

Quantum Consciousness:
the Large, the Small & the Human Mind
CogSci 98/198 Fall 2017

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University of California Berkeley: **Democratic Education at Cal**
Faculty Sponsor: Professor David Presti, Senior Lecturer of Neurobiology

Class is held in _____ every Tuesday from 6-8PM, starting September 5th and ending on December 5th. There are 13 days of class, 12 weekly HW assignments, and a 3 page research paper. You may miss 2 homework assignments and 2 days of class.

With the impending transition towards quantum computer technology and the necessity of quantum phenomenon in biology (e.g. photosynthesis), our naive physicalist assumptions from the 20th century must be augmented. Quantum Theory is based on three interacting principles: Measurement, Superposition, and Entanglement; of which, consciousness is theorized to have a correspondence. This course presents the trialist (3 part) model of consciousness: Physical (digital computation), Mental (quantum coherence), & Platonic (conceptual/fractal). The model presented throughout the course synthesizes the fields of Cognitive Science: Information, Philosophy, Biology, Linguistics, Psychology, & Spirituality.

Course Schedule

Unit 1 - Information - what can we learn from technology?

9/5 **1: Quantum Consciousness & Penrose's Three Worlds**
Many Worlds, Copenhagen Interpretation, Self-Collapse

9/12 **2: Computers: Illusion of Solid-State, NP-Complete, Artificial Intelligence**
Quantum Computers & Universal Quantum Simulation

* Antonella Vannini "Quantum Physics, Advanced Waves and Consciousness" (2011)

* Ray Kurzweil *The Singularity is Near* Ch. 1 The Six Epochs (2005)

* Seth Lloyd *Programming the Universe* Ch. 7 The Universal Computer (2006)

* Brian Greene *The Fabric of the Cosmos* Ch. 4 Entangling Space (2005)

* Michael Mensky "Logic of Quantum Mechanics and Phenomenon of Consciousness" (2011)

Unit 2 - Philosophy - what is reality made of and how do we understand it?

9/19 **3: Metaphysics of Mind/Matter: Physicalism, Dualism, & Trialism**
Double-Slit Experiment, Wave-Particle Duality & the Particle Illusion

* Justin Riddle "Mind/Body/Spirit Complex in Quantum Mechanics" (2014)

9/26 **4: Epistemology of Qualia: Deduction, Induction, & Abduction**
First Order Logic, Bayesian Inference, & Quantum Logic

* David Chalmers "Facing Up to the Problem of Consciousness" (1995)

Unit 3 - Biology - how could a quantum computer be in our brain?

10/3 **5: Microtubules:** Nonpolarity, ORigin of Life, Biological Qubits
Quantum Coherence & Decoherence Free Zones

* Roger Penrose, Stuart Hameroff "Consciousness in the Universe: Neuroscience, Quantum Space-Time Geometry and Orch-OR Theory" (2014)

10/10 **6: Brain:** Neural Oscillations, Quantum Brain Dynamics
Orchestrated Objective Reduction

* Terence McKenna *The Invisible Landscapes* Ch. 4 Toward a Holographic Theory of Mind (1975)

* Rhawn Joseph "Quantum Physics and the Multiplicity of the Mind: Split-Brain, Fragmented Minds, Dissociation, Quantum Consciousness" (2009)

Unit 4 - Fractals - what makes a computation meaningful?

10/17 **7: Cognition:** Feigenbaum Constant, Holarchy, Voices in Your Head, Cyclic Time
Digital Computer (Body), Quantum Computer (Mind) & Fractal Computer (Spirit)

* Justin Riddle "Fractal Cognitive Triad: A Theoretical Connections between Cognition and Neural Oscillations" (2015)

10/24 **8: Frequency:** Vibration, Integrated Information, Frequency Fractal Computing
Quasicrystals, Geometry in Physics

* Klee Erwin "A New Approach to the Hard Problem of Consciousness: A Quasicrystalline Language of Primitive Units of Consciousness in Quantized Spacetime" (2013)

Unit 5 - Linguistics - why is language so important?

10/31 **9: Metaphors,** Universal Grammar & Linguistic Relativity
The Rheomode, Pilot-Wave, Hidden Variables

***** RESEARCH PAPER PROMPTS ASSIGNED *****

* Robert Anton Wilson *Quantum Psychology* Ch. 13 E and E-Prime (1990)

* David Bohm *Wholeness & the Implicate Order* Ch. 2 The Rheomode (1980)

Unit 6 - Psychology - how do you control your body?

11/7 **10: Introspection:** Automaticity, Attention, Placebo Effect & Cognitive Therapy
Quantum Zeno Effect & Counterfactual Measurement

* Michael Talbot *The Holographic Universe* Ch. 4 I Sing the Body Holographic (1991)

11/14 *** NO CLASS ***

11/21 **11: Extrospection:** Dreams, Out of Body Experience, Collective Unconscious
Holograms, Fourier Transform, & Resonance

***** RESEARCH PAPER TOPIC DUE *****

* Carl Jung *Collective Unconscious & Archetypes* Sect. The Concept of the Collective Unconscious (1959)

* Edgar Mitchell "Quantum Hologram and the Nature of Consciousness" (2011)

Unit 7 - Spirituality - is your life meaningful?

11/28 **12: Mysticism,** Religion, Occult, New Age
Scientism, Quantum Revolution

* David Bohm *Wholeness and The Implicate Order* Ch. 1 Wholeness & Fragmentation (1980)

* Hazrat Salaheddin Ali Nader Angha *Theory "I"* Ch. 5 The Recognition and Discovery of "I" (2006)

* Dalai Lama *The Universe in a Single Atom* Ch. 3 Emptiness, Relativity, & Quantum Physics (2006)

12/5 **13: Prof. David Presti,** guest lecture

***** RESEARCH PAPER DUE *****

* Presti, David "The Mind-Body Problem" (2011)

Enrollment

To be enrolled, show up on the first day of class. If you cannot make it, you must email us before class. If student interest exceeds room capacity, a statement of interest determines enrollment. The Class Number is emailed out after the first day of class.

There are NO prerequisites for this class. All majors are encouraged to enroll.

Facilitators

Justin Riddle - riddler@berkeley.edu - Cognitive Neuroscience Doctoral Student

Dillan Cellier - dillcell@berkeley.edu - Cognitive Science Undergraduate

Homework

You are assigned to read one primary source article/chapter per week. Please download *all* readings from bCourses. Read the abstracts and look at the figures. Pick one of the papers to read and complete the online questionnaire every week found at: sites.google.com/site/quantumdecal/. You are allowed to miss **two** homework assignments. If you miss more than two you can make one of them up with a lengthy make-up assignment. Missing three homework assignments will result in a No Pass grade.

Attendance

You are allowed to miss **two** days of class. You will fail if you miss three days of class. There are credible reasons to miss class so make sure to use your two absences wisely. There is an assignment should you miss 3 days, but it will require about 3 to 4 hours of work.

Final Research Paper

You must turn in a paper topic on November 21st & the final draft on December 5th, the last day of class. Cite at least 3 sources and answer one of three prompts assigned mid-semester. 3 page minimum, double-spaced with appropriate citations (MLA or APA). Figures and diagrams are encouraged, but do not count towards page length.

Grading: Pass/No-Pass

If you do ten of the twelve homework assignments, miss two or fewer days of class and submit a satisfactory term paper, then you pass the course.

11/13 points Attendance

10/12 points Homework

25 points Final Paper

= 46/50 points to pass the course

Optional Discussion Section (3 units)

When you enroll for the course you may select to take the course for 3 units, instead of 2. There will be an additional 1 hour discussion section each week on Thursday from 5-6PM in 258 Dwinelle. You must attend 11 out of 13 discussion sections.

Every week you will be assigned to watch a lecture from an expert in the field of cognitive science (approximately 1 hour in duration). There will be a short question for comprehension due at 11:59PM the night before discussion section. Furthermore, students are required to bring a question/comment to discussion section.

Finally there will be a final project that students will be required to present. Essentially this is a 15 minute presentation based on your research paper from the lecture portion of the course. Final projects are presented December 7th, Thursday from 6-8PM.

11/13 points Discussion Attendance

10/12 points for Homework Assignment

25/25 points for Final Project

= 46/50 points to pass the course

Motivation for the Course

Our reality can be analytically divided into 3 aspects: General relativity describes the physical states of the universe in terms of discrete states and locality; Quantum theory groups physical reality into the functional states of quantum observers, these quantum observers are at the level of conscious states, responsible for memory access and executive control; Entanglement is the third and final aspect, which underlies the meaning and shared feelings of experience that are essential to the goals of every quantum observer: Plato's world of forms, Carl Jung's collective unconscious, David Bohm's implicate order.

"As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others."

- UC Berkeley Honor Code