UNIVERSITY OF THE FRASER VALLEY

**UPAC FORM #2 (Page 1)**

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| COURSE IMPLEMENTATION DATE: | December 2001 |
| COURSE REVISED IMPLEMENTATION DATE: | January 2010 |
| COURSE TO BE REVIEWED: | October 2013 |
| (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**

| **PHYS 372** | **PHYS 472** | **3** |
|---|---|---|
| COURSE NAME/NUMBER | FORMER COURSE NUMBER | UCFV CREDITS |

**DIGITAL ELECTRONICS LABORATORY**

COURSE DESCRIPTIVE TITLE

**CALENDAR DESCRIPTION:**

Physics 372 is the laboratory portion of the digital electronics course, Physics 362. The experiments done in this course are designed to provide students with practical experience using, testing, and designing digital logic circuits. The experiments are closely related to the material covered in the classroom. This course emphasizes design and assembly of circuits with discrete gates, interfacing these circuits directly to microprocessors, and using industrial production tools for practical applications.

Note: Students with credit for PHYS 472 cannot take this course for further credit.

PREREQUISITES: **PHYS 222**
COREQUISITES:
PRE OR CO-REQUISITES: **PHYS 362**

SYNONYMOUS COURSE(S)
(a) Replaces: **PHYS 472** *(Course #)*
(b) Cannot take: **n/a** *(Course #)* for further credit.

SERVICE COURSE TO: *(Department/Program)* *(Department/Program)*

TOTAL HOURS PER TERM: **45**

STRUCTURE OF HOURS:

| | | |
|---|---|---|
| Lectures: | | Hrs |
| Seminar: | | Hrs |
| Laboratory: | **45** | 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 2 or 3 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): George McGuire; revised P. Mulhern
Chairperson: Gillian Mimmack *(Curriculum Committee)* *September 1, 2009*
Department Head: Norm Taylor
Dean: Jackie Snodgrass
UPAC Approval in Principle Date: May 22, 2009
UPAC Final Approval Date: October 2, 2009

**LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:**

The experiments in this course are designed to provide students with:
1. the practical experience in using the basic digital gates;
2. digital design experience and how these circuits perform binary mathematics;
3. practical experience in using IC chips
4. the ability to interface digital circuits with common microprocessors

**METHODS:**

The experiments used in this course will be closely tied to the material covered in the lectures. The laboratory is meant to be an integral part of the classroom portion of the course—it should not be thought of as a separate part of the course. The experiments are needed to provide the practical experience with the logic circuits studied in the classroom. The unique combination of classroom theory, VHDL, computer simulation, and practical experience should provide the students with the necessary knowledge and the experience to design and test digital electronic circuits. Experiments on computer interfacing will be assigned. Students after successfully completing this course will have a good understanding of digital electronics, microprocessors, computer architecture, and computer interfacing.

**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:]

TEXTS: Miller, Experiments for Digital Computer Electronics, 3rd Ed., McGraw Hill (1993)

REFERENCES:
1. Horowitz and Hill, The Art of Electronics, Cambridge, 1989
2. Simpson, R., Introductory Electronics for Scientists and Engineers, 2nd Ed., Simon & Shuster, 1987
3. Driscoll, F., Analysis of Electric Circuits, Prentice Hall, 1973
4. Fortney, L., Principles of Electronics, HBJ, 1987

**SUPPLIES / MATERIALS:**

Fully-equipped physics lab

**STUDENT EVALUATION:**

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

The final grade will be awarded on the total number of points earned. There are 21 labs, each marked out of 10, a project worth 60 points, and a final exam worth 30 points, for a total maximum of 300 points. Extra projects can be done for additional credit.

The marks awarded will be based on the number of points awarded.

| | | | | | |
|---|---|---|---|---|---|
| A+ | 279+ | A | 264 – 278 | A- | 249 – 263 |
| B+ | 234 – 248 | B | 219 – 233 | B- | 204 – 218 |
| C+ | 189 – 203 | C | 174 – 189 | C- | 159 – 173 |
| P | 144 – 158 | N.C. | < 144 | | |

**COURSE CONTENT:**

[Course content varies by instructor. An example of course content might be:]
Introduction; techniques, lab manuals, data analysis

Lab 0: Measurement Techniques

Lab 1: Basic Gates

Lab 2: Combinations of Gates

Lab 3: Diode and Transistor Logic

Lab 4: Simple Op-Amp Amplifier

Lab 5: Loading a Gate

Lab 6: Frequency Response of a Gate

Lab 7: Schmitt Trigger

Lab 8: Mini-Project

Lab 9: Monostable Multivibrators

Lab 10: Astable Multivibrators

Lab 11: RS and D Flip-Flops

Lab 12: JK Flip-Flops

Lab 13: Encoders and Decoders; 7 Segment Display

Lab 14: Multiplexer

Project (Work Day #1)

Lab 15: Counters

Lab 16: Adders

Project (Work Day #2)

Lab 17: A/D test circuit

Lab 18: Computer Interface of A/D

Lab 19: Game Port Access

Lab 20: Printer Port Access

Project (Work Day #3)