**Atmospheric and Environmental Sciences Student Learning Outcomes Annual Report**

**2014-15**

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|  **Assessment Matrix for Atmospheric Science B.S.** |
|  | **Assessment Component** |
| *Direct* | *Indirect* |
| **Learning****Outcome** | ***Weather Forecasting******Contest***Practice cycle: Each semester; local contest.Review cycle: Yearly. | ***Embedded******Questions/ Assignments***Practice cycle: Biennial; start ’08–’09.Review cycle: Yearly. | ***Employment Record***Practice cycle: Yearly; first administration of survey Spring ’09.Review cycle: Yearly. | ***Focus Group***Practice cycle: Yearly; first in Spring ’09.Review cycle: Yearly. |
|  |
| 1) Effectively communicate with colleagues or others via clear and efficient writing or presentation technique | — | ***ATM 425***(Research Pres. For Oral Discourse Requirement) | ☻ | ☻ |
| 2) Acquire new knowledge and abilities by embracing a lifelong perspective of inquiry, discovery and learning | — | — |  ☻ | ☻ |
| 3) Cogently describe the fundamental physical and dynamical processes operating in our atmosphere utilizing appropriate mathematical formulation | — | ***ATM 316, 425*** | ☻ | ☻ |
| 4) Access, interpret and analyze a broad range of meteorological data, most typically for the purpose of generating an operational weather forecast | ***ATM 311*** | — | ☻ | ☻ |
| 5) Apply data, concepts, and models to the solution of problems in the atmospheric sciences | ***ATM 311*** | ***ATM 316, 425*** | ☻ | ☻ |

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| **Assessment Matrix for Environmental Science B.S.** |
|  | **Assessment Component** |
| *Direct* | *Indirect* |
| **Learning****Outcome** | ***Portfolio and Projects*** Practice cycle: Yearly; start ’08–’09.Review cycle: Yearly. | ***Embedded******Questions***Practice cycle: Biennial; start ’08–’09.Review cycle: Yearly. | ***Employment Record***Practice cycle: Yearly; first administration of survey Spring ’09.Review cycle: Yearly. | ***Exit Survey***Practice cycle: Yearly; first in Spring ’09.Review cycle: Yearly. |
|  |
| 1) Effectively communicate with colleagues or others via clear and efficient writing or presentation technique | ***ENV 490*** | ***ENV 250, 315, 490*** | ☻ | ☻ |
| 2) Acquire new knowledge and abilities by embracing a lifelong perspective of inquiry, discovery and learning | — | — | ☻ | ☻ |
| 3) Identify and describe the various systems comprising the Earth's environment, including recognizing key aspects of these systems’ interaction and feedback loops | ***ENV 490*** | ***ENV 250, 315, 490*** | ☻ | ☻ |
| 4) Perform quantitative analyses specific to environmental evaluation, including assessing relevant parameters and interpreting their trends in space and/or time | ***ENV 490*** | ***ENV 250, 315*** | ☻ | ☻ |
| 5) Apply field methods, data, concepts, and models to the solution of problems in the environmental sciences | ***ENV 490*** | ***ENV 250, 315*** | ☻ | ☻ |

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| **Assessment Matrix for Graduate Atmospheric Science Degrees** |
|  | **Assessment Component** |
| *Direct* | *Indirect* |
| LearningOutcome | ***Coursework/ Qualifying Exam (PhD)***Practice cycle: Yearly; start ’09–’10.Review cycle: Yearly. | ***Thesis or Dissertation******Quality***Practice cycle: Yearly; start ’09–’10.Review cycle: Yearly. | ***Focus Group***Practice cycle: Yearly; first to be held in Fall ’08. Review cycle: Yearly. | ***Alumni Survey and Success***Practice cycle: Three years; starting ’08–’09.Review cycle: Yearly. |
|  |
| 1) Demonstrate a clear mastery of advanced coursework and knowledge in the discipline;  | ☻ | ☻ | ☻ | ☻ |
| 2) Display requisite skill in common practices specific to the discipline, such as properly interpreting numerical weather forecasts or creating/interpreting detailed, multi-dimensional data fields; | ☻ | ☻ | ☻ | ☻ |
| 3) Coordinate a credible research project in the discipline and conduct this research via application of appropriate quantitative, computational and IT techniques;  | — | ☻ | ☻ | ☻ |
| 4) Document, detail and defend the research conducted in a formal written thesis or dissertation, including an oral presentation and defense; | — | ☻ | ☻ | ☻ |
| 5) Communicate effectively with peers and associates, both in writing and public presentation formats. | ☻ | ☻ | ☻ | ☻ |

Annual Assessment Report for ATM 311

Severe and Hazardous Weather Analysis and Forecasting

Fall 2014

Ross A. Lazear, DAES

 Weather forecasting in the Atmospheric Science B.S. degree is initially taught in the final month of ATM 211 (Weather Analysis and Forecasting), typically the second semester of a student’s sophomore year. The following semester, nearly every ATM B.S. major chooses to take ATM 311 (Severe and Hazardous Weather and Forecasting) as an elective. In this course, students are required to participate in two forecasting contests. One contest involves daily forecasting of temperature, probability of precipitation, and precipitation amounts for Albany, NY, during four successive 12-hour periods. Students must forecast at least 75% of all forecast days (Monday through Friday). The other contest is a medium-range forecast contest based on probabilities. As has been done in previous assessment reports, this report will discuss only the former of the two contests. In addition to the two aforementioned contests, it is optional for ATM 311 students to participate in a third contest, referred to as the National Forecast Contest or “Weather Challenge.” Due to the fact that participation in this contest is optional, assessing forecast skill would be statistically unreliable on a year-to-year basis, so it will also not be included in this report. The purpose of these three forecast contests as part of ATM 311 is to enable students to hone their forecasting skills in a competitive, fun environment.

 As is typically the case, in the 48-hour locally run Albany forecast contest, there were many other competitors forecasting along with the ATM 311 students. For the Fall 2014 semester, this group of forecasters was made up of an unusually small ATM 311 class (12 students), faculty/staff (1), graduate students (4), senior undergraduates (6), department alumni (2), and a National Weather Service forecaster. The makeup of this group remains similar year-to-year; thus, it allows us to compare students’ forecast accuracy trends both within the semester analyzed and over time. Interestingly, however, for the Fall 2014 semester, there were significantly more graduate students and senior undergraduates participating in the contest (especially relative to a smaller than normal ATM 311 class), which may have acted to decrease ATM 311 student skill.

The makeup of the Fall 2014 ATM 311 class was fairly similar to the historical average. 10 of the 12 students were atmospheric science majors, one was an anthropology major, and the other was an environmental science major. Both of the non-majors were atmospheric science minors.

Figure 1 depicts how students in the Fall 2014 ATM 311 class compared to the average forecaster in the contest for each week. In order to normalize the data, and because the number of students who forecast every day for a given week changes each week, the data are represented as a percentage of ATM 311 students forecasting *better* than the average forecaster for a given week. As an example, for week #1, 38% of students in the Fall 2014 ATM 311 class scored *better* than the average forecaster in the contest. An ideal value is at least 50%, since it implies that students are forecasting on a level comparable with more experienced forecasters. Values greater than 50% suggest that ATM 311 students are forecasting better than more experienced forecasters, which does seem to occur a few times per semester.

The Fall 2014 ATM 311 class (Fig. 1) improved steadily up until around week 7 (week of October 6), after which scores were markedly lower for the remainder of the semester. In the past, this drop-off in skill scores has been attributed to both midterm exam periods and the change of precipitation type to snow, the latter of which will be evaluated subsequently. The decrease in forecast skill for the Fall 2014 ATM 311 class from mid-semester all the way to the end of the semester matches that of the Fall 2013 ATM 311 class. After having taught ATM 311 for seven consecutive years, it is my belief that the decrease in forecast skill around the mid-point in the semester has more to do with time spent on forecasts (both from a lack of interest and a busier time in the semester). One way in which I plan on fixing this problem is by changing the discussion section in ATM 311 to make it more focused on the forecast contest. Rather than having 5-10 minutes spent on the Albany forecast, I will now require that students leading the discussion spend 30 minutes, which will hopefully go a long way in building forecast skill.

As has been calculated in previous assessment studies, students’ scores can also be broken down by the type of forecast made [i.e., temperature, probability of precipitation (POP), and precipitation amount (PA)]. For the Fall 2014 ATM 311 class, the skill scores for each category were 18% (temperature), 36% (POP) and 27% (PA). These scores were approximately the same as last year’s ATM 311 class (18%, 36% and 27% respectively), with temperature forecasting skill once again the lowest of the three, as has been the case for several years. As has been stated in previous assessment reports, forecasting temperatures likely has the steepest learning curve of each of the three variables, so this result isn’t surprising. I look forward to spending more time discussing temperature forecasts, specifically, with the aforementioned longer discussion sections.

The scores from the mid-point of the semester through the end of the semester were also calculated. Just as was the case last year, the skill scores for two of the three forecast categories increased when scores from mid-semester and on were analyzed, with the PA score staying the same (25% temperature, 33% POP, 36% PA), and it is indeed good to see that students appear to be learning in each of the three forecast types.

In addition to adding significantly more time to discuss the Albany forecast contest specifically in the ATM 311 discussion section, I continue to try and work on the amount of time devoted to forecasting in the previous semester (ATM 211, Weather Analysis and Forecasting), so I do anticipate a marked improvement in next fall’s ATM 311 forecast skill.



Fig. 1: Percentage, by week, of the Fall 2014 ATM 311 students (12 students total) whose forecast skill was above the average skill of every forecaster in the contest.

**A ATM 425Y Spring 2015 Assessment Report Justin R. Minder, DAES**

**Methods**

Assessment was based on 24 multiple-choice questions that are representative of major topics in the course. These questions are not comprehensive of all the material in the course, but represent most of the major topics. They were chosen to represent material and concepts that the students were likely unfamiliar with before the course, but should have learned by the end of the course. The questions are included in the Appendix to this report.

This was the second time I taught ATM 425. The assessment method was very similar to the previous assessment in Spring of 2014. A handful of questions were modified to improve clarity or better reflect the content of the course. As previously, formal assessment was not attempted for the oral discourse discussion session of the course.

The students were given the questions as a multiple-choice ungraded assessment quiz on the first day of class to provide baseline data. This quiz was not announced ahead of time and the graded quizzes were not returned to the students. 9 students were enrolled.

The students encountered the same multiple choice questions distributed through two in-term exams and the final exam (without warning). The two in-term exams contained a subset of the multiple-choice questions focusing on the topics of the exams (radiation & cloud physics). The final exam contained the remaining questions, which spanned the breadth of the course. There may be some biases in scores depending on if the question was asked during the in-term exam (close to when we covered the material) or during the final (as much as 10 weeks after we covered the material).

Scores were recorded for individual students and the group as a whole and compared to quantify student progress. One question (#20) was inadvertently omitted from the exam, so this question was not used in the final statistics.

**Summary**

The below table summarizes the results of the 2015 assessment for ATM 425.



Overall, the results were mixed. The mean score before the course was 65%, substantially higher than in 2014, suggesting that the course material was more familiar to the students entering the class this year than last. The mean change in score after being taught the material was 16 %-points, a moderate improvement. All individual students posted improvement. The improvement was notably less than last year (26%). I speculate that this is in part due to the specific sample of students in this class. Myself and other faculty noted an overall lack of motivation and work ethic in this graduating class relative to the previous one.

The highest two improvements (both 26%-points) were made by the students who scored the highest overall grades in the course (both A-). These students couldn’t have shown much more improvement on the assessment because their final scores were in the 90%’s. Thus, for the top performing (and hardest working) students the course very effectively met its assessment goals. However, for these students the assessment would need to be harder to effectively gauge their learning because they came in with a relatively high level of knowledge.

The students with the worst final grades in the course (C, D+, D-) also posted the worst initial assessment scores. Thus, the students with the worst background knowledge performed the worst overall in the course. This may be in part due to the importance of physical reasoning and quantitative skills in the class. Additional review or extra background materials may help these students. However, in my experience, the poor scores for these students was also the result of poor study habits/work ethics as these students did not come to office hours for assistance outside of class or take advantage of extra credit opportunities.

Grades on individual questions point both to limitations in the quiz, but also to room for improvement in the pedagogy. Several questions (highlighted in yellow above) had very high (>75%) initial scores, indicating that these topics were already familiar to most students, so they can be treated more quickly in future classes and perhaps some should not be used for assessment. Many of these questions posted poor (or even negative) improvements. This is in part because there was very little room for improvement and students may tend to score slightly worse under the higher pressure of a formal exam.

Three of the questions with low improvements (22-24) included material on weather radar covered at the end of the course. This material receives less treatment in class and homework. Next time this material could be better emphasized, but other content would need to be sacrificed to do so. Overall I will use questions with low improvements to flag topics that require more focus or clarity in the course instruction.

A very similar assessment quiz will be used next time I teach the course so trends can be identified.

**Appendix**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Assessment Quiz ATM 425 (Spring 2015)

*Circle the single best choice for each question. NOTE: this is for assessment purposes only and will not affect your grade!*

1. The **radiance** (intensity) at a given point is defined to be:
	1. The radiant energy flux across all wavelengths
	2. The radiant energy flux per unit area across all wavelengths
	3. The radiant energy flux per unit area per unit solid angle across all wavelengths
	4. None of the above
2. A **blackbody** ...
	1. Emits radiation depending upon it temperature as described by the Planck Function.
	2. Completely absorbs all radiation incident upon it.
	3. Emits the maximum radiation possible considering its temperature
	4. All of the above
3. According to the **Stephan-Boltzmann Law**, if a blackbody increases its temperature by a factor of two, its total emitted flux density will increase by a factor of...  a. 2 b. 4 c. 8 d. 16
4. On a cloud free day, as **solar radiation** passes through the atmosphere, which of the following is NOT TRUE...
	1. Solar radiation is partially absorbed in the stratosphere by photodissociation of ozone and oxygen.
	2. Solar radiation is partially scattered by gas molecules in the troposphere.
	3. Solar radiation undergoes scattering and absorption that is independent of  wavelength.
	4. Solar radiation can be either scattered or absorbed by atmospheric aerosol  particles.
5. The presence of an **atmosphere** increases the **radiative equilibrium temperature** at the  surface because...
	1. The surface responds to the atmospheric pressure by warming, increasing radiative  emission
	2. The atmosphere absorbs terrestrial radiation and re-radiates it downwards, so a  higher surface temperature is required to attain radiative balance
	3. The atmosphere absorbs solar radiation and transports it downwards to the surface  by conduction
	4. All of the above
6. Objects viewed on the **horizon**...



1. Are viewed through a much longer optical path length than overhead objects
2. Can appear at a different zenith angle than they actually are
3. Sometimes appear pink or reddish due to preferential scattering of the shorter  wavelengths
4. All of the above
5. A **rainbow** is an optical phenomena due primarily to...
	1. Reflection and interference
	2. Diffraction and interference
	3. Refraction and reflection
	4. None of the above
6. Integrating the **solid angle** over a hemisphere yields a value of:
	1. π
	2. 2π
	3. 4π
	4. 1
7. The **optical depth** of a layer of atmosphere...
	1. Depends on the absorption properties of the gasses and particles contained in the  layer
	2. Decreases with increasing transmissivity
	3. Depends on the physical depth of the layer
	4. All of the above
8. The **albedo** of a portion of the Earth’s surface DOES NOT depend directly on
	1. The intensity of the radiation considered
	2. The incidence angle of the radiation considered
	3. The wave length of the radiation considered
	4. The type and amount of surface vegetation
9. The **type of scattering / reflection** (e.g., Raleigh vs. Mie vs. geometric optics) that radiation  experiences as it passes through the atmosphere is determined primarily by:
	1. The wavelength of radiation and diameter of the scatterers
	2. The wavelength of radiation and air pressure
	3. The intensity of radiation and number of the scatterers
	4. The intensity of radiation and air temperature
10. Generally, the **concentration** (number per unit volume) of **aerosol particles** in the  troposphere...
	1. Decreases with increasing particle diameter
	2. Increases with increasing particle diameter
	3. Is essentially constant with increasing particle diameter
	4. Is largest near 1 μm particle diameter, and decreases for larger and smaller  diameters
11. A **pure water droplet** will...
	1. Be unable to reach a stable equilibrium and will evaporate or grow indefinitely in response to a small change in radius
	2. Have a reduced vapor pressure over its surface relative to a flat pure water surface at the same temperature.
	3. Always grow if the relative humidity is greater than 100%
	4. All of the above
12. A **solution drop** will become **activated** if...
	1. The ambient saturation ratio, S=e/es(T), falls below 1.0
	2. The ambient saturation ratio rises above 1.0
	3. The ambient saturation ratio exceeds the critical value (Köhler curve peak) for the  droplet
	4. Any water vapor condenses onto it
13. **Diffusional** (condensation) **growth of a cloud droplets** does not adequately explain the rapidity of rain onset in warm clouds because...

a. Diffusional growth is inversely proportional to droplet radius



1. Super-saturations are too large in clouds for this mechanism to be effective
2. Diffusion cannot take place in the presence of latent heat release
3. All of the above
4. Efficient droplet growth by **collision & coalescence** requires a broad range of droplet sizes, including larger drops (>20 μm). This broadening of the droplet distribution can be aided by...
	1. Large cloud condensation nuclei (such as sea salt) producing large drops upon activation
	2. In-cloud turbulence, which affects droplet evaporation and diffusional growth on small-scales
	3. The stochastic nature of the collision & coalescence process
	4. All of the above
5. Comparisons of warm clouds with similar liquid water contents and environmental  conditions reveals that, **compared to continental clouds, maritime clouds** have
	1. fewer cloud droplets, are more likely to rain, and have lower albedos, due to lower  CCN concentrations
	2. more cloud droplets, are more likely to rain, and have lower albedos, due to lower  CCN concentrations
	3. fewer cloud droplets, are less likely to rain, and have higher albedos, due to lower  CCN concentrations
	4. fewer cloud droplets, are more likely to rain, and have lower albedos, due to higher  CCN concentrations
6. **Clouds with temperatures below 0°C often do not contain ice** because
	1. The number of available CCN is too low
	2. The layer of cloud below 0**°**C must attain a minimum depth of 2 km.
	3. The number of super-cooled droplets is too few
	4. The number of ice nuclei active at temperatures of a few degrees below 0**°**C are  deficient
7. The terminal **fall speed for ice crystals** ...
	1. Depend on the atmospheric pressure
	2. Depend on the degree of riming
	3. Depend very little on crystal size beyond 1mm for pristine ice
	4. All of the above
8. **Diffusional growth of ice** in a liquid-water-saturated environment
	1. Is maximized near -30**°**C, because cold temperatures are the most important factor  in the snow growth equation
	2. Is maximized near -14**°**C, since this is near where the difference between the  saturation vapor pressure over ice and water maximizes
	3. Is always more important than growth by riming
	4. Is only effective for “plate-like” crystal habits
9. **Cloud liquid water content** (LWC) is generally **less than the adiabatic LWC** in young clouds because
	1. Precipitation has fallen from the cloud, removing liquid
	2. Entrainment occurs
	3. Latent heat release evaporates water
	4. None of the above
10. **Radar reflectivity factor**, expressed as *dBZ*,
	1. Always decreases away from a radar
	2. Is a directly related to the precipitation rate
	3. Is insensitive to the phase of hydrometeors
	4. Is related to 10 log10 () of the returned power received by the radar
11. The **Doppler velocity** measured by a **precipitation radar** most directly represents
	1. The radial wind velocity along the direction the radar antenna is pointing
	2. The 2-dimensional horizontal wind velocity

c. The radial velocity of precipitation particles (and other scatterers) along the direction the radar antenna is pointing

d. The 2-dimensional horizontal velocity of precipitation particles (and other scatterers) along the direction the radar antenna is pointing

24. **Radar differential reflectivity** (ZDR)

1. Compares power received at different frequencies to reveal information about  attenuation
2. Compares power returned from different azimuths to reveal spatial variations
3. Compares power returned with horizontal and vertical polarizations to reveal  information about hydrometeor shape
4. Compares power returned from successive pulses to reveal time evolution

**ENV/GEO 250 Sustainable Development: Energy and Resources**

**Outcome Assessment: Spring 2015**

Robert G. Keesee, Associate Professor

A “pre-test” was administered during the first class meeting of ENV/GEO 250 on January 21, 2015. The test consisted of ten multiple choice questions (each with five options for response) and a survey question. Students have the last 25 to 30 minutes of the class meeting to complete the pre-test. The pretest is appended below. Questions #9 and #10 required quantitative calculations. Forty six students took the pretest with an average score of 2.87 correct and median of 2.94 out of 10. Random chance would be expected to be 2 correct out of 10. Students were not alerted to the fact that these questions would be used in exams later in the semester. The class average of the pretest was shared with the class and each student’s pre-test score was posted in Blackboard, but the answers to the questions were not shared with the class. The pre-test was not returned to the students either.

Of the 46 students taking the pre-test, 41 eventually remained in the class roster and they all took the three exams during the semester. Another 10 students who did not take the pretest were in the final class roster.

The ten questions appeared on subsequent exams. Pretest questions #1, #2, #3 and #9 were on Exam #1 administered on March 4th. Questions #3 (repeated), #4, #5, and #6 appeared on Exam #2 administered on April 16th. Questions #1 (repeated), #7, #8 and #10 appeared on Exam #3 administered on May 11th. All three exams consisted of 30 multiple choice questions (each with five options) and two brief essay questions. The exams were open book, open note and students are allowed to use their laptops. Students had approximately 60 minutes to complete Exams #1 and #2 and were given two hours for Exams #3 although the median time taken was about 75 minutes.

The following assessment has been limited to the 41 students who took the pre-test and all three exams. Overall, this cohort averaged 2.83 correct answers on the pre-test and 7.66 correct answers on the exams. The bubble chart below correlates pretest score with exam score on these ten questions for each student. The chart depicts only the last assessments for Questions #1 and #3. The size of the bubble indicates the number of students falling at that data point (from 1 to 5 for the largest). Bubbles above the red line means the score improved over the pre-test.



Discussion of specific pre-test questions: The Table below lists the number of students (and percentages) of students responding correctly to each question.

 Question Pretest Exam

#1 10 (24%) 35 (85%) [28 (68%) on Exam #1]

#2 20 (49%) 36 (89%)

#3 9 (22%) 35 (85%) [23 (56%) on Exam #1]

#4 5 (12%) 26 (63%)

#5 5 (12%) 27 (66%)

#6 7 (17%) 30 (73%)

#7 9 (22%) 33 (80%)

#8 23 (56%) 39 (95%)

#9 19 (46%) 26 (63%)

#10 9 (22%) 27 (66%)

Of the eight qualitative questions, improvement was substantial. As a central theme of the course, Question #1 was asked on Exam #1 and Exam #3. Nine of 10 students answering correctly on the pretest also gave the correct answer on Exam #1 in addition to 19 others who missed the question on the pretest. On Exam #3, only six students missed the question, four of whom never correctly answered the question. For Question #3, an overview of indirect solar energy was given before Exam #1 and then we focused on coal. Hydropower and wind were discussed more explicitly before Exam #2. The pattern of answers is interesting. Five students consistently answered the question correctly, another 15 students answered the question correctly on both exams, and another 13 finally answered the question correctly on the second exam. Two students never got the correct answer and another only on the pretest, in spite of going over the answers to the first exam in class. Oddly another three got the correct answer on the first exam (two of whom also gave the correct answer on the pretest) but missed it on the second exam. Three others were correct on the first exam but not the second, including one who also had the correct answer on the pretest. Some of that pattern may to attributable to random guessing.

The quantitative question #9 showed the most modest improvement possibly due to lack of time on the exam for some students to work out the problem. Question #10 was on Exam #3 for which nearly all students finished with time remaining, so time was not an issue.

In comparison to previous years, this class had the lowest pretest average and median, actually being slightly below 3 out of ten for the first time. Last year’s class had done exceptionally well at 3.58 correct with, if anything, a couple of minutes less to complete the pretest. Although the exam average for these ten questions was a bit lower for this class at 7.66 versus 8.37 for last year, the absolute improvement on the exam assessment, however, was nearly identical at +4.83 correct for this class compared to +4.79 correct for last year.

ENV/GEO 250 PRE-TEST name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Spring 2015 (please print legibly)

This is an ungraded exercise to assess what you and the class already knows. Please enter your answers for questions #1 thru #10 on the bubble sheet along with your name and student id. Please enter your answer to question #11 in the space provided on the back of this page.

**1.** What is the best meaning of “sustainable development”?

1. Increasing production at the lowest possible cost to meet demand.
2. Meeting current needs without compromising the ability to meet needs in the future.
3. Promoting technologies that more efficiently utilize fossil fuels and other natural resources.
4. Formulating fiscal policies that maintain continuous economic growth.
5. All of the above are equally good definitions of the term “sustainable development”.

**2.** Emission of carbon dioxide from human activity (anthropogenic emissions) is a concern because:

* + - * 1. carbon dioxide destroys ozone
				2. carbon dioxide is highly toxic to plants and animals
				3. it can account for the observed increase in atmospheric carbon dioxide, which is a greenhouse gas
				4. anthropogenic emissions are far greater than natural emissions
				5. all of the above

**3.** Which is a form of indirect solar energy?

1. Coal
2. Hydropower
3. Wind power
4. All of the above
5. None of the above

**4.** The amount of useful energy from a power plant employing cogeneration is increased because:

1. the efficiency for conversion of thermal energy into electricity is improved
2. heat that otherwise would be wasted is distributed as hot water to consumers
3. several power plants cooperating together are better than one going it alone
4. oil burns cleaner than coal
5. all of the above

**5.** Which statement about nuclear power is ***false***?

1. A new unused fuel rod is highly radioactive and must be manufactured and delivered under strict safety rules.
2. The fuel needed to power a 1000 MW nuclear power plant for one year can fit on a single truck whereas a 1000 MW coal-fired power plant would need a trainload of coal every day.
3. Electricity generation by nuclear power plants produces a crucial ingredient needed for making nuclear weapons.
4. A nuclear power plant was constructed in Shoreham, New York but largely because of public resistance never produced any commercial electricity.
5. After a hiatus of nearly three decades in the U.S., the Obama administration offered government loan guarantees to encourage the construction of new nuclear power plants.

**6.** Hydroelectric power is considered a renewable source of energy because:

1. nature provides the energy source (falling water) for free
2. the energy source is inexhaustible and limitless
3. nature replenishes the energy source on time scales and in quantities useful for human activity
4. no pollution or other environmental problems result from exploiting the energy source
5. all of the above

**7.** Inthe push to build electric cars, a sobering fact confronts automakers and governments seeking to lower their reliance on foreign oil. What is that fact?

* + - * 1. Most electricity is generated by burning oil.
				2. Consumers will avoid buying electric vehicles for fear of getting electrocuted in minor auto accidents.
				3. The increase in electricity demand can only be met by building more nuclear power plants, which would increase the chances of accidents such as at Fukushima and Chernobyl.
				4. The reserves for cadmium, used in the batteries, will last only ten years if 20% of vehicles produced are electric.
				5. The reserves for lithium, the mineral used in the batteries, are mostly located in just a few nations.

**8.** An example of passive solar design for home heating is:

1. a geothermal heat pump
2. a solar thermal power plant that produces electricity for electrical heating
3. a solar collector on the roof that heats and circulates water through the house in pipes
4. a south facing window that allows solar heating of the interior of the house in winter
5. all of the above

**9.** Assume a person has a daily intake of 2500 (food) Calories. If that person could find nourishment by eating coal (Do not try this at home; coal is not digestible), how much coal would that person need to eat daily? One ton (2000 lbs) of coal has an energy content of 25 million Btu and 1 (food) Calorie is the same as 4 Btu.

 a. 2.0 oz (= one-eighth of a pound)

 b. 0.8 lbs

 c. 1.25 lbs

 d. 2.5 lbs

 e. 8.0 lbs

**10.** Suppose a plug-in all electric vehicle gets 3 miles/kWh and costs $28,000 while a similar internal combustion vehicle gets 40 mpg and costs $25,000. How long will it take to recover the extra $3,000 cost of the electric vehicle through the savings on energy costs? Assume the vehicle is driven 10,000 miles per year, gasoline costs $3.00 per gallon and electricity costs $0.15 per kWh.

* 1. two year
	2. four years
	3. eight years
	4. twelve years
	5. never

**11.** What are ***three*** **environmental** issues related to the production and/or use of energy that you consider important? Please be as specific as possible

A.

B.

C.

ATM/ENV 315 Assessment – Fall 2014

Professor Roundy began experimenting with new assessment strategies fall 2013, by given students a dataset previously unknown to them, and asked them to use statistical applications to tell as much as they could about the dataset along with physical interpretations. As noted in his report from that semester, he originally intended to develop a ranking system based on the levels of complexity in each of the algorithms the students applied, to track year to year their abilities to perform the techniques at the end of the term. This approach focused on quantity produced, but the students reacted differently than anticipated, by spending more time using the statistics to understand the physical system represented by the dataset. Although this outcome confounded his ability to assess outcomes as originally planned, it demonstrated the students capacity to perform the primary outcomes intended for the course. Dr. Roundy concluded that assessing this ability better demonstrates the intended outcomes better than assessing their specific technical capabilities (although such capabilities are necessary to yield the conclusions students made). In fall 2014, motivated by this new objective, Dr. Roundy assigned students an assessment project, wherein they were expected to find datasets related to problems in atmospheric, climate, or environmental sciences of interest to them, and analyze the datasets to demonstrate their capacity to use the skills of the course to yield conclusions about natural systems. Unfortunately, only 5 students participated that day (two were ill, one was participating on a sports team, and the other two, who usually attended class, did not come to class). The students who provided no explanation for their absence  had previously attended well throughout the term. This assessment assignment was counted as equivalent to completion of a homework assignment, and in order to increase participation in 2015, Dr. Roundy plans to include it more substantially in the semester grade.

The list below provides information about the individual student projects, the datasets analyzed, and the general approaches followed. All of these projects demonstrated practical application of the techniques of the course to real world problems in natural sciences, thereby demonstrating fulfillment of the class goals. However, the low participation rate is a concern that will need to be resolved in 2015.

**Deniesha Cox**   Natural gas residential users change over time. She modeled the trends with linear regression with nonlinear terms.

**John Dellalo**  Analyzed yearly energy and power consumption in US. Nuclear/renewable/fossil fuels/total.  Plotted time series from 1949-2013. Did a log regression fit with power terms.

**Ariana London**  EOF analysis of natural gas usage in the United States. Student was ill, so did not present in class, but provided an overview of results in an e-mail.

**James Sommer**    Analyzed Atlantic cod data, in millions of tons. From 1962-1965, fall/spring. Did Fourier regression fit. We discussed the trends in the fish load—peaks in 1970s, then downward trends because of regulations, reduced fish populations, and market shifts.

**Toni Slyer**  Analyzed an Arctic sea ice dataset, plotted, discussed data observation rate issues, aliasing, and trends.

Each of the projects demonstrated reasonable proficiency in the approaches applied, and the whole program enriched the class experience by providing student driven discussion and connection to real world problems.

**Exit interview:** Atmospheric Science B.S.

Members of the graduating Atmospheric Science B.S. class were interviewed by Ross Lazear (Instructional Support Specialist, DAES) on May 7, 2015 in order to learn which aspects of the ATM B.S. curriculum worked for them, and which could be improved. In total, six of the eight graduating students attended.

**Suggestions**:

It was suggested that there should be a better unification of programming tools, and that a Python course would be a good addition to the curriculum.  The students also felt that they didn't really learn much programming or statistics in ATM/ENV 315 because they were both taught at once, and itw as difficult to learn either very well.  *DAES is restructuring ATM/ENV 315 so that it has an extra credit and will be required for ATM majors.  While the course will attempt to teach introductory Python as well as introductory statistics, DAES hopes that the extra credit will allow the students to develop a good foundation of both.*

The students felt that the oral discourse portion of ATM 425 (Physical Meteorology) would be better served if it were taught earlier, so they could use what they learned in advanced classes.  The students also thought that the oral discourse portion of the course could be a one-credit independent course taught earlier, because it needn't be related to physical meteorology.  *A proposal has already been put into place to move ATM 425 back to junior year for this, and other reasons.  However, we will hold off separating the oral discourse lab from the course, and see how moving ATM 425 to junior year goes.*

One student requested that different types of weather forecasting be taught.  For instance:  Cyclone track and vorticity phasing, rather than just temperature and precipitation forecasting for a specific location.  *This was an excellent suggestion, and will be considered for the 2015-16 academic year in ATM 211/311.*

ATM 418 (Dynamics III) is taught too early in the morning for such a quantitatively intense course.  Additionally, the students felt that this course needed a TA given that it is an advanced, required course.

The students felt that Physics III didn't relate to their studies in atmospheric science, since thermodynamics was skimmed through quickly, and the majority of the course focused on quantum theory.  *A proposal has been accepted to remove Physics III from the ATM curriculum.*

A major concern was some of the poor quality teaching in required math courses.  *While this is an issue outside DAES, it was discussed among the Chair and undergraduate committee.*

Some environment issues were raised:  Smoking outside the building would get into the classrooms from the air intake between ES and FA.  WiFi is a problem in certain rooms.

**Positives**:

The students felt that Physics I was a good introduction to applying calculus before taking atmospheric science courses.

The department environment is excellent.

Faculty in DAES are always reachable, and students had absolutely no complaints about the teaching with DAES.

Specific courses (ATM 400, 401 and 421) were noted as really making students think rather than memorize, which was appreciated.

**Feedback from seniors on the Environmental Science B.S. degree**

Every year at the end of the spring semester I seek feedback from seniors attending my capstone course ENV-490 (Major Topics in Environmental Science) regarding our Environmental Science B.S. curriculum.

Similar to last year I again asked my students to provide answers and feedback to the following four questions:

1) Why did you choose the Environmental Science B.S. degree?

2) What did you like about our program?

3) What did you not like about our program?

4) Do you have any specific concerns or recommendations how the program could be improved?

I handed the students the questions in writing and asked them to respond in writing during class time. 17 students filled out and handed in the survey (4 were absent). A summary of their answers to the four questions is provided below.

***1) Why did you choose the Environmental Science B.S. degree?***

As in most years, the common response was a general passion about in the environment, concerns about environmental issues, and a positive outlook on jobs. Several students also mentioned that they switched from Biology, or as a result of exposure to the subject in High School.

*- ‘I loved the combination of biology, earth science, global warming and energy issues…’*

*- ‘I wanted to know the science of our environment in a more big picture sense…’*

*- ‘I have a strong connection to protecting the environment…’*

*-‘ I always had concerns about climate change...’*

*- ‘I have always been passionate about environmental conservation and sustainability …’*

*- ‘I am a big proponent of solar energy and believe that climate change is really a big problem…’*

*- ‘It seemed to encompass all my studies of interest…’*

*- ‘I decided I needed to do something beneficial rather than focusing on a career for $ purposes…’*

*- ‘I chose ENV because I was interested in the environment, human health and climate change…’*

*- ‘It was the most appealing major to me. I want to save the planet from us…’*

*- ‘A career based on saving, maintaining and improving the environment is ideal to me…’*

*- ‘The growing job market for this field. I want to be part of the solution, not the problem…’*

*- ‘I am interested in the field and also believe it is a growing field with new job opportunities every day…’*

*- ’I started as Bio major but didn’t love the chemistry…’*

*- ‘I originally was a Bio major but didn’t feel it was right for me; a friend suggested Env Sci. – I was not even aware that was a major…*

*- ‘I chose this major over Biology so I could learn a wide variety of subjects instead of focusing only on Biology…’*

*- ‘I was interested in Environmental Science out of High School …’*

***2) What did you like about our program?***

The main comment was that students liked the quality of the teaching, the diversity of the courses offered and the possibility to specialize in a specific concentration. Some also commented on the small class sizes and the fact that DAES continuously informs their undergraduates about internships and job opportunities.

 *- ‘I liked the array of classes available. I also enjoyed the mix of ENV and ATM classes…’*

*- ’The information I learned, I can use for the rest of my life…’*

*- ’The more ENV courses I took the more I fell in love with the subject matter…‘*

*- ‘I like the incorporation of the many ATM classes that are required…’*

*- ‘Concentration choices…’*

*- ‘Prepared me for writing and speaking in a scientific manner …’*

*- ‘The program has a lot of interesting courses and many branches of concentrations for ENV majors…’*

*- ‘I liked that there are concentrations provided…’*

*- ‘Carry-over information between classes provided a means for cross-examination of material…’*

*- ‘I liked that you could pick a concentration that best suited your interests…’*

*- ‘I liked the various courses offered in this program and the fact that you could select a concentration...’*

*- ‘I enjoyed the broad variety of classes offered…’*

*- ‘I enjoyed virtually all of my ENV courses…’*

*-‘ I liked the emphasis on climate change and renewable energy…’*

*- ‘Teachers! Many teachers are enthusiastic and care about their students…’*

*- ‘The majority of professors have a great interest in the natural environment as well as the drive to protect it. This attitude helped improve the learning environment and challenge me to work harder at finding solutions…’*

*- ‘The faculty was knowledgeable, helpful and engaging. There was also a good amount of guest lectures from people working in the field…’*

*- ’Faculty is very great…’*

*- ‘All of the professors are helpful and great at teaching and are very interested and engaged with their students…’*

*- ‘Very helpful and available professors and advisors…’*

*- ‘All of the professors I had were very enthusiastic and passionate about their field of study and very knowledgeable…’*

*- ‘Great roster of professors…*

*- ‘Most of the teachers are great…’*

*- ‘Small class sizes…’*

*- ’Fairly small class sizes…’*

*- ‘Ongoing information on upcoming lectures, internships and job opportunities….’*

*- ‘ I liked getting the e-mails about ENV science opportunities on campus and off …’*

***3) What did you not like about our program?***

The main criticism was too much overlap between existing ENV courses and the lack of fieldwork, labs and hands-on applications. Some students also voiced their discontent over course options in Biology and Geography.

*- ‘Some classes repeat the same topic – could use larger variety in classes offered…’*

*- ‘There is a lot of overlap from class to class…’*

*-‘ Many of my classes covered much of the same information…*

*- ’Although there are a ton of ENV classes, many of them are very redundant and relearning of the same information…’*

*- ‘Too many classes that describe the problems and less that are centered around solutions…’*

*- ‘I would like to see more hands on work and field trips…’*

*- ’I did not like the limited “hands on” experience…’*

*- ‘We did not have many labs or options to take hands on courses…*

*- ‘Many courses were lecture style. I personally prefer hands on learning styles…’*

*- ’I did not like that I did not have the opportunity to take any field-based classes’*

*- ‘Not enough hands on work. I would have enjoyed some labs…’*

*- ‘The Department is too focused on atmospheric science. I wish there were more classes that incorporated biology with environment…’*

*- ‘Biology concentration should have expanded course work in lab and field work…’*

*- ’I would have liked a Bio class specifically for ENV Sci. Bio concentration students…’*

*- ‘Not enough focus on sustainable energy and environmental policy. An environmental policy class should be required…’*

*- ’Terrible elective choices for GOG concentration…’*

*- Some classes being offered only every other year made it tough to plan my schedule. Many class times also overlapped.*

***4) Do you have any specific concerns or recommendations how the program could be improved?***

Recommendations that were voiced are similar to last year and focus around the apparent lack of labs and fieldwork. Several students also mentioned a lack of emphasis on sustainability, insufficient coverage of Biology aspects in ENV courses, lack of courses in general or that required courses were scheduled at the same time or only offered every other year.

*- ‘Seriously in need of fieldwork component. I am worried I will be embarrassed at my first job outside of college because I will be unable to do something very fundamental…’*

*- ‘Challenge our problem solving skills…’*

*- ‘More hands-on applications of Env. Sci. and real world scenarios…’*

*- ‘Include more relevant hands on courses…’*

*- ‘I recommend that the department have more labs that allow students to get hands on experience with data and models…’*

*- ‘More hands on experience…’*

*- ‘The BIO concentration specifically would be better with more field-based classes where we could make actual observations about the environment…’*

*- ‘More emphasis on sustainability. I understand its going to be one of the new concentrations. Good work…’*

*- ‘More policy courses and more courses in sustainability in the business world…’*

*- ‘I wish I could have taken more Bio and less ATM classes…’*

*- ‘More professors/lectures that incorporate the biology side of Env. Science…’*

*- ‘A larger course selection would be ideal…’*

*- ‘Give students more choices of classes to take that satisfy a concentration…’*

*- ‘Create a course specific to adaptation and mitigation of climate change…’*

*- ‘Offer classes that can only be taken every other year more often. Those are the most interesting classes and much more enjoyable…’*

*- ’Fix problem of clashing classes. Have classes that are co-requisites be at different times…’*

**Atmospheric Science B.S. graduates – one year after graduation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | Graduation date | Employed in field/related? | Where employed? |
| **Scharmett, Jared** | Aug-13 | **N** | **Technical Recruiter** |
| **Bacek, Ray** | May-14 | **Y** | **Marine forecaster at FleetWeather - Hopewell Junction, N.Y.** |
| **Dickinson, Dan** | May-14 | **-** | **-** |
| **Farruggio, Nick** | May-14 | **Y** | **Field Technician with New York State Mesonet - Albany, N.Y.** |
| **Feliciano, Christian** | May-14 | **Y** | **Graduate student in atmospheric science at Ohio State - Columbus, OH** |
| **Gallagher, Alex** | May-14 | **Y** | **Graduate student in atmospheric science at UAlbany - Albany, N.Y.** |
| **Levesque, Elizabeth** | May-14 | **Y** | **GIS intern at NYS Department of Health - Albany, N.Y.** |
| **Mallon, Conor** | May-14 | **N** | **-** |
| **Mears, Katherine** | May-14 | **-** | **-** |
| **Newman, Katie** | May-14 | **N** | **Intern at financial corporation** |
| **Perez, Steven** | May-14 | **Y** | **Field Technician with New York State Mesonet - Albany, N.Y.** |
| **Smith, Robert** | May-14 | **N** | **-** |
| **Towey, Katie** | May-14 | **Y** | **Graduate student in atmospheric science at Plymouth State - Plymouth, N.H.** |
| **Weber, Stephen** | May-14 | **Y** | **Graduate student in information technology at Univ. North Carolina at Charlotte - Charlotte, N.C.** |

**Environmental Science B.S. graduates – one year after graduation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Graduation date** | **Concentration** | **Employed in field?** | **Where employed?** |
| **Boyer, Elizabeth** | Aug-13 | Biology | - | - |
| **Cruz, Arnold** | Dec-13 | Geography | Y | Parks analyst at NYC Dept. of Parks and Recreation - New York, N.Y. |
| **D'Arcy, Daniel** | Dec-13 | Geology | Y | Geoligist at ALS-Empirica |
| **Grant, Ryan** | Dec-13 | Geography | - | - |
| **Johnson, Gregory** | Dec-13 | Geology | Y | Environmental health and safety at Albany Medical Center - Albany, N.Y. |
| **Marconi, Danielle** | Dec-13 | Biology | Y | Technician at Saint Gobain and Hazard Review Specialist at Underwriters Laboratories in Latham and Watervliet, N.Y. |
| **McMurry, Joseph** | Dec-13 | Climate | - | - |
| **Nicolella, Tiffany** | Dec-13 | Geography | Y | Project Associate at TRC Companies - Clifton Park, N.Y. |
| **Osenni, Nicholas** | Dec-13 | Biology | Y | Engineer at Engineering and Surveying Properties , PC (after receiving MEng) in Montgomery, N.Y. |
| **Patrick, James** | Dec-13 | Biology | - | - |
| **Rudd, John** | Dec-13 | Biology | N | - |
| **Savasta, Cailey** | Dec-13 | Biology | Y | Field Technician at WEST, Inc. - Des Moines, IA |
| **Barends, Justin** | May-14 | Climate | - | - |
| **Brucaliere, Nicholas** | May-14 | Climate | Y | Energy data analyst at Ei3 Corporation - Montvale, N.J. |
| **Carbone, Adam** | May-14 | Biology | - | - |
| **Charpin, Christopher** | May-14 | Geography | - | - |
| **Darby, Kevin** | May-14 | Geography | Y | GIS Technician at New York State Dept. of Environmental Conservation - Albany, N.Y. |
| **Depradine, Tereek** | May-14 | Geography | - | - |
| **Dixon, Gregory** | May-14 | Geography | - | - |
| **DuMond, Jason** | May-14 | Biology | Y | Marine Mammal Education and Research Intern at New England Aquarium - Boston, MA |
| **Englesson, Laurel** | May-14 | Geography | - | - |
| **Esch, Nicholas** | May-14 | Climate | Y | Research Intern at Solar Electric Power Assocation - Tempe, AZ |
| **Fortier, Jordan** | May-14 | Biology | Y | Intern at Norrie Point Environmental Center - Staatsburg, N.Y. |
| **Fox, Kaitlyn** | May-14 | Biology | Y | Environmental Scientist at Fleming Lee Shue, Inc. - New York, N.Y. |
| **Frazier, Melinda** | May-14 | Geography | - | - |
| **Goss, Joseph** | May-14 | Geography | - | - |
| **Hackett, Kevin** | May-14 | Climate | N | - |
| **Kennedy, Nicholas** | May-14 | Biology | Y | Microbiologist at Adirondack Beverages - Scotia, N.Y. |
| **Kim, Se Mi** | May-14 | Climate | - | - |
| **Martin, Jason** | May-14 | Biology | - | - |
| **Martin, Mary** | May-14 | Biology | - | - |
| **Minotti, Peter** | May-14 | Atmos. Sci. | - | - |
| **Skomsky, Daniel** | May-14 | Biology | N | - |
| **Statt, Cory** | May-14 | Climate | Y | Field Technician at SunEdison - Rochester, N.Y. |

**DAES Graduate Focus Group**

**Spring 2015**

A meeting took place on 8 June to discuss graduate program issues. This included two faculty (Professors Chris Thorncroft and Ryan Torn) and 26 graduate students, which is roughly half of the current enrolled students and a fairly broad cross-section of the DAES graduate student population. The bullet points represent the main points raised by students. Where appropriate the DAES response is included in brackets and italics.

Based on last year’s meeting, the following action items were undertaken by DAES in the past year:

* Additional information on research credits was added to the Graduate student handbook.

An elective course scheduling policy was developed that will ensure that elective courses in each of the three main areas of the field (dynamics, climate, atmospheric physics & chemistry) will be offered each semester

* The new core curriculum was approved by governance (applies to newly admitted students)
* Career advice meetings were set up with all seminar speakers. These meetings were generally well attended and valuable to students.
* Expanded introductory sessions to include more NCL training, with quality of life lectures given by graduate student Hannah Attard and Rosimar Rios-Berrios.
* More emphasis was placed on varying TA assignments among lower (100-200) and upper (300-400) level courses.
* The PhD written exam policy was revised for clarity based on requests by both faculty and students. In addition, the written exam will only be given during specific times of the year

During this year’s meeting, the following topics were discussed.

1. Curriculum
* Most students were satisfied with the current breadth of courses being offered within DAES.
* Students were concerned that an advanced tropical cyclone course was being offered in Spring 2016, while the basic tropical cyclone course will not be offered in the near future *(Professor Torn will work with Professor Kristen Corbosiero to help students who want to take the advanced course, but have not taken the basic class)*
* Students expressed interest in a course on practical aspects of numerical weather prediction *(Professor Torn will meet with Professor Rob Fovell to determine if it is appropriate to make his 400-level numerical weather prediction class a shared resource course. This class is geared toward the practical aspects of numerical weather prediction.)*
* Shared resource graduate courses were geared too closely to undergraduate students; therefore, the graduate students do not feel as challenged. *(Professor Torn will speak with the instructors of shared resource classes to make sure both levels are being taught).*
1. Preparation to conduct research
* Students were concerned about the amount of time a computing account remains active after graduation. *(The DAES computing committee will develop a policy.)*
* Graduate students have been downloading data and providing it for use by other students. These students are near graduation, so this service could end. *(The DAES computing committee will develop a policy to deal with this.)*
* Students had difficulty finding the department wiki. *(Professor Torn will request that a link get added to the department website.)*
* Students were interested in an informal seminar on the department’s data holdings. *(This will be addressed while developing the informal seminar series. In addition, the data locations are listed on the department wiki.)*
* Students had difficulty accessing older issues of the Journal of Geophysical Research-Atmospheres through the internet *(DAES will investigate this issue through the Science Librarian.)*
1. TA Duties
* Students were satisfied with TA workload and assignment policies.
1. Other
* Professor Roberta Johnson, who has coordinated some of the department’s outreach activities and owns some of the equipment used in these activities, is leaving in June. Students were concerned that outreach activities could be negatively impacted by her departure. *(DAES will address this concern and encourage the graduate students to nominate an outreach liaison.)*
* Students requested that graduate student seminars, including MS presentations, PhD prospectus, PhD defenses, and tropical/climate group, should be added to the DAES calendar, which has been integrated into the University’s online calendar system. *(The DAES office staff will begin doing this.)*
* Some students requested that an archive of PhD written exam questions be made available. *(Although there are copies of past exams circulating among graduate students, this idea would need to be discussed with the DAES faculty.)*
* Students wanted the graduate student handbook added to the website *(This will be done when the 2015/2016 handbook is completed.)*
* Some meetings of interest were not being publicized *(DAES will investigate ways of publicizing meetings better).*

Response to IRPE feedback:

In previous years, IRPE indicated that they would like to see DAES to develop a graduate course assessment scheme similar to what was developed for the DAES undergraduate degrees. Starting with the 2015/2016 academic year, DAES is implementing a core curriculum that all graduate students will be required to take. As a consequence, the graduate committee will work with the course instructors (Professor Brian Rose and Liming Zhou) develop an appropriate set of assessment methods for these courses.

**Professional status of DAES Atmospheric Science M.S. and Ph.D. graduates fives years following graduation**

|  |  |  |
| --- | --- | --- |
| **Name** | **Degree Date** | **Professional Status** |
| **Babij, Natalie** | Aug-10 | Graduate student in math at University of Vermont - Burlington, VT |
| **Chen, Yimin** | Dec-09 | Senior Research Scientist at AWS Truepower - Albany, N.Y. |
| **Jones, Justin** | Dec-09 | Independent consultant in atmospheric and environmental research - Somerville, MA |
| **Matusiak, Jamie** | Dec-09 | Forecaster at the National Weather Service - Chicago, IL |
| **Tian, Jian** | Dec-09 | - |
| **Silviotti, Brian** | May-10 | Meteorologist and Science Officer at WeatherWorks - Hackettstown, N.J. |
| **Sukup, Scott** | Aug-10 | Forecaster at the National Weather Service - Oxnard, CA |
| **Verhagen, Lynn** | May-10 | Science teacher at Pawling High School - Pawling, N.Y. |
|  |  |  |
| **Name** | **Degree Date** | **Professional Status** |
| **Galarneau, Thomas** | Aug-10 | Project Scientist I at National Center for Atmospheric Research - Boulder, CO |
| **Schreck, Carl** | Aug-10 | Research Associate at Cooperative Institute for Climate and Satellites at NCDC - Asheville, N.C. |
| **Wu, Henry** | Aug-10 | - |