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>Faculty of Science, Health &amp; Human Services/Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 472</td>
<td>3</td>
</tr>
<tr>
<td>COURSE NAME/NUMBER</td>
<td>FORMER COURSE NUMBER</td>
</tr>
<tr>
<td>DIGITAL ELECTRONICS LABORATORY</td>
<td></td>
</tr>
</tbody>
</table>

CALENDAR DESCRIPTION:

Physics 472 is the laboratory portion of the digital electronics course, Physics 462. 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.

PREREQUISITES: PHYS 222
COREQUISITES: PHYS 462
PRE OR CO-REQUISITES:

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

SERVICE COURSE TO:

TOTAL HOURS PER TERM: 45
TRAINING DAY-BASED INSTRUCTION

<table>
<thead>
<tr>
<th>STRUCTURE OF HOURS:</th>
<th>HOURS PER DAY:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures:</td>
<td>Hrs</td>
</tr>
<tr>
<td>Seminar:</td>
<td>Hrs</td>
</tr>
<tr>
<td>Laboratory:</td>
<td>45 Hrs</td>
</tr>
<tr>
<td>Field Experience:</td>
<td>Hrs</td>
</tr>
<tr>
<td>Student Directed Learning:</td>
<td>Hrs</td>
</tr>
<tr>
<td>Other (Specify):</td>
<td>Hrs</td>
</tr>
</tbody>
</table>

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 [ ]

COURSE IMPLEMENTATION DATE: December 2001
COURSE REVISED IMPLEMENTATION DATE: September 2006
COURSE TO BE REVIEWED: November 2009
(Four years after UPAC final approval date)

AUTHORIZED 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: UPAC Final Approval Date: May 26, 2006
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:)

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:]


REFERENCES:

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.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Minimum</th>
<th>Maximum</th>
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<tbody>
<tr>
<td>A+</td>
<td>279+</td>
<td>264 – 278</td>
</tr>
<tr>
<td>A</td>
<td>249 – 263</td>
<td></td>
</tr>
<tr>
<td>B+</td>
<td>234 – 248</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>219 – 233</td>
<td></td>
</tr>
<tr>
<td>B-</td>
<td>204 – 218</td>
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</tr>
<tr>
<td>C+</td>
<td>189 – 203</td>
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<tr>
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<td>174 – 189</td>
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<td>P</td>
<td>144 – 158</td>
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<tr>
<td>N.C.</td>
<td>&lt; 144</td>
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</tbody>
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COURSE CONTENT:
[Course content varies by instructor. An example of course content might be:]

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)