

# BA Astronomy 11

<b>District Name:</b>	School District No. 73 (Kamloops/Thompson)
<b>District Number:</b>	73
<b>Developed By:</b>	Grady Sjokvist
<b>Date Developed:</b>	January 2005
<b>School Name:</b>	Brocklehurst Secondary
<b>Principal's Name:</b>	Tom Elliot
<b>Board/Authority Approval Date:</b>	2005/05/30
<b>Board/Authority Signature:</b>	
<b>Course Name:</b>	Astronomy 11
<b>Grade Level of Course:</b>	11
<b>Number of Course Credits:</b>	4
<b>Number of Hours of Instruction:</b>	100
<b>Prerequisite:</b>	Science 10
<b>Special Training or Equipment:</b>	A telescope, and familiarity with its use

**Course Synopsis:** Astronomy 11 is an introductory course for students interested in a “larger world.” Students will develop a more complete understanding of how astronomy affects our daily lives, from navigation to tides and seasons. They will develop skills for identifying objects in the night sky and using a telescope. Working from the inside out, students will gain an appreciation of the size and scale of the Solar System, the Milky Way, and the universe. They will examine the dynamics inside stellar fusion and the big bang theory. Students will develop analytical skills to evaluate space missions and judge the realism of science fiction in various media. This course could also give students a head start on University studies in Physics and Astronomy, Engineering or Mathematics.

**Rationale:** This is a course that allows students to pursue an interest in astronomy that has no major outlet past Science 9. The course picks up on the topics covered in Science 9 such as the solar system and stars and further develops the ideas such as the formation of planets and evolution of stars. Students also have an opportunity to explore some of the cutting edge research that is broadening our understanding of the universe, how it came about, and how it will evolve.

**Organizational Structure:**

<b>Unit/Topic</b>	<b>Title</b>	<b>Time</b>
Unit 1	The history of Astronomy	10
Unit 2	Telescopes and Observatories	10
Unit 3	The Earth and Moon	20
Unit 4	The Solar System	15
Unit 5	Stellar Evolution	15
Unit 6	Cosmology	15
Unit 7	Space Travel and ET Life	15
Unit 8	Science Fiction	10
	<b>Total Hours</b>	<b>110</b>

**Unit Descriptions:**

**Unit 1: The history of Astronomy                    10 hours**

It is expected that students will:

- Describe the mythology of ancient peoples and how it related to astronomy
- List specific contributions by Greek astronomers
- Explain how astronomy survived the middle ages
- List achievements of important astronomers such as: Brahe, Copernicus and Galileo
- State Kepler’s Laws
- Use Newton’s Laws to explain motion of celestial bodies

**Unit 2: Telescopes and Observatories            10 hours**

It is expected that students will:

- List the main types of telescopes
- Locate visible light on the electromagnetic spectrum
- Compare redshift and blueshift of stars
- Give reasons why some telescopes need to be located in space
- Define parallax
- Calculate distance using parallax
- Define celestial sphere
- Define right ascension and declination
- Use spherical geometry to locate objects in the sky
- Build their own telescope

- Describe an ideal location for an observatory

**Unit 3: The Earth and Moon** **20 hours**

It is expected that students will:

- Describe the formation of the Earth
- Describe the protection provided by the Earth's atmosphere and magnetosphere
- Define Satellite
- List some effects of the Earth's tilt
- Describe the three theories for the Moon's formation
- Compare the layers of the Earth and Moon
- Describe tidal forces
- Compare surface conditions on the Earth and Moon
- Describe the Moon's orbit and spin
- List the Moon's phases
- Compare a Solar and Lunar eclipse

**Unit 4: The Solar System** **15 hours**

It is expected that students will:

- Define Solar System
- Describe the formation of the Sun and planets
- Compare the planets
- Do a presentation on the planet of their choice
- Compare and contrast comet, asteroid, meteor, meteorite, meteoroid
- Analyze craters and their formation
- Compare the asteroid belt, Kuiper belt, Oort cloud
- Use Kepler's laws to explain planetary orbits

**Unit 5: Stellar Evolution** **15 hours**

It is expected that students will:

- Define proton, neutron, electron
- Describe the process of Fusion
- Use a Hertzsprung-Russell graph
- Compare the Sun with other stars in the Solar neighbourhood
- Describe the lifetime of a typical star
- Compare white dwarf, red dwarf, red giant, pulsar, neutron star
- Predict the final state of a star based on its mass
- Describe the conditions leading to a supernova
- Compare emission and absorption nebulae

## **Unit 6: Cosmology**

**15 hours**

It is expected that students will:

- Compare methods for determining stellar distance and magnitude
- Define black hole, galaxy, quasar, and big bang
- Classify galaxies
- Describe the structure of the Milky Way
- Describe the processes involved in the big bang and the early Universe
- Use current research to predict the future state of the Universe.
- Investigate current issues in cosmology such as GUT, strings, dark matter and dark energy

## **Unit 7: Space Travel and ET Life**

**15 hours**

It is expected that students will:

- Describe the cold war and space race
- Analyze past space missions and learn from their successes and mistakes
- Plan a space mission to a distant planet or star
- Describe ongoing space missions such as the ISS, shuttle missions, Hubble, Huygens and MOST.
- Consider the chances of finding ET life in our Solar System
- Describe the processes of searching for ET life.
- Make up a description of possible alien life based on its environment

## **Unit 8: Science Fiction**

**10 hours**

It is expected that students will:

- Analyze science fiction in the following media: novels, television and movies
- Compare the predictions made by the authors
- Describe how the authors address the scientific challenges of space travel, colonization, and alien life.
- Create their own science fiction future world, including details on the above.

**Instructional Component:**

- ✓ direct instruction
- ✓ indirect instruction
- ✓ interactive instruction
- ✓ scientific experimentation
- ✓ hands on learning
- ✓ group work
- ✓ video
- ✓ online modules
- ✓ internet research projects

**Assessment Component:**

Assessment will be composed of 50% formative, including projects, quizzes and extensions. Extensions components may include topics requiring Principles of Mathematics 11 or higher, or participation in observations outside of class time. Students hoping for top marks in this course should complete as many of the extensions as possible. In order to avoid penalizing students without adequate transportation or Principles of Math 11, extensions are weighted as only 10%. Summative assessment will be 50% of the mark, including tests and formal laboratory write-ups.

<b>Type of Assessment</b>	<b>Category</b>	<b>Details</b>	<b>Weighting</b>
Formative		Assignments	30%
		Quizzes	10%
		Extensions	10%
Summative		Labs	20%
		Tests	30%
		Total	100%

## Learning Resources:

- ✓ Library: books and periodicals
- ✓ Internet: websites such as:
  - ✓ NASA <http://www.nasa.gov/audience/forstudents/9-12/features/index.html>
  - ✓ SETI <http://setiathome.ssl.berkeley.edu/>
  - ✓ Hubble Space Telescope <http://hubblesite.org/>
  - ✓ MOST <http://wombat.astro.ubc.ca/MOST/index.html>
  - ✓ Astronomy Online modules: <http://whfreeman.com/aol/>
  - ✓ University websites:
    - ✓ <http://astrowww.phys.uvic.ca/>
    - ✓ <http://www.astro.ubc.ca/>
  - ✓ Videos:
    - ✓ Hyperspace, with Sam Neill: British Broadcasting Corporation Miniseries
    - ✓ The Astronomers: PBS Video Set
    - ✓ Mechanical Universe series: California Institute of Technology and Intelcom
    - ✓ Bill Nye the Science Guy series
- ✓ Textbook: suggested textbooks:
  - ✓ Astronomy: a Beginner's Guide to the Universe, by Chaisson/McMillan. Published by Prentice Hall
  - ✓ Nightwatch: A Practical Guide to Viewing the Universe: Dickinson
  - ✓ The Universe And Beyond: Dickinson/Gibson

## Additional Course Information

This course was created to address a demand by the student body for an Astronomy elective. Students circulated a sign up sheet and encouraged the teacher to pursue and develop a course of this nature.