SYLLABUS for course ASTB03 Fall 2022
Title: Great Moments in Astronomy
Lecturer: Prof. Pawel Artymowicz [pron: PAvel artyMOvich]
Location and time of Lectures: Mondays 7-9pm MW 120. No tutorials.

Calendar and planned topics of lectures (L1-L24), assignments (1-4) & exams.
Deadline time for submission of assignment to Quercus/Assignments is 7pm
unless announced separately.
This schedule has priority over the information on Quercus & UTSC Calendar

12 Sep L1-2:

Organization of the course.
A brief tour of the Universe. 'Cosmic Calendar' compressing the
history of universe into one year.

19 Sep L3-4:

Ancient discoveries of sky cycles and planets up to Greek Dark Ages.
Pre-scientific astrology. Eclipses and Saros period.
Greek materialists and the beginning of Physics and Astronomy:
Leukippos, Democritos.

26 Sep L5-6:

Pythagoras, Plato, and Aristotle. Geocentric system.
Science begins: Archimedes. Palimpsest & Antikythera Mechanism
Hipparcos. Ptolemy's Almagest.

3 Oct L7-8: (*** 1st written assignment due ***)

Mikołaj Kopernik: Scientific revolution begins
Tycho Brahe and the greatest pre-telescopic discoveries
Johannes Kepler: a mystic finds the laws of orbital motion

10 Oct -- Thanksgiving

17 Oct L9-10:

Gallileo Gallilei: great telescopic observer, dubious science martyr.
R. Hooke, E. Halley, and I. Newton: rivalry, collaboration, and
the greatest book in the history of science

24 Oct L11-12: (*** 2nd written assignment due ***)

Comet Halley. Scientific method.
Newton's ideas after Newton, part 1:
Astrophysics emerges. Spectroscopy does the impossible.

31 Oct L13-14: (*** L13 in-class midterm ***)
Midterm timing: writing 19:05-20:05

Newton's ideas after Newton, part 2:
Titius-Bode law --> rule
Prediction and discovery of Uranus and Neptune.

7 Nov L15-16:

Great telescopes and their builders: 18-19th century
F.W. Herschel, W. Parsons, J. Lick
Great telescopes and their builders: 20th century
G.E. Hale, Hubble Space Telescope, future telescopes.

14 Nov L17-18: (*** 3rd written assignment due ***)

Adaptive Optics
Early 20th cent. interplay of physics and astronomy:
A. Einstein's theory of relativity and its astronomical proof
A. Eddington and the question of why stars shine

21 Nov L19-20: [also: last drop date w/o acad. penalty]

G. Gamow and his solution to hydrogen fusion problem
W. Fleming, H. Leavitt: finding meter sticks for the universe
The Great Debate in 1920: Heber Curtis and Harlow Shapley.
Edwin Hubble and the world of galaxies. Classification.
Expanding universe: Friedman, Lemaitre
Chandrasekhar's voyage

28 Nov L21-22: (*** 4th written assignment due ***)

Black hole invention in 1800s
Pulsars: Discovery of neutron stars in 1967
Low-mass black holes - endpoints of stellar evolution.
Galaxy mergers and evolution (*)
Supermassive black holes in the centers of galaxies
First (sub)millimeter images of black holes
Incredible direct detection of gravitational waves.

5 Dec L23-24:

The dark dominance: Dark matter
Cosmic Microwave Background Radiation
Dark energy: modern cosmology
Dusty disks: young planetary systems (*)
Habitable and inhabitable: extrasolar planets.
Discovery of other worlds: A. Wolszczan, M. Mayor, G. Marcy.
SETI (search for ExtraTerrestrial Intelligence).
Fermi paradox

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Final exam: TBA
