## 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.

<table>
<thead>
<tr>
<th>FACULTY/DEPARTMENT:</th>
<th>PHYS 462</th>
<th>Faculty of Science, Health &amp; Human Services/ Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE NAME/NUMBER</td>
<td>PHYS 462</td>
<td>COURSE DESCRIPTIVE TITLE</td>
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<tr>
<td>FORMER COURSE NUMBER</td>
<td>PHYS 222</td>
<td>Digital Electronics and Computer Interfacing</td>
</tr>
<tr>
<td>UCFV CREDITS</td>
<td>3</td>
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</tr>
</tbody>
</table>

### CALENDAR DESCRIPTION:

This course emphasizes elementary digital electronics and interfaces. Topics include: gates and Boolean algebra, Karnaugh maps, flip flops, registers, counters and memories, digital components, microprocessor functions and architecture, instruction sets, D/A and A/D converters, and waveshaping. PHYS 472, the laboratory portion of this course must be taken concurrently. This course is designed to provide practical experience with the basic digital logic chips and how digital circuits can be interfaced with microprocessors.

### PREREQUISITES:

PHYS 222

### COREQUISITES:

### PRE or CO-REQUISITES:

PHYS 472

### SYNONYMOUS COURSE(S)

(a) Replaces: n/a
   (Course #)

(b) Cannot take: n/a for further credit.
   (Course #)

### SERVICE COURSE TO:

### TOTAL HOURS PER TERM: 75

<table>
<thead>
<tr>
<th>STRUCTURE OF HOURS:</th>
<th>TRAINING DAY-BASED INSTRUCTION</th>
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<tbody>
<tr>
<td>Lectures: 75 Hrs</td>
<td>LENGTH OF COURSE:</td>
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<tr>
<td>Seminar: Hrs</td>
<td>HOURS PER DAY:</td>
</tr>
<tr>
<td>Laboratory: Hrs</td>
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<tr>
<td>Field Experience: Hrs</td>
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<tr>
<td>Student Directed Learning: Hrs</td>
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<tr>
<td>Other (Specify): Hrs</td>
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### MAXIMUM ENROLLMENT: 24

<table>
<thead>
<tr>
<th>EXPECTED FREQUENCY OF COURSE OFFERINGS:</th>
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<tbody>
<tr>
<td>WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)</td>
</tr>
<tr>
<td>☑ Yes ☐ No</td>
</tr>
<tr>
<td>WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)</td>
</tr>
<tr>
<td>☑ Yes ☐ No</td>
</tr>
<tr>
<td>TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:</td>
</tr>
<tr>
<td>☑ Yes ☐ No</td>
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</tbody>
</table>

### AUTHORIZATION SIGNATURES:

Course Designer(s): George McGuire; revised P. Mulhern

Chairperson: Gillian Mimmack (Curriculum Committee)

Department Head: Norm Taylor

Dean: Jackie Snodgrass

UPAC Approval in Principle Date: May 1994

UPAC Final Approval Date: May 26, 2006
LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

This course is designed to provide students with:
1. the theory needed to understand the purpose and how digital devices function;
2. an understanding and an appreciation of how a digital computer functions;
3. the ability to design, construct and test simple digital logic circuits;
4. an ability to program the common microprocessors;
5. how information can be transferred to and from computers.

METHODS:

This course will be presented using lectures, demonstrations, experiments, and computer simulations. Computer simulations will be used to design and to check the digital logic circuits. The laboratory portion of the course will provide the actual experience and the practice needed to confirm the digital logic theory studied in the lecture portion of the course. This unique combination of classroom theory, computer simulation, and practical experience should provide the students with the necessary knowledge and experience to design circuits to perform specific tasks. Students after successfully completing this course will have a good understanding of basic digital electronics, microprocessors, computer architecture, computer interfacing, and computers can be used to model and test circuits.

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:]

      Borgart, Introduction to Digital Circuits (1992)

REFERENCES:
5. Bogart Jr, T.F. Introduction to Digital Circuits

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

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

Assignments 25%
Mid-term 25%
Final 50%

COURSE CONTENT:

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

(Chapters refer to Bogart)

Introduction: Digital vs. Analog; Elements of Design
Chap 3: Logic Gates
Chap 4: Boolean Algebra
Chap 4: Karnaugh Maps; Chap 5: Practical Considerations
Chap 6: Pulse and Digital Circuits
Physics of semiconductors; Analog – diodes
Analog – transistors and op-amps
Chap 7: Waveshaping and Waveform Analysis
Appendix 1: Spice
Chap 7: Comparators and Schmitt Triggers; Sensors
Chap 8: Multivibrators and 555 Clock
Chap 9: Basics of Internal Gate Structure
Chap 10: Logic Families
Chap 11: RS and D Flip-Flops
Chap 11: JK Flip-Flops and applications: bus structure
Chap 12: Registers; Chap 15 Multiplexers
Chap 13: Encoders and Decoders
Chap 2: Binary and Hexadecimal
Chap 14: Counters – Asynchronous
Chap 14: Counters – Synchronous
Midterm: Chapters 3 – 11
Chap 15: Adders
Chap 12: Registers: Logical Comparators
Computers: Turing machine, Von Neuman cycle, architecture
Virtual Machines: Bus Architecture
Chap 16: Memories
Chap 17: D/A
Chap 17: A/D and other interfacing
Game Port; Software interrupts
RS – 232 Interface
IEEE – 488 Interface
PLA and 8253/8255 chips
Mechanical Interfaces; Stepper Motors