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| **College of Arts and Sciences** | | | | | | | **Course and Program Action Form** | | | | | | | | | | | | | | | | **Proposal No.** | | | | **14-129** | | |
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| Please check one: | | | |  | Course Proposal | | | X | | Program Proposal | | | | | | |  | | | | | | | | | | | | |
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| Please mark all that apply: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | New Course | | | | | | | | Revision of: | | | | | | |  | | Number | | | | | | |  | Description | | | |
|  | Cross-Listing | | | | | | | | | | | | | | |  | | Title | | | | | | |  | Prerequisites | | | |
|  | Shared-Resources Course | | | | | | | | | | | | | | |  | | Credits | | | | | | | | | | | |
|  | Deactivate/Activate Course (boldface & underline as appropriate) | | | | | | | | | | | | | | | X | | Other (specify): | | | | | | Revision of the B.S. in Atmospheric Science | | | | | |
| Department: | | **Atmos. and Environ. Sciences** | | | | | | | | | | | Effective Semester, Year: | | | | | | | | | **Fall 2015** | | | | | | | |
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| Course Number | | | Current: | | |  | | | | | | New: | |  | | | | | | | Credits: | | |  | | | | | |
| Course Title: | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Prerequisites statement to be appended to description in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| If S/U is to be designated as the only grading system in the course, check here: | | | | | | | | | | | | | | | | | | | |  | |  | | | | | | | |
| This course is (will be) cross listed with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
| This course is (will be) a shared-resources course with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
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| Explanation of proposal: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| The proposed revision to the Atmospheric Science B.S. curriculum creates a more coherent sequence of required courses, while also taking advantage of new faculty expertise and requiring additional courses in order to teach technical skills that are valuable in today’s job market. Specific changes and their reasoning are detailed as follows: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other departments or schools which offer similar or related courses and which have certified that this proposal does not overlap their offering: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| *If this proposal is for an interdisciplinary program, please indicate the Department where the major/minor will be housed:* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Chair of Proposing Department **(TYPE NAME)** | | | | | | | | | | | | | | | Administrative Manager or Department Secretary **(TYPE NAME)** | | | | | | | | | | | | | Date | |
| **Chris Thorncroft** | | | | | | | | | | | | | | | **Chaina F. Porter** | | | | | | | | | | | | | 12/11/14 | |
| Approved by Chair(s) of Departments having cross-listed course(s) **[Copy of e-mail approval(s) on following page.]** | | | | | | | | | | | Date | | | | Dean of College | | | | | | | | | | | | | | Date |
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| Chair of Academic Programs Committee | | | | | | | | | | | Date | | | | Dean of Undergraduate or Graduate Studies | | | | | | | | | | | | | | Date |
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*Proposed Curriculum Revisions in the*

*Atmospheric Science B.S.*

Department of Atmospheric and Environmental Sciences

December 11, 2014

***Summary of Atmospheric Science B.S. Proposed Changes***

The proposed revision to the Atmospheric Science B.S. curriculum creates a more coherent sequence of required courses, while also taking advantage of new faculty expertise and requiring additional courses in order to teach technical skills that are valuable in today’s job market. Specific changes and their reasoning are detailed below:

1) The faculty in the Department of Atmospheric and Environmental Sciences (DAES) feels that our undergraduate atmospheric science majors would benefit greatly from the addition of a required programming and statistics course. Thus, ATM/ENV 315 is being revised into such a course, and will serve as an introductory programming course while also teaching basic statistics using classic atmospheric and environmental science examples. It will be a 4-credit course required for both atmospheric and environmental science majors, and will require a significant in-class work (i.e., lab) component.

2) The environmental science B.S. curriculum has required a capstone course (ENV 490) for many years, and the faculty in DAES has recently discussed adding a capstone requirement in atmospheric science as well. With the addition of new faculty member Robert Fovell in the summer of 2015, we would like to introduce a new course, *Applications of Numerical Weather Prediction*, ATM 419, to serve as a capstone-like course in an atmospheric science major’s final semester. A course on numerical weather prediction will employ many aspects of atmospheric science, such as dynamics, thermodynamics, physical meteorology, and programming. Thus, it serves as a highly appropriate capstone course, and will require a research component with an emphasis on modeling various atmospheric phenomena. A detailed syllabus for the proposed course is presented within.

3) Although we recently moved *Physical Meteorology* to senior year, we would like to move it back to junior year in the core sequence within the major. This is partially due to the need to have some knowledge of physical meteorology in 400-level courses such as *Dynamics III* and the aforementioned *Numerical Weather Prediction* course. Additionally, through assessment, it was revealed that the considerable gap between ATM 320 (*Thermodyamics*) and ATM 425 (*Physical Meteorology*) was seen as an unnecessary disadvantage for students, and it makes much more sense to have these two courses taught in sequence. This enables a tandem of core courses to be taught beginning in the fall semester of junior year (*Thermodynamics* / *Physical Meteorology*, and *Dynamics I, II, and III*).

4) Adding required courses ATM 315 and ATM 419 will increase the credit total for the major, however we also propose to eliminate PHY 240 from the required course list. This is supported by the Physics department, and reflects a concern that PHY 240 is predominantly quantum theory, and thus is not as relevant for our students as ATM 315 and ATM 419. Through advisement, however, we will still recommend students take PHY 240 and 250, especially if they are considering graduate school.

As a result of these changes in the required courses in the major, the total credits required within the major in the proposed changes is 70, an increase from 66. Hence, we request approval of an exemption from the standard 66-credit limit and wish to implement this new curriculum in fall 2015.

***Interdepartmental Support***

**Physics:**

**From:** Ariel Caticha <[arielcaticha@gmail.com](mailto:arielcaticha@gmail.com)>

**Reply-To:** "Caticha, Ariel" <[acaticha@albany.edu](mailto:acaticha@albany.edu)>

**Date:** Thursday, October 23, 2014 3:17 PM

**To:** Vincent Idone <[vidone@albany.edu](mailto:vidone@albany.edu)>

**Cc:** "Lanford, William A" <[wlanford@albany.edu](mailto:wlanford@albany.edu)>, "Saint-Vil, Leslie" <[lsaint-vil@albany.edu](mailto:lsaint-vil@albany.edu)>

**Subject:** curriculum changes

Vince,

The Physics Department does not object to the curriculum changes that you propose,

**Environmental Science Major (ENV SCI) - currently requires Phy140 and 150.  In 2015/16, it will only require 140 (Seamless SUNY)**

**Atmospheric Sciences (ATM) – Currently requires Phy140, 150 and 240.  In 2016/17 it will only require 140 and 150**.

The impact of these courses on our enrollment is about 6-7% for Phy150, and 16% for Phy 240. We suspect that once we include students that double major or take a minor in physics the impact will be even smaller.

my best,

Ariel

--

Ariel Caticha

Professor and Chair,

Department of Physics

University at Albany

***Summary of Atmospheric Science B.S. Proposed Changes***

**Current Curriculum Proposed Changes**

A MAT 111/112/118, 113, 214, 311 “ ”

A PHY 140, 145, 150, 240 A PHY 140, 145, 150

A CHM 120 “ ”

A ATM 209 “ ”

A ATM 210 “ ”

A ATM 211 “ ”

A ATM 316 “ ”

A ATM 317 “ ”

A ATM 320 Taken one semester earlier

A ATM 350 “ ”

A ATM 418 “ ”

A ATM 425 A ATM 321 (same course, one year earlier)

--- A ATM 315 (programming + statistics)

--- A ATM 419 (new core course, spring sem. sr. year)

12 upper-level electives incl. “ ”

311 or 405

66 credits in major 70 credits in major

**Current Curriculum**

**General Program B.S.:**A minimum of 66 credits for the combined major and minor including: A ATM 209, 210, 211, 316, 317, 320, 350, 418, 425; at least 12 additional credits from A ATM 301 and higher level courses (excluding A ATM 304) and including one of A ATM 311 and 405; A CHM 120 or 130 or T CHM 130; A MAT 111 or 112 or 118 or T MAT 118; A MAT 113 or 119 or T MAT 119; A MAT 214, 311; A PHY 140 or 141 or T PHY 141; A PHY 145; A PHY 150 or 151 or T PHY 151; A PHY 240. No more than 6 credits from A ATM 490, 497, 498 or 499 may be applied toward the major requirements; further, a maximum of 3 credits from A ATM 490 will apply.

**Proposed Changes**

**General Program B.S.:** A minimum of 70 credits for the combined major and minor including: A ATM 209, 210, 211, 315, 316, 317, 320, 321, 350, 418, 419; at least 12 additional credits from A ATM 301 and higher level courses (excluding A ATM 304) and including one of A ATM 311 and 405; A CHM 120 or 130 or T CHM 130; A MAT 111 or 112 or 118 or T MAT 118; A MAT 113 or 119 or T MAT 119; A MAT 214, 311; A PHY 140 or 141 or T PHY 141; A PHY 145; A PHY 150 or 151 or T PHY 151. No more than 6 credits from A ATM 490, 497, 498, or 499 may be applied toward the major requirements; further, a maximum of 3 credits from A ATM 490 will apply.

***Atmospheric Science B.S. MAP with proposed curriculum revisions***

***\*ONLY required courses are listed\****

**Fall 1 Spring 1**

MAT 112 MAT 113

CHM 120 PHY 150

PHY 140

PHY 150

**Fall 2 Spring 2**

MAT 214 MAT 311

ATM 209 ATM 211

ATM 210 ATM 315

**Fall 3 Spring 3**

ATM 316 ATM 317

ATM 320 ATM 321

ATM 350

**Fall 4** **Spring 4**

ATM 418 ATM 419

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| College of Arts and Sciences | | | | | | | Course and Program Action Form | | | | | | | | | | | | | | | | **Proposal No.** | | | | **14-129A** | | |
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|  | New Course | | | | | | | | Revision of: | | | | | | |  | | Number | | | | | | |  | Description | | | |
|  | Cross-Listing | | | | | | | | | | | | | | | X | | Title | | | | | | |  | Prerequisites | | | |
|  | Shared-Resources Course | | | | | | | | | | | | | | | X | | Credits | | | | | | | | | | | |
|  | Deactivate/Activate Course (boldface & underline as appropriate) | | | | | | | | | | | | | | |  | | Other (specify): | | | | | |  | | | | | |
| Department: | | **Atmos. and Environ. Sciences** | | | | | | | | | | | Effective Semester, Year: | | | | | | | | | **Fall 2015** | | | | | | | |
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| Course Number | | | Current: | | | **ATM 315** | | | | | | New: | |  | | | | | | | Credits: | | |  | | | | | |
| Course Title: | | **Environmental Statistics and Computation (Former Title: Environmental Statistics)** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course Description to appear in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Prerequisites statement to be appended to description in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| If S/U is to be designated as the only grading system in the course, check here: | | | | | | | | | | | | | | | | | | | |  | |  | | | | | | | |
| This course **is** (will be) cross listed with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | | ENV 315 | | | | | | | | | | |
| This course is (will be) a shared-resources course with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
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| Explanation of proposal: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| The faculty in the Department of Atmospheric and Environmental Sciences (DAES) feels that our undergraduate atmospheric science majors would benefit greatly from the addition of a required programming and statistics course. Thus, ATM/ENV 315 is being revised into such a course, and will serve as an introductory programming course while also teaching basic statistics using classic atmospheric and environmental science examples. It will be a 4-credit course required for both atmospheric and environmental science majors, and will require a significant in-class work (i.e., lab) component. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other departments or schools which offer similar or related courses and which have certified that this proposal does not overlap their offering: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| *If this proposal is for an interdisciplinary program, please indicate the Department where the major/minor will be housed:* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Chair of Proposing Department **(TYPE NAME)** | | | | | | | | | | | | | | | Administrative Manager or Department Secretary **(TYPE NAME)** | | | | | | | | | | | | | Date | |
| **Chris Thorncroft** | | | | | | | | | | | | | | | **Chaina F. Porter** | | | | | | | | | | | | | 12/11/14 | |
| Approved by Chair(s) of Departments having cross-listed course(s) **[Copy of e-mail approval(s) on following page.]** | | | | | | | | | | | Date | | | | Dean of College | | | | | | | | | | | | | | Date |
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| Chair of Academic Programs Committee | | | | | | | | | | | Date | | | | Dean of Undergraduate or Graduate Studies | | | | | | | | | | | | | | Date |
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***New/Revised Course Syllabi***

**Draft Syllabus for ATM/ENV 315**

**Environmental Statistics and Computation**

**AATM 315, Spring/Fall 20XX**

**Credits**: 4

**Professor**: ??

**Location**: ES ###

**Class Schedule**: ??

**TA(s)**: ??

**Contact Information**:

**Office**: ES ### **Phone**: 518-442-#### **Fax**: 518-442-####

**E-mail**: ??

**Office hours**: ??

**Course Description**

**General Goals**

This course builds understanding of natural systems through an introduction to statistical and computational methods used to analyze atmospheric and environmental data. Key goals of the class are for students to become proficient at drawing conclusions about the behaviors of natural systems by importing data from different repositories, using common visualizing methods, and statistically analyzing data from observations and dynamical models. Data will be drawn from a variety of earth systems applications. This four credit course will give a concise and comprehensive introduction to computation and programming methods suited for students with no or low background in computer coding. To this end, the student will be introduced to the general-purpose programming language Python.

**What Students can expect**

The course is designed as an interactive lecture: You will work (in groups) with real-world data sets and solve statistical problems by identifying the data processing steps, the mathematical calculations, and the computer code to perform the analytical tasks. This course assumes no or little prior knowledge in programming and we will introduce you to the basic principles in writing computer code in Python (available for all common computer operating systems as free software). The basic principles will be introduced and readily applied to import data, conduct statistical calculations, and create visualizations of data and statistical results.

The statistical problems you will solve are commonly encountered data analysis tasks in atmospheric and environmental research. The essential mathematical and theoretical aspects will be introduced in the classes as we learn from the data examples to discover general concepts behind the applied statistical analysis methods. Students are expected to use online resources in self-directed independent learning. This course will cover standard concepts in probability theory, univariate and multivariate statistical analysis methods, statistical description of data, visualization of data and the concepts of hypothesis testing, time series analysis and model forecasting of environmental data. Bring your computer or equivalent devices to the classes. Please contact the instructor for special assistance.

**Content:**

**Applied Data Analysis and Statistics**

* Probability
  + randomness in atmospheric and environmental systems
  + Sampling (and errors)
* Distributions
  + Physical interpretations of distribution structures
    - Interpreting distributions in terms of sample size,  
       mean, median, variance, skewness
* Hypothesis testing
  + Confidence intervals
  + Significance,
  + Error type I + II
* Multivariate Analysis
  + Covariance and Correlation
  + Principal Component Analysis
  + Simple and multiple linear Regression
  + Fourier Regression
* Statistical forecasting and skill assessment:
  + Hit rate, false alarm
  + Error Metrics
* Time series analysis:
  + Moving averages and other filtering, trends
  + Auto and cross correlation
  + As time allows: Fourier transforms, spectrum analysis

**Programming**

* Basics of programming
* The Python environment, structure and flow control, functions, etc.
* Variable types
* Declaration of variables and arrays
* Basic arithmetic
* Strings, lists and dictionaries
* Use of functions, modules and packages
  + Numpy
  + Scipy
* ‘Thinking object-oriented’:
  + Introduction to Classes:
  + Abstract data types: Putting variables and methods together
* Importing atmospheric and environmental data
* Exploratory Data Analysis/Visualization
  + Histograms
  + Expressing error and confidence
  + Time series
  + Contour maps
  + Scatterplots
* Simple geographic data mapping

No text required, but the following are recommended:

John V. Guttag, Introduction to Computation and Programming Using Python, MIT Press, (revised edition), 298pp, 2013.

Daniel. S. Wilks Statistical Methods in Atmospheric Sciences, Academic Press, 2nd edition, 627pp, 2006. (for ATM majors a good choice!)

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| College of Arts and Sciences | | | | | | | Course and Program Action Form | | | | | | | | | | | | | | | | **Proposal No.** | | | | **14-129B** | | |
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|  | New Course | | | | | | | | Revision of: | | | | | | |  | | Number | | | | | | |  | Description | | | |
|  | Cross-Listing | | | | | | | | | | | | | | |  | | Title | | | | | | | X | Prerequisites | | | |
|  | Shared-Resources Course | | | | | | | | | | | | | | |  | | Credits | | | | | | | | | | | |
|  | Deactivate/Activate Course (boldface & underline as appropriate) | | | | | | | | | | | | | | |  | | Other (specify): | | | | | |  | | | | | |
| Department: | | **Atmos. and Environ. Sciences** | | | | | | | | | | | Effective Semester, Year: | | | | | | | | | **Fall 2015** | | | | | | | |
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| Course Number | | | Current: | | | **A ATM 320** | | | | | | New: | |  | | | | | | | Credits: | | |  | | | | | |
| Course Title: | | **Atmospheric Thermodynamics** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course Description to appear in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Prerequisites statement to be appended to description in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Co-requisite: A ATM 316.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| If S/U is to be designated as the only grading system in the course, check here: | | | | | | | | | | | | | | | | | | | |  | |  | | | | | | | |
| This course is (will be) cross listed with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
| This course is (will be) a shared-resources course with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
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| Explanation of proposal: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **This change in prerequisites reflects our proposal to move A ATM 320 to the fall of an atmospheric science major’s junior year, to be taken in tandem with A ATM 316, which already has a prerequisite of A PHY 150.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other departments or schools which offer similar or related courses and which have certified that this proposal does not overlap their offering: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Chair of Proposing Department **(TYPE NAME)** | | | | | | | | | | | | | | | Administrative Manager or Department Secretary **(TYPE NAME)** | | | | | | | | | | | | | Date | |
| **Chris Thorncroft** | | | | | | | | | | | | | | | **Chaina F. Porter** | | | | | | | | | | | | | 12/11/14 | |
| Approved by Chair(s) of Departments having cross-listed course(s) **[Copy of e-mail approval(s) on following page.]** | | | | | | | | | | | Date | | | | Dean of College | | | | | | | | | | | | | | Date |
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| Chair of Academic Programs Committee | | | | | | | | | | | Date | | | | Dean of Undergraduate or Graduate Studies | | | | | | | | | | | | | | Date |
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| College of Arts and Sciences | | | | | | | Course and Program Action Form | | | | | | | | | | | | | | | | **Proposal No.** | | | | **14-129C** | | |
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| Please check one: | | | | X | Course Proposal | | |  | | Program Proposal | | | | | | |  | | | | | | | | | | | | |
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| Please mark all that apply: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | New Course | | | | | | | | Revision of: | | | | | | | X | | Number | | | | | | |  | Description | | | |
|  | Cross-Listing | | | | | | | | | | | | | | |  | | Title | | | | | | | X | Prerequisites | | | |
|  | Shared-Resources Course | | | | | | | | | | | | | | |  | | Credits | | | | | | | | | | | |
|  | Deactivate/Activate Course (boldface & underline as appropriate) | | | | | | | | | | | | | | |  | | Other (specify): | | | | | |  | | | | | |
| Department: | | **Atmos. and Environ. Sciences** | | | | | | | | | | | Effective Semester, Year: | | | | | | | | | **Fall 2015** | | | | | | | |
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| Course Number | | | Current: | | | **A ATM 425Y** | | | | | | New: | | **A ATM 321Y** | | | | | | | Credits: | | |  | | | | | |
| Course Title: | | **Physical Meteorology** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course Description to appear in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Prerequisites statement to be appended to description in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Current: Prerequisite(s): A ATM 316. Prerequisite(s) or corequisite(s): A ATM 320.**  **New Prerequisite: A ATM 320.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| If S/U is to be designated as the only grading system in the course, check here: | | | | | | | | | | | | | | | | | | | |  | |  | | | | | | | |
| This course is (will be) cross listed with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
| This course is (will be) a shared-resources course with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
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| Explanation of proposal: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **This change in prerequisites reflects our proposal to move A ATM 321 to the spring of an atmospheric science major’s junior year, to be taken following A ATM 320. Because we are moving the course from senior year to junior year, we are also proposing to change the course number from 400-level to 300-level.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other departments or schools which offer similar or related courses and which have certified that this proposal does not overlap their offering: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| *If this proposal is for an interdisciplinary program, please indicate the Department where the major/minor will be housed:* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Chair of Proposing Department **(TYPE NAME)** | | | | | | | | | | | | | | | Administrative Manager or Department Secretary **(TYPE NAME)** | | | | | | | | | | | | | Date | |
| **Chris Thorncroft** | | | | | | | | | | | | | | | **Chaina F. Porter** | | | | | | | | | | | | | 12/11/14 | |
| Approved by Chair(s) of Departments having cross-listed course(s) **[Copy of e-mail approval(s) on following page.]** | | | | | | | | | | | Date | | | | Dean of College | | | | | | | | | | | | | | Date |
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| Chair of Academic Programs Committee | | | | | | | | | | | Date | | | | Dean of Undergraduate or Graduate Studies | | | | | | | | | | | | | | Date |
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| University at Albany – State University of New York | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| College of Arts and Sciences | | | | | | | Course and Program Action Form | | | | | | | | | | | | | | | | **Proposal No.** | | | | **14-129D** | | |
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| Please check one: | | | | X | Course Proposal | | |  | | Program Proposal | | | | | | |  | | | | | | | | | | | | |
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| Please mark all that apply: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X | New Course | | | | | | | | Revision of: | | | | | | |  | | Number | | | | | | |  | Description | | | |
|  | Cross-Listing | | | | | | | | | | | | | | |  | | Title | | | | | | |  | Prerequisites | | | |
|  | Shared-Resources Course | | | | | | | | | | | | | | |  | | Credits | | | | | | | | | | | |
|  | Deactivate/Activate Course (boldface & underline as appropriate) | | | | | | | | | | | | | | |  | | Other (specify): | | | | | |  | | | | | |
| Department: | | **Atmos. and Environ. Sciences** | | | | | | | | | | | Effective Semester, Year: | | | | | | | | | **Fall 2015** | | | | | | | |
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| Course Number | | | Current: | | | **A ATM 419** | | | | | | New: | |  | | | | | | | Credits: | | | **3** | | | | | |
| Course Title: | | **Applications of Numerical Weather Prediction** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course Description to appear in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **This is a hands-on course in numerical weather prediction (NWP), with an emphasis on simulating mesoscale weather systems (including thunderstorms, windstorms, and sea/land breezes), model validation, sensitivity (to initialization, resolution and other numerical aspects, and model physics), and how model physical parameterizations work. The principal tool will be the Weather Research and Forecasting (WRF) model. The overarching goal is to understand how NWP models like WRF work, what their strengths and limitations are, and how and why they may fail. Each student is responsible for producing a final capstone project that utilizes their knowledge and understanding of this class and its direct and indirect prerequisites.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Prerequisites statement to be appended to description in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Prerequisite: A ATM 418.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| If S/U is to be designated as the only grading system in the course, check here: | | | | | | | | | | | | | | | | | | | |  | |  | | | | | | | |
| This course is (will be) cross listed with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
| This course is (will be) a shared-resources course with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
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| Explanation of proposal: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **As explained in the narrative that introduces this round of revisions in atmospheric science, this required course gives students a new technical skill while synthesizing important concepts learned in previous courses. While it won’t be a formal capstone, it will require the use of numerical weather prediction in testing hypotheses and studying complex phenomena, as the course description explains.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other departments or schools which offer similar or related courses and which have certified that this proposal does not overlap their offering: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| *If this proposal is for an interdisciplinary program, please indicate the Department where the major/minor will be housed:* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Chair of Proposing Department **(TYPE NAME)** | | | | | | | | | | | | | | | Administrative Manager or Department Secretary **(TYPE NAME)** | | | | | | | | | | | | | Date | |
| **Chris Thorncroft** | | | | | | | | | | | | | | | **Chaina F. Porter** | | | | | | | | | | | | | 12/11/14 | |
| Approved by Chair(s) of Departments having cross-listed course(s) **[Copy of e-mail approval(s) on following page.]** | | | | | | | | | | | Date | | | | Dean of College | | | | | | | | | | | | | | Date |
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| Chair of Academic Programs Committee | | | | | | | | | | | Date | | | | Dean of Undergraduate or Graduate Studies | | | | | | | | | | | | | | Date |
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**ATM 419 – Applications in Numerical Weather Prediction**

**Spring 2016**

**Instructor: Prof. Robert Fovell**

**Office**: TBD

**Office hours**: Whenever my door is open

**Home page**: TBD

**E-mail**: TBD

**AIM/iMessage**: “parody@mac.com” (without the quotes)

**Credit**: TBD

**Prerequisites**: ATM 418

**Class meetings**: TBD

**Required text**: None. Papers and other materials will be distributed in class.

**Useful references**: Markowski and Richardson, Mesoscale Meteorology in Midlatitudes; Houze, Cloud Dynamics; Stensrud, Parameterization Schemes.

**Overview**: This is a hands-on course in numerical weather prediction (NWP), focusing on mesoscale phenomena and dynamics. We will emphasize simulation of mesoscale weather systems (including thunderstorms, windstorms, and sea/land breezes), model validation, sensitivity (to initialization, resolution and other numerical aspects, and model physics), and how model physical parameterizations work. Our principal tool will be the Weather Research and Forecasting (WRF) model. The overarching goal is to understand how NWP models like WRF work, what their strengths and limitations are, and how and why they may fail. Each student is responsible for producing a final capstone project that utilizes their knowledge and understanding of this class and its direct and indirect prerequisites.

**Grading**: Experiments (30%), Exam(s) (30%), Final project (30%), Class participation (10%).

* Review of dynamics. The anelastic approximation and pressure decomposition.
* Modeling: How to run the idealized WRF. Experiment: Two-dimensional thermal.
* The sea-breeze circulation. Experiment: Two-dimensional sea-breeze, without moisture.
* Explicit convection in models. Experiment: Two-dimensional sea-breeze, with moisture. Physics: Microphysics schemes I.
* Mesoscale convective systems I. Experiment: Two-dimensional squall line. Physics: Microphysics schemes II.
* Mesoscale convective systems II. Experiment: Three-dimensional squall line. Physics: Radiation schemes.
* Mesoscale convective systems III. Experiment: Supercell thunderstorms.
* Boundary layer phenomena. Experiment: Three-dimensional rolls. Physics: Boundary layer schemes.
* Modeling: How to run the real-data WRF. Experiment: Florida sea-breeze case. Physics: Land surface models.
* Mesoscale convective systems IV. Experiment: Derecho case. Physics: Cumulus parameterizations.
* Mountain-induced weather I. Experiment: 2D flow over an isolated mountain. Physics: Turbulence parameterizations.
* Mountain-induced weather II. Experiment: Downslope windstorm. Physics: Stochastic perturbations.
* Model validation against observations.
* Class initialization/physics/perturbation ensemble. Experiment: Tropical cyclone.

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| College of Arts and Sciences | | | | | | | Course and Program Action Form | | | | | | | | | | | | | | | | **Proposal No.** | | | | **14-129E** | | |
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| Please check one: | | | | X | Course Proposal | | |  | | Program Proposal | | | | | | |  | | | | | | | | | | | | |
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| Please mark all that apply: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | New Course | | | | | | | | Revision of: | | | | | | |  | | Number | | | | | | | X | Description | | | |
|  | Cross-Listing | | | | | | | | | | | | | | |  | | Title | | | | | | | X | Prerequisites | | | |
|  | Shared-Resources Course | | | | | | | | | | | | | | |  | | Credits | | | | | | | | | | | |
|  | Deactivate/Activate Course (boldface & underline as appropriate) | | | | | | | | | | | | | | |  | | Other (specify): | | | | | |  | | | | | |
| Department: | | **Atmos. and Environ. Sciences** | | | | | | | | | | | Effective Semester, Year: | | | | | | | | | **Fall 2015** | | | | | | | |
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| Course Number | | | Current: | | | **A ATM 421** | | | | | | New: | |  | | | | | | | Credits: | | |  | | | | | |
| Course Title: | | **Tropical Meteorology** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course Description to appear in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Current:**  Tropical cyclone dynamics and thermodynamics; tropical cyclone formation; monsoons; tropical waves; El Niño. Prerequisite(s): A ATM 316. Offered alternate spring semesters; will next be offered in spring 2015.  **Newly Proposed:**  An introduction to the behavior, dynamics, and thermodynamics of the tropical atmosphere, with an emphasis on the interactions between convection and dynamics; tropical energy and moisture balance; tropical convection; monsoons; equatorial waves; the Madden-Julian oscillation (MJO); tropical cyclogenesis; tropical cyclone structure and intensity change.Prerequisites: A ATM 316 and 320. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Prerequisites statement to be appended to description in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Prerequisite: A ATM 316 and 320.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| If S/U is to be designated as the only grading system in the course, check here: | | | | | | | | | | | | | | | | | | | |  | |  | | | | | | | |
| This course is (will be) cross listed with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
| This course is (will be) a shared-resources course with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
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| Explanation of proposal: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **This is a straightforward course description change, with an addition of A ATM 320 as a prerequisite.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other departments or schools which offer similar or related courses and which have certified that this proposal does not overlap their offering: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| *If this proposal is for an interdisciplinary program, please indicate the Department where the major/minor will be housed:* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Chair of Proposing Department **(TYPE NAME)** | | | | | | | | | | | | | | | Administrative Manager or Department Secretary **(TYPE NAME)** | | | | | | | | | | | | | Date | |
| **Chris Thorncroft** | | | | | | | | | | | | | | | **Chaina F. Porter** | | | | | | | | | | | | | 12/11/14 | |
| Approved by Chair(s) of Departments having cross-listed course(s) **[Copy of e-mail approval(s) on following page.]** | | | | | | | | | | | Date | | | | Dean of College | | | | | | | | | | | | | | Date |
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| Chair of Academic Programs Committee | | | | | | | | | | | Date | | | | Dean of Undergraduate or Graduate Studies | | | | | | | | | | | | | | Date |
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Form: CAS Course and Program Action Form (revised 05/13/14)

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| College of Arts and Sciences | | | | | | | Course and Program Action Form | | | | | | | | | | | | | | | | **Proposal No.** | | | | **14-129F** | | |
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| Please check one: | | | | X | Course Proposal | | |  | | Program Proposal | | | | | | |  | | | | | | | | | | | | |
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| Please mark all that apply: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | New Course | | | | | | | | Revision of: | | | | | | |  | | Number | | | | | | |  | Description | | | |
|  | Cross-Listing | | | | | | | | | | | | | | |  | | Title | | | | | | | X | Prerequisites | | | |
|  | Shared-Resources Course | | | | | | | | | | | | | | |  | | Credits | | | | | | | | | | | |
|  | Deactivate/Activate Course (boldface & underline as appropriate) | | | | | | | | | | | | | | |  | | Other (specify): | | | | | |  | | | | | |
| Department: | | **Atmos. and Environ. Sciences** | | | | | | | | | | | Effective Semester, Year: | | | | | | | | | **Fall 2015** | | | | | | | |
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| Course Number | | | Current: | | | **A ATM 424** | | | | | | New: | |  | | | | | | | Credits: | | |  | | | | | |
| Course Title: | | **Fundamentals of Atmospheric Electricity** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course Description to appear in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Prerequisites statement to be appended to description in Bulletin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Prerequisite: A ATM 321.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| If S/U is to be designated as the only grading system in the course, check here: | | | | | | | | | | | | | | | | | | | |  | |  | | | | | | | |
| This course is (will be) cross listed with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
| This course is (will be) a shared-resources course with (i.e., CAS ###): | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | |
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| Explanation of proposal: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Due to recent curriculum changes, the prerequisites for this course are being updated and simplified.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other departments or schools which offer similar or related courses and which have certified that this proposal does not overlap their offering: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| *If this proposal is for an interdisciplinary program, please indicate the Department where the major/minor will be housed:* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Chair of Proposing Department **(TYPE NAME)** | | | | | | | | | | | | | | | Administrative Manager or Department Secretary **(TYPE NAME)** | | | | | | | | | | | | | Date | |
| **Chris Thorncroft** | | | | | | | | | | | | | | | **Chaina F. Porter** | | | | | | | | | | | | | 12/11/14 | |
| Approved by Chair(s) of Departments having cross-listed course(s) **[Copy of e-mail approval(s) on following page.]** | | | | | | | | | | | Date | | | | Dean of College | | | | | | | | | | | | | | Date |
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| Chair of Academic Programs Committee | | | | | | | | | | | Date | | | | Dean of Undergraduate or Graduate Studies | | | | | | | | | | | | | | Date |
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