UNC CHARLOTTE

To:	**College Curriculum Committee**
From:	**Matthew Eastin, Manda Adams, Walter Martin & Terry Shirley** **Department of Geography and Earth Sciences**
Date:	**October 21, 2009**
Re:	**Revision of the degree requirements for a B.S. in Meteorology.**

SUMMARY:

The Department of Geography and Earth Sciences proposes to revise the degree requirements for a B.S. in Meteorology in the following manner:

1. Require METR 3210 Atmospheric Thermodynamics
2. Require MATH 2241 Calculus III
3. Require ITCS 1212 and 1212L Introduction to Computer Science
4. Remove the requirement for ETME 3143 Thermodynamic
5. Remove the requirement for ETME 3133 Fluid Mechanics
6. Remove the requirement for ESCI 4600 Earth Sciences Seminar
7. Change ESCI 3105 Oceanography from a required upper-division course to an elective.
8. Add the following courses to the elective list:

   ESCI 4155 Fluvial Processes
   GEOG 2103 Elements of GIScience & Technologies
   GEOG 3215 Environmental Planning (W)
   GEOG 4120 Fundamentals of GIS
   GEOG 4131 Environmental Modeling with GIS

9. Increase the number of required elective course hours from 7 to 9
10. Change METR 3240 Boundary Layer Meteorology (currently a 4-credit course with both lecture and laboratory components) to a 3-credit, 4000-level course without the laboratory component (METR 4240 Boundary Layer Meteorology)
11. Change course descriptions and pre-requisites for several METR courses

Given the increased number of majors in the B.S. Meteorology program (approximately 96 in this, the fourth year of the degree), the undergraduate curriculum needs additional coursework and flexibility to better prepare students for the wide variety of meteorology-related careers. Students would be best served by expanding and changing the course requirements to include more advanced meteorology, math, computer science, geography, and earth science courses. The proposed revisions to the degree requirements will serve that need.

LONG SIGNATURE SHEET

Proposal Number: _____

Proposal Title _____

_____

Originating Department _____

TYPE OF PROPOSAL: UNDERGRADUATE_____ GRADUATE_____ UNDERGRADUATE & GRADUATE____

DATE RECEIVED	DATE CONSIDERED	DATE FORWARDED	ACTION	SIGNATURES
				DEPARTMENT CHAIR
				COLLEGE CURRICULUM COMMITTEE CHAIR
				TEACHER EDUCATION COMMITTEE CHAIR (Teacher Education Program proposals only)
				COLLEGE FACULTY CHAIR
				COLLEGE DEAN
				UNDERGRADUATE COURSE & CURRICULUM COMMITTEE CHAIR (for undergraduate courses)
				GRADUATE COUNCIL CHAIR (for graduate courses)
				FACULTY GOVERNANCE SECRETARY (noting Faculty Council approval on Consent Calendar)
				FACULTY EXECUTIVE COMMITTEE (if decision is appealed)

Revised 4/08/03
OAA/jdp

University of North Carolina at Charlotte **METR 10-21-2009**
Revised Undergraduate Degree Requirements
Course and Curriculum Proposal from the Department of Geography and Earth Sciences

TITLE: *Revision of the degree requirements for a B.S. in Meteorology*

A. PROPOSAL SUMMARY AND CATALOG COPY:

1. SUMMARY:

The Department of Geography and Earth Sciences proposes to revise the degree requirements for a B.S. in Meteorology in the following manner:

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Given the increased number of majors in the B.S. Meteorology program (approximately 96 in this, the fourth year of the degree), the undergraduate curriculum needs additional coursework and flexibility to better prepare students for the wide variety of meteorology-related careers. Students would be best served by expanding and changing the course requirements to include more advanced meteorology, math, computer science, geography, and earth science courses. The proposed revisions to the degree requirements will serve that need.

2. PROPOSED CATALOG COPY:

BACHELOR OF SCIENCE IN METEOROLOGY

The primary goal of the Bachelor of Science in Meteorology is to advance our understanding of the atmospheric processes that influence weather and climate. This pursuit inherently involves an interdisciplinary approach through the combination of advanced coursework in mathematics, chemistry, physics, statistics, computer science, geology, earth science, and meteorology with emphasis on recent basic and applied research. The program is designed to provide the next generation of meteorologists with sufficient knowledge and skills to (a) effectively monitor and analyze the atmospheric state across a spectrum of temporal and geospatial scales; (b) provide accurate and timely forecasts of ordinary and severe weather; and (c) address relevant contemporary challenges such as global and region climate change, human interactions with the natural environment, and the development of sustainable communities. To this end, the core meteorological curriculum is composed of courses that collectively provide a broad treatment of multi-scale atmospheric processes, including atmospheric thermodynamics and physics as well as synoptic, dynamic, and mesoscale meteorology. The major comprises a minimum of 70 total hours with 31 hours of required departmental courses, 9 hours of elective departmental courses, and 30 hours of required extra-departmental courses. An outline of the program appears below. Students are also encouraged to take additional coursework in related disciplines. Students enrolled in the program must complete a total of 120 hours, and fulfill the general education requirements applicable to all baccalaureate degrees at UNC Charlotte. Consult the Department of Geography and Earth Sciences for a suggested schedule to complete a B.S. degree in Meteorology.

Required Courses (31 hours)

ESCI	1101	Earth Sciences – Geography (3)
ESCI	1101L	Earth Sciences – Geography Lab (1)
GEOL	1200	Physical Geology (3)
GEOL	1200L	Physical Geology Lab (1)
METR	3140	Introduction to Meteorology and Climatology (3)
METR	3210	Atmospheric Thermodynamics (3)
METR	3220	Physical Meteorology (3)
METR	3245	Synoptic Meteorology (4)
METR	3250	Dynamic Meteorology (4)
METR	4245	Advanced Synoptic Meteorology (3)
METR	4250	Advanced Dynamic Meteorology (3)

Elective Courses (Select 9 hours)

ESCI	3105	Oceanography (3)
ESCI	4140	Hydrological Processes (4)
ESCI	4155	Fluvial Processes (4)
ESCI	4170	Fundamentals of Remote Sensing (4)
ESCI	4180	Advanced Remote Sensing (4)
GEOG	2103	Elements of GIScience & Technologies (4)
GEOG	3215	Environmental Planning (W) (3)
GEOG	4120	Fundamentals of GIS (4)
GEOG	4131	Environmental Modeling with GIS (4)
METR	3252	Weather Analysis Laboratory (1)

METR	3330	Forecasting (3)
METR	3340	Weather Communications (3)
METR	4150	Applied Climatology (W) (3)
METR	4240	Boundary Layer Meteorology (3)
METR	4320	Tropical Meteorology (3)
METR	4350	Mesoscale Meteorology (3)

Required Extra-Departmental Courses (30 hours)

CHEM	1251	Principles of Chemistry (3)
CHEM	1251L	Principles of Chemistry Lab (1)
ITCS	1212	Introduction to Computer Science (3)
ITCS	1212L	Introduction to Computer Science Lab (0)
MATH	1241	Calculus I (3)
MATH	1242	Calculus II (3)
MATH	2171	Differential Equations (3)
MATH	2241	Calculus III (3)
PHYS	2101	Physics for Science I (3)
PHYS	2101L	Physics for Science I Lab (1)
PHYS	2102	Physics for Science II (3)
PHYS	2102L	Physics for Science II Lab (1)
STAT	2122	Introduction to Probability and Statistics (3)

COURSE DESCRIPTIONS:

METR 3140 Introduction to Meteorology & Climatology (3) Prerequisite: ESCI 1101-1101L, or permission of instructor. Fundamental physical principles of weather and climate. Analysis of short and long term atmospheric behavior are introduced. Topics include solar radiation, temperature, moisture, wind and pressure, synoptic systems, regional climates, paleoclimates, climatic change, and applied climatology. (Fall)

METR 3210 Atmospheric Thermodynamics (3) Prerequisites: METR 3140 with a grade of C or better and MATH 1241, or permission of instructor. The study of the physical processes associated with atmospheric thermodynamics and stability. Topics include: atmospheric composition, equation of state, hydrostatics, first and second laws of thermodynamics for dry, moist, and saturated air, atmospheric stability, parcel buoyancy, and thermodynamic diagrams. Three hours of combined lecture and lab per week. (Spring)

METR 3220 Physical Meteorology (3) Prerequisite: METR 3210 with a grade of C or better, or permission of instructor. Properties of aerosols and clouds, cloud nucleation and precipitation processes, and atmospheric electricity. Principles of atmospheric radiation, radiative transfer, and radar meteorology. Three hours of combined lecture and lab per week. (Fall)

METR 3245 Synoptic Meteorology (4) Prerequisite: METR 3210 with a grade of C or better, or permission of instructor. Principles of meteorological analysis; fundamental concepts of meteorology, thermodynamics, and kinematics are integrated to understand the structure and evolution of mid-latitude cyclones and fronts. Three hours of lecture and one three-hour lab per week. (Fall)

METR 3250 Dynamic Meteorology (4) Prerequisites: METR 3245 with a grade of C or better, MATH 1242, and PHYS 2101, or permission of instructor. Principles of atmospheric dynamics including the equations of motion, circulation, vorticity, divergence, balanced and unbalanced flows, and the general circulation. Three hours of lecture and one three-hour lab per week. (Spring)

METR 3252 Weather Analysis Laboratory (1) Prerequisites or Corequisites: METR 3245 and permission of instructor. Topics related to atmospheric observation, data collection, analysis, and techniques of weather forecasting. May be repeated for credit. (On demand)

METR 3330 Weather Forecasting (3) Prerequisite: METR 3245, or permission of instructor. This course will focus on weather forecasting: real-time, short-term, and long-term. Verification techniques will be studied. Three hours of combined lecture and lab per week. (Spring, On demand)

METR 3340 Weather Communications (3) Prerequisite or Corequisite: METR 3245, or permission of instructor. A survey of the field of weather communications covering weather forecasting principles, television and radio broadcasting, science writing, forensic meteorology, and forecasting for business applications. Three hours of combined lecture and lab per week. (Fall, On demand)

METR 4000 Selected Topics in Meteorology (1-4) Prerequisite: METR 3140, or permission of the instructor. In-depth treatment of specific topics selected from meteorology. May be repeated for credit as topics vary. (On demand)

METR 4150 Applied Climatology (3) (W) Prerequisite: METR 3250, or permission of instructor. Methods of acquiring and analyzing climactic data in various types of applied problems. Emphasis on methods to assess and reduce the impact of weather and climate upon human activities. Three hours of combined lecture and lab per week. (Spring)

METR 4240 Boundary-Layer Meteorology (3) Prerequisite: METR 3210, or permission of instructor. Examines the flow of mass, energy, and moisture within the planetary boundary layer including their exchange at the earth's surface and theories of interaction. Principles of air pollution including sources, sinks, and controls. Interaction of the atmosphere with underlying surfaces (i.e. soils, vegetation, oceans, glaciers). Design and operation of instruments used to monitor the atmosphere with an emphasis on practical application. Three hours of combined lecture and lab per week. (Fall, On demand)

METR 4245 Advanced Synoptic Meteorology (3) Prerequisite: METR 3250 with a grade of C or better, or permission of instructor. An integrated view of synoptic and dynamic meteorology focusing on advanced conceptual models and analysis techniques for mid-latitude weather systems and regional precipitation events. Three hours of combined lecture and lab per week. (Fall)

METR 4250 Advanced Dynamic Meteorology (3) Prerequisites: METR 3250 with a grade of C or better, MATH 2171, and MATH 2241, or permission of instructor. An in-depth examination of atmospheric dynamics, focusing on the structure and evolution of synoptic and mesoscale weather systems, wave dynamics (Rossby, topographic, inertia-gravity, etc.), scale-analysis, non-dimensional numbers, and atmospheric modeling. Three hours of combined lecture and lab per week. (Fall)

METR 4320 Tropical Meteorology (3) Prerequisite: METR 3250, or permission of instructor. A comprehensive study of the tropical atmosphere, including climatology, mean structure and circulation, air-sea energy exchange, cumulus transport, synoptic waves, and tropical storms. Special attention is paid to the formation, evolution, motion, and societal impacts of hurricanes. Three hours of combined lecture and lab per week. (Fall, On demand)

METR 4350 Mesoscale Meteorology (3) Prerequisite or Corequisite: METR 3250, or permission of instructor. A comprehensive study of the structure, evolution, and dynamics of atmospheric phenomena having spatial scales between 2 and 2000 km. Topics include: fronts, convective initiation, mesoscale convective systems, severe thunderstorms, tornadoes, low-level jets, drylines, land-sea breezes, shallow convection, and terrain effects. Three hours of combined lecture and lab per week. (Spring, On demand)

METR 4400 Internship in Meteorology (3-6) Prerequisite: Permission of the department. Research and/or work experience designed to be a logical extension of a student's academic program. The student must apply to department for an internship by submitting a proposal which specifies the type of work/research experience preferred and how the internship will complement his or her academic program. The department will attempt to place the selected students in cooperating community organizations to complete specified research or work-related tasks which are based on a contractual arrangement between the student and community organization. The student can receive three to six hours credit, depending on the nature and extent of the internship assignment. (On demand)

METR 4800 Individual Study in Meteorology (1-4) Prerequisite: Permission from the department and credit hours established in advance. Tutorial study or special research problems. The student must request permission for independent study from an individual faculty member. May be repeated for credit as topics vary. (On demand)

B. JUSTIFICATION:

1. NEEDS ADDRESSED: Several events have encouraged the proposed revision to the Bachelor of Science Program in Meteorology. First and foremost, the majority of graduates with a B.S. in Meteorology are either employed by the federal government, broadcast communication companies, or private firms. These organizations utilize the minimum curriculum requirements set forth by the American Meteorological Society (AMS) for employment of a meteorologist. **The AMS recently updated these requirements and will soon begin an *accreditation* process for all B. S. Meteorology programs based on these new requirements.** Second, the recent addition of two tenure-track faculty and one lecturer has lead to the addition of five new courses to the meteorology program. Four of these courses (METR 3330, 3340, 4320, and 4350) greatly expand the elective course offerings, providing students greater options and better preparation for the wide spectrum of meteorology careers. The fifth course (METR 3210) provides fundamental instruction on thermodynamics with a much needed focus on *atmospheric* processes. Finally, many enrolled and prospective students inquire about coursework appropriate for careers in weather forecasting, broadcast meteorology, climatology, and air quality as well as for graduate study preparation. While most students are receptive to the current requirements of the major, these students would be better served by requiring courses with a greater focus on fundamental atmospheric processes, requiring additional coursework in

mathematics and computer science, and increasing the number of elective courses. Thus, the proposed curriculum changes satisfy the new AMS requirements for accreditation, incorporate the new courses with a greater focus on fundamental atmospheric processes, and provide maximum flexibility for students to tailor their degree program.

At this time, ETME 3133 and ETME 3143 are required extra-departmental courses. However, the same basic concepts taught in these courses (with an emphasis on engines and flow through pipes) are also taught in METR 3210, METR 3250, and METR 4250 (but with an emphasis on the atmosphere). The proposed addition of METR 3210 to (and the removal of ETME 3133 and 3143 from) the required course list eliminates repetition within the program, provides greater focus on relevant atmospheric processes, and streamlines the number of required courses. These changes also help permit an increase in the number of elective courses without significantly changing the overall total hours required for by the program.

The minimum curriculum requirements recently updated by the AMS highly recommend a third semester of calculus as well as a lab-based computer science course. The addition of MATH 2241 and ITCS 1212 satisfy these recommendations, and allow our graduates to remain highly competitive for the full spectrum of career opportunities and graduate programs.

ESCI 4600 is designated as an oral communication (O) course, and at this time serves as the means by which meteorology majors satisfy this general education requirement. Its proposed removal from the required course list will provide greater opportunities for our majors (particularly those interested in a broadcast meteorology career) to satisfy the oral communication requirement and effectively improve their communication skills.

At this time, ESCI 3105 is a required upper division course. However, the updated AMS guidelines recommend the course as an elective. The proposed change of moving ESCI 3105 to the list of elective courses brings the UNCC Meteorology program more inline with the AMS guidelines. This change also helps permit the increase in the number of elective courses without significantly changing the overall total hours required by the program.

Many employers in the private and non-traditional sectors of meteorology desire employees with basic knowledge and familiarity of computer software that can easily integrate meteorological data with geographical databases. The addition of GEOG 2103, 4120, and 4131 to the elective course list provides students interested in such careers with the desired skills.

There is also an ongoing trend by emergency management organizations (such as FEMA) and environmental monitoring firms to integrate physical and social scientists into their environmental planning and disaster mitigation efforts (such as those related to floods or hurricanes). The addition of GEOG 3215 to the elective course list provides students interested in such careers with these desired skills.

Finally, the recent of addition of Dr. Manda Adams to our faculty has motivated the proposed change of the METR 3240 Boundary Layer Meteorology (currently listed as a 4-credit course with both lecture and laboratory components) to a 3-credit, 4000-level course without a laboratory component (METR 4240 Boundary Layer Meteorology). Dr. Adams is an expert in the exchange of mass and energy between the atmosphere and the underlying surface with research emphases on both flow through complex terrain and the impacts of wind energy production (i.e. electricity for human consumption) on atmospheric structure - such topics are

inherently boundary layer meteorology. Thus, Dr. Adams plans to resurrect the course (it has not been taught for a number of years due to personnel changes) and expand its content to include the more advanced topics of instrumentation, surface interactions, and air pollution. We are also proposing additional prerequisites (METR 3210) to those associated with the current catalog description (METR 3140 and MATH 1241 – both of which are now proposed prerequisites for METR 3210). In our opinion, such content changes merit a course number increase to the 4000-level. Furthermore, Dr. Adams feels that the re-organized course would not benefit from a laboratory component, and thus we are proposing its removal with a reduction in credit hours from four to three. An example syllabus for the course is attached. Such changes will provide students with exposure to advanced topics that are becoming critical components of contemporary boundary layer meteorology and environmental science.

2. PREREQUISITES AND COREQUISITES: Several events have also motivated revisions to several course prerequisites. The rationale for each revision is outlined below, and the revisions are incorporated into the catalog course descriptions listed above. First, many fundamental concepts and methods introduced in METR 3210 require the application of elementary calculus, and thus MATH 1241 has been included as a prerequisite. Second, the proposed addition of METR 3210 to the degree requirements alters the course sequence by which our majors should progress through the program for effective concept and application development within the required meteorology courses. Thus, the prerequisites for METR 3220, and 3245 have been altered accordingly. Likewise, the prerequisites for METR 3250, 4245, 4240, 4250, 4320, and 4350 have been altered to reflect this more structured progression while remaining consistent with when elective courses are offered. Third, fundamental concepts introduced in METR 3250 are extensions of classic physics developed through the application of differential and integral calculus, and thus MATH 1242 and PHYS 2101 have been included as prerequisites. Fourth, the atmospheric processes and wave dynamics taught in METR 4250 requires application of three-dimensional vector calculus and differential equations, and thus MATH 2171 and 2241 have been included as prerequisites. Fifth, the meteorology program has been experiencing rapid growth in majors. Continued growth at the current rate will be impossible without a significant increase in resources (e.g. additional faculty to teach multiple sections, physical space, computers, etc.). The proposed requirement of "a grade of C or better" in the METR prerequisites for METR 3210, 3220, 3245, 3250, 4245, and 4250 (i.e. the required courses) is anticipated to stabilize program numbers while increasing the academic rigor. In particular, such a grade requirement will ensure greater mastery of required material before students can advance to the next course in the sequence, which will increase the overall quality of our graduates. Finally, all METR course descriptions have been modified to accurately reflect the course material in a manner consistent with the updates AMS guidelines, and to correct several inconsistencies as to when and how frequent each required and elective course is offered.

3. CONSISTENCY OF COURSE NUMBERING: With the exception of changing METR 3240 to METR 4240 (as outlined above), no additional renumbering of courses will be required.

4. IMPROVEMENT: This proposal improves the department's offerings for meteorology undergraduate students. This proposal would result in steady enrollment numbers in all meteorology courses with no added sections. The combination of coursework with a greater focus on atmospheric processes, an increase in the number of elective courses, and additional coursework in mathematics and computer science will not only strengthening the overall

instruction and quality of program but also provide a more opportunities for students to tailor their meteorology degree and better prepare for their intended career within meteorology.

C. IMPACT:

1. GROUP(S) SERVED: Undergraduate majors in the B.S. Meteorology program will be served by this proposal. A small number of majors in the B.S. Earth Science program (~5 per year) will also be impacted, since the Boundary Layer Meteorology course is an elective for that program. However, the restructured course will include greater focus on mass and energy exchange between the earth and atmosphere, and thus better serve these students.

2. EFFECT ON EXISTING COURSES AND CURRICULA:

- **a.** No new courses are proposed. The restructured Boundary Layer Meteorology course will be taught in the fall, on demand.
- **b.** The proposed changes will not impact the frequency of any METR, ESCI, or GEOG course offerings. Likewise, the ETME, ITCS, and MATH courses are large lecture sections where enrollment increase/decreases of 10-25 students per year (see below) should not impact their offering frequency. No content changes to existing courses are expected – the changes in METR course descriptions are designed to simply update old descriptions in a manner consistent with contemporary content. Overall, the changes will stabilize enrollment numbers in all meteorology courses with no added sections. Furthermore, the proposal will bring the program in line with the pending AMS accreditation guidelines, and increase the overall program quality.
- **c.** No new courses are proposed. The expected enrollment in the restructured Boundary Layer Meteorology course will be 10-15 students per year (when taught).
- **d.** Enrollment numbers for ETME 3133 and ETME 3143 are expected to decrease as ~25 meteorology majors per year will no longer be taking these courses. In contrast, enrollments numbers for ITCS 1212 and MATH 2241 are expected to increase due to the addition of ~25 meteorology majors per year. The affected departments are agreeable to these changes. We do not anticipate a significant impact on the enrollments in ESCI 3105 or ESCI 4600 (decreases will be < 10 per year), as many students will continue to select these courses to complete their major elective and oral communication requirements. Likewise, we do not expect significant enrollment increases in ESCI 4155, GEOG 2103, GEOG 3215, GEOG 4210, or GEOG 4131 (increases will be ~5 per year) as many students already take these courses to fulfill their writing communication requirement and/or expand their skills. Enrollments in all METR courses should stabilize in response to the additional, more rigorous, prerequisites (i.e. program growth will be offset by fewer weak students advancing through the major). These projections were determined by evaluating the transcripts of current majors and alumni since the program's inception.
- **e.** The restructured Boundary Layer Meteorology course is being taught as a topics course [METR 4000 / ESCI 5000 Boundary Layer Meteorology (3)] for the first time this semester (Fall 2010). Total enrollment is 17 students, consisting of 11 undergraduate meteorology majors, 2 undergraduate earth science majors, and 4 earth science graduate students. Mid-course feedback from students suggests the proposed course structure is effective for all.

f. The degree requirements for the Bachelor of Science in Meteorology as well as the METR course descriptions and prerequisites will be affected in the catalog. A catalog copy congruent with the proposed changes is shown above.

D. RESOURCES REQUIRED TO SUPPORT PROPOSAL:

1. PERSONNEL: None. The needed faculty and staff are on hand to teach the existing and restructured courses without increases to teaching loads.
2. PHYSICAL FACILITY: None. All required classrooms and computer labs to teach the existing and restructured courses already exist within the McEniry Building.
3. EQUIPMENT AND SUPPLIES: None. All required equipment and supplies are either on hand or can easily be purchased with the Department's annual operating or lab fee budget.
4. COMPUTER: None. The meteorology computer laboratory (McEniry 203) was recently upgraded from 14 to 19 Linux machines. This upgrade can accommodate all proposed curricular changes and restructured courses at existing and projected enrollment numbers.
5. AUDIO-VISUAL: None. The existing computer labs and "smart" classrooms in the McEniry Building
6. OTHER RESOURCES: None. No additional resources for travel, communication, or publishing are required to support the proposed curricular changes.
7. SOURCE(S) OF FUNDING: None. No additional funding is required to support this proposal.

E. CONSULTATION WITH THE LIBRARY AND OTHER DEPARTMENTS OR UNITS:

1. LIBRARY: Consultation with Atkins Library was initiated by email on 2 October 2009, and the library reference staff confirmed that the holdings are sufficient to support this proposal (see attachment).
2. OTHER DEPARTMENTS: Consultations with the Departments of Engineering Technology and Construction Management, Mathematics and Statistics, and Computer Science were initiated by email on 2 October 2009, and each department is agreeable to the proposed changes (see attachments).

F. INITIATION AND CONSIDERATION OF THE PROPOSAL:

1. ORIGINATING UNIT: This proposal was initiated in August 2009 soon after Dr. Manda Adams was hired and arrived on campus. The proposal was passed unanimously by the Geography and Earth Science faculty on 20 November 2009. The department planned to submit the proposal to the CLAS Curriculum Committee in February 2010, but internal communication challenges resulted in an October 2010 submission.
2. OTHER CONSIDERING UNITS: Besides consultation with the Library and other departments (outlined above), no action by other units was required.

G. ATTACHMENTS:

Letter of Support from the Department of Engineering Technology and Construction Management
Letter of support from the Department of Mathematics and Statistics
Letter of Support from the Department of Computer Science
Course Syllabus for METR 4240 Boundary Meteorology

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Subject: Curriculum revisions to Meteorology Program
From: Eastin, Matthew
Sent: Fri. 10/2/2009 7:04 AM
To: Brizendine, Tony

Good morning Tony,

The Department of Geography and Earth Sciences is in the process of revising the degree requirements for the Bachelor of Science in Meteorology. Currently, majors are required to take ETME 3133 Fluid Mechanics and ETME 3143 Thermodynamics taught within your department. We are proposing to remove this requirement, and we wish to consult with your department concerning this change.

We anticipate the impact on your department will be a reduction of ~25 students per academic year in each course. This impact will likely take affect during the next academic year (2010-2011). Our rationale is as follows: The recent addition of new faculty have allowed a new course to be developed (METR 3210 Atmospheric Thermodynamics) and two current courses (METR 3250 Dynamic Meteorology and METR 4250 Advanced Dynamics Meteorology) to be revised in a manner that covers many similar fundamental topics, but with an emphasis on *atmospheric* processes.

We would appreciate your support of these revisions to the BS in Meteorology. I would be happy to answer any questions you may have about these changes.

Have a great day,

Matt

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Subject: RE: Curriculum revisions to Meteorology Program
From: Tony Brizendine
Sent: Fri. 10/2/2009 7:11 AM
To: Eastin, Matthew
Cc: Byars, Nan; Coowar, Rosida

Good morning Matt,

Once again, our Department offers its support to curriculum revisions from your program. I am pleased to hear of your recent faculty additions, and would welcome potential collaborations in research and scholarship between our Departments where opportunities might present themselves in the future.

Good luck moving forward!

Best regards,
Tony

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Anthony L. Brizendine, PhD, PE
Chair & Professor, Engineering Technology & Construction Management
University of North Carolina at Charlotte
tele: 704-687-2305
fax: 704-687-6653

email: albrizen@uncc.edu
web: www.et.uncc.edu

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Subject: Curriculum revisions to Meteorology Program
From: Eastin, Matthew
Sent: Fri. 10/2/2009 7:05 AM
To: Dow, Alan

Good morning Alan,

A few years ago, we started a Bachelors of Science in Meteorology, and it's been rather successful (almost 100 majors as we enter our fourth year). We are now revising our curriculum, and we think it would be a good idea to require our majors to take MATH 2241 Calculus III. This change would increase the course enrollment by ~25 students per year.

Would the Department of Mathematics and Statistics be agreeable to have MATH 2241 as a requirement for the B.S. in Meteorology?

Best regards,

Matt Eastin

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Subject: RE: Curriculum revisions to Meteorology Program
From: Dow, Alan
Sent: Fri. 10/2/2009 9:03 AM
To: Eastin, Matthew
Cc: Harris, Kim; Kazemi, Mohammad; Dow, Alan

Hi Matthew,

Thanks for the message.

We are completely in agreement with the introduction of Math 2241 as a requirement in the Meteorology program (both philosophically and in commitment to support).

We look forward to the students enrolling in the class (and then luring them into a double major in Math!!)

All the best,
Alan

Alan Dow, Ph.D. | Professor of Mathematics UNC Charlotte | Dept. of Mathematics and Statistics
9201 University City Blvd. | Charlotte, NC 28223
Phone: 704-687-4560 | Fax: 704-687-6416

adow@uncc.edu | http://www.math.uncc.edu

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Subject: Curriculum revisions to Meteorology Program
From: Eastin, Matthew
Sent: Fri. 10/2/2009 7:04 AM
To: Ribarsky, William

Good morning William,

A few years ago, we started a Bachelors of Science in Meteorology, and it's been rather successful. We are now revising our curriculum, and we think it would be a good idea to require our majors to take ITCS 1212 Introduction to Computer Science (including its lab component). This change would increase the course enrollment by ~25 students per year.

Would the Computer Science Department be agreeable to have ITCS 1212 as a requirement for the B.S. in Meteorology?

Best regards,

Matt

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Subject: ITCS 1212
From: Osborne, Lynne
Sent: Wed. 10/14/2009 4:23 PM
To: Eastin, Matthew

Hi Matt,

You called me earlier today and I am assuming you wanted to ask about the proposal of adding ITCS 1212 as a requirement for the BS in Meteorology. Dr. Ribarsky has confirmed that Computer Science does support this proposal.

Thanks!

Lynne

Lynne Osborne **|** Administrative Assistant to the Chair
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transmission is strictly prohibited. If you have received this transmission in error, please notify me immediately by reply e-mail or by telephone at 704-687-8565. Thank you.

METR 4240 / ESCI 5240
BOUNDARY LAYER METEOROLOGY
FALL 2011

Place and Times: McEniry 203, Monday / Wednesday at 2:00 - 3:15 pm

Prerequisite: METR 3210 or permission of the instructor

Instructor: Dr. Manda Adams
McEniry 232
704-687-5984
manda.adams@uncc.edu

Office Hours: Tuesday / Thursday 10:00 – 11:00 pm or by appointment

Required Texts: An Introduction to Boundary Layer Meteorology
Roland S. Stull
Kluwer Academic Publishers

Air Pollution Meteorology and Dispersion
S. Pal Arya
Oxford University Press

Course Description: This course examines the flow of mass, energy, and moisture within the planetary boundary layer including their exchange at the earth's surface and theories of interaction. Principles of air pollution, including sources, sinks, and controls, will also be explored, as will the interaction of the atmosphere with underlying surfaces (such as soils, vegetation, oceans, and glaciers). Finally, the course will examine the design and operation of instruments used to monitor the atmosphere with an emphasis on practical application.

Course Objectives:

1. Gain a basic understanding of the structure and evolution of the planetary boundary layer including interactions and exchanges between the atmosphere and a variety of underlying surfaces.
2. Gain a basic understanding of air pollution including its societal impacts.
3. Develop sufficient knowledge to effectively analyze and interpret observations collected by standard boundary layer instrumentation.
4. Learn to think critically about scientific research presented in professional journals as well as the continuum of modern media.

Course Policies:

Attendance, Participation and Due Dates: Regular class attendance and active participation is expected. You are responsible for all information presented in class; if you are absent, you will need to consult the online course management system (Moodle) or contact a classmate to obtain the material.

Assignment Deadlines and Exam Dates: I expect you to turn in assignments and take exams as scheduled - except due to extraordinary circumstances or participation in a university sanctioned event. I will not accept late assignments. If you know you will not be in class on the due date, turn the assignment in early. Exams will occur as scheduled and there are no make-up exams. If you miss an exam for what you believe to be a valid reason, you must provide written documentation in order for me to consider allowing a make-up exam. There will be no extra credit.

Academic Integrity: Students are responsible for knowing and following **The UNCC Code of Student Academic Integrity** http://www.legal.uncc.edu/policies/ps-105.html and **The UNCC Code of Student Responsibility** http://www.legal.uncc.edu/policies/ps-104.html in all aspects of their work in this course. This code forbids cheating, fabrication or falsification of information, multiple submissions of academic work, plagiarism, abuse of academic materials, and complicity of academic dishonesty. Standards of academic integrity will be enforced in this course. Any special requirements or permission regarding academic integrity in this course will be stated by the instructor, and are binding on the students. Questions regarding the policies and enforcement of the policies may be addressed to me during class or during office hours. Students are expected to report cases of academic dishonesty to the course instructor.

Accommodations: UNCC abides by interpretations of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973 that stipulates no student shall be denied the benefits of an education "solely by reason of a handicap." Disabilities covered by law include, but are not limited to, learning disabilities, hearing, sight or mobility impairments, and other health related impairments. This course will gladly provide accommodations for students with documented needs. If you feel you need an accommodation, please contact the Office of Disability Services, Fretwell Room 230, phone 704-687-4355 for the necessary evaluation and documentation.

Course Requirements:

Homework (all students): A total of 5 homework assignments will be given. Each homework will consist of several in-depth exercises related to the current topic(s), and will involve the examination of data from a variety of observing platforms, numerical models, cases studies, and/or multi-media instructional modules. You are required to show and/or explain your work on all homework assignments. You are encouraged to work together on homework, but each should submit one's individual work.

Paper Presentation (all students): Each student will read, critique, and orally present a professional journal article on a boundary layer phenomenon. Oral presentations (13-15 minutes in length) should include a summary of the article's methodology and results, as well as a critique of the data used, methods, and/or results. The article may be chosen from a provided list or selected independently. All articles must be approved by the instructor. *The list of potential articles and the evaluation rubric will be forthcoming.*

Research Project (METR 5240 students only): Each graduate student will conduct an independent research project on a boundary layer process or phenomenon of their choice. The project should consist of the observational analysis and/or modeling of the event using operational or research data networks. Each student will present their results in a paper (6-10 pages not including tables and figures) and an oral presentation (18-20 minutes in length). The format of the paper must follow the American Meteorological Society publication guidelines.

Exams (all students): There will be two exams during the semester (in class on September 29 and November 03) and a cumulative final exam (December 15 at 3:30 – 6:30 pm). The final exam day and time **may not** be rescheduled; plan your semester break departure to accommodate this time.

Evaluation:

The grading scale will be a standard percentile scale. Your final grade will be calculated using the following formula:

	METR 4240	**ESCI 5240**
Homework (5 @ 20 pts. each)	100	100
Paper Presentation	100	100
Research Paper	-	100
Research Presentation	-	100
Exams (2 @ 50 pts. each)	100	100
Cumulative Final Exam	100	100
Total Points	400	600

Percent	Grade
90-100	A
80-89	B
70-79	C
60-69	D
0-59	F

Tentative Class Schedule:

Week	Date		Subject
1	Mon	8/23	Introduction to the Course and the Planetary Boundary Layer
	Wed	8/25	Mean Boundary Layer Characteristics
2	Mon	8/30	Mean Boundary Layer Characteristics
	Wed	9/01	Turbulent Flow
3	Mon	9/06	**No Class – Labor Day**
	Wed	9/08	Turbulent Flow
4	Mon	9/13	Turbulence Closure Techniques
	Wed	9/15	Turbulence Closure Techniques
5	Mon	9/20	Boundary Conditions and Surface Exchange
	Wed	9/22	Boundary Conditions and Surface Exchange
6	Mon	9/27	Boundary Conditions and Surface Exchange
	Wed	9/29	**Exam 1**
7	Mon	10/04	Convective Boundary Layer
	Wed	10/06	Convective Boundary Layer
8	Mon	10/11	**No Class – Fall Break**
	Wed	10/13	Stable Boundary Layer
9	Mon	10/18	Stable Boundary Layer
	Wed	10/20	Boundary Layer Instrumentation and Measurement Techniques
10	Mon	10/25	Boundary Layer Instrumentation and Measurement Techniques
	Wed	10/27	Boundary Layer Instrumentation and Measurement Techniques
11	Mon	11/01	Boundary Layer Instrumentation and Measurement Techniques
	Wed	11/03	**Exam 2**
12	Mon	11/08	Fundamentals of Air Pollution
	Wed	11/10	Sources and Sinks of Air Pollution
13	Mon	11/15	Sources and Sinks of Air Pollution
	Wed	11/17	Controls on Air Pollution
14	Mon	11/22	Controls on Air Pollution
	Wed	11/24	**No Class – Thanksgiving Break**
15	Mon	12/29	Paper Presentations
	Wed	12/01	Paper Presentations
16	Mon	12/06	Paper Presentations
	Wed	12/08	Graduate Research Presentations

17 Wed 12/15 **Cumulative Final Exam 3:30 – 6:30 pm**

J. Murrey Atkins Library

Memorandum

TO: Dr. Matthew D. Eastin

FROM: Barbara G. Tierney
Liaison Librarian to Earth Sciences

DATE: September 8, 2009

RE: **Consultation with Library for new Course and Curriculum Proposal**

Date of initiation of consultation with Library Reference personnel: Request received October 2, 2009

Courses/Program: METR 4240 / ESCI 5240 Boundary Layer Meteorology

The Dept. of Geography and Earth Sciences proposes to add these courses to the M.S. and undergraduate Earth Science curriculum. At present, there are only six courses offered at the graduate level at UNCC with a focus on either meteorology or climatology. This proposed course would provide graduate students with such interests a broader selection of coursework than is presently offered.

Boundary-Layer Meteorology examines the flow of mass, energy, and moisture within the planetary boundary layer including their exchange at the earth's surface and theories of interaction. It also examines: principles of air pollution (including sources, sinks, and controls); interaction of the atmosphere with underlying surfaces (i.e. soils, vegetation, oceans, glaciers); design and operation of instruments used to monitor the atmosphere, with an emphasis on practical application.

Summary of Librarian's Evaluation of Holdings:

Evaluator: Barbara Tierney_____ Date: October 8, 2009

Please Check One:
Holdings are superior ____

Holdings are adequate _**x**___
Holdings are adequate only if Dept. purchases additional items. _____
Holdings are inadequate ____

Comments: After a careful review of relevant library collections, I find current library holdings to be adequate to support the proposed new undergraduate/graduate course "METR 4240 and ESCI 5240 Boundary Layer Meteorology. Specifically I find that the J. Murrey Atkins Library has adequate print and electronic indexes, databases, journals and books to support these new courses. Please see below for details regarding existing relevant library holdings:

Available Reference Indexes and Databases include (electronic and print)
Earth and Environmental Sciences
GEOBASE
GeoScience World
GeoRef
Pollution Abstracts
Science Direct
Springer Verlag
Web of Science
Wiley Interscience
Academic Search Premier

Books:

Required Texts:

An introduction to boundary layer meteorology, by Roland S. Stull. Kluwer, 2003. Atkins Library currently does not have this title.

Air pollution, meteorology and dispersion, by S. Pal Arya. Oxford Univ. Press, 1999. Atkins Library currently has the 1999 edition of this title (QC 882 A856 1999)

Atkins General Collections books:

Below is a table of the number of holdings under relevant Library of Congress Subject Headings. In addition, the field is supported by a large collection of federal documents received through the federal depository library program.

LC Subject Heading or Keyword	Monographs in General Collection	
	Total number	Published 2000+
Climatology	98	15
Meteorology	59	5
Boundary Layer (Meteorology)	21	0
Air- Pollution - Meteorological Aspects	6	0
Pollution - Social Aspects	2	0
Ocean - Atmosphere Interaction	34	6
Ocean - Atmosphere Interaction - Mathematical Models	3	0
Atmospheric Turbulence	28	5
Turbulent Boundary Layer	29	0

SUMMARY:

I believe that the J. Murrey Atkins Library has sufficient relevant databases, indexes, journals, and books to support the new undergraduate/graduate courses – METR 4240/ESCI 5240 Boundary Layer Meteorology. It is recommended, however, that the Earth Science Department continue to purchase additional current monographic materials in the above subject areas to update relevant collections.

Barbara Tierney *Barbara Tierney, Liaison Librarian to Earth Sciences*, Oct. 8, 2009

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Evaluator's Signature **Date**