

Course Outline: Honors Discussion Session (Physics 89) for Physics 6B

Instructor:

- Katsushi Arisaka, Professor of Physics & Astronomy
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Meeting:

- During Winter 2013 quarter, in parallel to Physics 6B
- Weekly meeting, scheduled on
 - Physics 89, Sem. 1: Thursday at 10:00 – 10:50 am**
 - Physics 89, Sem. 2: Thursday at 11:00 – 11:50 am**
- Location: **PAB 4330**
- ~20 students per each seminar are expected.

Purpose:

- This course is specifically designed for highly motivated life science majors in 6B to understand the fundamental principle behind human's dynamical behavior. Topics include:
 - *Five senses:*
 1. *Vision*
 2. *Hearing*
 3. *Touch (Pain, Temperature)*
 4. *Smell, Taste*
 - *Neural networks in Brain*
 1. *Memory and Learning*
 2. *Consciousness and unconsciousness*
 - *Motions*
 1. *Muscles*
 2. *Heart*
- Participants will learn direct application of basics concepts from Physics 6B (Wave, Electricity and Magnetism) to biological systems listed above.
- Advanced techniques on medical and bio-imaging are also introduced.

Proposed Program:

- The program will consist of the following, related to the topics mentioned above.
 - *Weekly lecture by Arisaka and informal discussion*
 - *Reading assignments and Written reports*
 - *End-of-Course Oral presentation (will be scheduled in early April.)*

Reference:

- Feynman's Lectures on Physics (Copy will be provided.)
- Recent articles from scientific magazines

Tentative Course Outline

<u>Week</u>	<u>Day</u>	<u>Topics</u>
1	January 10	Orientation, Origin of Universe and Particles
2	January 17	Origin of Life and Consciousness
3	January 24	Organization of students research projects
<i>(First Midterm of 6B: Monday, January 28)</i>		
4	January 31	Five senses (Vision, Hearing, Taste ...)
5	February 7	Neural networks
6	February 14	Group meeting by students
7	February 21	Advanced technique of high-speed Bio-imaging
<i>(Second Midterm of 6B: Monday, February 25)</i>		
8	February 28	Tour to Arisaka's bio-imaging lab
9	March 7	Progress report from students
10	March 14	Final Lecture: What is Life? Origin of Consciousness

Mini Conference – Oral Presentation by students

Sunday, March 31 9 am – 5 pm

Saturday, April 6 9 am – 5 pm

Sunday, April 7 9 am – 5 pm

Reading Assignment

Please read two of the following books, one by February 4 (Mon), and the other by March 4 (Mon). Write a short (~1/2 page) book review. As for the first book, I strongly encourage you to read "**I of the Vortex: From Neurons to Self**" because it covers the central theme of this course extensively.

1. **I of the Vortex: From Neurons to Self**
by Rodolfo Llinas
\$16.29

2. **The Double Helix :**
A Personal Account of the Discovery of the Structure of DNA
by James D. Watson
\$11.20

3. **The Selfish Gene**
by Richard Dawkins
\$10.85

4. **Life Ascending: The Ten Great Inventions of Evolution**
by Nick Lane
\$16.95

5. **In Search of Memory: The Emergence of a New Science of Mind**
by Eric R. Kandel
\$18.95