SYLLABUS for course ASTB23, Title: Stars, Galaxies & the Universe
Fall 2017. The contents may change; please download updated syllabus ~every week.

Lectures: Thursdays 12:00-14:00 AA206. Tutorials: Thur. 17:00-18:00 IC204, (no tutorial at first meeting)
Calendar od lectures (L1...L24) and tutorials (T1...T10) with remarks:

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 7 Sept.        L1 + L2,       --
14 Sept.        L3 + L4,       T1       (last day to add/remove courses 18 Sept)
21 Sept.        L5 + L6,       T2
28 Sept         L7 + L8,       T3
 5 Oct.            L9 + L10,   T4
12 - no meetings, reading week
19 Oct.         L11 + L12,  T5
26 Oct.         L13 + L14   T6      <--- in-class midterm during T6
 2 Nov          L15 + L16,     T7
 9 Nov.         L17 + L18,     T8
16 Nov.        L19 + L20,     T9      (last day to drop courses w/o penaly 20 Nov)
23 Nov.         L21 + L22,  --
30 Nov.         L23 + L24,  T10
```

Final exam: date TBA (exam session 7-20 Dec)
[2 double-sided hand written (not printed or photocopied) sheets, i.e. 4 pages
of own notes are allowed at midterm, and 3 sheets (6p.) during the final exam.
Calculators are required. Books, phones, other electronic devices not allowed.]

Office hours: right after lectures, right after tutorial; other times as well,
stop by and ask if you can talk to me.

Note: The updates to this syllabus will always be here available from the course
web page: http://planets.utsc.utoronto.ca/~pawel/ASTB23
With some exceptions the topic number below coincide with lecture number.
See web page for textbooks. In the second part of the course the provided
PDF lecture notes will important.
The relevant chapters/sections of the textbook #3 are indicated as,
for instance, Chapter 5.1, => [5.1], while [L10] would indicate
Lecture10 in PDF/PPT form, posted on our web page

0. Organization and goals of the course

1. Introduction to stellar (and planetary) astrophysics [L1]
* Unification of planetary sciences, connections w/physics
* Comments on the history of the idea of other stars and planets

2. The Present Revolution in Astronomy: An Overview
[1-Unnumbered] From p. xvii of textbook 1.

PLEASE READ - it's a very good overview, we skipped it during the lecture as it is indeed long, but you should read the whole 150+ page textbook, and questions from the this Overview may be asked on the quiz, as they relate to the Universe, for instance.

Until the midtem, we will follow closely our textbook 1 ("What are the stars")

1. What are the Stars?
    * Historical Introduction
    * The Photosphere
    * The Interior of the Sun
    * The Virial Theorem
2. Stars as Globes of Gas
    * A Theory of the Stars
    * Hydrostatic Equilibrium

The 2nd part: Sparke and Gallagher book "Galaxies in the Universe"

13. Formation of disks and stars
* Giant molecular clouds
* Jeans instability of protostellar cloud cores
* Opacity-limited fragmentation
* Simulations: the ubiquity of protostellar disks, brown dwarfs
Accretion disks [9]
* AGN and quasars: accretion onto `black' holes
* Accretion disk geometry
* Disks as evolving, shearing flows
* Collapse simulations using SPH (smoothed particle hydrodynamics)

14. Introduction, The Milky Way [1]
[1.a] History of the discovery of the Galaxy
[1.b] The Great Debate about galaxies
[1.1] The stars
[1.2] Our Milky Way

15. [1.3] Other galaxies, Galaxy photometry
Hubble sequence, other classifications
[1.4] Galaxies
Typical properties and statistics of of galaxies
Gauss theorem and examples of its use. Laplace equation
Gravity force and potential
Spherical systems & Newton's theorems
Potentials of some simple systems
Potential- density pairs of flattened systems

16. [2] Mapping our Milky Way
[2.1] The solar neighborhood 2.2 The stars in the Galaxy
The vertical structure of the disk / Distances to star clusters /
Bottliger diagram, asymmetric drift

17. [2.3] Galactic rotation
Infrared & radio view of the Milky Way
Glactic bulge and Center (Nucleus)
Measuring the Galactic rotation curve

Einstein's cosmological constant Lambda returns (Dark Energy)