UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE:	January 2003
COURSE REVISED IMPLEMENTATION DATE:	September 2006
COURSE TO BE REVIEWED:	November 2009
(Four years after UPAC final approval date)	(MONTH YEAR)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.

Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **Faculty of Science, Health & Human Services / Physics**

PHYSICS 452		**3**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

INTRODUCTION TO GENERAL RELATIVITY

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

General Relativity is Einstein's Theory of Gravitation. It is the first theory that allows the properties of space-time to be determined by the matter contained in the space-time.

PREREQUISITES: **PHYSICS 352**
COREQUISITES: **None**

SYNONYMOUS COURSE(S)
(a) Replaces: **N/A** *(Course #)*
(b) Cannot take: **N/A** *(Course #)* for further credit.

SERVICE COURSE TO: *(Department/Program)*

TOTAL HOURS PER TERM: **75**

STRUCTURE OF HOURS:

Lectures:	**75**	Hrs
Seminar:		Hrs
Laboratory:		Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE:
HOURS PER DAY:

MAXIMUM ENROLLMENT: **24**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **Once every two years**

WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☐ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☐ Yes	☒ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☐ Yes	☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Rob Woodside
Chairperson: Gillian Mimmack *(Curriculum Committee)*
Department Head: Norm Taylor
Dean: Jackie Snodgrass
UPAC Approval in Principle Date:
UPAC Final Approval Date: December 14, 2005

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

This course completes the sequence 252, 352, 452. On completion of the course, a successful student will be able to understand and use Einstein's Theory of Gravity. Using GRII, a tensor package plug-in for Maple, the student will be able to do large tensor calculations in a stress-free manner - possibly even original, publishable work. To do this, the student will learn the language of differential geometry. Students will be able to solve various problems in each of the topic areas listed in the Calendar Description section.

METHODS:

This course will be taught using lectures, demonstrations, and computer simulations. (GRII plug-in for Maple).

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check:) ☒ Yes ☐ No

METHODS OF OBTAINING PLAR:

Departmental Review and/or Course Challenge

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

B.F. Schutz, A First Course in General Relativity, Cambridge (1983)
R.M. Wald, General Relativity, Chicago (1984)
Misner, Thorne & Wheeler, Gravitation, Freeman (1973)

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Assignments	25%
Mid-term examination	30%
Final examination	45%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

1. Special Relativity
2. Vectors in Special Relativity
3. Tensors in Special Relativity
4. Perfect Fluids in Special Relativity
5. Curved Manifolds
6. Physics in Curved Space-time
7. Einstein Equations
8. Gravitational Radiation
9. Spherical Solutions
10. Schwarzchild Geometry and Kerr Black Holes
11. Cosmology