ASTRONOM 2022A Course Outline – Fall 2025

1. Course Information

Delivery Mode

*Details about design and delivery of the course are listed below in Section 4.

Classes Start	Reading Week	Classes End	Study day	Exam Period
Sept. 5	Nov. 3-7	Dec. 9	Dec. 10	Dec. 11-22

*December 1, 2025: Last day to drop a second-term half course without penalty

OWL website

- Students should regularly check the OWL site " **ASTRONOM 2022A 001 FW25** "
- Weekly updates will be provided on the OWL site
- Emails will be monitored daily; students should expect a response in 48 hours
- This course will use the OWL or Perusall forum for discussion
- Students should post all course-related questions on the discussion forum so that everyone can access the answers
- The discussion forums will be monitored by the instructor or the teaching assistants

There are no prerequisites for this course. This course is designed for students not enrolled in a program in the Faculty of Science as an introduction to current ideas about the universe. The content of the course will be presented in a learned but accessible manner.
The following are **antirequisites** for this course: Astronomy 4602A/B, Earth Sciences 1086A/B

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Adam Koberinski (Course Coordinator)	akoberin@uwo.ca			
TAs				

3. Course Syllabus, Schedule, Delivery Mode

During the last century our understanding of the universe has been completely changed and a new science, modern cosmology, has allowed us to investigate the origins of the universe. This advance was made possible by the two major revolutions of 20th century physics: general relativity and quantum mechanics. This course will present these discoveries in an accessible manner, highlighting how the laws that govern the infinitesimally small and those that govern the infinitely large bring us a precise picture of the evolving cosmos and challenge us with new questions.
This course is designed for students not enrolled in a program in the Faculty of Science as an introduction to current ideas about the universe. The content of the course will be presented in a learned but accessible manner and no prerequisite is required for this course. On the other hand, the following courses would constitute an "antirequisite": Earth Sciences 1086F/G, Physics 1101A/B, Physics 1201A/B, Physics 1401A/B, Physics 1501A/ B (or equivalent courses from the previous years).

Learning Outcomes
Upon successful completion of this course, students will be able to:

- Frame modern cosmology in its historical development
- Understand the conceptual basis of the scientific notions of Space, Time and Matter
- Understand the main revolutions in 20th century physics
- Know what, according to the current understanding, the Universe is made of
- Understand the basics of modern cosmology
- Know what are the different messengers with which the Universe is now investigated

Discovery Credits: As of the 2018–19 academic year, students have had the option to declare a course as a "Discovery Credit," so that it is graded as pass/fail on their transcript. This privilege is open only to students in their second year or higher, and cannot be used to meet a student's modular requirements or essay requirements. Instructors will not know which students have declared their course as a Discovery Credit, and are expected to provide the same assessments, evaluated to the same standards, to all students.

Audit: Audit students are welcome and they do not need to consult with the instructor before.

Online component

Extensive course material and links will be posted to OWL, and linked to the Perusall website. Any changes will be indicated on the OWL site and discussed with the class.

If students need assistance, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Google Chrome or Mozilla Firefox are the preferred browsers to optimally use OWL; update your browsers frequently. Students interested in evaluating their internet speed, please click here.

Dates	**Topic**	**Texts**	**Additional Podcasts**
Week 1 Sept 4	Introduction	**C** Ch. 1	Hindu Creation Nature

		Excerpt Rovelli	
Week 2 Sept 11	Observing the heavens; the birth of science	Stamp text	Ptolemy and Ancient Astronomy
Week 3 Sept 18	What is Matter? Part 1: Quantum Mechanics	**Q** Ch. 1, 2	The measurement problem The physics of reality States of matter
Week 4 Sept 25	What is Matter? Part 2: Particles, Fields, Symmetries	**P** Ch. 1,2,4,7	Antimatter The proton The neutron Nuclear fusion
Week 5 Oct 2	What is Space? Part 1: Special Relativity	**R** Ch. 1	In Einstein's shadow Speed of light
Week 6 Oct 9	What is Space? Part 2: General Relativity	**R** Ch. 2 **C** Ch. 2	Relativity Gravitons Black Holes
Week 7 Oct 16	MIDTERM TEST		First 6 lessons will be tested
Week 8 Oct 23	Astrophysics: what is in the night sky?	**A** Ch. 3 **A** Ch. 5	William and Caroline Herschel Comets The Life of Stars The Planets Exoplanets
Week 9 Oct 30	Cosmology Part 1: The shape of the universe	**C** Ch. 3, 4	The Universe's shape Age of the universe Poincaré Conjecture
-	Reading Week		
Week 10 Nov 13	Cosmology Part 2: What is the universe made of?	**C** Ch. 5-7	Dark Matter The Cool Universe Dark Energy Vacuum of Space
Week 11 Nov 20	Cosmology Part 3: The universe's beginning and end	**C** Ch. 8	Origin of the Universe Quantum gravity The Multiverse
Week 12 Nov 27	Contemporary Astrophysics	**P** Ch. 5 **A** Ch. 6	Cosmic rays The neutrino Galaxies Gravitational waves

'Texts' key: **C** = Cosmology, **Q** = Quantum Theory, **P** = Particle Physics, **R** = Relativity, **A** = Astrophysics

4. Course Materials

OWL website
Lessons and additional instructional material will be made available in the OWL website of the course. You need to have access to a desktop computer or laptop with internet connection. After entering your user id and password, you click on the course tab for your Astronomy course: **ASTRONOM 2022A 001 FW25**

Textbooks

- Peter Coles, *Cosmology: A Very Short Introduction*, Oxford University Press
- John Polkinghorne, *Quantum Theory: A Very Short Introduction*, Oxford University Press
- Russell Stannard, *Relativity: A Very Short Introduction*, Oxford University Press
- James Binney, *Astrophysics: A Very Short Introduction,* Oxford University Press
- Frank Close, *Particle Physics: A Very Short Introduction*, Oxford University Press

We will use these texts for online reading assignments in Perusall and thus students must have access to them via Perusall. You must access the course's Perusall site via the link on OWL and enrol in the course using the button on the left menu of the webpage. It is mandatory to use your university ID number and your UWO email address to enrol. You will be prompted to purchase the book through Perusall when you first access it on the platform. It is possible to choose the "renting" option for the duration of the term, making the total cost approximately $40-45. Please note that it is compulsory to purchase the textbook in some form on Perusall to complete the assignments. You will need to connect to Perusall to complete the annotations and interact with the online forum there. You will work in a small group of peers, and you will be able to interact with your instructor and TAs. If you have any difficulty accessing Perusall and acquiring the textbook, contact the instructor and/or your academic counsellor immediately in the first week of classes.

Podcasts
Lessons are complemented by podcasts from BBC-4 radio. These provide a way to supplement the understanding of the topic of each lesson. The recommended podcasts are accessible through links posted on the OWL webpage of each lesson. While the podcasts are not mandatory, they are great resources.

Further recommendations
Each OWL lesson page will be accompanied by reading suggestions, including articles and books, and other online material such as video and podcasts.

Students are responsible for checking the course OWL site (https://westernu.brightspace.com/) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the OWL Brightspace Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

Reading & Discussion assignments on Perusall 30%: A portion of the class marks will be assigned for performing the readings, for posing and answering questions, engaging with other students and making well-thought out comments on the Perusall website. Students have to create a separate Perusall account, using their ID number and their UWO email.

Exam Part 1 (Midterm) 30%: There will be an in-person exam on October 16, 4:30-6:30 PM concerning the content of lessons 1-6. Hand written or printed notes will be allowed during the test.

Exam Part 2 (Final) 40%: There will be a final in-person exam concerning the content of lessons 7-11. Hand written or printed notes will be allowed during the test. The date and time will be determined and announced by the Office of the Registrar and announced win the OWL website.

Grades: Scores will be transferred to the Gradebook on OWL. Any errors, or appeals to your scores, must be reported within two weeks of their initial posting. Please note: a) your final exam mark will only be posted to OWL after the end of the exam period, b) your final course grade must come officially from the Registrar's Office, and c) in rare cases, final course grades may be adjusted in order to conform to the Physics & Astronomy department policy.

Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

Assignments (11)	30%
Midterm Test	30%
Final Exam	40%

General information about missed coursework
Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:
https://registrar.uwo.ca/academics/academic_considerations/
All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline, using the Student Absence Portal.

All Academic Consideration requests normally must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the

policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods (Defined by policy)
- Midterm

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

Evaluation Scheme for Missed Assessments

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under Special Examinations), especially for those who miss multiple final exams within one examination period.

Coursework with Assessment Flexibility

By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

> **Flexible Completion: Reading Assignment.** This course has 11 reading assignment, and the 10 with the highest marks are counted towards your final grade. Should extenuating circumstances arise, students do not need to request Academic Consideration for the first missed assignment. Academic Consideration requests may be granted when students miss more than 2 quizzes, and these additional (3^{rd}, 4^{th}…) missed quizzes will be reweighted to the final exam.

6. Recommendations

Perusall

- Contribute thoughtful questions and comments to the class discussion, spread throughout the entire reading
- Start the reading early
- Break the reading into chunks (instead of trying to do it all at once)
- Read all the way to the end of the assigned reading
- Pose thoughtful questions and comments that elicit responses from classmates
- Answer questions from others
- Up-vote thoughtful questions and helpful answers

Note: The annotations on Perusall can be seen from all students within the study group and are supposed to be strictly on the reading material and on previous annotations of peer students of the study group. Perusall annotations can for instance be questions or a helpful response to a question, e.g. enlighten about unclear material, etc.: a learning tool. No personal comments are allowed, nor any disrespectful annotations. If a student complains about being disrespectfully criticized or made fun of on Perusall about his/her annotations, questions, comments, etc. by a peer student, the student responsible for the inappropriate annotation and/or comment will be removed from the Perusall study group and will receive a mark of zero for the entire Perusall component of the course.

Working Habits

Students enrolled in this class should understand the level of autonomy and self-discipline required to be successful.

- Invest in a planner or application to keep track of your courses. Populate all your deadlines at the start of the term and schedule time at the start of each week to get organized and manage your time.
- Make it a daily habit to log onto OWL to ensure you have seen everything posted to help you succeed in this class.
- Follow weekly checklists created on OWL or create your own to help you stay on track.
- Take notes as you go through the lesson material. Keeping handwritten notes or even notes on a regular Word document will help you learn more effectively than just reading, listening, or attending lectures.
- Connect with others. Try forming an online study group and try meeting on a weekly basis for study and peer support.
- Do not be afraid to ask questions. If you are struggling with a topic, check the online discussion forum or contact your instructor(s) and or teaching assistant(s).
- Reward yourself for successes. It seems easier to motivate ourselves knowing that there is something waiting for us at the end of the task.

7. Additional Statements

Religious Accommodation
When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

https://www.edi.uwo.ca.

Accommodation Policies
Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

Academic Policies
The website for Registrar Services is https://www.registrar.uwo.ca/.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

No electronic devices will be allowed during midterm or final examinations. Students may bring hand-written notes as aides.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic-related matters: https://www.uwo.ca/sci/advising/

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.