning programs.

**Teaching & Learning Undergraduate Assessment Plan**

**Data Collection.** Data are collected at transition points throughout the program to assess candidate performance, program quality and program operations. The Teaching and Learning Undergraduate Assessment Committee (UGAC) develops an annual schedule for the purposes of data collection. T&L undergraduate faculty who assess critical tasks, staff in the Office of Advising and Admissions and staff in the Office of Field Experience are responsible for submitting data presented in the table below. The UGAC monitors the collection process and follows up in a timely manner when data is missing.
**Data Analysis and Reporting.** The UGAC is responsible for submitting an annual report to the undergraduate faculty in the Department of Teaching and Learning, the Chair of Teaching and Learning and the Associate Dean for Teacher Education (NCATE Coordinator) based upon a detailed analysis of data collected over the course of the previous year. The Assessment Committee facilitates an annual Assessment Retreat. Faculty discuss the report at the departmental and individual program level and develop a written plan of action designed to address areas of weakness. Should no areas of weakness be found, a written record of faculty discussion leading to this conclusion is created. In between assessment retreats, the UGAC monitors progress in the implementation of the action plan(s). In subsequent retreats, the action plans are revisited and revised in light of the new round of data analysis.

Unit Assessment System for the Elementary Education Program

| Initial Programs Undergraduate | Upon Admission to Teacher Education | Before Entering Student Teaching | Before Program Completion | After Completion |
|---|---|---|---|---|
| • Elementary<br>• ECE/Elementary<br>• Elementary/Middle | • GPA<br>• PPST Score<br>• Letter of Application<br>• Dispositions | • Critical Tasks (Child Study, Multicultural Teaching, Lesson Plan, Beliefs and Practices Statement)<br>• Praxis II Tests<br>• Dispositions | • Critical Tasks (Mid-term Evaluation, Final Evaluation<br>• Dispositions | Assessments:<br>• Graduate Surveys<br>• Principal Surveys |

## II. Multicultural/Native American /Diversity Standard

The program requires the study of multicultural education including Native American studies and strategies for teaching and assessing diverse learners.

**This response is prepared for all programs approved by ESPB. If you are reviewing an undergraduate or initial program only, please read the sections of this response headed *Initial Programs*. For Advanced or Professional Programs, please read the sections of this response headed *Advanced Programs*. Syllabi, vita and cited electronic work samples referred to in the report may be found in the folder labeled "MC-Diversity Standard."**

*MULTICULTURAL EDUCATION/NATIVE AMERICAN STUDY*

Initial Programs

Opportunity to Address/Meet Standard
T&L 433: Multicultural Education: All candidates in the Teacher Education Program at the University of North Dakota are required to complete this course (There is also a correspondence course with the same prefix and title which is offered to those who are in non-UND programs. Rarely, an exception is made for a candidate in the program who is unable to take the on-campus course.)
Course Description
This class takes an anthropological view of multicultural education. It will help students better understand students in culturally diverse classrooms as well as prepare them to teach about cultural diversity. This class examines several cultures but is particularly interested in American Indians of North Dakota. Those original groups include: Lakota, Dakota, and Nakota, Chippewa, and the three affiliated tribes: Mandan, Hidatsa, and Arikara (see attached sample syllabus TL 433).

Assessments/Results

1. Critical Task: Multicultural Teaching is submitted and assessed in LiveText, an on-line data management system. This Critical Task is a research paper based upon an issue in multicultural education. The paper includes a lesson plan which is assessed to determine candidates' ability to apply what they have learned related to diversity. The task was piloted in the spring of 2007 and assessed formally for the first time in the fall of 2007.

**Initial Programs Critical Task Assessment Results for Multi-Cultural Teaching**

**Fall 2007 N=90**

| Teaching & Learning Standards | Does Not Meet | Fulfills Expectations | Exceeds Expectations |
|---|---|---|---|
| 1.2 Teacher candidate uses tools of inquiry to develop content knowledge. | 13% | 56% | 30% |
| 1.3 Teacher candidate selects content to encourage diverse perspectives. | 13% | 53% | 33% |
| 6.2 Teacher candidate uses language to promote learning (e.g., use questioning skills, discussion techniques, delivery style, nonverbal cues). | 14% | 56% | 29% |

| | | | |
|---|---|---|---|
| 6.3 Teacher candidate uses media and technology as effective learning and communication tools. | 13% | 36% | 30% |
| 6.6 Teacher candidate's communication skills facilitate partnerships with students, families and colleagues. | 15% | 52% | 32% |

Standards 1.3 and 6.6 especially target candidates knowledge and dispositions related to diversity. As indicate in the table 84%-86% of candidates meet or exceed expectations in these categories.

2. Mid-Term Showcase: Candidates work in pairs to create a showcase of a culture that includes engaging hands on learning activities.

| Fall 2007 | **Multicultural Ed** | | | | |
|---|---|---|---|---|---|
| TL433: Section 1: Midterm Showcase Scores | A | B | C | D | F |
| N = 30 | # 30<br>100% | 0% | 0% | 0% | 0% |

3. Native American Reservation Field Trip: The class participates in a field trip, to an American Indian reservation school K-12. Each candidate is expected to write a 3-5 page paper reflecting on the field experience. At a minimum, the student should provide answers to the following questions after the field experience: (a) What does education and learning experiences mean to these students; (b) Is the educational system ensuring that the diverse needs of those students are met?

The field trip reflection assessment rubric covers three areas:
(a) Focus (i.e. relevant, specific and clear response to the above questions....10 points);
(b) Perspective (i.e. the student reflects on the field trip from a diverse/multiple perspective...10 points );
(c) Language/Grammar (i.e., the students uses appropriate diversity terminology/ language as well as correct grammar...5 points).

| TL 433 Section 1:Fall 2007 | A | B | C | D |
|---|---|---|---|---|
| Field Trip Reflection Scores (N=30) | #26<br>87% | #4<br>13% | #0 | #0 |

Student Work Samples

1. For candidate work related to the critical task (#1 above), please click on the any of the documents below:

- Sample 1 Does Not Meet Expectations
- Sample 2 Meets Expectations
- Sample 3 Exceeds Expectations

2. A variety of student work samples related to the showcase will be available in the hard copy exhibit room.

*Advanced Programs*
Opportunity to Address/Meet Standard

**EFR 506: Multicultural Education**: Candidates who have not taken T&L 433 as undergraduates are encouraged to take this course. As described in the catalog the course is a "review of the conceptual, historical, and theoretical aspects of multicultural education. A major goal will be to provide educators with the processes for incorporating multicultural education into their own education environments to meet the needs of their culturally diverse students and to increase the cultural awareness and sensitivity of all students. North Dakota/Native American issues are primary elements of this course" (pg.249). (Also, see attached sample syllabi: EFR 5061; EFR5062.

Assessments/Results:
Course Grades

| Sections 1-4: SU, 2007 | | | | | |
|---|---|---|---|---|---|
| Course EFR 506: Multicultural Education | A | B | C | D | F |
| N=28 | # 26<br>93% | #1<br>3.5% | #0<br>% | #0<br>% | #1<br>3.5% |

As indicated by the majority of A's and B's in the chart above, candidates taking this course met or exceeded course goals.

*STRATEGIES FOR TEACHING AND ASSESSING DIVERSE LEARNERS*
Initial Programs

Opportunity to Address/Meet Standard

**T&L 315: Education of Exceptional Students**: All candidates in our Early Childhood Education, Elementary Education and Middle Level programs are required to take this course(see attached syllabus T&L 315).

Course Description: "An orientation course, especially for classroom teachers, stressing the identification, characteristics and educational problems of exceptional children" (college catalog p.184).

**TEAM Methods:** Candidates in Elementary Education, Early Childhood Education and Middle Level Education take a series of methods related courses that require them to demonstrate an ability to accommodate instruction for students with special needs. Initially, candidates are presented with a case of a virtual student. They view a video and review an IEP and create a lesson plan with accommodations for this student (see IEP of Nathan). Next, candidates complete a 60-hour field experience. They select a lesson for assessment that includes accommodations for one or more students in their field experience setting.

**Integration of Special Needs**: The secondary education program has developed an integrated approach to guide candidates' knowledge about and skill in teaching diverse learners (see Integration of Special Needs within the Secondary Education Program document).

Assessments/Results
Course Grades

| Fall 06 - Spring 07 | | | | | |
|---|---|---|---|---|---|
| Course TL 315: Education of Exceptional Students | A | B | C | D | F |
| N=197 | #148<br>75% | #34<br>18% | #7<br>3% | #4<br>2% | #4<br>2% |

Over 93% of candidates from spring 2006 to fall of 2007 met or exceeded expectations related to the content of TL315 as demonstrated by the percent of A's and B's awarded.

**TEAM Methods**: Candidates development and implement a lesson plan and during the 60 hour field experience tied to the methods semester that is submitted and assessed in LiveText, an on-line data management system. INTASC Standard 3 and Program Standard 3.1 are assessed to determine candidates' abilities to accommodate all learners needs. Results from fall 2006-spring 2007 are presented in the table below:

| Standard: 3.2 TAAL INTASC 3 Teacher candidate plans and adapts instruction for individual needs | Not Met | Met | Exceeds |
|---|---|---|---|
| Fall 2006 | 6.4% | 70.2% | 23.4% |
| Spring 2007 | 13.8% | 74.2% | 12% |

During the 2006-2007 academic year 87.2%-94.6% of candidates met or exceeded the standard related to adapting instruction. The faculty reviewed data in May of 2007 and were disappointed in the lower results in the spring semester. It was at this point that the case of Nathan was developed for implementation in the fall of 2007. We hope to see improvements during the 07-08 academic year.

**Integration of Special Needs**: Candidates development and implement a lesson plan and during the 60 hour field experience tied to the methods semester that is submitted and assessed in LiveText, an on-line data management system. INTASC Standard 3 and Program Standard 3.1 are assessed to determine candidates' abilities to accommodate all learners needs. The Lesson Plan for secondary programs is submitted and scored only in the fall since this is when the methods courses are offered. At the time of this report, no results are available. Results for fall 2007 will be available in the spring of 2008.

**Student Teaching Evaluations:** Mid-term and final evaluations during the student teaching semester provide additional evidence that candidates in all of our programs address the needs of diverse learners in their classrooms. Cooperating Teachers and University Supervisors complete these evaluations at mid and end term during the student teaching semester. The results for candidates' in the area of exceptionalities in the fall 2006 and spring 2007 are presented in the table below:

| INTASC Standard 3: Teacher candidate plans and adapts instruction for individual needs |
|---|

| | Mid Term N = 86 | | | | Final N =86 | | | |
|---|---|---|---|---|---|---|---|---|
| Fall 06-Spring 07 | Deficient | Developing | Proficient | Not Observed | Deficient | Developing | Proficient | Not Observed |
| All Programs | 0% | 30% | 58% | 12% | 0% | 10% | 75% | 15% |

As noted in the evaluations 85%-88% of candidates during student teaching are able to adequately address this standard. In addition, 20% of candidates moved from the developing to proficient category by the end of the their student teaching assignment.

*Advanced Programs*
Opportunity to Address/Meet Standard

**EFR 506: Multicultural Education:** Candidates who have not taken T&L 433 as undergraduates are encouraged to take this course. The emphasis of the course may vary dependent upon the semester. For example, in the summer of 2007 one section of EFR 506 emphasized issues in special education within the context of the multicultural framework (see syllabus EFR 506).

Assessment /Analysis
Course Grades

| Course | A | B | C | D | F |
|---|---|---|---|---|---|
| EFR 506: Multicultural Education: Sec3: SU, 2007<br>N=14 | #12<br>86% | #1<br>7% | #<br>0% | #<br>0% | #1<br>7% |

As indicated by the majority of A's and B's in the chart above, candidates taking this course met or exceeded course goals.

Other important diversity aspects are part of the curriculum in the required courses of EFR 500: Philosophical Foundations of Education, TL 540: Philosophies and Theories of Curriculum, and TL 542: Models of Teaching. In addition, the candidate is required to take an additional three credits of foundations. Typically, they are advised to take EFR 505: Social Foundations of Education or EFR 507 Gender and Education; in either of these latter two courses, candidates study multicultural education, diversity education, and socioeconomic aspects related to access, equality, and equity.

**TL 590 ST: Children's Literature in the Classroom.** In this course, candidates in the reading specialist and elementary education advanced programs read multicultural literature and critique literature used in classrooms to determine its resonance with all students. Further, students complete projects which explore Native American Literature. The syllabus for TL590ST states the following goal:

- Expand your knowledge of the wealth of literature available for diverse children in classrooms (NBPTS #2)

The goal is met through reading and discussing articles and children's literature and by assignments. Sample readings and assignments are provided to illustrate candidate experiences.

Sample articles on diverse learners (cultural, racial, gender, socioeconomic)

- Enteneman, J., Murnen, T. J., & Hendricks, C. (2005). Victims, bullies, and bystanders in K-3 literature. *The Reading Teacher, 59,* pp. 352-364.
- Livingston, N. & Kurkjian, C. (2005). Circles and celebrations: Learning about other cultures through literature. *The Reading Teacher, 58,* pp. 696-703.
- Louie, B. L. Guiding princiles for teaching multicultural literature. *The Reading Teacher, 59*, pp. 438-448.
- Wason-Ellam, L. (1997). "If only I was like Barbie." *Language Arts, 74*(6), pp. 430-437.
- Yenika-Agbaw, V. (1997). Taking children's literature seriously: Reading for pleasure and social change. *Language Arts, 74*(6), pp. 446-453.

Multicultural and gender-based literature assigned for the course and read by candidates:

- Curtis, C. P. (1995). *The Watsons Go To Birmingham*. Yearling. **ISBN:** 0440414121
- DiCamillo, K. (2000). *Because of Winn-Dixie*. Scholastic. **ISBN:** 043925051X
- Erdrich, L. (1999). *The Birchbark House*. Scholastic. **ISBN:** 0439203406
- Munsch, R. (1980). *The Paper Bag Princess*. Annick Press. **ISBN:** 0920236162
- Ryan, P. M. (2000). *Esperanza Rising*. Scholastic.

Artifacts supplied to illustrate multicultural course experiences are listed here and supplied for perusal.

- PowerPoint by candidate—Contemporary Native Americans and Literature
- Character Comparison between Esperanza in *Esperanza Rising* and Opal in *Because of Winn-Dixie*
- Key Discussant Grade Report on *Birchbark House* with bibliography of Native America book resources and teaching ideas
- Multicultural Book Analysis

**TL 590 ST: Writing in the Elementary School Classroom.** In part this course is designed to increase candidates' ability to effectively teach diverse children to write, respecting development, culture, gender, and individuality. Though meeting a goal such as this is integrated throughout the semester, specific course readings and activities are devoted to the goal. Readings on gender and writing, specifically paying attention to boys, and culturally conscious writing instruction is also addressed. Multicultural and gender-based readings include the following:

- Dworin, J. E. (2006). The family stories project: Using funds of knowledge for writing. *The Reading Teacher, 59*(6), 510-520.
- Dyson, A. H. (1998). Fold processes and media creatures: Reflections on popular culture for educators. *The Reading Teacher, 51*(5). 392-402.
- Fletcher, R. (2006). Boy writers: Reclaiming their voices. (Chapter 10). Portland, ME: Stenhouse Publishers.
- Fu, D. & Shelton, N.R. (2007). Including students with special needs in a writing workshop. *Language Arts, 84*(4), 325-336.
- Newkirk, T. (2000). Misreading masculinity: Speculations on the great gender gap in writing. *Language Arts, 77*(4), 294-300.
- Rubin, R. & Carlan, V. G. (2005). Using writing to understand bilingual children's literacy development. *The Reading Teacher, 58*(8), 728-739.

One artifact supplied to illustrate linguistic/cultural study of writers is a whole class effort to identify ways to support ELLs in the writing classroom. Candidates reviewed numerous books and articles, identified resources, and gleaned specific practical ideas for supporting young writers. The series of charts that evolved from that activity are supplied as an example of the type of learning event that is integrated in the course to learn about supporting multicultural learners in writing.

*Programs for Other School Professionals*

In addition to the instruction and assessment in the above programs, the following coursework in Educational Leadership and School Counseling attend to multicultural and diversity issues.

## Educational Leadership:

Opportunity to Address/Meet Standard: Courses

EDL 514: Personnel, Supervision, and Staff Development: Various in-depth discussions regarding diversity occur (e.g., Native American and the BIA system). EDL 516 Policy and Educational Finance: Candidates conduct research on various schools, locations, and issues. An example of a research project may be an exploration of the funding for a Native American school.

EDL 519: The Principalship: Principals from various schools (including Indian Reservations) discuss the complexity of education and how it affects students, teachers, and communities.

EDL 501: Leadership, Planning, and Organizational Behavior: Studies include shaping school culture, addressing individual and group needs, setting goals and priorities according to the context of the community.

EDL 511: Personal Communications and Ethics: Discussions are held on how culture, age, and socioeconomics influences education.

Assessments Include:

Exams
Research Papers
Portfolios

## School Counseling:

Opportunity to Address/Meet Standard: Courses

Coun 518: Group Theory and Process: Addresses the principles and practices of support, task, psycho-educational, and therapeutic groups with various populations in a multicultural context. Includes study of professional issues relevant to group processes, involves participation and leading group experiences.

Coun 531: Psychology of Women, Gender, and Development: This course presents current research and trends in developmental theory, particularly theories pertaining to psychological development of women and men. Issues such as abuse, ageism, depression, eating disorders, emotional experience and expression, heterosexism, feminism, and multiculturalism will be examined as related to the practice of psychology. Learning methods include writing, music, film, group discussion and creative projects.

Coun 532: Multicultural Counseling: “This course offers an introduction to counseling theories and interventions appropriate for American ethnic and non-ethnic minority clients. The values suppositions of various cultural groups will be examined”(college catalog p. 24).

Assessments Include:

Papers
Exams
Presentations
Counselor Preparation Comprehensive Examination (CPCE)
Student Internship Evaluation Forms

**CURRICULUM EXHIBIT FORM BASIC PROGRAM**
EDUCATION STANDARDS AND PRACTICES BOARD
SFN 14381 (05-06)

| | | |
|---|---|---|
| Institution: University of North Dakota | | Major: Physics |
| Credits are: Semester | | |
| Credits required for degree: 125 | | |
| **General Studies** | **Teaching Specialty** | **Professional Education** |
| Must total at least 39 credits | Credits required: 71 | total at least 34-36 credits |

<u>Behavioral Sciences (9 Min)</u>
Electives in at least 2 areas from the following departments: Anthropology, A&S, Communication, CSD, Economics, Geography, History, Honors, Humanities, Indian Studies, Music, Nursing, Nutrition, Political Science, Psychology, Recreation and Leisure, Rehab Services, Sociology, Social work, Space Studies, T&L. **9 credits Total**

<u>Humanities (9 Min)</u>
Electives from at least 2 areas in the following departments: Art, EHD, English, Fine Arts, History, honors, Indian Studies, IT, Languages, Music, Philosophy, Political Science, Religion and Theater Arts. **9 credits Total**

<u>Natural Sciences (9 Min)</u>
Electives in at least 2 areas and 1 lab science from the following departments: Anthropology, Atmospheric Sci, Biology, Chemistry, Computer, Sci, Economics, Geography, Geology, Honors, Humanities, IT, Mathematics, Nutr and Dietetics, Philosophy, Physics, Psychology, Sociology and Space Studies
**9 credits Total**

<u>Symbolic Systems (9 Min)</u>
Engl 110 Composition (3)
Engl 120 Composition (3)
Comm 110 Public Speaking (3) **OR** Engl 125 **OR** Advanced Composition Course
**9 credits Total**

**Core Courses:**
Phys 251 Univ. Physics I (Lab) (4)
Phys 252 Univ. Physics II (Lab) (4)
Phys 253 Univ. Physics III (L) (4)
Phys 317, 318 Mechanics I, II (6)
Phys 324 Thermal Physics (3)
Phys 325 Optics (3)
Phys 325L Optics Laboratory (1)
Phys 327, 328 Electricity & Magnetism (6)
Phys 415 Research Experience (3)
Phys 428 Advanced Physics Lab (2)
Phys 431,432 Quantum Mechanics I & II (6)
Chem 121, 122 Gen Chem I, II (6)
Chem 121L, 122L Labs (2)
Math 165, 166, 265 Calc I, II, III (12)
Math 266 Elem Diff Equations (3)
Math 352 Partial Diff Equations (3)
Math 327 Applied Linear Algebra (3)

Beyond completion of the core listed above, all physics majors must complete one of the following options, together with additional electives for a total of 125 credits.

**1. General Physics:** 9 credits of Physics numbered above 300, No more than 3 credits of these may be in Special Problems, Phys 492.

**2. Applied Physics:**
EE 206 Circuit Analysis (3)
EE 321 Electronics I (3)
EE 308 Electronics Lab (2)
Phys 402 Computers in Physics (3)
EE 452 Microprocessors (3)

**3. Astrophysics:**
Phys 110 Intro Astronomy (3)
Phys 110L Intro. Astronomy Lab (1)
Phys 434 Nuclear Physics (3)
Phys 460 Intro. Astrophysics I (3)
Phys 451 Intro Astrophysics II (3)

**4. Computers in Physics:**
CSci 160 Computer Sci I (4)
CSci 161 Computer Sci II (4)
Phys 402 Computers in Phys (3)

**5. Materials Science:**
Phys 320 Intro. Materials Sci (3)
Phys 420 Topics in Materials (3)
Phys 437 Solid State Phys (3)

**(each track an approved research project for Phys 415.)**

T&L 325 Exploring Teaching in Secondary Schools (3)
T&L 345 Curriculum Development (3)
T&L 350 Dev & Ed of Adolescent (3)
T&L 386 Field Experience (Optional 1)
T&L 390 School Lab Safety (1)
T&L 400 Methods & Materials Science (3)
T&L 433 Multicultural Ed (3)
T&L 460 Micro Teaching (3)
T&L 486 Field Experience (1)
T&L 487 Senior Seminar (1)
T&L 495 Independent Study (Optional 1)
T&L 486 Student Teaching (16)

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