**DEPARTMENT OF PHYSICS, ENGINEERING AND ASTRONOMY**

**COURSE OUTLINE**

# ASTR 311
# EXPLORING THE UNIVERSE

**INSTRUCTOR:** Greg Arkos
**OFFICE:** Building 315, Room 209
**OFFICE HOURS:** TR 1:00 pm - 2:30 pm *or by appointment*
**PHONE:** (250) 753-3245 & *ask to be transferred to me* OR *MS Teams calling*
**EMAIL:** gregory.arkos@viu.ca
**WEBSITE:** https://wordpress.viu.ca/arkosg/
**VIULEARN**: https://learn.viu.ca

**LECTURE:** TR 11:30 am – 1:00 pm Bldg 315, Rm 216

**OPTIONAL TEXT:** Cosmic Perspective: Stars, Galaxies & Cosmology by J. Bennett et al. (7e).

**CALENDAR DESCRIPTION:** A detailed examination of the evidence for and current thinking on the birth, evolution, and eventual fate of the Universe. Topics include the Big Bang model, relativity, peculiar but useful objects such as quasars and supernovae, and the search for extra solar planets and life beyond Earth. (3:0:0)

**OBJECTIVES & LEARNING OUTCOMES:** Astronomy 311 is a detailed examination of current thinking regarding the nature and evolution of our universe. Covered are cosmology, The Big Bang Theory, the exotic landscape of special and general relativity, quantum theory, and the search for extraterrestrial life. Basic astronomical concepts are introduced as required. The content spans all of known history, from the moment of the Big Bang to present day. The course stresses conceptual understanding and class discussion regarding the evolution of our understanding of the cosmos, with minimal mathematical derivation. Quizzes and exams emphasize descriptive material and an understanding of course concepts. Students are expected to be able to apply their knowledge of the processes and evidence leading to our current understanding of the cosmos to construct original, well supported written arguments on a variety of related astronomical topics. The group presentation invites students to identify & research a specific, detailed topic of astronomical interest and work with a group to effectively communicate that information to the class. By the end of the course students should be conversant regarding the nature of scientific enquiry, be able to describe in detail the various eras following the Big Bang, cite examples of significant evidence for modern cosmology, recall factual information regarding the structure & presumed fate of the universe, discuss the principal predictions & consequences of Einstein's Theories of Relativity and the Standard Model of quantum mechanics, and draw on elements of biology, geology and astronomy to assess the search for extraterrestrial life.

**PREREQUISITES:** *Third year standing or permission of the instructor.*





**** Please read ALL of the important course details & policies which follow. ****

**STUDENT RESPONSIBILITIES:** Read this course outline *carefully*; it is assumed that you are **fully aware** of its contents with regards to dates & deadlines, evaluation and policies. You are responsible for keeping up with material presented in lecture and monitoring your progress in the course. *Please speak with me **immediately** if you are having difficulties which might impact your grade in the course.*

**CLASSES & OFFICE HOURS:** During the formal office hours listed above I will be available in my office for face-to-face meetings on a drop-in or by-appointment basis. You may also reach me via the provided email and phone number both during and outside of my office hours. It is also possible to arrange individual or small-group meetings via MS TEAMS (see the link on the course website).

**OBSERVING SESSIONS**: *Optional* outdoor observing sessions take place (weather permitting) during the semester. ** Dates and times for observing sessions are TBD. **

**ASTRONOMY PRESENTATION:** Students work in groups of three (3), with each member responsible for researching, creating and presenting a portion of the presentation. **A single grade** is assigned to each group and **applies to all members**. Presentations take place near the end of term during class; dates are TBD. Detailed instructions and the marking rubric are available on the course website.

**EVALUATION:**
Term Test #1 (in class) ……30%
Term Test #2 (exam period) ……30%
Quizzes (best 5 of 6) ……15%
Group Project ……..…25%

**GRADES:** Final grades are assigned using the *VIU Institutional Grade Scale*:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***A+*** | *90-100%* | ***B+*** | *76-79%* | ***C+*** | *64-67%* | ***D*** | *50-54%* |
| ***A*** | *85-89%* | ***B*** | *72-75%* | ***C*** | *60-63%* | ***F*** | *0-49%* |
| ***A-*** | *80-84%* | ***B-*** | *68-71%* | ***C-*** | *55-59%* | | |

**FAILING GRADES:** Students worried about poor grades should speak with me as soon as possible. Please see the online VIU Calendar regarding registration related policies. ** The last day for academic penalty-free voluntary withdrawal is below. **

**ACADEMIC INTEGRITY & POLICIES** Academic misconduct can have ***significant*** repercussions on your academic career and is taken ***very seriously*** at VIU. Details of VIU's General Regulations, Policy 96.01 and Procedure 96.01.001 are available from: https://www.viu.ca/registration/general-regulations, https://learningmatters.viu.ca/ready-set-go/academic-integrity

**GENERATIVE ARTIFICIAL INTELLIGENCE:** Students are expected to submit their *own work & ideas for this course*; the *usage and scope of ANY form of AI generated content or imagery* in submitted work *MUST be pre-approved by the instructor & fully referenced.*

**EDI & CODE OF CONDUCT:** VIU values human diversity in all its dimensions and is committed to achieving and ensuring learning and working environments that are equitable, diverse and inclusive. *It is expected that students will treat one another and the instructor with respect and dignity at all times, without exception*.

**ACCESSIBILITY SERVICES:** VIU's Accessibility Services provides information, support services and reasonable accommodation to students with documented permanent and temporary disabilities, such as mental health conditions, ADHD, learning disabilities, chronic health issues, hearing and visual impairments, physical disabilities and temporary impairments due to accident, illness or injury.

If you have a condition requiring academic accommodations for this course please contact Accessibility Services at AccessibilityServices@viu.ca or visit them in BLDG 255. *If you are already registered with AS please provide me with your accommodation letter, either in person or by email*.

**** IMPORTANT course policies – READ CAREFULLY ****

1 Concerns regarding graded material MUST be raised within a week of its return.
2 Late submissions will NOT be accepted for grading WITHOUT prior approval.
3 There are NO deferred or make-up quizzes for this course.
4 There will be NO "extra" or "make-up" work for this course.
5 Requests for exam deferments REQUIRE official supporting documentation.
6 Students MUST be available for the entire term, eg. the ENTIRE final exam period.
7 There will be NO accommodation of non-university related travel, eg. vacations.
8 There is ZERO tolerance for academic dishonesty, including plagiarism.

**IMPORTANT DATES:**

**FIRST DAY OF CLASSES:** January 5, 2026
**WITHDRAWAL DEADLINE:** Mar 27, 2026
**LAST DAY OF CLASSES**: April 10, 2026
**FINAL EXAMINATIONS**: April 13 – 22, 2026

**HOLIDAYS:** (No classes, labs or exams)

**FAMILY DAY:** February 16, 2026
**STUDY DAYS:** February 16 – 20, 2026
**GOOD FRIDAY:** April 3, 2026
**EASTER MONDAY**: April 6, 2026





**TENTATIVE QUIZ, EXAM & PRESENTATION DATES:**

| | | |
|---|---|---|
| **Quiz 1** | **Intro, Olber & Steady State** | **Jan 15** |
| **Quiz 2** | **Light, Hubble's Law, forces** | **Jan 29** |
| **Presentation Proposal** | **due (topic & method)** | **Feb 6** |
| **Quiz 3** | **Big Bang timeline, fate of universe** | **Feb 12** |
| **Term Test #1** | **Intro – Special Relativity** | **Feb 26** |
| **Quiz 4** | **Einstein & Relativity** | **Mar 12** |
| **Quiz 5** | **Stellar evolution, BH's, Quantum** | **Mar 26** |
| **Quiz 6** | **ET Life** | **Apr 9** |
| **Presentations** | **in class** | **Mar 31, Apr 2, 7, 9** |
| **Term Test #2** | **Einstein – ET Life** | **Final Exam period** |

**TOPICS:** The following is a *tentative* list of topics that will be covered in this course.

| **Subject** | **Chapter(s) in text** |
|---|---|
| Introduction | 1 |
| The Big Bang & modern Cosmology | 20, 22, 23 |
| Spacetime & Quantum Theory | S2, S3, S4 |
| Black Holes | 18, 21 |
| Extraterrestrial Life | 13, 24 |

**** NOTE: Circumstances may require modifications to the dates & topics in this outline. ****