ASTR 511: Contemporary topics in observational extra-galactic astronomy

Department of Physics and Astronomy

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Territory acknowledgement: We acknowledge and respect the Lək̓ʷəŋən (Songhees and Esquimalt) Peoples on whose territory the university stands, and the Lək̓ʷəŋən and W̱SÁNEĆ Peoples whose historical relationships with the land continue to this day.

Office hours: Tuesdays 2-3pm in Elliott 208 (or by appointment, in person or on Zoom)

Lecture delivery: This is an in-person lecture course. Regular attendance is expected (and necessary for optimal learning).
Lecture schedule: Monday and Thursday 2:30pm-3:50pm
Location: Elliott 038
Unit value: 1.5

Course goals: To provide students with an understanding of modern research topics in the field of observational extragalactic astronomy. By the end of the course, students should 1) have a broad understanding of the methods used in modern observational astronomy as well as the theory that underpins them; 2) be able to engage in meaningful discussions about topics of current interest; 3) have some detailed knowledge of recent research discoveries and questions of on-going interest.

Course delivery: In the spirit of providing a modern review, the course is based on papers published in the Annual Review of Astronomy & Astrophysics (ARA&A) journal. Seven papers are selected by the instructor to cover a range of topics that, together, give a good overview of research into different aspects of galaxy formation and evolution, both locally and at high redshift.

The topic of each ARA&A paper spans three lectures, with each lecture taking a progressively deeper dive into the subject. In the first lecture on each topic, the instructor will provide a pedagogical introduction to the methods and requisite theory of the topic. The second lecture will present an overview of some of the important research results from the ARA&A paper. The third lecture in each cycle will be student-led – each student will identify one research paper on the topic of the review (more details below) and present to the class.

The ARA&A journal references and lecture schedule will be available before the first day of class. It is recommended that students read the review paper in advance of each 3-lecture topic cycle.

Course content and schedule:

- Review #1: Salim & Narayanan (2020) - The dust attenuation law in galaxies. Jan 6, 9, 13
- Review #2: Hickox & Alexander (2018) – Obscured active galactic nuclei. Jan 16, 20, 23
- Review #3: Saintonge & Catinella (2020) – The cold ISM of galaxies in the local universe. Jan 27, 30, Feb 3.
- Review #4: Sanchez (2020) – Spatially resolved spectroscopic properties f low redshift star forming galaxies. Feb 6, 10, 13
- Review #5: Tumlinson, Peeples & Werk (2017) – The circumgalactic medium. Feb 24, 27, Mar 3.
- Review #6: Tacconi, Genzel & Steinberg (2020) – The evolution of the star forming ISM over cosmic time. Mar 6, 10, 17 (no class on March 13)
- Review #7: Forster-Schreiber & Wuyts (2020) – March 20, 24, 27.

Course materials:
Lecture slides and videos are available on Brightspace. It is recommended that you use these as a basis for your notes (they contain many figures) complemented by your own note taking. There is insufficient text on the lecture slides for them to be considered as lecture notes, so it is important that you make your own notes in class.

Assessment: Marks are divided into the following components:

1) 7 x 10% = 70% on in-class presentations. For each of the 7 ARA&A reviews, there will be one student-led session. Each student in the class will present on each review topic (i.e. once every 3 weeks). The presentation should focus on one science paper whose content is relevant to the topic. The paper can either be one referenced in the ARA&A review, or one selected by the student. The student's presentation should identify the science question/objective of the paper, why this is important, and what the results are. A simple review of the paper (that does not demonstrate thoughtful understanding of the topic's relevance, context or importance) will not receive full marks. Presentations should be 20 minutes long.

2) 10% class participation throughout the course. To receive full participation marks you should a) attend all classes except when you excuse yourself in advance, b) engage in discussions and ask questions. For example, if you attend every lecture but ask no questions all term, you will only receive 5% for your participation grade.

3) 20% final oral exam. One of the goals of the course is that you should be able to have meaningful conversations about modern extra-galactic observational astronomy. The oral exam will be a 30 minute one-on-one discussion with the instructor on topics

covered by the course. You should be able to demonstrate familiarity with the methods, key science discoveries, relevance and potential for future work.