UNIVERSITY COLLEGE of the FRASER VALLEY

UPAC FORM #2 (Page 1)

COURSE IMPLEMENTATION DATE:	September 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**

COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS
PHYS 455		**3**

Solid State Physics
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course develops the basic principles of metal and semiconductor solids, including crystal and structural properties, phonons, thermal properties, and electrical properties. The course also discusses practical applications including x-ray diffraction, magnetism, and alloying.

PREREQUISITES: **A course involving PDE's such as one of (PHYS 222, PHYS 381,or CHEM 322) and (a course involving thermodynamics, such as one of (PHYS 231 or PHYS 311, PHYS 381, or CHEM 222) and (a course involving quantum mechanics, such as one of (PHYS 252, PHYS 351, or CHEM 322) and (a course involving vectors, such as one of MATH 152, MATH 211, or PHYS 221)**

COREQUISITES:

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

SERVICE COURSE TO: *(Department/Program)* *(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:	**36**	
EXPECTED FREQUENCY OF COURSE OFFERINGS:	**Once every two or three yea**	
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): Peter Mulhern
Chairperson: Gillian Mimmack *(Curriculum Committee)*
Department Head: Norm Taylor
Dean: Jackie Snodgrass
UPAC Approval in Principle Date:
UPAC Final Approval Date: May 26, 2006

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

At the completion of the course the students should be competent to work in industrial or research solid state/condensed matter labs. Students should be comfortable with all the basic concepts and have a conversation level exposure to current advanced topics. Students should be capable of performing all basic solid state calculations, be competent to partially analyse x-ray diffraction spectra, and understand the standard practical measurement procedures. Students will be able to solve various problems in each of the topic areas listed in the Calendar Description section.

METHODS:

As students will have no personal experience with solid state physics prior to the course, a primarily lecture-based approach will be used during class time. Assignments will focus both on practice with computational procedures, and also analysis of real data.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

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

METHODS OF OBTAINING PLAR:

Please see the Physics PLAR policy on the department's webpage

TEXTBOOKS, REFERENCES, MATERIALS:

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

Kittel, Introduction to Solid State Physics--most recent edition

Other texts are available

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

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

Assignments	25%
Midterm	30%
Final	45%

COURSE CONTENT:

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

Week	Topic
1 and 2	Introduction; crystal structure, lattice vectors, basis vectors, space and point groups, indexing, classical structures
3	Reciprocal lattice, Bragg Law, Laue and Powder techniques, Fourier Analysis of structures; form factors; diffraction analysis
4	Binding, van der Waals forces; Lenoard-Jones potentials; ionic and covalent bonding; properties arising from bonding
5 and 6	Phonons: brouillon zones, lattice vibrations, thermal properties; standard models
7 and 8	Fermi gasses, energy levels and energy bands; applications to electrical properties
9	Semiconductors, basic thermal and electrical properties, operation of a pn junction
10	Fermi Surfaces; applications to STM
11, 12, 13	Selected topics from: ferromagnetic and antiferromagnetic behaviours; superconductivity; optical properties; dislocations and alloys.