Missoula College UM  
Department of Applied Computing and Electronics  

**Course Number and Title** ........... ETEC 245 Digital Electronics  
**Term** ....................................... Fall 2014  
**Semester Credits** ..................... 4  
**Prerequisites** ........................... EET 105 *DC Circuit Analysis*, or consent of instructor  

**Faculty Contact Information**  

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Office</th>
<th>Office Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steven (Steve) L. Stiff</td>
<td>GH08-I</td>
<td>T, W, R: 2:10 PM – 3:00 PM</td>
</tr>
<tr>
<td>Phone: 243-7913</td>
<td>MC East Campus</td>
<td>or by appointment</td>
</tr>
<tr>
<td>Email: <a href="mailto:steven.stiff@umontana.edu">steven.stiff@umontana.edu</a></td>
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**Class Meeting Times and Final Exam**  

<table>
<thead>
<tr>
<th>Section</th>
<th>Day, Time, and Location</th>
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| 01 (CRN 75202) | Lecture: MWF, 10:10am – 11:00am, HB05  
Lab: R, 10:10am – 12:00am, HB05 |

| Final Exam |
| R, 12/11/2014, 8:00am – 10:00am, HB05 |

**Course Description**  
This course covers the operation, application, and troubleshooting of TTL and CMOS electronic logic devices, their use in combinatorial and sequential logic circuits, the interface between the logic families, and the interface between digital and analog circuits. The course also provides a study of Boolean algebra, binary and hexadecimal number systems, binary codes, and the analysis of the basic components and circuits used in semiconductor switching.

**Course Objectives**  
Upon completion of this course students will be able to:

- Identify analog and digital electrical signals.
- Convert numbers between decimal, binary, octal, and hexadecimal number systems.
- Explain the operation of digital logic gates.
- Use Boolean algebra to express logic operations as equations.
- Use Karnaugh maps to minimize (simplify) Boolean equations.
- Identify combinatorial logic circuits and sequential logic circuits, and explain their operation.
- Identify, explain, and implement various types of flip-flops, counter circuits, shift registers, and other logic circuits.
- Identify commonly used integrated circuit families used in digital equipment.
- Troubleshoot digital circuits using standard test equipment and specialized instruments.

**Required Materials**  
- EET 227 parts kit (MC bookstore)
- Graph paper, Engineer’s Computation Pad, Ampad #22-144 or equivalent (¼” grid, green)
- Breadboard / Prototyping board
- Hook-up wire
- Miscellaneous tools as needed

Revision: 08/25/2014
Evaluation and Grading Criteria

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Grading Scale</th>
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<tbody>
<tr>
<td>Assignments, quizzes, projects, etc.</td>
<td>35.0% 100% - 90%</td>
</tr>
<tr>
<td>Laboratories</td>
<td>25.0% 90% - 80%</td>
</tr>
<tr>
<td>Exams</td>
<td>35.0% 80% - 70%</td>
</tr>
<tr>
<td>Attendance (Bonus)</td>
<td>2.0% 70% - 60%</td>
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Course Policies

Online Component

Various components of the course will be delivered via UMOnline (http://umonline.umt.edu) using the Moodle Course Management Software. It is the responsibility of the student to become familiar with and work in Moodle. Moodle training is also available through UMOnline.

Attendance

- Regular classroom attendance is expected and attendance is taken.
- Students more than 10 minutes late for class will not be given credit for attendance.

Assignments and Exams

- All assigned work is due at the assigned time on the assigned date.
- All exams are to be taken at the assigned time on the assigned date.
- All late or missed work receives a score of 0. Late work is accepted only in extraordinary circumstances, and is accepted and graded at the instructor’s discretion.

Electronic Communication Devices

- All electronic communication devices must be secured, muted, or tuned off prior to the start of class.
- Any use of an electronic communication device during an exam is considered cheating and will be handled at the instructor’s discretion (refer to Student Conduct).
- Audio and/or video recording of class sessions is not permitted without prior approval of the instructor (refer to Students with Disabilities).

Email

This course uses and therefore requires you to use your student email account for all course email communication.

Student Conduct

- All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or disciplinary sanction by the University.
- Student conduct is governed by the Student Conduct Code. All students need to be familiar with the Student Conduct Code. It is available for review or can be downloaded at http://www.umt.edu/vpsa/policies/student_conduct.php.

Students with Disabilities

- Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely manner. Please be prepared to provide me a copy of your Letter of Verification supplied by your Disability Services for Students (DSS) Coordinator for my records. Refer to http://life.umt.edu/dss or call 406-243-2243 (voice/text) for information regarding your rights.
- When requesting accommodations, please contact me after class or in my office to discuss your needs. This is done in order to maintain your privacy and minimize class disruptions.
- For students requesting examination accommodations, you must supply me the completed Learning Center (LC) scheduling form for my signature at least 3 days prior to the scheduled test date (the LC
requires the signed form at least two days prior to testing). LC contact information is available at http://www.mc.umt.edu/academics/learningcenter.

Policies for Dropping and Adding Courses, Changing Sections, Grading, and Credit Status

- The University Policy for dropping courses or requesting grading/credit status changes can be found in the academic catalog or on the web at http://www.umt.edu/registrar/students/dropadd.php. All students should be familiar with this policy.
- If you are having difficulty with the course for any reason and decide not to continue, please complete a drop or withdrawal form. A properly completed and approved drop or withdrawal form will prevent you from receiving a failing grade on your college transcript.
- Please note: if you are receiving financial aid, dropping or withdrawing from a course may affect your financial aid status.

Changes to Syllabus

NOTE: The instructor reserves the right to modify the syllabus and assignments as needed based on faculty, student, and/or environmental circumstances. If changes are made to the syllabus, amended copies will be dated and made available to the class.
ETEC 245 Course Outline (Tentative)

Unit 1: Introduction to Digital Electronics
1.1 Number Systems and Codes
1.2 Digital Electronic Signals and Switches
1.3 Basic Logic Gates
   a. AND, OR, and NOT
   b. NAND and NOR
1.4 Boolean Algebra and Reduction Techniques
   a. Boolean Algebra
   b. Karnaugh Mapping
   c. De Morgan’s Theorem

Unit 2: Combinatorial Logic
2.1 Exclusive OR and Exclusive-NOR Gates
2.2 Arithmetic Operations and Circuits
   a. Half Adder
   b. Full Adder
2.3 Data Control Structures
   a. Code Converters
   b. Multiplexers and Demultiplexers

Unit 3: Logic Design; Flip-Flops
3.1 Logic Families and Their Characteristics
3.2 Flip-Flops and Registers
   a. S-R Flip-Flop
   b. D Flip-Flop
   c. J-K Flip-Flop
3.3 Practical Considerations for Digital Design

Unit 4: Sequential Logic, Timers; Interfacing with the Real World
4.1 Counter Circuits
   a. Asynchronous Counters
   b. Synchronous Counters
4.2 Shift Registers
   a. Serial/Parallel Data Conversions
   b. Specialized Counter Circuits
4.3 Multivibrators and Timers
   a. Astable
   b. Monostable
   c. Schmitt Trigger
4.4 Interfacing with the Real World
   a. Analog-to-Digital
   b. Digital-to-Analog
   c. Signals and Signal Conditioning