



## The University of North Carolina

GENERAL ADMINISTRATION

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Central University

North Carolina  
School of  
the Arts

North Carolina  
State University  
at Raleigh

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North Carolina  
at Asheville

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North Carolina  
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*Constituent High School*  
North Carolina  
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and Mathematics

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January 29, 2008

TO: Committee on Educational Planning Policies and Programs

FROM: Alan Mabe

SUBJECT: Report on 2+2 Online Initiative with Community Colleges

This is UNC's half of the required joint report by the NCCCS and UNC on the 2+2 Online Initiative. Once this report is approved, it will be put together with the report from the NCCCS and provided to the General Assembly.

**Part II**  
**UNIVERSITY OF NORTH CAROLINA**  
**REPORT ON USE OF 2006-07**  
**UNC-NCCCS 2+2 E-LEARNING INITIATIVE FUNDS**

January 2008

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In 2005, the General Assembly approved legislation to provide the North Carolina Community College System \$1 million (R) and the University of North Carolina \$1 million (NR) to support the UNC-NCCCS 2+2 E-Learning Initiative. The legislation (SL2005-0276, §9.5) states:

Funds appropriated in this act to The University of North Carolina and the North Carolina Community College System for the UNC-NCCCS 2+2 E-Learning Initiative shall be used to fund further development of online courses for 2+2 programs. Based on a mutually agreed upon decision by the State Board of Education Chairman, the President of the North Carolina Community College System, and the President of The University of North Carolina as to the areas of greatest need, funds are available to support joint technology development, systems to track student progress and articulation between a North Carolina community college and a University of North Carolina campus, and to develop technology to support online courses and 2+2 programs.

While in the first year of this legislation (2005) the North Carolina Community College System (NCCCS) received recurring funds and University of North Carolina received non-recurring funds, the General Assembly provided the University of North Carolina \$1 million (NR) in 2006 to continue work with the NCCCS to place more articulated degree programs online so students anywhere in the State could access them by taking the first two years online through a community college, followed by the upper-division major courses being completed through a constituent institution of the University of North Carolina.

In 2006-07, funds provided to the University of North Carolina (UNC) were directed toward the development of online secondary mathematics education courses, additional support for middle grades mathematics concentration courses, middle grades education pedagogy course development, middle grades and secondary science education course development, and 2+2 integration efforts with the University of North Carolina Online.

<b>IDENTIFIED HIGH NEED PROGRAM AREAS</b>
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The NCCCS and UNC have previously collaborated to articulate online degree programs in the areas of communication, criminal justice, liberal arts, and business, with continuing discussion of other potential areas for online articulation. Based on these previous program articulations the two systems agreed to focus the “UNC-NCCCS 2+2 E-Learning Initiative” on building online degree programs primarily in teacher education and targeting high-need licensure areas. This focus will result in full four-year articulated online degree programs accessible from anywhere in the State and can assist in increasing the number of teachers being produced for NC public school classrooms. The teacher education program areas identified for online development are as follows:

- Secondary Mathematics Education
- Secondary Science Education (specific fields and comprehensive)
- Middle Grades Education (concentrations in mathematics and in science)
- Special Education
- Elementary Education
- Birth through Kindergarten
- Biology Education

The overarching goal of this collaborative plan is to have a pre-major agreement between the Community Colleges and the University serving each identified area so that students at community colleges will know the sequence of courses that will prepare them to enter the upper-division education major.

### **UNC STRATEGY FOR ADDRESSING PRIORITY AREAS**

UNC identified two primary strategies to address the priority high-need program areas; 1) support for individual campus 2+2 development efforts in the identified areas, and 2) collaborative development effort that will enable all campuses to utilize courses developed in the areas of mathematics and science.

- **UNC Strategy 1** - In some of the identified program areas, such as, Birth to Kindergarten, Special Education, and Elementary Education, there had been a significant number of courses developed online at UNC campuses. For these areas and campuses that had a program close to being available online, funds were provided to make those programs available fully online. These programs can enroll students sooner since a smaller development effort was needed.
- **UNC Strategy 2** – In high-need areas where few or almost no courses were available online at the UNC campuses, such as in mathematics and some sciences, the strategy adopted was to jointly develop a full set of courses for these degree areas which would be available for use by any campus. As part of this arrangement one or more campuses would commit to offer the degree fully online and in articulation with the community colleges. While these courses will be developed as part of unitary degree programs, many of the courses will serve lateral entry teachers and others who hold a bachelor's degree in a subject area but who need additional course work in order to be certified.

### **UNC INITIAL DEVELOPMENT EFFORTS AND SUPPORTING INITIATIVES**

In 2005-06, East Carolina University (ECU) was funded to develop Elementary Education and Special Education; ECU was also funded to develop Birth through Kindergarten; North Carolina Agricultural & Technical State University was funded to develop Elementary Education; UNC Pembroke was funded to develop Birth through Kindergarten.

Also a focus of initial collaborative development efforts in 2005-06 was the Mathematics concentration in Middle Grades. First, faculty from Mathematics and Mathematics Education met to determine what constituted a good sequence of courses for a Middle Grades major who wanted to concentrate in Mathematics. From comprehensive list developed by the faculty,

courses were selected for online development. Following this initial step faculty from across the system were identified to develop the courses. An education pedagogy review team, consisting of faculty from across the system, was established to ensure quality review and instructional design for each course prior to being made available for all campuses to utilize. Additionally, UNC contracted development support from LEARN NC to provide instructional design and project management for this work.

The courses selected for the Middle Grades concentration in Mathematics and currently under development are:

- Calculus I (4sch)
- Calculus II (4sch)
- Numbers (3sch)
- Algebra (3sch)
- Numbers/Algebra (3sch)
- Geometry (3sch)
- Measurement (3sch)
- Geometry/Measurement (3sch)
- Data/Statistics (3sch)
- Discrete Math (3sch)

To ease the transition of community college students to upper-division online programs, an electronic portal devoted specifically to the needs of 2+2 track students was developed in 2005-06 to provide the necessary information to make the transfer process much easier. UNC in collaboration with NCCCS is committed to expanding the development of this portal for these students.

A potential source of new teachers is retired military, but there have been difficulties connecting military and their spouses to teacher education opportunities around the State. In 2005-06, an online module was developed to acquaint military personnel and their spouses with the rich educational opportunities available across the State, and to make them aware of online programs that will allow them to start working on teacher certification before they retire.

<b>UNC 2006-07 ACCOMPLISHMENTS AND CONTINUING DEVELOPMENT EFFORTS</b>
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Through the collaborative development strategy, 10 Middle Grades Mathematics concentration courses and 16 Secondary Mathematics Education courses are currently either under development or have been completely developed in an online format by mathematics and mathematics education faculty across the system. Of these courses, 2 (geometry and algebra) were offered online in fall 2007; 3 (number theory, mathematics methods I, and history of mathematics) are being offered online spring 2008; and 8 of the courses are currently being reviewed by the 2+2 pedagogy team and will be offered online in the summer and fall terms 2008. The remaining courses are still under development and will begin pedagogical review in the spring and summer terms 2008.

**Secondary Mathematics Education Course Sequence**

Courses selected for the Secondary Mathematics Education degree are:

- Calculus I (4sch)
- Calculus II (4sch)
- Calculus III (4sch)
- Linear Algebra (3sch)
- Modern Algebra (3sch)
- Geometry – primarily Euclidian, axiomatic, and proof oriented (3sch)
- History of Math (3sch)
- Differential Equations (3sch)
- Proof and Number Theory (3sch)
- Statistics II – calculus/probability based (3sch)
- Computer Science (3sch)
- Mathematical Modeling (3sch)
- Discrete Math I (3sch)
- Discrete Math II (3sch)
- Teaching Methods I (3sch)
- Teaching Methods II (3sch)

In addition to addressing Secondary Mathematics Education in 2006-07, the course sequences for a Middle Grades Science concentration and Secondary Science Education were identified with initial coordination and development efforts beginning for this content area.

### **Middle Grades Science Concentration Course Sequence**

Courses selected for the Middle Grades concentration Science are:

- Chemistry I (3sch) & Lab (1sch)
- Conceptual Physics (3sch) & Lab (1sch)
- Basic Physical Geology (3sch) & Lab (1sch)
- Earth Systems - (3sch) & Lab (1sch)
- Astronomy (3sch) & Lab (1sch)
- Environmental/Ecology (3sch) & Lab (1sch)
- Human Biology
- General Biology I (3sch) & Lab (1sch)
- Genetics (3sch) & Lab (1sch)
- Science Methods for Middle Grades I - integrated lab course
- Science Methods for Middle Grades II - integrated lab course

### **Secondary Science Education Course Sequence**

Courses selected for the Secondary Science Education degree are:

- Chemistry I (3sch) & Lab (1sch)
- Chemistry II (3sch) & Lab (1sch)
- Organic Chemistry I (3sch) & Lab (1sch)
- Organic Chemistry II (3sch) & Lab (1sch)
- Quantitative Analysis (3sch) & Lab (1sch)
- Physical Chemistry I (3sch) & Lab (1sch)
- Inorganic Chemistry (3sch) & Lab (1sch)
- Biochemistry (3sch) & Lab (1sch)
- Physics I – (3sch) & Lab (1sch)

- Physics II – (3sch) & Lab (1sch)
- Basic Physical Geology (3sch) & Lab (1sch)
- Historical Geology (3sch)
- Meteorology & Climatology Combination (3sch) & Lab (1sch)
- Earth Systems - (3sch) & Lab (1sch)
- Oceanography (3sch) & Lab (1sch)
- Astronomy (3sch) & Lab (1sch)
- General Biology I (3sch) & Lab (1sch)
- General Biology II (3sch) & Lab (1sch)
- Genetics (3sch) & Lab (1sch)
- Ecology (3sch) & Lab (1sch)
- Environmental Studies (3sch)
- Cellular and Molecular (3sch) & Lab (1sch)
- Secondary Science Methods I – integrated lab course
- Secondary Science Methods II – integrated lab course

Funding was also provided in 2006-07 to Western Carolina University and East Carolina University to develop the Middle Grades Education pedagogy courses that will complement the Middle Grades Mathematics and Science concentration courses for this degree program area. As part of this arrangement, these campuses have agreed to utilize the collaboratively developed concentration courses in Mathematics and Science to offer the degree fully online and in articulation with the community colleges.

UNC also directed a small portion of funding in 2006-07 toward the integration of online 2+2 degree program development with the University of North Carolina Online and the ongoing enhancement of the transfer articulation module developed 2005-06.

<b>UNC 2006-07 BUDGET FOR DEVELOPMENT AND SUPPORTING EFFORTS</b>
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LINE	ITEM	AMOUNT
1	UNC CH LEARN NC <ul style="list-style-type: none"> <li>▪ Middle Grades Education and Secondary Science Education Course Development</li> <li>▪ Expanded Support for Middle Grades Education and Secondary Math Education Course Development</li> </ul>	\$604,197
2	Western Carolina University <ul style="list-style-type: none"> <li>▪ Middle Grades Education Pedagogy Course Development</li> </ul>	\$212,450
3	East Carolina University <ul style="list-style-type: none"> <li>▪ Middle Grades Education Pedagogy Course Development</li> </ul>	\$120,450
4	2+2 Integration Efforts with University of North Carolina Online	\$62,903
5	Total	\$1,000,000

Note: With the exception of the 2+2 integration efforts with the University of North Carolina Online, all of the funds provided to the University of North Carolina were directed toward course and program development to support online 2+2 programs in teacher education.

## UNC FUTURE STEPS FOR CONTINUED DEVELOPMENT AND IMPLEMENTATION

Future steps for continued development and implementation of the “UNC-NCCCS 2+2 E-Learning Initiative” will involve collaborative inter-institutional accessibility of the courses through the University of North Carolina Online, including establishing a timeline and process for continued rotation of pedagogical and content review directed at ensuring the online courses maintain standards of high quality.

Additionally, UNC will take steps to develop systems to track student progress and articulation between a North Carolina Community College and a UNC institution. In doing so, UNC will seek to forge partnerships with the Duke Data Center, NC Department of Public Instruction, and others such as the Frank Porter Graham Child Development Institute at UNC Chapel Hill to conduct research and data analysis regarding teacher quantity and quality and its impact on K16 education in North Carolina, particularly as it relates to student progress and articulation between North Carolina community college campuses and University of North Carolina Institutions.

UNC will continue development effort with the primary list of courses in Middle Grades Science and Mathematics concentrations, Secondary Mathematics, and Secondary Science. In addition to these, UNC will expand the list of Secondary Science courses to include upper-level concentration sequence courses.

### **Expanded Secondary Science Education Courses:**

The expanded course list for Secondary Science Education is:

- Mechanics
- Electricity and Magnetism
- Thermodynamics
- Quantum Mechanics
- Optics
- Hydrology
- Rocks and Minerals
- Structural Geology
- Geomorphology
- Plant Biology
- Animal Biology
- Plant Physiology
- Animal Physiology
- Evolutionary Biology
- Organismal Biology
- Micro Biology

List of alternative courses to add laboratories:

- Historical Geology
- Environmental Studies

## Conclusion

This work in online course development for high need teacher education areas is going well and we are nearing the end of the development of the full curriculum for mathematics secondary and

middle grades mathematics concentration. As part of our quality control process we do not consider the course fully developed for online use until it has been reviewed by a pedagogy team and has been taught once by the developer and modified if needed based on the teaching experience. The level of faculty cooperation across institutions is to be applauded in this important initiative.

We are in the start up phase of developing the sciences courses which are complicated by the presence of labs that typically are taught on site. We are carefully exploring how to develop labs that provide the kinds of experiences the science faculty at our institutions expect from science students. The success with developing mathematics courses for mathematics teacher education has generated a strong confidence that success can be realized with the challenges presented by offering online science courses and labs.

The availability of these programs online will not only address the quantity and quality of the preparation of prelicensure teachers, but the courses or parts of the course will be available for professional development of mathematics and sciences teachers across the State.