This course examines the content and culture of the natural sciences in the modern period. Content will include relativity theory, quantum theory, nuclear physics, the standard model in particle physics, advances in astrophysics and cosmology, genetics, the evolutionary synthesis, molecular biology, and work on genome sequences. As these bodies of knowledge are examined, we will also consider the culture of science, individual and collective styles of working in science, the role of the scientist in the culture at large, and the larger cultural and philosophical relevance of scientific knowledge.

In the course of the semester, you will be exposed to the core concepts of modern science, you will be introduced to a number of perspectives from which science can be studied, and you will critically discuss the content and the context of modern science. An outline of the topics for the semester follows.

Reading assignments are indicated as follows:

- **C1** = Read Crick, Chap. 1.
- **J4** = Read Jones, Chap. 4.
- **R3** = Read item 3 in the course reader.

Refer to the list of assigned reading on page 3 for a complete key.

Do the Reading Before Class on the Day Indicated.

Schedule of Topics and Reading Assignments

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 22</td>
<td>Introductions, Course Themes</td>
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</tr>
<tr>
<td>Aug 24</td>
<td>New Discoveries: Radioactivity and Atoms</td>
<td>HT1-2, R1-2, J22.</td>
</tr>
<tr>
<td>Aug 31</td>
<td>Early Quantum Theory</td>
<td>J8.</td>
</tr>
<tr>
<td>Sep 5</td>
<td>LABOR DAY – NO CLASS MEETING</td>
<td></td>
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<tr>
<td>Sep 7</td>
<td>Modern Quantum Theory</td>
<td>HT5, J9, J11, M2-3.</td>
</tr>
<tr>
<td>Sep 12</td>
<td>Origins of Relativity Theory</td>
<td>HT12, R7.</td>
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<tr>
<td>Sep 14</td>
<td>Special Relativity</td>
<td>J 1-2.</td>
</tr>
<tr>
<td>Sep 19</td>
<td>General Relativity and Experimental Verification</td>
<td>CP2, J3-4.</td>
</tr>
</tbody>
</table>
Sep 26    The Evolutionary Synthesis
Read:    HT17-18, R8, M6-8.

Sep 28    EXAM I

Oct 3     Molecular Biology
Read:    HT15-16, R9, C1-3.

Oct 5     Molecular Biology
Read:    P2-3, C4-7.

Oct 10    Molecular Biology
Read:    P4-6, C8-9.

Oct 12    Molecular Biology
Read:    C10-13.

Oct 17    Nuclear Physics
Read:    HT8, J16.

Oct 19    Nuclear Physics
Read:    G1-4.

Oct 24    Particle Physics
Read:    HT9, J18.

Oct 26    Particle Physics
Read:    G7-9.

Oct 31    Astrophysics
Read:    HT10-11, CP7.

Nov  2    Cosmology
Read:    J6, CP5.

Nov  7    Big Science
Read:    R10, R11.

Nov  9    EXAM II

Nov 14&16 Oral Presentations

Nov 21&23 FALL RECESS

Nov 28&30 Oral Presentations

Dec  5&7 Oral Presentations,
Closing Remarks and Course Evaluation
Required Texts:


R  Reader, available at Little Professor Books.

Assessment:

Each student’s performance will be assessed in four distinct ways:

§ 1. Examinations. These will occur on September 28 and November 9. Each exam will include a short answer section and an essay section. Each exam will account for 20% of your final grade.

§ 2. Discussion Questions. Starting in the second week of the semester, you will be responsible for sending me, by email, questions about the readings that will serve as the foundation for our discussions. A complete description of the expectations for this assignment appears on pages 5 and 6 of the syllabus. Your email submissions will make up 20% of your final grade.

§ 3. Class Participation. Your contribution to the learning community includes discussion of assigned reading and active engagement during your classmates’ presentations. Active participation in all facets of the course will make up 20% of your final grade.

§ 4. Oral Presentation. A detailed description of this assignment appears on page 7 of the syllabus. You will be responsible for presenting the key ideas in an article about recent work in science to your classmates. All work related to the presentation will make up 20% of your final grade.

Final grades submitted to the registrar will include +/- as appropriate.

There are no extra credit options in this course.

Performance Weighted Grading Option:

Recognizing that each student brings a different set of skills and talents into the classroom, I will allow each student to shift the relative weights of their grades as follows:

Your strongest grade in §§ 1–3 will account for 25% of your final grade.  

and  Your weakest grade in §§ 1–3 will account for 15% of your final grade.

You may not exercise this option if:

You accumulate more than two hours of unexcused absences in the course of the semester.  

or  You accumulate more than four hours of absences in the course of the semester.

or  You do not take both exams in § 1.

or  You miss more than one fourth of the assignments in § 2.
Absenteeism:
The purpose of this course is to expose you to a variety of perspectives and issues in contemporary science. Excessive absenteeism will be disruptive to your ability to integrate the material presented. The class participation portion of your final grade will suffer dramatically if you miss more than two hours of class time without a legitimate and documented excuse.

Contact Information:
I am here to help you do well in this course. I am available to help you during office hours and by appointment. Don’t hesitate to ask for an appointment—problems are easiest to resolve when they are brought up early. Don’t feel like you need to have a problem in hand to come see me.

Office: H 223C
Office Hours: MW 9-10am, W 2:30-3:30pm, and by appointment
Office Phone: (714) 278-3935 (24-hour voice mail)
email: cmcconnell@fullerton.edu
online resources: http://faculty.fullerton.edu/cmcconnell/304/SResources.htm

Readings:
R1 Craig McConnell, “A Brief Overview of Science Studies.”
R7 Time’s Person of the Century (Time Magazine, Dec. 31, 1999):
Discussion Questions:

Starting in the second week of the semester, you will be responsible for sending me, by email, questions about the readings that will serve as the foundation for our discussions. Your email needs to be in my inbox no later than 9 am to be considered on time.

There are three different kinds of emails that you will prepare for this assignment.

1. Main Points: Without quoting from the text, send me a few sentences telling me what the main points of the reading assignment were.

2. Questions: Send a list of 3-5 questions, based on the reading assignment, that you would like to have discussed.

3. Vocabulary: Send me a list of any words that you would like to see defined more carefully. If you understood every word in the reading assignment, send a short note saying so. If there were an overwhelming number of words that you did not know, send me the first twenty and tell me what page number the 20th word falls on.

To help me manage the incoming email, please follow these guidelines:

1. Do not use attachments – make sure that your work is in the body of your email.

2. Do not lump submissions together – send a separate email for each reading assignment.

3. Use the following for your subject:
   – first enter “304”, followed by a space
   – then enter the one letter code indicating the kind of email that you are sending
   – then enter the reading assignment as it appears on the grid

Examples:
   304 M J5
   304 Q G1-2
   304 V C4

These emails should not be burdensome – they are meant to help you order your thinking about the day’s readings and to give me some warning about the issues that you want to discuss. Generally, I will not respond to these emails – the issues that you submit by email should be raised in class.
The following grid will tell you which set of questions to prepare each day.

If your last name begins with A through H, you are in Group 1.
If your last name begins with I through P, you are in Group 2.
If your last name begins with Q through Z, you are in Group 3.

<table>
<thead>
<tr>
<th>Reading</th>
<th>M</th>
<th>Q</th>
<th>V</th>
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</thead>
<tbody>
<tr>
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<td>2</td>
<td>3</td>
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<tr>
<td>J8</td>
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<td>3</td>
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<td>J9</td>
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<td>J11</td>
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<tr>
<td>P2</td>
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<td>2</td>
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Oral Presentations:

In the final weeks of the semester, you will be responsible for presenting the key ideas in an article about recent work in science to your classmates and for being an active participant during your classmates’ presentations.

These sessions will resemble a journal reading circle – each of you will work with three feature articles published in *Scientific American* in the last year – one that you will read carefully and prepare for an oral presentation, and two others that you will read that will be presented by classmates.

Your presentation should include:

1. A brief description of the background(s) of the author(s).
2. A brief statement about the kind of article that it is (Was it an announcement of new results? An announcement of a new theory? A review of the thinking about an issue?)
3. An overview of the conceptual content of the article (you should digest the material and report on it; you will *not* have time to do a point-by-point summary).
4. Your assessment of that argument.
5. Your personal reaction to the article.

Your presentation will be ten minutes in length, and time should be budgeted for questions from your classmates. After your presentation, I will ask each of you to turn in the notes that you prepared for your presentation, and a copy of the article that you read.

A written reflection on this aspect of the semester will be due in the Liberal Studies office at the time scheduled for the final examination. Your reflection should be no more than three typed pages.