MSE 2151: ASTRONOMY LABORATORY – STARS **Spring 2020 Syllabus**
Mendel Hall 241
Tue 11:30pm-2:10pm

OFFICE HOURS

Mon 10am – noon
Wed 10am – 2pm
Thu 10am – noon
other times by appointment

Instructor: Dr Andrej Prša, assoc. prof.
Dept. of Astrophysics and Planetary Sciences
Mendel 458c (4th floor)
aprsa@villanova.edu
(610) 519-4822 – work
(484) 868-0813 – cell

When contacting me by email, please keep communications professional: include a greeting, write in complete sentences and include your name at the end of your emails.

Course homepage: http://aprsa.villanova.edu/?q=mse2151

Course description:

In the lab we will explore the basics of working with numbers, units, graphs and using the computer to get scientific results. We will touch upon energy transport in stars, telescope operation, the basics of spectroscopy and spectral classification, study the effects of our atmosphere on astronomical observations, discuss how we measure the temperature of a star, how we determine astronomical distances using the parallax method and H-R diagram fitting, how we measure the masses of other galaxies, and finally, focus on the expansion of the Universe. In parallel, we will use the Villanova public Observatory to observe the night sky and describe our experience using real astronomical instrumentation.

This course aims to offer a joyful, meaningful, and empowering experience to every participant; we will build that rich experience together by devoting our strongest available effort to the class. You will be challenged and supported. Please be prepared to take an active, critical, patient, and generous role in your own learning and that of your classmates.

Course objectives:

Once you have successfully completed the *Astronomy Laboratory Stars* course, you will be able to:

- explain the steps in the scientific method of inquiry, which involves gathering observable, empirical and measurable evidence subject to specific principles of reasoning, and recognizing that reproducible observation of a result is necessary for a theory to be accepted as valid by the scientific community;
- analyze specific examples of how the scientific method has been used in the past to collect data through observation and experimentation, and to formulate, test and reformulate hypotheses about the physical universe; evaluate scientific information from a variety of sources and use that information to articulate well-reasoned responses to scientific concerns;
- interpret scientific data – graphs, tables and equations – and highlight the importance of physical units;
- have the foundation for conducting your own scientific experiments and astronomical observations;

- gain proficiency with the basic astronomical vocabulary related to astronomical observations;
- gain independence and critical thinking when interpreting information encountered in the media.

Course material:

- AST 2151 Lab Manual, Spring 2020 Edition, available for download from the course webpage.

Weekly schedule (subject to change due to University closures or unforeseen events):

Jan 14:	Lab A: Working with Numbers, Graphs and the Computer (take-home)
Jan 21:	Lab B: Energy Transport in Stars
Jan 28:	Lab C: Introduction to Spectroscopy
Feb 4:	Lab D: Introduction to Optics
Feb 11:	Lab E: Building a Galileoscope
Feb 18:	Lab F: Classification of Stellar Spectra
Feb 25:	Lab G: Effects of the Atmosphere on Astronomical Observations
Mar 3:	--- midterm break ---
Mar 10:	Lab H: Taking a Star's Temperature
Mar 17:	Lab I: Trigonometric Parallax
Mar 24:	Lab J: The Distance to a Star Cluster
Mar 31:	Lab K: Measuring the Mass of the Andromeda Galaxy
Apr 7:	Lab L: Expansion of the Universe
Apr 14:	Make-up lab
Apr 21:	Observatory lab due

Course work and grading:

There are 13 labs that comprise this course. Each lab is graded on a 0–100 scale, each lab contributes equally to the final grade.

Note that two of the labs, "Lab A: Working with Numbers, Graphs and the Computer" and "Observatory Lab", happen outside of normal lab hours. The first lab is a take-home lab. For the second, you are required to visit the observatory on a clear night and write a 2 page report that describes your visit. Include sky conditions, information on the telescope that you used, and celestial objects that you observed. There is no makeup for the Observatory Lab, so exercise due vigilance and do not postpone this to the end of the semester as weather might be unfavorable for observing. Bad weather is no excuse for missing this lab assignment.

The final grade is determined according to the following breakdown:

0-60%	F	70-73%	C-	83-87%	B
60-63%	D-	73-77%	C	87-90%	B+
63-67%	D	77-80%	C+	90-93%	A-
67-70%	D+	80-83%	B-	93-100%	A

Attendance:

Regular attendance is essential for completing all lab assignments. Please arrive to the lab on time. If you are more than 10 minutes late with no prior arrangement, you will not be allowed to complete that day's lab. There will be a single make-up opportunity at the end of the semester, when you will be able to make up one lab. If you cannot attend the lab session for any justifiable reason, note that there are several sessions of this lab every week; reach out to the instructor for the lab session that you can make and ask to do the lab with them. If due to extenuating circumstances you miss more than a single lab, talk to me and we will figure something out.

Commitment to Equity:

The Department of Astrophysics and Planetary Science (APS) considers Diversity and Inclusion to encompass true and complete equality of gender, gender identity, race, sexual orientation, disability, spiritual values, political beliefs or nationality. We are committed to treating all students, staff and faculty in a dignified manner, where we celebrate diversity and highlight its principal role in enriching our academic, professional and personal lives. We commit to respect, recognition and support for the achievements, talents and successes of everyone in our community, irrespective of any human differences.

Academic integrity:

Finally, here goes the standard blurb: any violation of the Code of ethics will be grounds for failing the course. Any cheating, copying, duplication of work, etc, will result in a 0 for that lab assignment. A repeated offense will cause you to fail the entire class. If you have any concerns about your performance, come talk to me in due time and we will figure it all out.

Special needs:

It is the policy of Villanova University to make reasonable academic accommodations for qualified individuals with special needs. If you are a person with a special need please contact me after class or during office hours and make arrangements to register with the Learning Support Office by contacting 610-519-5176 or at learning.support.services@villanova.edu as soon as possible. Registration is needed in order to receive accommodations.