

The University of Alabama 5th Year Scholars Program
in Physics/Mathematics Education
An Innovative Dual Alternative Class A Certification Program

The University of Alabama wishes to propose an innovative unique Dual Certification program in Mathematics and Physics that utilizes the University Scholars program in collaboration between the Mathematics, Physics, and Curriculum & Instruction departments within both the College of Arts & Sciences and the College of Education. This rigorous program contains coursework that combines both aspects of Physics majors, Mathematics majors, and Secondary Education majors for both mathematics and science certification programs. What makes this program unique is the utilization of the University Scholars program collaboratively across two colleges and three departments. The faculty within the program areas of mathematics and physics expect only one or two graduates per year at most, so to be able to offer such a program, it must operate within existing coursework, schedules, and faculty teaching loads. Mathematics & Physics are areas of *high needs* in Alabama and beyond.

Recruiting strong mathematics and physics students into teaching has long been a very difficult challenge. The National Science Foundation (NSF) established the Robert F Noyce grant program that offers scholarships to attract strong candidates into the STEM teaching disciplines. With large scholarships, the NSF Noyce program has grown STEM teacher education programs nationally, yet there is still a large need for the “hard sciences” teaching disciplines. At The University of Alabama, the faculty continue to recognize that teacher pay in mathematics, physics, and chemistry continues to be stumbling blocks to attract strong “hard sciences” majors into teaching. Professions of the hard sciences pay in the range of 50%-300% more than beginning teaching salaries, unlike majors in disciplines like English, History, and Foreign Languages. Based on a survey of 20,000+ individuals’ current and beginning salaries, long-term 10-year average salaries in the hard sciences continue to outpace even the highest salaried positions in English, History, and Foreign Languages. Therefore, the faculty in collaborative partnership created this proposal with the initial certification level of Class A to make the program attractive with the ~15% starting teacher salary increase in Alabama that can be completed in five years. Furthermore, these students will earn BS degrees in their hard science major that provides them a strong opportunity outside education if they so choose to do so. The undergraduate Class B programs are all BSE degrees in secondary education with majors in the hard sciences, but not BS degrees in the hard sciences. Our innovative program recognizes the need to provide “options” to high-level strong talent in the STEM disciplines and locking these teacher candidates into only education degrees will not work.

Our program proposal offers an approach to enter the teaching fields of physics and mathematics with “above the undergraduate” program requirements including the following at UA:

- 35-50% more clinical classroom hours before student teaching than the minimum
- 12 hours of graduate level coursework above other alternative masters certification programs
- 79 total credit hours in the mathematics and physics teaching fields, of which
 - 34 hours of upper division math and physics coursework
 - 18 graduate hours of teaching field courses (9 each field)
- Passing three Praxis II tests (Math-5161, Physics-5265)
 - Praxis II PLT 7-12 and both content tests are required in this program

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The University of Alabama Innovative Dual Alternative Class A Certification Program proposal will require latitude on five ALSDE rules to meet the demands of the high needs fields of mathematics and physics teachers in Alabama and beyond. We recognize by asking for latitude on these five rules, a possible Pandora's box may open the gates for other secondary education dual certification submissions (e.g. Social Studies, English Language Arts). However, our proposal should be considered ONLY due to the shortage of highly qualified mathematics teachers and science teachers with a strong physics background in Alabama. To help open the door to University of Alabama advanced scholars, our program proposal maintains the rigor of existing programs and has GPA requirements above our existing program at both the undergraduate and graduate levels. We also acknowledge that Praxis II testing can add a field of study after three years of teaching experience without major coursework in that field (e.g. Elementary K-6 certified teachers taking Middle School Math Praxis, English Language Arts Teachers 6-12 taking the Social Studies Praxis). This program presents a rigorous study of mathematics and physics content, mathematics and physics education, and professional studies in education. There are only small concessions (in the "minor field") from our existing programs. We ask that the ALSDE consider the following:

CONSIDERATIONS for this proposal by ALSDE:

1. Rule 290-3-3-.44(3)(d)...Prior to unconditional admission, a person... should have completed... (3) an academic major in the teaching field, or if an academic major is not on the official transcript, 32 semester hours in the teaching field including at least 19 semester hours of upper-division credit."
2. Rule 290-3-3-.44(3)(a)3. Candidates admitted on or after October 1, 2009, may complete no more than five approved program courses prior to unconditional admission."
3. Rule 290-3-3-.02(4)(a)12.3.(c)2. For Candidates who are seeking certification in two or more distinct teaching fields, an additional internship(s) shall be required (e.g. Mathematics and Biology).
4. Rule 290-3-3-.44(3)(b) reads..."person who is eligible for admission to an Alternative Class A program shall have earned a bachelor's or higher degree with a minimum grade point average overall of 2.50 [UA is higher at 2.75, soon to be 3.0]. This GPA must be documented on the official transcript of the degree granting institution and must be the GPA that was used as the basis for granting the degree."
5. Rule 290-3-3-.44(3)(a)5. Courses that were taken as part of the degree used to meet the admission requirement in Rule 290-3-3-.44(3)(b) for a bachelor's or higher degree with a minimum grade point average of 2.5 cannot be used again to meet Alternative Class A program requirements."

ALSDE RULE CONCERNS ADDRESSED:

There are three of the five Rules for which we ask for partial/temporary waivers within this program.

1. Rule 290-3-3-.44(3)(d) – Candidates would be admitted to graduate school at the end of the 3rd year of study with more than 91 credits hours. Of these 91+ credit hours, 52 credit hours are in the teaching fields of

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mathematics and physics of which 22 are at the upper division level. Students would be unconditionally admitted to the teacher education program during the fall of their fourth year during the CSE 390 course if they have passed the AECTP and meet all the University of Alabama Scholars program requirements.

2. Rule 290-3-3-.44(3)(a)3. – Candidates would be admitted in the fall of the fourth year unconditionally. In that specific semester of admission, candidates would be concurrently enrolled in four program courses. At the end of the unconditional admission semester, these candidates will have amassed 110 credit hours, been unconditionally admitted to the Teacher Education Program, and will have completed four graduate program courses and the undergraduate Special Education course.
3. Rule 290-3-3-.02(4)(a)12.3.(c)2. – Candidate will complete a split internship in one of the UA cooperating schools. All cooperating schools operate on a 6-8 period day, no block schedules. The candidates will spend 50% of their time (3-4 periods) during the internship with a cooperating teacher in a mathematics classroom AND 50% of their time (3-4 periods) with a cooperating teaching in a physics only classroom. Candidates will teach 30 full days of teaching during the split internship, of which, at least 8 consecutive days will be in EACH physics and mathematics classroom. We ask the ALSDE to consider Mathematics and Physics as “related teaching fields” and allow Rule 290-3-3-.02(4)(a)12.3.(c)3. supersede (c)2.

ALSDE RULES asking for a waiver for the innovative program to work

We ask these two rules be waived under these specific circumstances and requirements

The University of Alabama Scholars Program permits advanced undergraduates to enter Phase 1 of the scholars program after the sophomore year (61 credit hours) with a GPA of 3.3 or higher at UA (**Highlighted in Green on page 5**) and consists of 33 hours of advanced upper division coursework. Students who complete Phase 1 with total GPA of 3.3 or higher (3.0-3.3 can be accepted in special circumstances) with all core curriculum requirements met, students then enter Phase 2 (**Highlighted in Orange on page 5**). Phase 2 consists of finishing undergraduate coursework and beginning graduate level coursework.

4. Rule 290-3-3-.44(3)(b) – Candidates will receive their bachelor’s degree in Mathematics/Physics at the completion of the residence year (Phase 2) with an overall minimum GPA of 3.0 (preferably 3.3) with at least 125 credit hours. The degree is awarded one semester after unconditional admission to the Teacher Education Program.

We ask the ALSDE to waive Rule 290-3-3-.44(3)(b) for one semester due to the comprehensive and rigorous nature of completing this innovative program in the hard sciences.

5. Rule 290-3-3-.44(3)(a)5 – Candidates will complete four courses (12 hours) at the graduate level during year four (Phase 2) that apply to the mathematics/physics bachelor’s degree and are graduate program courses. The university scholars program permits up to 15 hours of courses to be dually counted towards both the undergraduate and graduate degree programs. The UA scholars program is to attract strong

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undergraduate students into graduate programs of study which is our goal in the “hard sciences” teaching disciplines in this proposal.

We ask the ALSDE to waive Rule 290-3-3-.44(3)(a)5 under the following conditions and, due to the comprehensive and rigorous nature of completing this innovative program.

Program rigor at or above traditional single field license in Math or Physics Class B programs.

1. Candidates in this program MUST pass the AECTP basic skills test BEFORE or DURING the semester for which they are applying unconditional admission to the teacher education program (CSE 390 semester)
2. Candidates MUST have their background check and fingerprinting COMPLETED before or during the same term as mentioned in #1 above.
3. Candidates MUST possess a 3.3 GPA at the completion of year 3 (UA Scholars Phase 1), prior to beginning year 4 (UA Scholars Phase 2).
4. Candidates MUST maintain a 3.0 GPA at the completion of year 4 (Phase 2), prior to beginning year 5 (Professional Studies year) with no grade lower than a “C” in any graduate level course.
5. Candidates MUST pass the Praxis II PLT (7-12), Math 5161, & Physics 5265 BEFORE the student teaching internship semester.
6. Candidates MUST maintain a 2.75 GPA in ALL teaching field courses at the completion of all teaching field courses before student teaching.
7. Candidates who fail to meet any of these requirements would have to revert to seeking only single field certification in physics or mathematics meeting the requirements of that respective program at the class B or class alt-A as would any other candidate, or seek another major/degree that does not pursue teacher certification.

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Mathematics Major, Physics Minor BS-Mathematics MA-Secondary Education Alabama Class A Certificate in Math & Physics		Physics Major, Mathematics Minor BS-Physics MA-Secondary Education Alabama Class A Certificate in Math & Physics	
Fall Freshman (13)	Spring Fresh (17)	Fall Freshman (14)	Spring Fresh (15)
MATH 125 EN 101 ??? (FA) HD 101 (SB)	MATH 126 PH 105 EN 102 PY 101 (SB) HY 203 (HI)	MATH 125 EN 101 CH 101 ??? (FA)	MATH 126 PH 105 EN 102 CH 102
Fall Soph (15)	Spring Soph (17)	Fall Soph (16)	Spring Soph (17)
MATH 227 MATH 238 PH 106 EN 205 (L)	MATH 237 MATH 301 PH 253/255 EDU 200 COM 123 (HU) Sequence (L, HI)	MATH 227 MATH 238 PH 106 EN 205 (L) PY 101 (SB)	MATH 237 MATH 301 PH 253/255 EDU 200 COM 123 (HU) HY 203 (HI)
Fall Jr (15)	Spring Jr (16)	Fall Jr (15)	Spring Jr (16)
MATH 486 CS 104 ST 260 PH 301 or 302 PH 331	Math 470 SPE 300 MATH 404 MATH 355 PH 354 ??? (L-FA-HU or HI-SB)	PH elective PH 301 or 302 PH 331 HD 101 (SB) Sequence (L, HI)	PH elective SPE 300 MATH 404 MATH 355 PH 354 ??? (L-FA-HU or HI-SB)
Fall Sr (16)	Spring Sr (15)	Fall Sr (16)	Spring Sr (15)
CSE 390/493 CSE 575 (CSE 401) MATH 503 BEF 510 PH 591, 583, or 534 *TEP uncond. admit	CSE 576 MATH 505 BER 550 PH 505 CSE 406 ^B.S. Degree awarded	CSE 390/493 CSE 575 (401) MATH 503 BEF 510 PH 591, 583, or 534 *TEP uncond. admit	CSE 576 MATH 505 BER 550 PH 505 CSE 406 ^B.S. Degree awarded
Fall Grad (15)	Spring Grad (12)	Fall Grad (15)	Spring Grad (12)
CSE 583 CSE 586 CSE 592 CSE 512 CSE 530	CSE 597 CSE 566 CSE 565	CSE 583 CSE 586 CSE 592 CSE 512 CSE 530	CSE 597 CSE 566 CSE 565

Both programs would require passing the Praxis II examination in mathematics and physics and the PLT 7-12.
Application to Graduate school required in Spring Junior Year. (GRE score>300, 3 letters of recommendation)
The college of education would require the passing of a graduate comprehensive examination that reflects knowledge graduates should have in mathematics/physics secondary education as a beginning teacher.
??? Indicates remaining course in either L-FA-HU or HI-SB, depending on where the sequence course is taken in Spring Soph
Red indicates Major Ancillary courses required by the Major in A&S
*Students are admitted unconditionally in the fall senior semester.

Undergraduate Existing Majors in Mathematics Education and Physics Education Tracks

MATH MAJOR	hr	PHYSICS MINOR	hr	PHYSICS MAJOR	hr	MATH MINOR	hr
Math 125 – Calculus 1	4	PH 105 – General Physics w/Calculus 1	4	PH 105 – General Physics w/Calculus 1	4	Math 125 – Calculus 1	4
Math 126 – Calculus 2	4	PH 106 – General Physics w/Calculus 2	4	PH 106 – General Physics w/Calculus 2	4	Math 126 – Calculus 2	4
Math 227 – Calculus 3	4	PH 253 – Intro to Modern Physics	3	PH 253 – Intro to Modern Physics	3	Math 227 – Calculus 3	4
Math 237 – Linear Algebra	3	PH 255 – Modern Physics Lab	1	PH 255 – Modern Physics Lab	1	Math 237 – Linear Algebra	3
Math 238 – Differential Equations	3	PH 301 – Mechanics 1	3	PH 301 – Mechanics 1	3	Math 238 – Differential Equations	3
Math 301 – Discrete Math	3	PH 331 – Electricity & Magnetism 1	3	PH 331 – Electricity & Magnetism 1	3	Math 301 – Discrete Math	3
Math 355 – Theory of Probability	3	PH 354 – Intermediate Modern Physics	3	PH 354 – Intermediate Modern Physics	3	Math 355 – Theory of Probability	3
*Math 403 – Advanced Algebraic Connections and their Development (Capstone 1)	3	*PH 405 – Physics for Science Teachers (Capstone 1)	3	*PH 405 – Physics for Science Teachers (Capstone 1)	3	*Math 403 – Advanced Algebraic Connections and their Development (Capstone 1)	3
Math 404 – Special Topics for Sec Math Teachers	1	*PH 491 – Advanced Laboratory	3	*PH 491 – Advanced Laboratory	3	Math 404 – Special Topics for Sec Math Teachers	1
*Math 405 – Geometry for Teachers (Capstone 2)	3	PH 300-499 Elective	3	PH 300-499 Elective	3	*Math 405 – Geometry for Teachers (Capstone 2)	3
Math 470 – Principles of Modern Algebra	3	PH 300-499 Elective	3	PH 300-499 Elective	3	Math 470 – Principles of Modern Algebra	3
Math 486 – Real Analysis	3					Math 486 – Real Analysis	3
Ancillary Courses for Major		Ancillary Courses for Major		Ancillary Courses for Major		Ancillary Courses for Major	
ST 260 – Statistical Data Analysis	3	CH 101 – Chemistry 1	4	CH 101 – Chemistry 1	4	ST 260 – Statistical Data Analysis	3
CS 150 or CS 104 – Programming I or Principles of Computing	3	CH 102 – Chemistry 2	4	CH 102 – Chemistry 2	4	CS 150 or CS 104 – Programming I or Principles of Computing	3
CSE 406 – Secondary Math Curriculum	3					CSE 406 – Secondary Math Curriculum	3
TOTAL MAJOR (does not include ancillary courses)	37	TOTAL MINOR (second field)	27	TOTAL MAJOR (does not include ancillary courses)	33	TOTAL MINOR (second field)	28
UPPER DIVISION (credit hours at the 300-499 level)	19	UPPER DIVISION (credit hours at the 300-499 level)	15	UPPER DIVISION (credit hours at the 300-499 level)	21	UPPER DIVISION (credit hours at the 300-499 level)	13

*Double Strikethrough text represents the concessions from existing majors for students to complete the undergraduate minor in the second teaching field rather than the major. UA minors consist of 18-20 hours, this program proposes a strong minor than is currently required at UA. Concessions are very light in the minor. Please note the total upper division total credit hours is 34 respectively. The 32/19 rule would require 38 for two fields. ^Upper division Physics courses fit the “math credit” definition. *Asterisk courses represent courses that would be taken at the graduate level as part of the UA Scholars program.

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Master's Level Program Coursework

Secondary Education (PK)	Technology (TPACK)	Foundations, Assessment, Special Education
CSE 530 – Secondary Education CSE 592 – Clinical Field Experienc CRD 512 – Content Area Reading 9 hrs	CSE 575 – Devlp Math Teach Tech CSE 576 – Imprv Sci. Teach Tech 9 hrs	BER 550 – Assessment BEF 510 – Education Foundations SPE 500 – Special Education# #6 hrs
Mathematics Education (PCK)	Mathematics Content (CK)	
CSE 583 – Sec. Math Methods CSE 566 [^] - Improving Math Instr. 6 hrs	Math 503 [^] - Capstone 1 (Algebra) Math 505 [^] - Capstone 2 (Geom) 6 hrs	
Science Education (PCK)	Physics Content (CK)	Student Internship
CSE 586 – Sec. Science Methods CSE 565 [^] - Improving Sci. Instr. 6 hrs	PH 505 [^] - Physics for sci. teachers PH 591 [^] - Adv Lab for teachers 6 hrs	CSE 597 – Split Physics / Math student teaching 6 hrs

*PK—Pedagogical Knowledge

*PCK—Pedagogical Content Knowledge

*CK—Content Knowledge

*TPACK—Technological Pedagogical and Content Knowledge

#Special Education requirement satisfied by undergraduate SPE300.

[^]State approved teaching field courses:

Total: 18 hours teaching field, 12 of which are content courses

TOTAL GRADUATE PROGRAM HOURS: 54-57 hrs (1/3 is 18 hours in the teaching field courses)

Note: [^]12 hours counts towards the undergraduate degree in math or physics, 3 hours in undergraduate special education, and 42 hours independently count towards the master's degree in secondary education (STEM-Physics-Math).

Name: _____

CWID _____

Program: **SESI/SEMA: Physics & Mathematics (6-12)**

Total Hours: **54**

INNOVATIVE ALTERNATIVE FIFTH-YEAR DUAL MATH-PHYSICS
PROGRAM CHECKLIST (CLASS A)

Date Approved: _____

Date Expires: _____

THE UNIVERSITY OF ALABAMA
COLLEGE OF EDUCATION

This advising sheet applies to candidates who are pursuing dual certification in mathematics and physics through the University of Alabama Scholars Program, and who began this program at UA for completion at UA. Candidates must also complete the undergraduate requirements of the Math-Physics majors/minors as documented in the undergraduate program of study. Candidates must have met ALL requirements of the undergraduate program to qualify for this program. Candidates must present a GPA of a least 3.0 on all courses in the program below, with no grade below a "C." Credits over 6 years old may not be used for degree purposes.

<p>Curriculum and Teaching: 12 sem hrs req CSE 530 Modern Secondary School Programs.....3 CSE 583 Teaching Secondary School Mathematics3 CSE 586 Teaching Secondary School Science.....3 CSE 592 Fieldwork in Secondary Education3</p>	<p>Teaching Field: 18 sem hrs req (At least 1/3 of the total hrs in this program must be in graduate-level teaching field courses. Appropriate "prior" courses--as many hours as in the state approved class B program in this teaching field--are required.)</p>
<p>Professional Studies: 3 sem hrs req BEF 510 Social & Philosophical Foundations of Educ3</p>	<p>Advisor approved courses (12 sem. hrs) in the tching field MATH 503 Advanced Algebraic Connections & Develop. ...3 MATH 505 Geometry for Teachers.....3 PH 505 Physics for Science Teachers.....3</p>
<p>Special Education Course work: 3 sem hrs req SPE 500 Introduction to Exceptional Children and Youth..... #Completed as SPE 300 Survey Special Accommodations and Strategies</p>	<p>PH 534 Digital Electronics OR PH 582 Selected topics in Physics & Astronomy OR PH 591 Advanced Lab for Science Teachers.....3</p>
<p>Technology: CSE 576 Improving Science Teaching w/Tech.....3 CSE 575 Developing Math Teaching w/Tech3</p>	<p>and CSE 566 Improving Mathematics Instruction.....3 CSE 565 Improving Science Instruction3</p>
<p>Evaluation of Teaching & Learning: 3 sem hrs req BER 550 Evaluation of Classroom Learning..... iii</p>	<p>Additional Requirements/Electives: none</p>
<p>Reading: 3 sem hrs req CRD 512 Improve of Reading in Secondary Schools.....3</p>	
<p>Full-time Internship: 6 sem hrs req CSE 597 Internship in Secondary Schools6</p> <p>Candidates MUST complete a 50-50 split internship with Physics and Math teachers in the same school. Half the day will be Physics and half the day will be Math.</p>	<p>_____</p> <p>Dean, College of Education</p>
<p>Notes: a) Completion of EDU 200 plus general studies courses including humanities, social science, science, and mathematics. All deficiencies must be completed prior to unconditional admission to TEP including a content major or 32/19; b) a passing score on a comprehensive written exam covering the content of the curriculum is required; c) field experiences in a wide variety of school settings prior to the internship are required.</p>	<p>Date: _____</p>