

# Life and Times of Great Physicists from Galileo to Hawking

FOUN 091-44      Fall 2010

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**Classes:** MWF 2 – 3 pm      BIOL 222

**Video Sess.:** R 7 - 9 pm      Olin 275

**Office Hours:** T 1 – 3 pm, R 3 – 5 pm or by appointment

**webpage:** [http://www.eg.bucknell.edu/~kvollmay/found\\_f2010/](http://www.eg.bucknell.edu/~kvollmay/found_f2010/)

**Texts:**

- Richard P. Brennan, "Heisenberg Probably Slept Here"
- William H. Cropper, "Great Physicists"
- Richard P. Feynman, "Surely You're Joking Mr. Feynman"
- Michael Frayn, "Copenhagen"
- Kurt Vonnegut, "Cat's Cradle"
- G. Graff and C. Birkenstein, "They Say, I Say"
- M. Shelley, "Frankenstein"

**Course Description:** This course is about scientists and their society. During the first three weeks we discuss how scientists are portrayed. We use movies like Frankenstein, cartoons like Bugs Bunny, and literature like Cat's Cradle to extract common stereotypes. For the rest of the semester we learn about the life, time and work of great physicists, beginning with Bacon and Galileo and ending with Hawking and other scientists of the present. As a guideline we ask questions like: Which kind of characters were they? What made them successful? What motivated them? Did their lives have anything in common? How were their lives influenced by their times, for example during World War II or as a minority in physics? Do we find certain stereotypes to be true?

**Objectives:** This course is a foundation seminar and is intended to help you with the transition to academic life at Bucknell. In the college setting you might encounter a different approach to learning than what you are used to from your high school.

The main goals of a foundation seminar are active learning, collaborative working, critical thinking, writing skills, familiarity with the library and computers, and learning good work habits. By active learning we mean that contrary to just listening, you take an active role in the course in group discussions, in which you form, share and reshape your own opinions. Collaborative work, a skill which will help you later in life, means that you do group work both in class as well as for projects out of class. Critical thinking is the process of understanding and evaluating issues which are complex and not simply right or wrong.

Summarized, our main goal is that you learn how to enjoy your time at Bucknell.

**Course Structure:** This course is a mixture of group discussions, mini lectures, video sessions, and trips to the library, writing center, and Career Development Center. There will be “daily assignments”, which prepare you for each class and are handed in via email. They consist of some reading and/or writing assignment, often with questions which give you guidance for the reading and the opportunity to give me, the instructor, feedback about the reading and course. You will work on three main projects: an autobiographical paper, a paper and talk about a physicist in the past, and a paper and talk about a scientist of the present. The latter two projects will be done in groups of two. For movies we have the additional Thursday evening sessions.

**Grading:** *There will be no exams and no final!* You will have to keep up with the course on a day to day basis, because we will cover a lot of course material in a short amount of time. The three main projects will amount to 54% of your grade, daily assignments account for another 30% and the remaining 16% is for professionalism.

The three *main papers* are each handed in as a first and second draft, on which you get feedback, as well as a final paper. Both the drafts and the final paper are included in your grade for each paper. For any late paper you get a one-tenth reduction for each calendar day (maximal reduction half credit).

**Grading**  
(continued):

Since the *daily assignments* have the purpose to prepare you for the in-class discussions, you will get **no** credit for any late daily assignment. Effort is what counts most for daily assignments.

Your participation in this course is essential and therefore 16% of your grade is on *professionalism*. **Attending and being on-time is mandatory.** Professionalism also includes working as a team, being prepared for class and class participation. Therefore you may not do phone calls, texting, web-surfing or emailing during class. Attendance and participation are required for the following reasons:

- This is a seminar with in-class discussions and thus in-class work cannot be made up easily outside of class.
- The course material is cumulative and therefore each class is planned under the assumption that all previous course material is known.
- You will work in groups and therefore need to be there as fairness to your group partners.
- Most importantly, these are work place skills you will need both at Bucknell as well as after Bucknell.

If you must miss class (e.g. because of an athletic conflict), you **must** arrange with me **ahead of time** to make up the missed class. If this is not possible (e.g. last-minute emergencies), you must contact me as soon as reasonably possible so that I can help with planning how to make up any class that you will need to miss.

Any writing you hand in should be your own words (or of you and your group partner for group work). Do not copy sections of any other source (world wide web, books, etc.) without quoting and referencing the source! For further clarification of academic responsibility please see <http://www.bucknell.edu/x1324.xml>

In the case of any doubt please ask.

|                        |      |
|------------------------|------|
| Professionalism        | 16 % |
| Daily Assignments      | 30 % |
| Autobiographical Paper | 10 % |
| Physicist in Past      |      |
| Paper                  | 11 % |
| Talk                   | 11 % |
| Scientist in Present   |      |
| Paper                  | 11 % |
| Talk                   | 11 % |

## Course Syllabus

The following syllabus may change with the flow of the semester. Reading assignments of “Heisenberg Probably Slept Here” and “Great Physicists” (Cropper) have been abbreviated with HPSH and GP respectively. Additional reading assignments which you will find on blackboard are indicated with \*. The Writing Assignments column lists mainly the due dates of the three projects (in bold). It is incomplete since not all daily assignments are included. For more details see the updated daily assignments on our web page ([http://www.eg.bucknell.edu/~kvollmay/found\\_f2010/](http://www.eg.bucknell.edu/~kvollmay/found_f2010/)).

| Dates          | Topic                             | Assignments listed by due date (see Daily Assign.) |                               |
|----------------|-----------------------------------|--|-------------------------------|
|                |                                   | Reading Assignments                                | Writing Assignments           |
| Aug. 25        | Introduction & Chain Writing      | Course Information                                 |                               |
| <i>Aug. 26</i> | <i>Dr. Strangelove (video)</i>    |  |                               |
| Aug. 27        | Disc. Chain Wr. & Plan Interview  | Faust to Dr. Strangelove: Intro*                   |                               |
| Aug. 30        | Cartoons & Present Interviews     | They Say, I Say                                    | <b>sketch of autob paper</b>  |
| Sep. 1         | Writing Center: Peer Review       |  | <b>1st draft autob. paper</b> |
| <i>Sep. 2</i>  | <i>Frankenstein (video)</i>       |  |                               |
| Sep. 3         | Frankenstein (Visit: G. McDayter) | Frankenstein                                       | <b>2nd draft autob. paper</b> |
| Sep. 6         | Cat’s Cradle                      | Cat’s Cradle                                       |                               |
| Sep. 8         | Stereotypes                       | TBA*   |                               |
| Sep. 10        | Library Session                   |  | <b>final autob. paper</b>     |
| Sep. 13        | Bacon                             | Books You Found                                    |                               |
| Sep. 15        | Galileo: Life & Work              | GP pages 5 – 17                                    |                               |
| <i>Sep. 16</i> | <i>Galileo (video)</i>            |  |                               |
| Sep. 17        | Galileo: Dialogue                 | TBA*   |                               |
| Sep. 20        | Newton                            | HPSH pages 11 – 43                                 |                               |

| Dates          | Topic                                     | Assignments listed by due date (see Daily Ass.) |                                |
|----------------|---|---|--------------------------------|
|                |   | Reading Assignments                             | Writing Assignments            |
| Sep. 22        | Einstein: Work                            | HPSH pages 45 – 84                              |                                |
| <i>Sep. 23</i> | <i>Einstein (video)</i>                   |   |                                |
| Sep. 24        | Einstein: Life                            |   | <b>bibliography project II</b> |
| Sep. 27        | Gibbs                                     | GP pages 106 – 123                              |                                |
| Sep. 29        | Maxwell                                   | GP pages 154 – 175                              | <b>1st draft project II</b>    |
| <i>Sep. 30</i> | <i>Curie (video)</i>                      |   |                                |
| Oct. 1         | Curie                                     | GP pages 293 – 307                              | <b>2nd draft project II</b>    |
| Oct. 4         | Rutherford                                | HPSH pages 107 – 129                            |                                |
| Oct. 6         | Meitner                                   | GP pages 330 – 343                              |                                |
| <i>Oct. 7</i>  | <i>Meitner (video)</i>                    |   |                                |
| Oct. 8         | Women in Science<br>(Visit: M. Verbrugge) | TBA*  |                                |
| Oct. 11        | Intro to Talks                            |   | <b>final draft project II</b>  |
| Oct. 13        | Talks:                                    |   | Summary of talks               |
| Oct. 15        | Biography of                              |   |                                |
| Oct. 20        | Physicist in Past                         |   |                                |
| Oct. 22        | Success                                   | TBA*  |                                |
| Oct. 25        | Heisenberg                                | HPSH 153 – 183                                  |                                |
| Oct. 27        | Copenhagen                                | Copenhagen: pages 3 – 94                        |                                |
| <i>Oct. 28</i> | <i>Copenhagen (video)</i>                 |   |                                |

| Dates          | Topic                     | Assignments listed by due date (see Daily Ass.) |                                 |
|----------------|---------------------------|---|---------------------------------|
|                |                           | Reading Assignments                             | Writing Assignments             |
| Oct. 29        | Biographies & History     | Copenhagen: pages 95 – 129 & TBA*               |                                 |
| Nov. 1         | Science in Total. State   | TBA*  |                                 |
| Nov. 3         | Feynman                   | Surely You're Joking Mr. Feynman                |                                 |
| <i>Nov. 4</i>  | <i>Feynman (video)</i>    |   |                                 |
| Nov. 5         | Feynman: Life & Work      | HPSH pages 185 – 212                            |                                 |
| Nov. 8         | What Motivates Scientists | TBA*  | <b>Bibliography project III</b> |
| Nov. 10        | Gell-Mann                 | HPSH pages 213 – 241                            |                                 |
| <i>Nov. 11</i> | <i>Hawking (video)</i>    |   |                                 |
| Nov. 12        | Hawking                   | GP 452 – 463                                    |                                 |
| Nov. 15        | Science & Fraud           | TBA*  |                                 |
| Nov. 17        | Career Develop. Center    |   | <b>1st draft project III</b>    |
| Nov. 19        | Scientists in Present     |   | <b>2nd draft project III</b>    |
|                |                           |   |                                 |
| Nov. 22        | Science & Pseudoscience   | TBA*  |                                 |
| Nov. 29        | Wrap Up Discussion        |   | <b>final paper proj. III</b>    |
| Dec. 1         | Talks:                    |   | Summary of talks                |
| Dec. 3         | Biography of              |   |                                 |
| Dec. 6         | Scientist in Present      |   |                                 |