

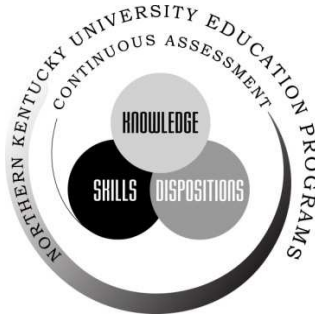
**PHYSICS CERTIFICATION (GRADES 8-12)
BACHELORS OF ARTS AND SCIENCE
PROGRAM SUBMISSION**

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1. Conceptual Framework



Committed to the Development of All Learners is the theme that undergirds the Conceptual Framework for all professional programs in the College of Education and Human Services (COEHS) at Northern Kentucky University (NKU). The Conceptual Framework is supported by the missions of the university and the college and used by faculty to continuously assess and update the curricula of the initial and advanced programs. The COEHS created its Conceptual Framework after input from its constituents: education and arts and science faculty, candidates, staff, and community members. The graphic depicts a framework of continuously assessing the knowledge, skills, and dispositions that classroom teachers, instructional leaders, and school counselors must have to facilitate student learning and academic achievement.

Please review the complete NKU Conceptual Framework document at the following link:
http://coehs.nku.edu/ncate/conceptual_framework.php

2. Continuous Assessment

Please review the complete NKU Continuous Assessment document at the following link:
http://coehs.nku.edu/ncate/continuous_assessmen.php

The Unit's assessment system for the initial and advanced certification programs at Northern Kentucky University is intentional, systematic, and continuous. Data included in the assessment system are based on both internal and external sources and are used to identify candidates' proficiencies, measure the effectiveness of the Unit, and institute data-driven programmatic changes. Candidates are admitted to the undergraduate education programs by meeting the following criteria.

Undergraduate students must apply for admission to the teacher education program. To be conditionally admitted a candidate must have:

- * Successfully passed a FBI fingerprint check.
- * Successfully completed EDU 104, Orientation to the Education Profession.
- * Attained a grade-point average of at least 2.50 on a 4.00 scale.
- * Earned a minimum of 48 semester hours of course work.
- * Achieved the minimum score required on one of several standardized admissions' Tests (ACT, SAT, PRAXIS I).

To receive full admission to the teacher education program a candidate must have:

- * Earned 64 semester hours of course work;
- * Attained a cumulative grade-point average of at least 2.50 on a 4.00 scale;
- * Achieved at least a B in ENG 291 or equivalent or passed the writing sample examination;
- * Achieved at least a B in CMST101 or equivalent
- * Achieved at least a C in EDU 300, EDU 305, EDU 313, and EDS 360;
- * Achieved at least a C in the Admissions Practicum (EDU 303, EDU 307, EDU 309, or EDU 311);
- * Filed three teacher education recommendation forms by professional educators;
- * Completed the required application for admission;
- * Signed a curriculum contract;
- * Received approval of the teacher education committee;
- * Presented an approved ePortfolio.

In addition, there is an alternative admissions policy for those candidates achieving all of the above criteria EXCEPT the required ACT/ SAT/ PPST scores. Candidates who do not meet the standardized testing requirements may petition to the Admissions Appeals Committee to be conditionally admitted into the teacher education programs IF they have:

- * Attained a 20 ACT composite score AND an overall GPA of 3.0 or higher OR
- * Attained a 19 ACT composite score AND an overall GPA of 3.25 or higher

To petition for alternative admission into a teacher education program the candidate must present the following evidence to the Admissions Appeals Committee during the semester before he/she plans to go into the admissions practicum.

1. Letter of application which describes the attributes you possess (knowledge, skills, and dispositions) for becoming a successful education student.
2. ACT test results which indicate a 19 or 20 composite score. This evidence **must be** a copy of your official scores from ETS or your unofficial NKU transcript which has the scores listed on it.
3. Evidence that you have taken the ACT test at least twice while attending a university, with the most recent one taken within the last 12 months.
4. An overall GPA matching the above criteria, through an unofficial university transcript.
5. Two letters of recommendation from NKU faculty or, if a new transfer student, from the most recent university you attended within the last year. The letters should describe the attributes you possess (knowledge, skills, dispositions) for becoming a successful education student.
6. Successful completion of ENG 291 with a B or better OR successful completion of the education writing sample test.
7. Evidence of participation in at least 10 hours of ACT Test Preparation BEFORE taking the most recent ACT test during your college years.

Table 1 illustrates the transition points of the undergraduate education programs as well as the assessments of each standard.

Table 1. Undergraduate Programs

TP I – Full Admission	Knowledge Required Standardized Test Score Course Success with a C or better 64 hours of coursework Overall GPA of 2.5 Professional GPA of 2.5 CMST101 B or better ENG 291 B or better/ pass proficiency exam Dispositions Dispositions/ Professional Behaviors Checklist ePortfolio	Standard Assessed KTS Standard 1 IECE Standard 1 KTS Standards 3, 4, 7, 8 IECE Standards 2, 3, 5, 6 KTS Standards 1, 6, 7 IECE Standards 5, 9	How Assessed Standardized Test Score Transcript Review Univ Sup/ Coop Teachers Dispositions/ Professional Behaviors Checklist ePortfolio Rubric
(TP II – Admission to Student Teaching	Knowledge Course Success with a C or better Overall GPA of 2.5 Professional GPA of 2.5 Content GPA 2.5 Skills Lesson Evaluation Dispositions Dispositions/ Professional Behaviors Checklist ePortfolio	KTS Standards 1, 2 IECE Standards 1, 4 KTS Standards 1, 2, 3, 4, 5, 6, 7, 9 IECE Standards 1, 2, 3, 4, 5, 7, 9 KTS Standards 3, 4, 7, 8 IECE Standards 2, 3, 5, 6 KTS and IECE Standards 1- 9	Transcript Review Univ Sup/ Coop Teachers Lesson Evaluation Form Univ Sup/ Coop Teachers Dispositions/ Professional Behaviors Checklist ePortfolio rubric
TP III – Program Completion	Knowledge Course Success with a C or better Degree Requirements met Overall GPA 2.5 Professional GPA of 2.5 Content GPA of 2.5 Skills Lesson Evaluation Dispositions Dispositions/ Professional Behaviors Checklist ePortfolio Teacher Work Sample	KTS Standards 1, 2 IECE Standards 1, 4 KTS Standards 1, 2, 3, 4, 5, 6, 7, 9 IECE Standards 1, 2, 3, 4, 5, 7, 9 KTS Standards 3, 4, 7, 8 IECE Standards 2, 3, 5, 6 KTS and IECE Standards 1-10 KTS Standards 1-8 IECE Standards 2-6, 9	Transcript Review Univ Sup/ Coop Teachers Lesson Evaluation Form Univ Sup/ Coop Teachers Dispositions/ Professional Behaviors Checklist ePortfolio rubric TWS Evaluation Form

3. Program Experiences

The physics education program at NKU is intimately tied to the unit's conceptual framework through facilitating the construction of knowledge, the development of skills, and the practice of professional dispositions that enhance the development of all learners. The physics education program has defined the content knowledge that its graduates must possess through the courses they are required to take and the grade point average they are required to maintain. These course requirements and their experiences are consistent with the essential knowledge of physics educators as defined by the National Science Teachers Association (NSTA). They must further demonstrate knowledge of their content, teaching skills, and dispositions through the continuous assessment of their coursework and field and clinical experiences.

The program experiences in the Physics Education Program include three major strands:

A. A strong foundation in the liberal arts which includes experiences in communication and literature, history, natural sciences, mathematics, humanities and fine arts, philosophy, social and behavioral sciences, health and wellness, and race/gender perspectives. These experiences are defined by the University and by the College of Education and Human Services in accordance with the requirements of the National Council for the Accreditation of Teacher Education (NCATE). All Physics education students must complete the general studies requirements for all majors in the University.

B. A comprehensive series of courses and experiences in physics provided through courses leading to the B.A. with a major in Physics will provide the teacher candidate with a current and sufficient knowledge of the major concepts and the skills (please see Curriculum Contract). The courses for the B.A. with a major in Physics will provide graduates of the Physics Education Program with the necessary knowledge and skills to demonstrate competency on Kentucky Teacher Standard I, The Teacher Demonstrates Applied Content Knowledge. The course requirements are listed below:

The Bachelor of Arts in Physics requires 33 hours of physics and astronomy which must include:

PHY 220	(4 semester hours)	University Physics with Lab I
PHY 222	(4 semester hours)	University Physics with Lab II
PHY 224	(4 semester hours)	University Physics with Lab III
PHY 300	(2 semester hours)	Intermediate Physics Lab
PHY 310	(3 semester hours)	Dynamics
PHY 360	(3 semester hours)	Thermodynamics
PHY 361	(3 semester hours)	Modern Physics
PHY 494	(1 semester hour) plus a minimum of 9 semester hours of physics or astronomy numbered above 300	Physics Seminar
Also required are MAT 129, 229, 325 and 329; and CHE 120/120L, CHE 121/121L.		

C. A sequence of professional education courses and experiences based on the Kentucky Teacher Standards and NSTA Standards are designed to prepare candidates to provide diverse students with the knowledge and skills required for the 21st century as defined by Kentucky's Learner Goals, Program of Studies, and Core Content for Assessment. Each of the four semesters of the professional education sequence is described below.

Candidates must receive at least a “C” or a “P” in all education/pedagogy courses listed below to be eligible to enroll in the next professional semester. In addition, all education candidates are required to take EDU 104, Orientation to the Education Profession, before enrolling in any education course. This is a one-credit hour course that introduces candidates to NKU's education program requirements, including the model for our dispositions checklist, and the education profession through discussion and observations at the elementary, middle grades, and secondary education levels.

1. The Admissions Semester consists of four courses and a practicum experience. Candidates enroll in the following professional education courses:

EDU 300, Human Growth and Development (3 semester hours);
EDU 305, Introduction to Education (2 semester hours);
EDU 313, Computer Applications for Teachers (2 semester hours);
EDS 360, Students with Exceptionalities in Schools (2 semester hours);
EDU 311, Secondary Practicum I (2 semester hours).

During the admission semester practicum candidates are introduced to the college's Code of Ethics as well as the state of Kentucky's Professional Code of Ethics. Candidates are required to read and sign each Code of Ethics, indicating their understanding and agreement to adhere to the codes. Candidates are then required to place a signed copy of each Code of Ethics in their ePortfolio, which is one of the criteria candidates are evaluated on for successful completion of their admission semester ePortfolio.

Candidates are typically placed in a diverse school during this beginning practicum experience, usually at Holmes High School located in Covington, Kentucky. NKU faculty and cooperating teachers collaborate to provide meaningful experiences which enable physics science education candidates to work toward a successful demonstration of their progress toward meeting NKU program requirements, the Kentucky Teacher Standards and NSTA Standards. The field experience for all physics science education candidates in the Admissions Semester is designed to provide experiences related to the courses in the block. All physics science education candidates are assigned to a certified physics teacher in an area high school to observe the teacher during instruction. To advance to Professional Semester I, teacher candidates must successfully complete all Admissions' Semester requirements and receive a satisfactory dispositions' evaluation from the university professor and cooperating teacher, as well as a satisfactory ePortfolio evaluation from the university professor.

2. Professional Semester I consists of three courses and a practicum experience. Candidates enroll in the following block of professional education courses:

EDS 322, Planning/ Implementing Instruction for Students with Exceptionalities (2 sem hours);
EDU 318, Middle Grades & Secondary Classroom Climate Management (1 semester hour);
EDU 324, Fundamentals of Secondary Education (2 semester hours);
EDU 393. Secondary Practicum I (2 semester hours).

During this semester physics education candidates participate in a practicum assignment for approximately 5 hours a week (2 days/2.5 hours a day). During one week, the physics education candidates participate in their practicum experiences Monday through Friday to teach a physics unit on a topic identified by the cooperating teacher. The candidates are immersed in almost every aspect of the high school program through assignments that require them to mentor a student with special needs; plan and develop a unit, observe and teach students with diverse backgrounds, and through optional activities which might include helping with field trips, assisting with site-based subcommittee work, chaperoning athletic and cultural events, or calling parents.

3. Professional Semester II consists of one course and a practicum experience. Candidates enroll in the following block of professional education courses:

EDU 315, Educational Assessment (2 semester hours)
EDU 396, Secondary Practicum I (2 semester hours)

During this semester physics education candidates participate in a practicum assignment for approximately 5 hours a week (2 days/2.5 hours a day). During two weeks, the physics education candidates participate in their practicum experiences Monday through Friday to teach a physics unit on a topic identified by the cooperating teacher. The candidates are immersed in almost every aspect of the high school program through assignments that require them to plan and develop a unit with appropriate assessment, observe and teach students with diverse backgrounds, and through optional activities which might include helping with field trips, assisting with site-based subcommittee work, chaperoning athletic and cultural events, or calling parents.

4. Professional Semester III is the candidate's student teaching semester. Students enroll in the following course:

EDU 496, Student Teaching in Secondary School (12 semester hours).

Candidates are interviewed by the coordinator of student teaching to determine if they have met all entrance requirements for the student teaching semester. Each candidate must have at least one diverse placement during their field and/or clinical experiences. If the candidate has not had a diverse field experience before student teaching they are placed in a diverse school for the student teaching semester.

During this semester the candidate is assigned to one cooperating teacher at a high school within a 50 mile radius of NKU. Candidates student teach for an entire school day, five days per week, for a period of 16 weeks. The student teacher is required to work with high school students for an extended period of time to help each student with whom he/she works meet Kentucky's Learner

Goals, Program of Studies, and Core Content for Assessment. If the candidate is student teaching in either Ohio or Indiana, the candidate also instructs students to meet the standards established by that state.

With the guidance of his/her cooperating teacher and a university faculty supervisor, the candidate is required to demonstrate his/her competency in meeting all of the Kentucky Teacher Standards and the NKU program requirements. Candidates are required to complete a teacher work sample during the first eight weeks of the student teaching semester. The cornerstone of the teacher work sample is the candidate's analysis of the pre- and post-assessment data. Candidates reflect on the data to determine the impact their instruction had on P-12 student learning and state what steps they will take to improve student learning during future instruction. Candidates reflect on the data for the entire class in addition to at least one identified gap group within that class

During the last eight weeks of the student teaching semester candidates complete a leadership project to meet Kentucky Teacher Standard 10. Once this project is approved by the cooperating teacher and university supervisor the candidate plans, implements, and analyzes the data to determine the impact the project had on P-12 student learning.

KENTUCKY TEACHER STANDARDS	Program Courses
<p>STANDARD 1: The teacher demonstrates applied content knowledge</p> <p><i>1.1 Communicates concepts, processes, and knowledge.</i></p>	<p>All aspects of Standard (1.1 through 1.5): PHY 220, PHY 222, PHY 224, PHY 300, PHY 310, PHY 360, PHY 361, PHY 494. Electives: PHY 305, PHY 315, PHY 320, PHY 330, PHY 410, PHY 420, PHY 460 Assessment: Homework, Exams, Quizzes, Written Lab Reports, and Oral Presentations</p> <p>EDU 313 assigned coursework; EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher; ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>

<p><i>1.2</i> Connects content to life experiences of student.</p> <p><i>1.3</i> Demonstrates instructional strategies that are appropriate for content and contribute to student learning.</p> <p><i>1.4</i> Guides students to understand content from various perspectives.</p> <p><i>1.5</i> Identifies and addresses students' misconceptions of content.</p>	<p>EDU 300 on demand tasks, exams, developmental observation, EDU 313 assigned coursework EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p> <p>EDU 305 On demand tasks EDU 313 assigned coursework EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p> <p>EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p> <p>EDU 313 assigned coursework EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>STANDARD 2: The teacher designs and plans instruction</p> <p><i>2.1</i> Develops significant objectives aligned with standards.</p>	<p>EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition</p>

<p>2.2 Uses contextual data to design instruction relevant to students.</p>	<p>Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 300 on demand tasks, exams, developmental observation, EDU 318, Assessment, reflection, observation, lesson plans, interview paper EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching</p>
<p>2.3 Plans assessments to guide instruction and measure learning objectives.</p>	<p>EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 313 assigned coursework EDU 315 Exams EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 330 Professional development experience, peer teaching, Unit plan EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>2.4 Plans instructional strategies and activities that address learning objectives for all students.</p>	<p>EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>2.5 Plans instructional strategies and activities that facilitate multiple levels of learning.</p>	<p>EDU 305 On demand tasks EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>STANDARD 3: The teacher creates and maintains learning climate</p>	
<p>3.1 Communicates high expectations.</p>	<p>EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical</p>

3.2 Establishes a positive learning environment.	<p>Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 318, Assessment, reflection, observation, lesson plans, interview paper EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
3.3 Values and supports student diversity and addresses individual needs.	<p>EDU 330 Professional development experience, peer teaching, Unit plan EDS 360 Assessment of students with exceptionalities; curriculum planning and legal issues in special education EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
3.4 Fosters mutual respect between teacher and students and among students.	<p>EDU 315 Midterm, graph of assessment results, classroom assessment plan, exam EDU 318, Assessment, reflection, observation, lesson plans, interview paper EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
3.5 Provides a safe environment for learning.	<p>EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors</p>

	and cooperating teacher; ePortfolio; Teacher Work Sample
<p>STANDARD 4: The teacher implements and manages instruction</p> <p>4.1 Uses a variety of instructional strategies that align with learning objectives and actively engage students.</p> <p>4.2 Implements instruction based on diverse student needs and assessment data.</p> <p>4.3 Uses time effectively.</p> <p>4.4 Uses space and materials effectively.</p> <p>4.5 Implements and manages instruction in ways that facilitate higher order thinking.</p>	<p>EDU 300 on demand tasks, exams, developmental observation, EDU 313 assigned coursework EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDS 360 Assessment of students with exceptionalities; curriculum planning and legal issues in special education EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 300 on demand tasks, exams, developmental observation, EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 300 on demand tasks, exams, developmental observation, EDU 315 Midterm, graph of assessment results, classroom assessment plan, exam EDU 318, Assessment, reflection, observation, lesson plans, interview paper observation, EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 300 on demand tasks, exams, developmental EDU 313 assigned coursework</p>

	<p>EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>STANDARD 5: The teacher assesses and communicates learning results</p> <p>5.1 Uses pre-assessments.</p> <p>5.2 Uses formative assessments.</p> <p>5.3 Uses summative assessments.</p> <p>5.4 Describes, analyzes, and evaluates student performance data.</p> <p>5.5 Communicates learning results to students and parents.</p> <p>5.6 Allows opportunity for student self-assessment.</p>	<p>EDU 330 Unit plan EDU 496 Teacher Work Sample EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 313 assigned coursework EDU 315 Midterm, graph of assessment results, classroom assessment plan, exam EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDS 360 Assessment of students with exceptionalities; curriculum planning and legal issues in special education EDU 315 Midterm, graph of assessment results, classroom assessment plan, exam EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 315 Midterm, graph of assessment results, classroom assessment plan, exam EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p> <p>EDU 330 Professional development experience, peer</p>

	teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample
<p style="text-align: center;">STANDARD 6: The teacher demonstrates the implementation of technology</p> <p>6.1 Uses available technology to design and plan instruction.</p> <p>6.2 Uses available technology to implement instruction that facilitates student learning.</p> <p>6.3 Integrates student use of available technology into instruction.</p>	EDU 311 (ePortfolio) EDU 313 assigned coursework EDU 330 Professional development experience, peer teaching, Unit plan EDS 360 Assessment of students with exceptionalities; curriculum planning and legal issues in special education EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 300 on demand tasks, exams, developmental observation, EDU 311 (ePortfolio) EDU 313 assigned coursework EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 311 (ePortfolio) EDU 313 assigned coursework EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample

<p>6.4 Uses available technology to assess and communicate student learning.</p> <p>6.5 Demonstrates ethical and legal use of technology.</p>	<p>EDU 311 (ePortfolio) EDU 313 assigned coursework EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 300 on demand tasks, exams, developmental observation, EDU 305 on demand tasks EDU 311 (ePortfolio) EDU 330 Professional development experience, peer teaching EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>STANDARD 7: Reflects on and evaluates teaching and learning</p> <p>7.1 Uses data to reflect on and evaluate student learning.</p> <p>7.2 Uses data to reflect on and evaluate instructional practice.</p> <p>7.3 Uses data to reflect on and identify areas for professional growth.</p>	<p>EDU 300 on demand tasks, exams, developmental observation, EDU 311 (ePortfolio) EDU 315 Midterm, graph of assessment results, classroom assessment plan, exam EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDS 360 Assessment of students with exceptionalities; curriculum planning and legal issues in special education EDU 311 (ePortfolio) EDU 315 Midterm, graph of assessment results, classroom assessment plan, exam EDU 330 Professional development experience, peer teaching, Unit plan EDS 360 Assessment of students with exceptionalities; curriculum planning and legal issues in special education EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 311 (ePortfolio) EDU 330 Professional development experience, peer teaching, Unit plan EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>STANDARD 8: Collaborates with colleagues/parents/others</p>	

<p>8.1 Identifies students whose learning could be enhanced by collaboration.</p> <p>8.2 Designs a plan to enhance student learning that includes all parties in the collaborative effort.</p> <p>8.3 Implements planned activities that enhance student learning and engage all parties.</p> <p>8.4 Analyzes data to evaluate the outcomes of collaborative efforts.</p>	<p>EDU 300 on demand tasks, exams, developmental observation, EDS 322, Learning Style Survey Assignment; observation Reports EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p> <p>EDU 300 on demand tasks, exams, developmental observation, EDS 322, Learning Style Survey Assignment; observation Reports EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; TWS EDU 300 on demand tasks, exams, developmental observation EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 300 on demand tasks, exams, developmental observation EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>STANDARD 9: Evaluates teaching and implements professional development</p> <p>9.1 Self assesses performance relative to Kentucky’s Teacher Standards.</p> <p>9.2 Identifies priorities for professional development based on data from self-assessment, student performance and feedback from colleagues.</p> <p>9.3 Designs a professional growth plan that addresses identified priorities.</p> <p>9.4 Shows evidence of professional growth and reflection on the identified priority areas and impact on instructional effectiveness and student learning.</p>	<p>EDU 300 on demand tasks, exams, developmental observation, EDU 330 Professional development experience, peer teaching, Unit plan EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p> <p>EDU 300 on demand tasks, exams, developmental observation, EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 300 on demand tasks, exams, developmental observation, EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample EDU 300 on demand tasks, exams, developmental observation, EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>

STANDARD 10: Leadership within school/community/profession	
10.1 Identifies leadership opportunities that enhance student learning and/or professional environment of the school.	EDU 330 Professional development experience, peer teaching, Unit plan
10.2 Develops a plan for engaging in leadership activities.	EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample, leadership project
10.3 Implements a plan for engaging in leadership activities.	EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample, leadership project
10.4 Analyzes data to evaluate the results of planned and executed leadership efforts.	EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample, leadership project

A. Content Standards:

NSTA STANDARDS

For each National Science Teachers Association (NSTA) standard on the chart below, identify the assessment(s) in Section II that address the standard. One course/assessment may apply to multiple NSTA standards.

Science Education	Program Courses and Assessments
<p>1. Content. Teachers of science understand and can articulate the knowledge and practices of contemporary science. They can interrelate and interpret important concepts, ideas, and applications in their fields of licensure; and can conduct scientific investigations. To show that they are prepared in content, teachers of science must demonstrate that they (a) understand and can successfully convey to students the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields as recommended by the National Science Teachers Association; (b) understand and can successfully convey to students the unifying concepts of science delineated by the National Science Education Standards; (c) understand and can successfully convey to students important personal and technological applications of science in their fields of licensure; (d) understand research and can successfully design, conduct, report and (e) evaluate investigations in science; and understand and can successfully use mathematics to process and report data, and solve problems, in their field(s) of licensure.</p>	<p>PHY 220, 222, 224, 300, 310, 360, 361 and 494. CHE 120, 121. Assessment: Homework, Exams, Quizzes, Written Lab Reports, and Oral Presentations.</p>
<p>2. Nature of Science. Teachers of science engage students effectively in studies of the history, philosophy, and practice of science. They enable students to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science. To show they are prepared to teach the nature of science, teachers of science must demonstrate that they (a) understand the historical and cultural</p>	<p>PHY 220, 222, 224, 300, 310, 360, 361 and 494. CHE 120, 121. Assessment: Homework, Exams, Quizzes, Written Lab Reports, and Oral Presentations</p>

Science Education	Program Courses and Assessments
<p>development of science and the evolution of knowledge in their discipline; (b) understand the philosophical tenets, assumptions, goals, and values that distinguish science from technology and from other ways of knowing the world; and (c) engage students successfully in studies of the nature of science including, when possible, the critical analysis of false or doubtful assertions made in the name of science.</p>	
<p>3. Inquiry. Teachers of science engage students both in studies of various methods of scientific inquiry and in active learning through scientific inquiry. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to develop concepts and relationships from empirical experiences. To show that they are prepared to teach through inquiry, teachers of science must demonstrate that they (a) understand the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge; and (b) engage students successfully in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner.</p>	<p>PHY 220, 222, 224, 300, 310, 360, 361 and 494. CHE 120, 121, Assessment: Homework, Exams, Quizzes, Written Lab Reports, and Oral Presentations</p> <p>EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>4. Issues. Teachers of science recognize that informed citizens must be prepared to make decisions and take action on contemporary science- and technology-related issues of interest to the general society. They require students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values. To show that they are prepared to engage students in studies of issues related to science, teachers of science must demonstrate that they (a) understand socially important issues related to science and technology in their field of licensure, as well as processes used to analyze and make decisions on such issues; and (b) engage students successfully in the analysis of problems, including considerations of risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals and values of the students.</p>	<p>PHY 220, 222, 224, 300, 310, 360, 361 and 494. CHE 120, 121. Assessment: Homework, Exams, Quizzes, Written Lab Reports, and Oral Presentations</p> <p>EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>5. General Skills of Teaching. Teachers of science create a community of diverse learners who construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies. To show that they are prepared to create a community of diverse learners, teachers of science must demonstrate that they (a) vary their teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding; (b) successfully promote the learning of science by students with different abilities, needs, interests, and backgrounds; (c) successfully</p>	<p>PHY 220, 222, 224, 300, 310, 360, 361 and 494. CHE 120, 121, Assessment: Homework, Exams, Quizzes, Written Lab Reports, and Oral Presentations</p> <p>EDU 300 on demand tasks, exams, developmental observation EDS 322, Learning Style Survey Assignment; observation Reports EDU 318, Assessment, reflection, observation, lesson plans, interview</p>

Science Education	Program Courses and Assessments
<p>organize and engage students in collaborative learning using different student group learning strategies; (d) successfully use technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science; (e) understand and build effectively upon the prior beliefs, knowledge, experiences, and interests of students; and (f) create and maintain a psychologically and socially safe and supportive learning environment. (Optional to address this standard in the NSTA report)</p>	<p>paper observation, EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ;ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>6. Curriculum. Teachers of science plan and implement an active, coherent, and effective curriculum that is consistent with the goals and recommendations of the National Science Education Standards. They begin with the end in mind and effectively incorporate contemporary practices and resources into their planning and teaching. To show that they are prepared to plan and implement an effective science curriculum, teachers of science must demonstrate that they (a) understand the curricular recommendations of the National Science Education Standards, and can identify, access, and/or create resources and activities for science education that are consistent with the standards; and (b) plan and implement internally consistent units of study that address the diverse goals of the National Science Education Standards and the needs and abilities of students.</p>	<p>EDU 311 ePortfolio EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ;ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>7. Science in the Community. Teachers of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage students in science-related studies or activities related to locally important issues. To show that they are prepared to relate science to the community, teachers of science must demonstrate that they (a) identify ways to relate science to the community, involve stakeholders, and use community resources to promote the learning of science; and (b) involve students successfully in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community.</p>	<p>EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ;ePortfolio EDU 330 Professional development experience, peer teaching, Unit plan EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>8. Assessment. Teachers of science construct and use effective assessment strategies to determine the backgrounds and achievements of learners and facilitate their intellectual, social, and personal development. They assess students fairly and equitably, and require that students engage in ongoing self-assessment. To show that they are prepared to use assessment effectively, teachers of science must</p>	<p>EDU 315 Midterm, graph of assessment results, classroom assessment plan, exam EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ;ePortfolio</p>

Science Education	Program Courses and Assessments
<p>demonstrate that they (a) use multiple assessment tools and strategies to achieve important goals for instruction that are aligned with methods of instruction and the needs of students;</p> <p>(b) use the results of multiple assessments to guide and modify instruction, the classroom environment, or the assessment process; and</p> <p>(c) use the results of assessments as vehicles for students to analyze their own learning, engaging students in reflective self-analysis of their own work.</p>	<p>EDU 330 Professional development experience, peer teaching, Unit plan</p> <p>EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching</p> <p>EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching</p> <p>EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>9. Safety and Welfare. Teachers of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field. To show that they are prepared, teachers of science must demonstrate that they (a) understand the legal and ethical responsibilities of science teachers for the welfare of their students, the proper treatment of animals, and the maintenance and disposal of materials; (b) know and practice safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction;</p> <p>(c) know and follow emergency procedures, maintain safety equipment, and ensure safety procedures appropriate for the activities and the abilities of students; and (d) treat all living organisms used in the classroom or found in the field in a safe, humane, and ethical manner and respect legal restrictions on their collection, keeping, and use.</p>	<p>PHY 220, 222, 224, and 300.</p> <p>CHE 120, 121,</p> <p>Assessment: Homework, Exams, Quizzes, Written Lab Reports, and Oral Presentations</p> <p>EDU 330 Professional development experience, Unit plan</p> <p>EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching</p> <p>EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching</p> <p>EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>
<p>10. Professional Growth. Teachers of science strive continuously to grow and change, personally and professionally, to meet the diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment. To show their disposition for growth, teachers of science must demonstrate that they (a) engage actively and continuously in opportunities for professional learning and leadership that reach beyond minimum job requirements; (b) reflect constantly upon their teaching and identify ways and means through which they may grow professionally; (c) use information from students, supervisors, colleagues and others to improve their teaching and facilitate their professional growth; and (d) interact effectively with colleagues, parents, and students; mentor new colleagues; and foster positive relationships with the community. (Optional to address this standard in the NSTA report)</p>	<p>EDU 311, ePortfolio</p> <p>EDU 324 Analysis paper; Class PowerPoint Presentations; Interviews with classroom teacher ;ePortfolio</p> <p>EDU 318, Assessment, reflection, observation, lesson plans, interview paper observation,</p> <p>EDU 330 Professional development experience, peer teaching, Unit plan</p> <p>EDU 393 ePortfolio, Field Experience Clinical Experience, Teaching</p> <p>EDU 396 ePortfolio, Field Experience Disposition Interview, Teaching</p> <p>EDU 496, Teaching and observation by supervisors and cooperating teacher; ePortfolio; Teacher Work Sample</p>

Course descriptions:

PHY 100 Science, Engineering, and Design (1,0,1) Course designed for students who wish to pursue a course of study in a field of science or pre-engineering at NKU. Topics will include career information, career and college success skills, and an introduction to design.

PHY 101 Einstein 101 (3,0,3) Introduction to concepts in modern Physics by studying the work and life of Albert Einstein. Theories to be covered include special and general relativity, photoelectric effect, quantum mechanics, and Brownian motion. Assumes knowledge of elementary algebra and graphing techniques. A general education course (natural science). PREREQ: MAH 099 or equivalent.

PHY 110 Introduction to Physics with Laboratory (3,2,4) Conceptual physics for non-science majors. Using guided inquiry activities to teach basic principles and their applications. Topics chosen from among: nature of physics as a science, mechanics, wave motion, light, heat, electricity, and the atom. Assumes knowledge of elementary algebra. A general education course (natural sciences). PREREQ: MAH 099 or equivalent.

PHY 115 Physics of Music and Sound (3,1,4) The course examines the physical principles involved in the description, generation, detection, and reproduction of sound. Topics include oscillations and vibrations, waves and waveforms, sound, traveling waves in air, standing waves, resonance, hearing, the ear, loudness, decibels, acoustical measurements, sound-generating electronics, digital sound. PREREQ: MAH 099. A general education course (natural science).

PHY 150 Current Topics in Physics (3,0,3) Directed projects, readings, and discussion for students interested in physics as a major or a minor. Does not meet general education requirement in natural sciences.

PHY 211 General Physics with Laboratory I (4,2,5) Non-calculus introduction to classical physics using guided inquiry activities. Topics include kinematics, forces and Newton's Laws of Motion, circular motion, work and energy, momentum, Rotational motion, static equilibrium, and fluids. Assumes knowledge of algebra and basic trigonometry. A general education course (natural sciences). PREREQ: MAT 119 or MAT 118 or equivalent placement.

PHY 213 General Physics with Laboratory II (4,2,5) Non-calculus introduction to classical physics using guided inquiry activities. Continuation of PHY 211. topics include oscillations, waves and sound, electric forces and fields, DC circuits, magnetic forces and fields, AC circuits, geometrical optics, and physical optics. A general education course (natural sciences). PREREQ: PHY 211.

PHY 220 University Physics with Laboratory I (3,3,4) Calculus based introduction to classical physics using guided inquiry activities. Topics include techniques for data analysis, kinematics, forces and Newton's Laws of motion, circular motion, work and energy, momentum, rotational motion, static equilibrium. A general education course (natural sciences). PREREQ or COREQ: MAT 120 or MAT 121.

PHY 222 University Physics with Laboratory II (3,3,4) Calculus based introduction to classical electromagnetic theory using guided inquiry activities. Topics include electric forces and fields, DC circuits, magnetic forces and fields, AC circuits. A general education course (natural sciences). PREREQ or COREQ: MAT 220 or MAT 221.

PHY 224 University Physics with Lab III (3,3,4) Calculus based introduction to classical physics using guided inquiry activities. Topics include oscillations, waves, sound, geometrical optics, physical optics, fluids and thermodynamics. PREREQ: :PHY 220.

PHY 294 Topics: Physics (1-3 sem. hrs.) Special topics in physics. Repeatable for a maximum of 12 semester hours. PREREQ: consent of department chair.

PHY 300 Intermediate Physics Laboratory (0,4,2) A selection of experiments in classical and modern physics. Topics include but are not limited to properties of light, quantization of charge, and atomic structure. COREQ: PHY 361.

PHY 301 Advanced Physics Laboratory (0,4,2) A selection of advanced experiments in classical and modern physics. Topics are selected from thermodynamical properties of matter, nuclear structure, particle physics and advanced optics. PREREQ: PHY 300.

PHY 304 Electronics and Circuit Analysis with Laboratory (3,2,4) Electronic components and devices; DC and AC circuit analysis; analog electronics. PREREQ: PHY 222.

B. KERA Initiatives

Kentucky Education Reform Act (KERA) Initiatives	Coursework in Physics Education Program
Learner Goals and Academic Expectations	EDU 300, EDU 305, EDU 311, EDU 313, EDS 360 EDU 324, EDU 330, EDU 393, EDU 396, EDU 496 PHY 220, PHY 222, PHY 224, PHY 300, PHY 310, PHY 360, PHY 361, PHY 494. Electives: PHY 305, PHY 315, PHY 320, PHY 330, PHY 410, PHY 420, PHY 460
Program of Studies	EDU 300, EDU 305, EDU 311, EDU 313, EDS 360 EDU 324, EDU 330, EDU 393, EDU 396, EDU 496 PHY 220, PHY 222, PHY 224, PHY 300, PHY 310, PHY 360, PHY 361, PHY 494. Electives: PHY 305, PHY 315, PHY 320, PHY 330, PHY 410, PHY 420, PHY 460
Core Content for Assessment	EDU 300, EDU 305, EDU 311, EDU 313, EDS 360 EDU 315, EDU 324, EDU 330, EDU 393, EDU 396, EDU 496 PHY 220, PHY 222, PHY 224, PHY 300, PHY 310, PHY 360, PHY 361, PHY 494. Electives: PHY 305, PHY 315, PHY 320, PHY 330, PHY 410, PHY 420, PHY 460

Alignment of KERA requirements in Physics Program:

The Physics program meets and exceeds many of the requirements of the KERA initiatives presented in the Big Ideas of *Forces and Motion*, *Energy Transformation* and *Structure and Transformation of Matter*. For example, in the area of *Forces and Motion*, candidates use scientific methods to analyze real-life problems such as reconstructing auto collisions, achieving airplane flight, designing electric motors, etc. Candidates also must experimentally test physics principles (Newton's laws, Conservation of Energy, Conservation of Momentum, Ohm's Law, etc.) making use of computer technologies, graphing, and data analysis. Typically, candidates work in a collaborative effort to present results (in written reports or by oral presentations). Similarly, the Physics program addresses the area of *Energy Transformation* in the applications of waves, light, sound and heat. For example, candidates investigate the law of energy conservation, especially with heat flow and through the study of thermal efficiencies of heat engines. The final Big Idea addressed by the Physics program is the *Structure and*

Transformation of Matter. The candidates explore kinetic theory of gases, the Universal Gas Law, change of state (with calorimeters), and investigate conductive properties of materials. Assessment in all areas is achieved by grading homework, exams, frequent quizzing, written reports and oral presentations.

C. EPSB Themes

EPSB Theme	Coursework in Physics Education Program
Diversity	EDU 300, EDU 305, EDU 311, EDU 313, EDU 315, EDU 324, EDU 330, EDU 393, EDU 396, EDU 496 EDS 360
Assessment	EDU 300, EDU 305, EDU 311, EDU 315, EDU 324, EDU 330, EDU 393, EDU 396, EDU 496 EDS 322, 360
Literacy/ Reading	EDU 300, EDU 313 EDU 315, EDU 324, EDU 330, EDU 393, EDU 396, EDU 496 EDS 322
Closing the Achievement Gap	EDU 300, EDU 305, EDU 313, EDU 315, EDU 324, EDU 330, EDU 393, EDU 396, EDU 496 EDS 360

D. Program Faculty:

Name	Highest Degree, University & Content Field and Certification	Faculty Rank (1) and Assignment: Indicate the role(s) of the faculty member (2)	Scholarship (3), Leadership in Professional Associations, and Service (4): List up to 3 major contributions in the past 3 years (5)	Teaching or other professional experience in P-12 schools	Status (FT/PT to institution, unit, and program)
Wayne Bresser	Ph.D., University of Cincinnati, Physics	Associate Professor, Faculty	Funded research with recent peer-reviewed publications in Solid-State physics. Astronomy student camps, Public talks at Cincinnati Observatory, KAS talks, Earth-Space Science Teacher alliance.	N/A	FT to institution PT to unit and program

Scott Nutter	Ph.D., Indiana University, Physics	Associate Professor, Faculty	Funded research with recent peer-reviewed publications in Astrophysics. Board member of KAS, Faculty Senate.	N/A	FT to institution PT to unit and program
John Filaseta	Ph.D., University of Illinois, Physics	Associate Professor, Faculty, Advisor	High Energy Particle Physics, Leader for Physics Teacher Alliance, Teacher workshops, student summer camps.	N/A	FT to institution PT to unit and program
Sharmanthe Fernando	Ph. D., University of Cincinnati, Physics	Associate Professor, Faculty	Funded research with recent peer-reviewed publications in General Relativity and Gravitation, Faculty Curriculum Committee	N/A	FT to institution PT to unit and program
Matthew Zacate	Ph. D., Oregon State University, Physics	Associate Professor, Faculty	Funded research with recent peer-reviewed publications in Computational Physics and Solid-State physics. Lead Presenter in Norse Physics Tour de Force (outreach).	N/A	FT to institution PT to unit and program
Charles Hawkins	Ph.D., Dartmouth College, Physics	Professor, Faculty, Chair, Advisor	Plasma Physics, Planetarium outreach (with funding). Head judge at regional science fairs.	N/A	FT to institution PT to unit and program
Ray McNeil	Ph.D., The Ohio State University, Astronomy	Associate Professor, Faculty	Astronomy, Earth-Space Science Teacher Alliance.	N/A	FT to institution PT to unit and program
Karl Vogler	Ph.D., University of Wyoming, Physics	Lecturer, Faculty	Infrared Astronomy, Astronomy; student camps.	N/A	FT to institution PT to unit and program
Education Faculty					
Code, Kimberly	Ph.D.; University of Louisville; Curriculum & Instruction;	Associate Professor	Publication: Economics and Children's Literature: The Twin Texts Approach. <i>Southern Social Studies Journal</i>	4 years, Gifted & Talented Instructor 1 year-Elementary Teacher	FT to institution. And unit PT to program

	<p>Certifications: Kentucky Teaching Certificate in elementary and gifted/ talented.</p>		<p><i>Publication: Web-Based Portals for Curriculum Differentiation: A Presentation of the www.GiftedSources.com Portal</i></p> <p><i>Exploring Large Scale Teaching Technologies-- Results from a Faculty Learning Community</i></p> <p>Economic Education; Gifted and Talented</p> <p>Education; Online Learning; and Curriculum and Instruction</p> <p>Fostering K-12 Teachers' Economic Knowledge and Entrepreneurial Teaching Dispositions. <i>Allied Academies, Academy of Economics and Economic Education International Fall Conference Proceedings</i></p>		
<p>Dallmer Denise</p>	<p>Ph.D. Ohio State University, Education Theory & Practice</p> <p>8-12 Ohio Secondary Social Studies & Spanish certification</p>	<p>Associate Professor Secondary Education</p>	<p>Publication: Using multimedia resources to teach about the Underground Railroad. <i>Kentucky Middle School Journal</i></p> <p>Publication: Doctoral students as boundary spanners: Complexity and ambiguity for university supervisors within an M.Ed./PDS project. <i>School University Partnerships</i></p> <p>National Council of English annual conference: presentation. Teaching the Literature of Freedom Seeking: The Underground Railroad in Elementary, Secondary and College Classrooms</p> <p>Co-chair Northern Kentucky Social Studies Advisory Council</p>	<p>5 years- High school teacher, Spanish and social studies teacher;</p> <p>1 year middle school social studies</p>	<p>FT to institution, unit, and program</p>

Eastep, Shannon	MEd., University of Cincinnati Technology & Instructional Design;	Lecturer	Publication: Instructional Design in On-Line Learning: Components of Quality. <i>The Kentucky Journal for Excellence in College</i> COEHS Technology Committee Workshop: - Creative Ideas for Online LearningPOD\SNHP <i>Teaching Online Learning</i>		FT to institution and unit PT to program
Fisk, Patsy	M.A.; Northern Kentucky University; Education; Kentucky Elementary and Middle Grades Teaching Certificate	Lecturer/ Advisor & Coordinator of Admission Practicum	Praxis I-PPST Preparation Seminar Coordinator of Admissions Practicum for the College of Education and Human Services	30 years, elementary, middle grades, and secondary; math education	FT to institution and unit PT to program
Huss, John	Ed.D., University of Cincinnati; Curriculum & Instruction; Certifications: Provisional Middle Grades.	Associate Professor	General Education Exploratory Task Force, Member International Journal of Leadership in Learning (Reviewer) Presentation: Keep Them smiling: Using Humor to Promote Learning for Middle School Students Outreach Instruction to children (k-12 students) Communication; Online Learning.	3 years- Middle Grades teacher	FT to institution and unit PT to program
Kasten, Sarah	Ph.D., Michigan State University, Mathematics Education 8-12 Ohio certification in Mathematics education	Assistant professor, faculty	(3) Kasten, S. E., & Sinclair, N. (submitted for publication). Using dynamic geometry software in the mathematics classroom: What activities teachers choose and why. <i>International Journal for Technology in Mathematics Education</i> . Kasten, S. E., & Newton, J. (submitted for publication). An analysis of K-8 measurement grade level expectations. In J. P. Smith	3 years high school mathematics teacher, Columbus, OH	FT to institution and unit PT to program

			<p>(Ed.), <i>Variability is the rule: A companion analysis of K-8 mathematics standards</i>. Charlotte, NC: Information Age.</p> <p>Kasten, S. E. (2004, November / December). A case for using reading and writing in a mathematics classroom. <i>Adolescent Literacy In Perspective</i>. Retrieved from http://www.ohiorc.org/adlit/in_perspective_content.aspx?parentID=115&recID=120&issue=0&status=live</p> <p>(4) Editorial Panel <i>Connections Newsletter</i>, publication of Association of Mathematics Teacher Educators (AMTE)</p>		
Kinne, Lenore	<p>Ph.D.; University of Minnesota; Educational Psychology</p> <p>Certifications: KTIP-TPA Trainer; Elementary Teaching License. (Minnesota, grades 1-6)</p>	Assistant Professor	<p>Publication: Instructional Design in ON-Line Learning: Components of Quality.</p> <p>Publication: Caroline's Quest for Calculus. <i>Teaching for High Potential</i></p> <p>Working Paper: Statewide data collection assessing the implementation of the middle school concept in Kentucky middle schools Publication: Teacher Work Sample for Course Improvement</p> <p>Educational Foundations Program Team</p> <p>Editorial Review Board Member: International Journal of Teaching & Learning in Higher Education</p> <p>Elementary Program Team member</p> <p>Impact on P-12 learning,</p>	<p>8 years, elementary Teacher</p> <p>4 years, Unit Leader</p> <p>2 years, Coordinator of Gifted Programs.</p>	<p>FT to institution and unit</p> <p>PT to program</p>

Love, Bettina	Ph.D. 2008 Georgia State University, Educational Policy Studies Concentration: Social Foundations Georgia elementary certification	Assistant Professor	Publications in Gender Forum, Educational Studies Multiple national and regional presentations – AERA, AESA, ASAALH Journal Reviewer, Youth & Society Journal Reviewer Educational Studies	2 yrs. Elementary School	FT to institution and unit PT to program
Maddin, Ellen	Ed.D., University of Cincinnati, Curriculum and Instruction Ohio Certification: Permanent High School 7-12 with an Endorsement in English; Five-year Supervisor	Assistant Professor	State Program Manager-Leadership for Integrating Technology (Ohio); State Professional Development Advisory Team Member (Ohio Department of Education/eTech Ohio)	12 years experience teaching in secondary schools	FT to institution and unit PT to program
Niemeyer, Jill	MA. Eastern Kentucky University Health Education Certification, P-12	Lecturer	SRATE, Impact of International Student Teaching ATE, Impact of International Student Teaching AACTE, The Ability to Identify with Diverse Populations	8 years experience teaching in secondary schools	FT to institution and unit PT to program
Noll, Rachel	Ph.D.; University of Cincinnati , Educational Studies Certifications: Kentucky Grades 7-12 Social Studies with concentration in History, Political Science, Sociology, and Psychology	Assistant Professor	History; Job Satisfaction; National Board Certification; Principal-Teacher Relationship KTIP Teacher Educator; Student Teacher Supervisor; Reviewer for Mid-Western Educational Education Association Conference	6 years, High School Social Studies teacher	FT to institution and unit PT to program

<p>Ofori-Attah, Kwabena D.</p>	<p>Ph.D. Curric. & Inst. Social Studies</p> <p>Elementary and High School certification in Nigeria and Ghana</p>	<p>Assistant Professor; Secondary Education Clinical Supervisor</p> <p>Serve on College Assessment Committee Secondary Education Committee Science Education Search Committee</p>	<p>Book;</p> <p>Ofori-Attah, K. D. (2008). <i>Going to school in the Middle East and North Africa</i>, Westport, CT: Greenwood Press.</p> <p>Book Chapter;</p> <p>Ofori-Attah, K. D. (2007). Urbanization and schooling in Africa: Trends, issues, and challenges from Ghana during the colonial era. In W. T. Pink and G.W. Noblit (Eds.), <i>International Handbook on Urban Education</i>, pp 23-48.</p> <p>Ofori-Attah, K. D. (2006). The British and curriculum development in West Africa. <i>International Review of Education</i>. 52, 409-423</p> <p>Review journal articles for publication professional journals</p> <p>President, Ghanaian Catholic Community Church, Cincinnati, OH, 2007- present</p> <p>Webmaster, Ghanaian Association of Greater Cincinnati, 2007 to present</p>	<p>5 years, Elementary School Teacher, Nkoranza Experimental School,</p> <p>6 years, High School Teacher, Agogo State Secondary School, Ghana,</p> <p>3 years, High School Teacher, Ilewo Community High School, Ogun State Nigeria</p> <p>3 years, High School Teacher, Osei Tutu Secondary School Ghana,</p>	<p>FT to institution, unit, and program</p>
<p>Walker, Stephen</p>	<p>Ed.D.;</p> <p>Ball State University;</p> <p>Special Education</p>	<p>Rank: Professor</p> <p>Role: Faculty</p>	<p>Sparzo, F. J., & Walker, S.C. (2004). <i>Managing behavior in the inclusive classroom</i>. In Joyce S. Choate (Ed). <i>Successful inclusive teaching: Proven ways to detect and correct special needs</i> (4th ed.). Needham Heights, MA: Allyn & Bacon.</p> <p>Past-president, Kentucky Federation, Council for Exceptional Children</p> <p>Chair of the Governmental Relations Committee and Children's Action Network (CAN) Coordinator for the</p>	<p>SpEd Teacher, 7 years.</p> <p>Associate Coordinator, 1 year.</p>	<p>FT to institution and unit</p> <p>PT to program</p>

			Council for Educational Diagnostic Services Member of the Board of Directors of the Children's Law Center, Covington, KY		
Wasicsko, Mark	Ph.D.; University of Florida; Foundations of Education/Education Psychology; Certifications: P-12 Secondary Composite Science, Texas Lifetime Certificate.	Dean of College; Professor and Bank of Kentucky Chair in Educational Leadership;	Recharging the Dispositions to Lead. <i>Principal Leadership</i> <i>Determining the Dispositions to Teach: A Hiring Strategy. Principal Magazine</i> <i>Multiple presentations:</i> KACTE, AACTE, AERA, NATA, KASA, NASDTEC KY Education Professional Standards Board Effective Leaders as Effective Persons: The Dispositions to Lead. University Event Dispositions	2 years, science teacher	FT to institution and unit PT to program

E. Syllabi:

Syllabi are found at the following links:

Education Foundations Course Syllabi: http://coehs.nku.edu/ncate/syllabi/foundations_syllabi.php

Secondary Pedagogy Course Syllabi: http://coehs.nku.edu/ncate/syllabi/secondary_syllabi.php

Physics Education Content Syllabi: http://coehs.nku.edu/ncate/syllabi/content_syllabi.php

F. Curriculum Contract/Guide sheet: (next page)

Date of Admission _____

You must attend a mandatory student teaching application meeting the semester BEFORE you student teach. If student teaching during the fall semester, the meeting will be in January. If student teaching during the spring semester, the meeting will be in August.

GRADUATION/ EXIT REQUIREMENTS:

To earn a bachelor’s degree at Northern Kentucky University (NKU) in the Secondary Physics education program, I must fulfill the following requirements:

- A. File a Degree Candidacy application in the Registrar’s Office during the semester prior to the one in which I intend to complete all degree requirements. The dates by which my application must be in the Registrar’s Office are as follows:
 - For spring graduation: October 8
 - For fall graduation: April 8
 - For summer graduation: April 8
- B. Complete a minimum of 120 semester hours, the last 30 of which must be earned at NKU;
- C. Complete general studies requirements (see “Catalog Applicability” in the NKU catalog);
- D. Earn the following grade point averages:
 - Overall GPA of 2.5 on all college work attempted
 - Overall GPA of 2.5 on all work attempted at NKU
 - GPA of 2.5 in each emphasis area
 - GPA of 2.5 in all professional education courses;
- E. Successfully complete forty-five (45) semester hours of 300 level or above coursework;
300 Level Courses: _____
- F. Successfully complete an education portfolio, with a final check during student teaching;
- G. Successfully complete a Teacher Work Sample during student teaching;
- H. Successfully complete a semester of student teaching.

Change in Academic Regulations

The Registrar reserves the right to implement new procedures as he/she deems necessary to ensure compliance with academic policies and procedures.

Other Regulations

See University Catalog for other appropriate regulations.

KY PRAXIS Test Information*

KY Passing Score

Student’s Score

Physics: Content Knowledge (0265)	133	_____
Principles of Learning and Teaching Grades 7-12 (0524)	161	_____

*Teacher certification test requirements are subject to change. Before registering for any PRAXIS tests please refer to the Kentucky Education Professional Standards Board (EPSB) website at: www.epsb.ky.gov for current requirements.

Students interested in Ohio, Indiana or certification in other states should review that state's PRAXIS test requirements on the ETS website: www.ets.org.

I understand that it is my responsibility to maintain regular contact with my advisor for any changes in program requirements. I have reviewed the information in the applicable EDU 104 handbook, the information above, and the other curriculum forms associated with this document. I accept the admission standards and regulations as applicable to my program of study. I further understand that any modifications to this program will be made if mandated by state certification regulations and that I will be notified if any such changes occur during the course of my continuous enrollment in the teacher education program. I also understand that evaluation of area/major/minor coursework will be final upon signature of the faculty advisor.

As a Secondary Physics education major I also understand I must have **85% of my content coursework completed and 100% of the Professional Coursework completed BEFORE student teaching**

Student Signature

Date

Advisor Signature

Date

Middle Grades & Secondary General Studies Framework (49– 61 Hours)

Area	Course Selection	Course	Credit	Grade
Common Core (9-15 Semester Hours)				
Written Communication I (3 hrs) (w/in 30hrs)	ENG 101 or ENG 151 for qualifying students	ENG		
Oral Communication (3 hrs) (w/in 30hrs)	CMST 101 (SPE 101) a minimum grade of a B is required for admission to education	CMST 101		
Mathematics (3 hrs) (w/in 45hrs)	One of the following courses: MAT 110, 112,114, 115, 115H, 128, 129, 227, (120, 121,122),18 STA 110, 113, 205, 212			
Written Communication II (3 hrs) (w/in 60hrs)	One of the following courses: ENG 291 or EDU291W, MUS 291W, CHEM 391W, BIO 291W (Requires sophomore standing) (a minimum grade of a B is required)			
Liberal Arts Core				
Natural Science (7-8 hours)	Two of the following courses, one of which must have a laboratory component. AST 110(L), 115(L) BIO 120(L), 121, 123, 125, 126, 150(L), 151(L), 160, 208(L), 209(L), 220 CHE 105(L), 112-112L, 115(L), 120(L), 121-121L ENV 110, 220(L) GLY 110(L), 120-120L, 130, 150, 220,	_____w/Lab		
Behavioral and Social Sciences 3 hrs PSY 100. 3 hrs. Soc. Sci. 3 additional. hrs. in Beh or Soc. Sci.	PSY 100, 100H ***Required*** SOCIAL SCIENCES – BLS 100 ECO 200, 201, 215 EMB 100, 105 GEO 100, 101, 103, 107 JOU 100 JUS 101 PSC 100, 100H, 101, 102, 103, 110, 111, 215 POP 205, SWK 203 BEHAVIORIAL SCIENCES –ANT 100, 110, 201, 230, 231, 240, 245, 270, 273, 294, 310 PSY 200, 201, 205, 206, 220 SOC 100, 205, 240, 245	PSY 100		
Fine Arts (3 hours)	ART 100 ARTH 101, 102, 103, 104 MUS 100, 107, 108, 109, 110, 230, 231 TAR 100, 111, 165			
History (3 hours)	HIS 100, 101, 102, 103, 106, 107, 108, 109, 194 PHI 180, 185 REL 181, 182, 185, 186			
Humanities (6-8 hrs) *Foreign language requires both courses in sequence **Only one Fine Arts (MUS, TAR) permitted	ENG 200, 201, 202, 203, 206, 207, 208, 209, 210, 211, 212, 217, 218, 265, 266, 300, 301, 302, 303, 305, 306, 308, 309, 311, 312, 314, 315, 318, 320, 324 HIS 100, 101, 102, 103, 106, 107, 108, 109, 194 MUS 100, 107, 108,109,110, 230, 231 PHI 150, 155, 160, 165, 170, 180, 185, 201, 210, 220, 240, 250, 330, 350 PSC 110, 111 REL 181, 182, 185, 186, 201, 370 TAR 100, 111, 165 WGS 211, 212 ARI 101,102, 201, 202 CHI 101, 102, 201, 202 FRE 101, 102, 201, 202, 320 GER 101, 102, 201, 202, 320 ITA 101, 102, 201, 202 JPN 101, 102, 201, 202 LAT 101, 102, 201, 202 RUS 101, 102, 201, 202 SPI 101, 102, 201, 202, 320, 321			
Literature (3 hrs)	ENG 200, 201, 202, 203, 206, 207, 208, 209, 210, 211, 212, 217, 218, 265, 266, 300, 301, 302, 303, 305, 308, 309, 311, 312, 314, 315, 318, 320, 322, 324 FRE 320 GER 320 SPI 320, 321 WGS 211, 212			
Diversity Core				
Race/Gender (3 hours)	ANT 273 BLS 100 EDU 316 EMB 105 ENG 217, 218, 306, 322 GEO 107 HIS 431, 444, 445 JUS 231 MUS 107 PHI 322, 324 PSC 215, PSY 201 REL 325 SOC 110, 210 SWK 106 TAR 102 WGS 150, 250, 310, 444, 445			

Non-Western (3 hours)	ANT 100, 201, 230, 231, 240, 245, 270, 310 ARI 101, 102, 201, 202 ARTH 104 BIO 325 BLS 100 CHI 101, 102, 201, 202 ENG 216 GEO 101, 103 JPN 101, 102, 201, 202, MUS 106, PHI 160, 250, POP 345, PSC 102, 103, RUS 201, 202 SOC 240, 245			
Education Admission Requirements				
Physical Education (3 hours)	PHE 200 Concepts of lifetime fitness	PHE 200	2	
	One-hour activity course (PHE) or Dance		1	
Education	EDU 104 – Orientation to Education Profession (required for education majors) Pass/Fail course- 1 credit hour.	EDU 104	1	
Computer (w/in Proficiency 45hrs)	INF 101, 110 or CSC 270 or equivalent course or pass proficiency exam.			

No more than two courses with the same prefix may be taken from the Liberal Arts and Diversity core groups.

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**Northern Kentucky University
Teacher Education Program
Curriculum Contract
Physics (8-12)**

I. Professional Education Courses	Course	Credit	Grade	<i>Quality Pts.</i>
<u>Admission Semester</u>				
Human Growth and Development	EDU 300	3	_____	_____
Introduction to Education	EDU 305	2	_____	_____
Admission Practicum –	EDU 311	2	_____	_____
Computer Applications for Teachers	EDU 313	2	_____	_____
Children w/Exceptionalities in the Schools	EDS 360	2	_____	_____
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** Teaching Science in the Secondary School (EDU 330) to be completed in the fall semester.				
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<u>Professional Semester I</u>				
Middle Grades & Secondary Classroom Climate Management	EDU 318	2	_____	_____
Planning/Implementing Instruction for Students w/ Exceptionalities	EDS 322	2	_____	_____
Fundamentals of Secondary Education	EDU 324	3	_____	_____
Secondary Practicum I	EDU 393	2	_____	_____
	_____	_____	_____	_____
<hr/>				
<u>Professional Semester II</u>				
Educational Assessment	EDU 315	2	_____	_____
Secondary Practicum II	EDU 396	2	_____	_____
	_____	_____	_____	_____
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<u>Professional Semester III</u>				
Student Teaching in the Secondary School	EDU 496	12	_____	_____

II. Major Courses

University Physics I with Lab	PHY 220	4	_____	_____
University Physics II with Lab	PHY 222	4	_____	_____
University Physics III with Lab	PHY 224	4	_____	_____
Dynamics	PHY 310	3	_____	_____
Thermal Physics	PHY 360	3	_____	_____
Modern Physics w/ Intermediate Laboratory	PHY 361	3	_____	_____
Physics Seminar	PHY 300	2	_____	_____
	PHY 494	1	_____	_____
9 Semester Hours of PHY or AST at 300-level or above	_____	-	_____	_____
	_____	-	_____	_____
	_____	-	_____	_____

III. Required Related Courses

Calculus IA	MAT 121	3	_____	_____
Calculus IB	MAT 122	3	_____	_____
Calculus II A	MAT 221	3	_____	_____
Calculus II B	MAT 222	3	_____	_____
Multivariable Calculus	MAT 320	3	_____	_____
Differential Equations	MAT 325	3	_____	_____
General Chemistry I with Lab	CHE 120	4	_____	_____
<i>General Chemistry II with Lab</i>	<i>CHE 121</i>	<i>4</i>	_____	_____

06/2009