SGC

SEBS Governing Council

Serving School of Environmental and Biological Sciences Students

Directions for Undergraduate Program Director Reports:

1. Talk to students in your major, ask around if there are any current academic issues. (ex: class conflicts within the major, issues with professors, etc)

2. Look at Degree Navigator, write down the course requirements

3. Formulate a list of things you would like to know about the program (corporate connections with the university, current research projects, opportunities for students to get involved, etc)

4. Email Undergraduate Program Director and Arrange Appointment

5. Fill out Undergraduate Report Sheet

6. email to vicepresident@sgc.rutgers.edu and complete by December 4th

SEBS Governing Council
Serving School of Environmental and Biological Sciences Students

Name: Kyle Reiman

Major: Meteorology

Date: 12/4/19

Semester: Fall 2019

Undergraduate Program Director: Dr. Steve Decker

UPD Contact Information:

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I. Major Options - What options are offered within the major? How do they differ?

Students can select one of three options for their major:

- Operational Meteorology (6 credits)
  - Geared for those interested in an operational meteorology career and forecasting the weather, such as working with the government, news agencies, etc.
  - Required courses:
    - 11:670:414 Hydrologic Processes (3)
    - 11:670:444 Tropical Meteorology (3)
- Environmental Meteorology (6 credits)
  - Geared for those interested in studying pollutants and how they effect weather patterns and climate.
  - Required courses:
    - 11:375:101 Introduction to Environmental Science (3)
    - 11:670:453 Air Quality Modeling (3)
- Climate Option (7 credits)
  - Geared for those interested in climate and large-scale weather patterns over long periods of time
  - Required courses:
    - 11:670:414 Hydrologic Processes (3)
    - 11:628:451 Physical Oceanography (4)

II. Total number of students within the major

There are approximately 40 students within the meteorology major currently. Freshman are not part of this figure since they are currently undeclared.

III. Goals within the major - What are expectations of students post-graduation?

Students who graduate from the Meteorology program are expected to:

- Conduct a weather discussion and apply diagnostic, prognostic, and technological tools to evaluate atmospheric processes across a multitude of scales.
- Demonstrate integrated understanding of the linked Earth–atmosphere–ocean–cryosphere–biosphere system, including the roles of atmospheric chemistry and human impacts on the system.
- Apply critical and analytical thinking to solve relevant scientific problems in both individual and collaborative settings.
- Effectively communicate scientific information orally and in writing, including by electronic means, at an appropriate level for their audience.
- Demonstrate mastery of the mathematical and physical foundations of meteorology and climatology as well as key atmospheric processes that occur at a variety of spatial and temporal scales.
- Understand and utilize the principles of proper ethical behavior within the atmospheric sciences and be aware of the scientific limits of prediction.

IV. Major Courses - What is the goal of each course? What should students be learning?

Meteorology Major Courses (Goal of each course listed below course name):

Introduction to Meteorology

- Overview of current weather maps; structure of the atmosphere and the role of moisture in the development of dew, clouds, and precipitation; air masses, fronts, cyclones, thunderstorms, tornadoes, and hurricanes. Elements of weather forecasting, instrumentation and communication.

Introduction to Climate Science

- Major mechanisms influencing climate, including Earth's energy balance, water cycle, and atmospheric circulation; spatial distribution of climate and climate classification; natural climate variability, including El Niño; past climate variations; and the carbon cycle and human-induced climate change.

Weather, Climate, and Television I, II

- Provides a theoretical foundation of television broadcasting and meteorology to supplement the hands-on television experience gained from the WeatherWatcher Living-Learning Community. By examining the history and characteristics of television, critical analyses of news and weather-related programming, and special topics pertaining to meteorology, students will gain a rounded understanding of the medium and its impact on the field of meteorology and broadcasting. This WeatherWatcher Living-Learning Community academic course is required of all first-year residents.

Meteorological Analysis

- Surface observation codes. Preparation of surface, upper air, and sounding charts. Forecast guidance, weather map interpretation, and preparation of weather forecasts. Map discussions.

Computational Methods for Meteorology

- Introduction to the basic concepts of programming and computation for meteorology and earth science students. Elements of compiled and interpreted languages. Development of skills necessary for the reading, analyzing, and plotting of meteorological and climatic data.

Thermodynamics of the Atmosphere

- Thermodynamics of the atmosphere; energy conservation; ideal gas law; water and its transformations; moist air; aerosols; hydrostatic stability and convection; vertical motion; cloud formation; precipitation.

Dynamics of the Atmosphere

- Hydrodynamics of the atmosphere; equations of motion on rotating earth; vorticity, potential vorticity, and divergence; boundary layer dynamics.

Special Topics in Meteorology

- Special courses taught on a one-time basis to meet specific needs.

Severe Weather Forecasting Field Trip

- Techniques for the forecasting and safe observation of severe convection; case study analysis of observed events.

Hydrological Processes

- Physical processes governing the occurrence and movement of water through the atmosphere, lithosphere, and biosphere. Techniques for collecting and analyzing hydrologic data and predicting the hydrologic states of particular systems.

Physical Meteorology

- Atmospheric optics; atmospheric radiation and applications to climate; atmospheric convection; cloud and precipitation formation; turbulence and boundary layer processes; atmospheric electricity.

Weather Analysis and Forecasting I: Synoptic Meteorology

- Dynamics and thermodynamics of the atmosphere applied to current weather situations and case studies. Cyclone and frontal theory, jet streams, and quasi-geostrophic diagnostics. Weather discussions, map analysis, and forecast preparation.

Weather Analysis and Forecasting II: Mesoscale Meteorology

- Real-time analysis and nowcasting of mesoscale atmospheric phenomena, including heavy snow, cold-air damming, severe weather, and flash floods. Case studies and weather discussions.

Tropical Meteorology