ST. FRANCIS ACADEMY

A division of St. Francis Methodist School

Curriculum Description for St. Francis Baccalaureate

LAS 170B – ATOM AND COSMOS

Course Description: A descriptive examination of fundamental principles in physics, both mechanics and energy. Includes a review of modern atomic research, origin theories, and current efforts to explore and map the Universe. Credit 3 hours.

Prerequisites: None

Outcomes

- Knowledge of the basic processes, concepts, and principles of space science, descriptive astronomy, cosmology, and quantum physics
- Knowledge of the nature of science and recognition that science and scientific activity are aspects of human culture
- Appreciation of the physical place of humans in the cosmos and the ways in which humans are connected to the rest of the cosmos

Objectives

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

- describe the general features, and limitations, of the scientific method as a model of the scientific process
- explain the nature and limitations of scientific knowledge
- distinguish between science and religion, astronomy and astrology, and science and technology
- use diagrams to illustrate principles and solve problems
- explain the physical basis of night and day, the seasons, the apparent motion of the planets, eclipses, and the phases of the moon
- determine the date for Easter in any given year
- describe the contributions made to astronomy and cosmology by the Babylonians, Aristotle, Aristarchus, Ptolemy, Copernicus, Kepler, Galileo, Newton, and Einstein
- describe the main features of the special and general theories of relativity
- describe in general terms the current understanding of the nature and evolution of the solar system, stars, and galaxies
- describe the possible end states of stars including black holes
- discuss the general structure and scale of the Universe
- describe the basic features of the current theory of the creation of the Universe and the possible fates of the Universe
- explain the quantum mechanical wave-particle duality of both matter and radiation
- describe the concept and consequences of the quantum mechanical interference of particles and contrast this behavior with the classical behavior of particles

Instructional Methodologies: Classes in this course will consist of lectures, discussions, videos, and group activities. Homework will be assigned on a regular basis.

Textbook [on reserve at the SC Library]: *Universe – Origins and Evolution*, by Theodore P. Snow and Kenneth R. Brownsberger. Wadsworth Publishing Company, Belmont, California (1997).

Readings Selections from *Conceptual Physics*, 6th Edition, by Paul G. Hewitt: (i) *About Science*, (ii) *The Special Theory of Relativity*, and (iii) *The General Theory of Relativity*.

Course Requirements:

Attendance: Students are required to attend all classes as scheduled – role will be taken and attendance points will be given. Students who exhibit disruptive behavior in class will lose attendance points. Students who are absent will be responsible for both the missed material and any announcements made in class. Students who must miss class due to an official college activity or because of a personal or family emergency should notify the instructor, in advance if possible. Any student accumulating more than a total of nine unapproved absences may be withdrawn from the course.

Group Activities: Cooperative-learning techniques will be used in this class. Homework assignments and the study guides for the videos shown during class will be completed as group projects. Any student who does not participate in a group activity will be given a zero for that activity. Each student's lowest group activity score will be dropped at the end of the semester. Group homework assignments and video study guides will be collected at the beginning of the class period of the due date. LATE WORK WILL NOT BE ACCEPTED. Students who cannot submit homework at the scheduled time (due to verifiable emergency or official college activity) should notify the instructor prior to the due date.

Writing Assignments: Several times during the semester students will be given writing assignments that involve analyzing and responding to information that is obtained from the textbook or from specified Internet websites. Further information concerning the nature and details of these assignments will be provided later. These writing assignments will be evaluated using a modification of the Six Trait Writing Model that is used in the *Writing Across the Disciplines* and *Research Across the Disciplines* courses. Note that a portion of the credit for these exercises will be based on the extent to which the given instructions are followed. In addition, a portion of the credit will be based on the mechanics of standard written English (spelling, punctuation, sentence structure, etc.) The writing assignments will be collected at the beginning of the class period of the due date. LATE WORK WILL NOT BE ACCEPTED. Students who cannot submit the writing assignment at the scheduled time (due to verifiable emergency or official college activity) should notify the instructor (if possible) prior to the due date.

Quizzes: A total of five closed-book, closed-note quizzes will be given during the semester. The quizzes will be given during the last twenty to thirty minutes of class and will include questions from the assigned reading as well as questions from class lectures, videos, discussions, and homework. Types of questions on the quizzes will include multiple choice, statement completion, simple problem, and essay. None of the quiz scores will be dropped. Students who cannot take a quiz at the scheduled time (due to verifiable emergency or official college activity) should notify the instructor prior to the quiz.

Final Exam: The final exam will be closed-book and closed-note and will include questions from the assigned reading as well as questions from class lectures, videos, discussions, and homework. Types of questions on the final exam will include multiple choice, statement completion, simple problem, and essay. THE FINAL EXAM WILL BE COMPREHENSIVE. The final exam time will not be changed except in cases of verifiable emergencies. Students who cannot take the final exam at the scheduled time (due to verifiable emergency) should notify the instructor (if possible) prior to the exam.

Evaluation: Course grades will be based on: five quizzes (400 pts), the final exam (100 pts), writing assignments (30 pts), group activities and homework (30 pts), and attendance (20 pts) for a total of 580 points. Course grades will be assigned as follows:

A: 100%-93%	A–: 92%-90%	
B+: 89%-87%	B: 86%-83%	B–: 82%-80%
C+: 79%-77%	C: 76%-73%	C–: 72%-70%
D+: 69%-67%	D: 66%-63%	D–: 62%-60%
F: 59%-0%		

Policy Regarding Academic Integrity: Academic honesty according to the Academic Integrity Policy is expected in this class for all work submitted for a grade and will be strictly followed. Students are responsible for understanding and following this policy.

PARTICULARLY FOR THE WRITING ASSIGNMENTS, NOTE CAREFULLY THE INFORMATION IN THE POLICY CONCERNING FABRICATION AND PLAGIARISM. FABRICATION IS THE FALSIFICATION OR INVENTION OF ANY INFORMATION OR CITATION, AND PLAGIARISM IS THE REPRESENTATION OF THE WORDS OR IDEAS OF ANOTHER AS ONE'S OWN (THAT IS, COPYING SOMEONE ELSE'S WORK).

THIS DOCUMENT IS SUBJECT TO ANNOUNCED CHANGES