Syllabus

This syllabus is a plan for the quarter, but subject to change. The only things I will keep fixed are the date of the mid-term essay and the date of the final in-class exam.

1/11 Lecture #1
   Meet the instructor and the students.
   Overview of Cosmology
   Goals for the quarter
   Models, theories, laws
   The Ptolemaic Cosmology
      Was it science? Cultural influences; Underpinning; Successes and failures

1/13 Lecture #2
   Copernican “revolution”
   Once again… Was it science? Cultural influences; Underpinning; Successes and failures
   Kepler

1/18 Lecture #3
   Homework #1 due (assignment will be posted on Chalk)
   Newtonian Cosmology
   Was it science? Cultural influences; Underpinning; Successes and failures

1/20 Lecture #4
   The Kapteyn Universe
   Successes and failures

1/25 Lecture #6
   Homework #2 due (assignment will be posted on Chalk)
   Einstein’s Special Theory of Relativity
   Why him, why then?

1/27 Lecture #7
   Einstein’s General Theory of Relativity

2/1 Lecture #8
   Homework #3 due (assignment will be posted on Chalk)
   Einstein misses the big bang (why?) and proposes the first “steady state” universe (his “biggest blunder”!)
2/3 Lecture #9
Friedmann and Lemaitre discover a big bang as the natural solution
“Origin of the world”
What does origin of the universe mean?
The Friedmann Equation describing the expansion history of the universe.

2/8 Lecture #10
Mid-term essay due.
Hubble discovers the expansion of the universe
Einstein becomes a big banger!

2/10 Lecture #11
The Quantum World

2/15 Lecture #12
Homework #4 due (assignment will be posted on Chalk)

2/17 Lecture #13
The Origin of the Elements, Big-Bang Nucleosynthesis

2/22 Lecture #14
Homework #5 due (assignment will be posted on Chalk)
Inflation: making the universe causal
Inflation: planting the seeds of structure

2/24 Lecture #15
The ΛCDM model
Growth of Structure

3/1 Lecture #16
Homework #6 due (assignment will be posted on Chalk)
Dark Matter

3/3 Lecture #17
The acceleration of the universe: Dark Energy

3/8 Lecture #18
The multiverse: is it science?
Time = 0.
Emergence of a universe from nothing

3/10 In-class Final Exam