“It is wrong to think that the task of physics is to find out how [nature](https://en.wikiquote.org/wiki/Nature) is. Physics concerns what we can say about nature...”

-- Niels Bohr

**BHP281: The Rhetoric of Science**

**Term, Year: Day(s) Times**

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**COURSE SYLLABUS**

**CATALOG DESCRIPTION**: This course will examine the rhetoric of science in an effort to see how science has used language and various text types to answer questions, resolve disputes, and legitimize the knowledge contained within its disciplinary borders, and conversely how language and communication have guided scientific discovery throughout history.  Reading texts from ancient and contemporary scientists, philosophers, historians, and literary authors, we will identify the key linguistic and rhetorical traits employed within the discourse communities of modern science, and consider consequences of—and the scientific developments enabled by—such language and textual practices. These concepts will be emphasized and elucidated vis-à-vis some of the most significant scientific and medical discoveries impacting the modern world.

This course fulfills the LAS General Education requirements for the following Disciplinary Perspectives: Natural Sciences or Arts and Literature.

**COURSE GOAL:** That you will recognize how science uses language and texts not only for the discovery and communication of knowledge but also for the establishment of its own identity and the maintenance of its power relationships within contemporary society.

**COURSE LEARNING OUTCOMES:**

As a result of this course students should be able to do the following:

* Identify and define the linguistic mechanisms scientists use to constitute and maintain discrete communities within a given society
* Learn how language has influenced who got to participate in science over time
* Differentiate and critically evaluate the construction of explanations of scientific findings for both scientific and lay audiences
* Analyze the data and mathematical thinking involved in key scientific breakthroughs
* Illustrate how both the theory and practice of discourse in a given community change over time
* Know the basic chronology of the Protestant Reformation as it impacted the Scientific Revolution
* Consider how the rise of vernacular languages and the technologies of printing impacted the Scientific Revolution
* Analyze how scientists use language and texts for the creation of meaning and the legitimation of knowledge within their profession, discipline, sect or subgroup
* Learn basic concepts of epistemology and elementary principles of linguistics and rhetoric
* Critically evaluate competing scientific arguments to explain the same phenomena
* Examine the contemporary flow of scientific information, including gray literature as well as the primary, secondary, and tertiary scientific literature

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| **Course Learning Outcomes** | **Brief Description of Sample Assignment**  | **University Learning Outcomes/Strategic Themes** |
| 1. 1. Identify and define the linguistic mechanisms by which scientists and their professional organizations establish and maintain professional, disciplinary, and/or sectarian identity.
 | Identify the internal and external audiences in Plato’s dialogue *Timaeus,* Lucretius’ epic poem *De Rerum Natura*, and Galileo’s “Starry Messenger,” and rank the clarity and persuasiveness of the scientific explanations of each. | Critical ThinkingWritten Communication |
| 2. Learn how language has influenced who got to participate in science over time. | In what ways did Galileo’s decision to publish his finding in the vernacular language alter the power relationships among his audience? | Critical ThinkingWritten Communication |
| 3. Differentiate and critically evaluate the construction of explanations of scientific findings for both scientific and lay audiences | What similarities and differences do you notice between Thomas Sprat’s “Epistle Dedicatory” to King Charles II in *The History of the Royal Society* and those written by Lucretius, Galileo (in “The Starry Messenger”) and Francis Bacon? | Critical ThinkingWritten Communication |
| 4. Analyze the data and mathematical thinking involved in key scientific breakthroughs5. Illustrate how both the theory and practice of discourse in a given community change over time6. Know the basic chronology of the Protestant Reformation as it impacted the Scientific Revolution7. Consider how the rise of vernacular languages and the technologies of printing impacted the Scientific Revolution | In your own words, explain how Galileo’s geometric diagram on p. 30 of “The Starry Messenger” illustrates how his telescope can be used to measure distances between celestial objects. | Quantitative ReasoningScientific ReasoningCritical ThinkingWritten Communication |
| 8. Analyze how scientists use language and texts for the creation of meaning and the legitimation of knowledge within their profession, discipline, sect or subgroup9. Learn basic concepts of epistemology and elementary principles of linguistics and rhetoric | Comment upon Descartes’ use of argument from authority in his *Discourse on Method* to justify what turns out to have been a completely erroneous account of the circulatory system. | Critical ThinkingScientific ReasoningWritten Communication |
| 10. Critically evaluate competing scientific arguments to explain the same phenomena | Explain the key differences between Lamarck’s and Darwin’s accounts of the mechanisms behind evolution. | Critical ThinkingScientific ReasoningWritten Communication |
| 11. Examine the contemporary flow of scientific information, including gray literature as well as the primary, secondary, and tertiary scientific literature | In a 6-8 page (2000 word) researched argument, develop a thesis based on a question in science or the rhetoric of science. Compose a well-constructed argument, employing evidence from reputable and independent scholarly sources to support (or refute) your claims. You are additionally required to give anoral presentation on your researched argument, both of which will be assessed for (1) quality of argument and (2) clarity of presentation. | Critical ThinkingWritten CommunicationOral CommunicationInformation Literacy |

**TEXTS**

Plato. *Timaeus* (online selections)

Aristotle. *De Animalia* (online selections)

Lucretius. *De Rerum Natura* (photocopied selections)

Galileo Galilei. *The Starry Messenger* (photocopied and online selections from *Dialogue Concerning the Two Chief World Systems*)

Francis Bacon. *The Advancement of Learning* (photocopied selections)

Thomas Sprat. *The History of the Royal Society* (photocopied selections)

René Descartes. *Discourse on Method*.

Thomas S. Kuhn. *The Structure of Scientific Revolutions* (photocopied selections)

Gregor Mendel. *Experiments in Plant Hybridization* (online selections)

Jean-Baptiste Lamarck. “Theory as to the Evolution of Man” (online selections)

Charles Darwin. *The Origin of Species*. Introduced and abridged by Philip Appleman.

Dmitri Mendeleev. Talk given to the Royal Chemical Society (online selections)

J.A.R. Newlands. Short papers on the Law of Octaves (online)

James D. Watson. *The Double Helix* (online selections)

Anne Sayre. *Rosalind Franklin and DNA* (photocopied selections)

Stephen J. Gould. *The Mismeasure of Man.* (photocopied selections)

Selected essays, articles, and excerpts from various sources (provided as photocopies).

**ADA:** If you have a disability and believe you will need academic accommodations in this course, please make an appointment for an Intake Interview with Services for Students with Disabilities in the Vona Academic Annex, Room 8 on the Lawrenceville campus. The phone number is (609) 895-5492 and the email is serv4dstu@rider.edu. They will ask for documentation of your disability to support your accommodation requests and to recommend services as appropriate to your individual situation.

**CODE OF ACADEMIC CONDUCT:** The submission of written work that includes the words or ideas of another without proper citation possibly constitutes plagiarism. Papers or presentations that are plagiarized will be given a grade of zero, and their authors will be treated in accordance with the “Procedures to be Followed in Academic Cases of Dishonesty” as outlined in the Rider Catalog at this URL *http://catalog.rider.edu/policies/code-academic-integrity/*

**LATE ASSIGNMENT:** Assignments are due as specified in the assignment guidelines. Late assignments will result in lower grades. Any change in this policy must be arranged before the assigned due date and be accompanied by a written explanation for your need to make any adjustment to the schedule of due dates.

**PAPER SPECIFICATIONS**: All essays and informal writing should be submitted electronically.

You should use a font that is easy to read in a size that would result in approximately 250 words per page if printed in hard copy. You should keep an electronic copy of all work (essays, informal writing, etc.) you submit in the event that anything gets lost. You will be submitting much of your writing electronically via Canvas, either in the Discussion Board Forums or in other digital fora. You may use either MLA or APA style to cite borrowings.

**CMS SPECIFICATION:** We will use Canvas for four primary purposes: Posting course materials and links to relevant resources; announcing events and activities; posting written versions of informal and formal writing assignments; providing you with forums for your informal writing. Informal writing activities will take a variety of forms; in most cases, we will expect you to engage in meaningful analyses of texts and cooperative learning behaviors that are conducive to helping yourselves and your classmates learn more and produce better work. You should check Canvas regularly for announcements.

**COMPUTER SKILLS USED:** Word processing, presentation software, electronic mail, Canvas CMS, bibliographic database software, and accessing online library and Internet resources.

**WRITING ASSIGNMENTS:**

You will have four different kinds of writing assignments. You will submit brief Free Informal Writings to the Discussion Board on a regular basis. They will be scored credit/no credit. If you submit them on time, you will earn the points. You will also submit Structured Informal Writings to the Discussion Board. They will be scored on a simplified letter grade basis. You will also write one formal researched argument on a topic of your choosing. It will be letter graded. Finally, you will compose and deliver an oral presentation. It will also be numerically scored.

**INSTRUCTIONAL ACTIVITIES:** In addition to the traditional practices of reading, writing, listening, and viewing, this section of BHP271 will incorporate current pedagogical approaches including process writing, cooperative learning, small group activities, and creative and critical thinking strategies. Some of the above approaches will be implemented through the writing and communication software available on Rider’s computer network, especially the Canvas Learning Management System.

**HOMEWORK AND ASSIGNMENTS**: The satisfactory completion of all major assignments and most homework assignments is required for a passing grade.

**PREPARATION AND PARTICIPATION**: Preparation for class and diplomatic participation in class activities are vitally important for your success in this course. This course requires a considerable amount of reading; preparing yourself for class and actively participating will greatly aid your learning process. Occasional quizzes on the reading material will account for 10% of your final grade.

**PROFESSIONALISM**

Professionalism includes the following:

* Arriving on time for classes and attending all class sessions (A "no cut" policy exists for this course). If you do have to miss class for unavoidable reasons, notify the instructor in advance of, or shortly after, the missed session, and ask a classmate to collect any handouts and summarize the night's events for you.
* Active, mature, and reflective participation in class activities and discussions. In order to maximize the efficiency and effectiveness of your participation, we recommend preparing brief point form chapter summaries for quick review before discussions of readings, which will occur in many class sessions. Active participation means carrying your share of the discussion, with diplomacy, and asking pertinent questions of the instructor and fellow students. Our class sessions will be interactive so we will make frequent transitions from group activities back to whole class sessions. Professionalism here entails rapid, efficient transitions without side conversations. Electronic devices are permitted provided they are used solely for things germane to this course.
* Timely completion of readings and assignments. You will have written assignments due at or before the beginning of most class meetings and marked on a simplified letter grade or credit/no credit basis. Late submissions will not be awarded credit.

**EVALUATION PROCEDURE:**

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| **Assignment** | **Grading Percentages**  | **Method of Evaluation** |
| Free Informal Writings | 10% | Credit/No Credit |
| Structured Informal Writings | 10% | Simple Letter Graded |
| Quizzes | 10% | Numerically Scored |
| Midterm Exam | 10% | Numerically Scored |
| Final Oral Presentation | 15% | Numerically Scored |
| Researched Argument  | 25% | Letter Graded |
| Final Exam | 20% | Numerically Scored  |

**COURSE CALENDAR**

The calendar below indicates the dates by which you should have read and be prepared for a quiz on the material listed. It also lists the due date for your Researched Argument and the dates when you will present your results orally. Additionally, you will have frequent Informal Writing assignments throughout the term.

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| **Date** | **Topic/Question/Focus** | **Assignment** |
| **1/25** | Introduction. Definitions of Language, Science, Epistemology, Empiricism, Rhetoric, and Discourse Communities. | In-class Writing: A brief autobiography of science education to date, including a statement of what science is and how it works. |
| **2/1** | History of Scientific Discourse: Examples Ancient, Renaissance, and Early Modern. Theories of Epistemology.  | Read: Plato, Aristotle, LucretiusWrite: Response to Discussion Board Prompts |
| **2/8** | Religion and Science. The Protestant Reformation and The Scientific Revolution. The Rise of Vernacular Languages | Read: GalileoWrite: Response to Discussion Board Prompts |
| **2/15** | History of Skepticism | Read: DescartesWrite: Response to Discussion Board Prompts |
| **2/22** | The Rise of Empiricism | Read: BaconWrite: Response to Discussion Board Prompts |
| **3/1** | The Royal Society and the Emergence of Scientific Disciplines | Read: Sprat and BoyleWrite: Response to Discussion Board Prompts |
| **3/8** | Newtonian Optics andTheories of Scientific Revolution | View “Newton’s Prism Experiment” and Read: KuhnWrite: Midterm Exam Responses |
| **3/15** | Spring Break |  |
| **3/22** | Science vs. Religion Regarding Questions of Human Origin  | Read: Mendel and DarwinWrite: Response to Discussion Board Prompts  |
| **3/29** | Simultaneous competition among diverse models. | Read: Chancourtois & MendeleevWrite: Response to Discussion Board Prompts  |
| **4/5** |  Contrast the methods of carrying out investigations and interpreting data. | Read: Crick & Watson and predecessors and SayreWrite: Response to Discussion Board Prompts |
| **4/12** | Modes and Media of Scientific Communication for Scientists and Lay People **Researched Argument Due** | Read: Gould *Mismeasure of Man* and Origins of Scientistic RacismWrite: Response to Discussion Board Prompts  |
| **4/19** | Who does science? Professionals, amateurs and crowd sourced investigations.**Oral Reports** | Read: Trends in Crowd Sourcing ScienceWrite: Response to Discussion Board Prompts |
| **4/26** | What roles do media and politics play in the version of science the general public receives?**Oral Reports** | Read: Recent articles supporting and denying human impact on climate change.Write: Response to Discussion Board Prompts  |
| **5/3** | **Final Exam Due** |  |

**WARNING:** The due dates listed above are provisional. Definite dates will be announced in class, and an updated version of this syllabus will be available via Canvas throughout the term. Also, the instructors reserve the right to make adjustments in this course to better meet the needs of the students.

**ACKNOWLEDGEMENTS:** In constructing this syllabus, we are indebted to the BHP faculty who provided helpful recommendations.