



SCHOLÉ ACADEMY  
CLASSICAL ACADEMIC PRESS

## Meteorology

Dr. Bill DiPuccio

Spring Semester Course

2024

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### ELIGIBLE STUDENT

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**Grades 9–12.** Students must be able to read independently and to create notes that are organized and easy to follow. Students should be able to express themselves effectively through writing, and must be capable of reviewing information and concepts on their own throughout the year outside of class.

**Prerequisites:** Physical Science, Algebra I (or taking concurrently). Prior classwork in Physics is helpful, but not required.

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### REQUIRED TEXTS & EQUIPMENT

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#### TEXTS:

- *The Weather Book: An easy to understand guide to the USA's weather*, by Jack Williams (1997 ed.)
- *Weather*, by Paul Lehr (a Golden Guide)
- Class notes (download from Canvas, and print in color before each class)

#### EQUIPMENT:

- Liquid-in-Glass Thermometer
- Shiny Can (e.g., food can)
- 2 Liter Soda Bottle w/Cap; Matches or Incense; Alcohol
- Drinking Bird (toy ‘heat engine’)
- Barometer (optional)
- Sling Psychrometer (optional)
- AcuRite Digital Hygrometer (optional)

## COURSE SCHEDULE

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**ORIENTATION SESSION:** Week of January 15, 2024. TBA.

**CLASS SESSION DATES:** This course includes 32 classes (16 wks. of instruction). Classes will be conducted from 2:00–3:15 on Tuesdays and Wednesdays, beginning January 23 and ending May 22, 2024. No classes will be held the week of March 25 – March 29, 2024, in observance of Holy Week and Easter.

**OFFICE HOURS:** Your teachers are available outside of scheduled class times! During “Office Hours” students may raise questions, seek assistance, or review class material. This can happen via email or a meeting in the Zoom classroom. Your teacher will do their best to respond within 24-48 hours; please keep in mind that they likely will not respond immediately to messages after 5 p.m. EST.

## COURSE DESCRIPTION

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Few things impact our everyday lives as much as weather. As history attests, many battles were turned by sudden changes in weather conditions. In antiquity we find numerous references to weather events and processes. Scripture highlights such phenomena as clouds, mist, hail, lightning, rain, seasons, snow, storms, thunder, and wind. Weather is also invoked in the Bible as metaphor and symbol. The Psalmist says, “He made darkness His hiding place, and storm clouds a canopy around Him.” Students will survey these motifs in class.

The oldest, systematic work on weather is Aristotle’s, *Meteorologica*. This work, which we will consider at times during the course, retained its authority for two thousand years. Until the end of the seventeenth century, all textbooks on meteorology were based on Aristotle’s treatise.

The atmosphere is a complex, ever changing, ocean of air, where a constant battle rages between chaos and order. High school meteorology includes the study not only of basic weather elements and surface systems, but also atmospheric physics and its application to large-scale, meso-scale, and small-scale phenomena. Using this approach, which is primarily conceptual, rather than mathematical, students learn how order emerges from fluid and seemingly chaotic interactions.

Students will also learn how to use basic instruments, how to make a simple weather forecast, and how to interpret surface charts, upper air charts, Doppler radar, and satellite photos. Each week, as time permits, the class will discuss current weather conditions by viewing real-time data across different layers of the atmosphere. Meteorology is offered in the spring in order to coincide with thunderstorm and tornado season.

## COURSE MAP

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### I. What Causes Weather?

*Scripture and Weather, Weather Essentials, Aristotle's Foundational Theory, Earth's Atmosphere, Energy Transfer, Earth's Energy Budget*

### II. Weather Elements, Units, and Observations

*Temperature, Heat, Air Pressure, Phase Changes, Humidity, Dew Point, Adiabatic Processes, Clouds, Precipitation, Aristotle's Meteors, Satellite and Radar*

### III. Weather Systems

*Wind Circulation, Coriolis Effect, Pressure Systems, Air Masses, Fronts*

### IV. Upper Air Systems

*Surface and Upper Air Maps, Long and Short Waves, Jet Stream Dynamics, Vorticity, Vertical Motion, Jet Streaks*

### V. Regional Weather & Hemispheric Oscillations

*Land/Sea Breeze, Lake Effect Precipitation, Mountain/Gravity Waves, Monsoons, Ocean Heat Transport, ENSO, PDO, etc.*

### VI. Storms

*Thunderstorms, Tornadoes, Hurricanes and Tropical Storms, Storms in Scripture, Aristotle's Theory*

### VII. Weather Forecasting

*Basic Forecasting, Numerical Forecasting, Long Term Forecasting*

### VIII. Climate and Global Warming

*Climates and Microclimates, World Climates, Climate Forcings and Feedbacks, Human Impacts on Climate, Anthropogenic Global Warming, Paleoclimates*

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## STUDENT EXPECTATIONS: EXECUTIVE FUNCTION SKILLS

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Students enrolling in this course will be expected to show development of Executive Function skills. Executive Function is a set of qualities and skills students can develop and hone to better approach the courses, lectures, readings and teachers they will face in their future academic coursework.

Here are five Executive Function skills that are necessary for this course:

- 1. An Engaged Student:** One who is willing to step into the arena of class discussion, ask questions, supply answers, and consider how the discussion at hand applies to oneself.
- 2. Note Taking:** A student must be engaged with the class by taking notes on important and relevant content in an organized fashion. They should then independently consult those notes for assignments and in preparation for assessments. It is essential that all students acquire a notebook for use during the class, as this will keep them organized by subject.

3. **Attention to Detail & Preparedness:** These students are ones who consistently adhere to deadlines, submission requirements, adhere to style guides and codes, confirm technology is working prior to the start of class, are responsible to determine how to proceed after an absence, are responsible for consulting their course syllabus and adjusting as the class proceeds, etc.
4. **Critical Reflection:** These students are ones who receive feedback to their submissions, and then apply that feedback to future assignments rather than repeating mistakes. These students also glean information from the live class critiques of fellow students and learn from others what mistakes to avoid.
5. **Initiative/Maturity:** This student will be proactive in listening to the teacher's comments, assessing how they apply to his/her work, taking the initiative to schedule office hours with the teacher if necessary.

## **STUDENT EXPECTATIONS IN ACTION**

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Students are expected to arrive to class on time and with all assigned material completed. The instructor will facilitate learning for the student, but the responsibility for staying up-to-date with classwork and assignments ultimately falls to the student.

Students will be expected to listen attentively and to participate actively in class discussions and practices. During class discussion, students will review answers, pose questions, explain and justify their answers and solutions. Students will also be expected to maintain their notes, submit drawings and preliminary plans before starting projects when appropriate, and be prepared to discuss the current state of any ongoing projects at any time.

All assignments will be due at the date and time specified in the assignment post. Students turning in late work may incur a 10% penalty for each day the assignment is late. Late penalties will be determined on a case-by-case basis.

Students will submit their work by scanning their homework pages and uploading onto the assignment post in Canvas. Photographs are the best way to document projects and experiments. However, **written work must be scanned for submission, not photographed, and uploaded to Canvas (preferably in a single PDF document)**. Photographs of written assignments will not be accepted, except under extenuating circumstances and with approval of the instructor.

**Parents and students are responsible for checking current assignments, monitoring grades, and checking missed assignments in Canvas.**

## **STUDENT GRADING AND EVALUATION**

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While studying Meteorology through Scholé Academy will be “restful” and enjoyable, we also recognize the need to provide grades for students who will be using this course as part of their prepared college transcript. It’s a delicate balance to achieve both restful learning and excellent academic performance. Earning a specific grade should not overshadow achievement goals for mastery of this discipline.

Meteorology seeks to feed and focus the natural curiosity of students, imparting not only a wealth of knowledge, but also developing skills in young natural philosophers (scientists who apprehend and apply the greater vision of God’s handiwork in nature) that will serve them well as they go on to explore advanced studies in the field. In that sense then, mastery of the understandings, methods, and contexts is its own reward in and of itself.

Students will receive traditional percentage grades which are readily accessed on the Meteorology Canvas page. Additionally, the instructor will provide a final transcript, by parental request, at the end of the semester.

## **STUDENT EVALUATION : MASTERY PORTRAIT**

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This course provides the academic components necessary to achieve content mastery in basic Meteorology, including the skills associated with spatial and analytical thought. It also challenges students in the development of their moral virtues and appreciation of God’s work in creation, as they consider the design and wonder of earth’s complex processes. Students can enrich their learning experience by mastering the vocabulary of Meteorology and the concepts peculiar to atmospheric physics.

Therefore, by the completion of this course, students should attain to the following skills:

- Master the basic atmospheric processes outlined in Weather Essentials.
- Describe the symbolic and metaphorical role of weather phenomena in Scripture.
- Observe and identify clouds, precipitation types, and other atmospheric phenomena.
- Read and interpret weather maps, satellite photos, and radar images.
- Explain the formation and structure of surface and upper air systems, including pressure cells, fronts, air masses, jet streams, and long/short waves.
- Be conversant with regional and hemispheric weather phenomena, including land/sea breezes, lake effect, monsoons, ENSO, PDO, etc.
- Distinguish between different storm types, their modes of formation, and their environment, including thunderstorms, tornadoes, and hurricanes.
- Produce a basic forecast based on local observations and the analysis of weather maps data.
- Define numerical forecasting and explain how models are used in weather forecasting.
- Be conversant with basic climate classifications, climate change concepts, and the controversy over anthropogenic global warming.

## **STUDENT EVALUATION: ASSIGNMENTS, TYPES & WEIGHTS**

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Dr. DiPuccio will communicate with students regarding assignment feedback and grading through the Canvas online grading system. **Please direct all email inquiries through Canvas.** In addition, students are expected to participate in class discussions and interact with class demonstrations.

40% Homework/Labs

30% Tests/Quizzes (most evaluations are open book/note)

20% Reading Assignments

10% Class Participation

## **STUDENT EVALUATION: ACADEMIC INTEGRITY**

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When students take tests and/or quizzes privately at home, they are on their honor to abide by Scholé Academy's Learning Philosophy which assumes the personal cultivation of student virtues described in the Student-Parent Handbook. We ask that parents proctor quizzes and tests to help keep their children accountable. Note that cheating and plagiarism are punishable offenses. Copying the work of other students is prohibited and proper citation of all sources is essential

## **THE VIRTUAL CLASSROOM:**

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We will be using the free online "virtual classroom" software provided by Zoom. The live, interactive nature of our courses is foundational and we require cameras to be on during all class sessions. The virtual classroom will provide students with interactive audio and an interactive whiteboard in which texts, diagrams, video and other media can be displayed and analyzed. We will provide students with a link (via email) that will enable students to join the virtual classroom. Courses will be managed through our learning management system, Canvas.

Specific information regarding the technology used by Scholé Academy (including required technology) can be found by visiting the [Technology in the Classroom](#) section of the Student Parent Handbook.

## ABOUT THE INSTRUCTOR

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Dr. William DiPuccio has been teaching science since 2002. He served as a science instructor and department head for five years at St. Nicholas Orthodox School, a classical school in Akron, Ohio. More recently, he taught Physical and Earth Science at Heritage Classical Academy, near Akron, Ohio. Bill has designed and taught online, laboratory courses in meteorology, geology, and astronomy, for the Classical Learning Resource Center. He has also conducted summer and weekend science camps.

Bill has a Ph.D. in historical theology, and a professional background in meteorology, engineering (ultrasonic and electromagnetic polymer joining processes, automation), and graphic design. In addition to teaching science, he enjoys tinkering with scientific equipment and performing experiments at home. He also owns a small business, Sacred Engraving, which specializes in cast and etched metal plaques.

*Please note: While this syllabus addresses details specific to this course, it is not extensive. Parents should also read the Student-Parent Handbook located on [scholeacademy.com](http://scholeacademy.com) and be familiar with the ideas, policies, and procedures outlined.*