

9-2013

EET 227.01: Digital Electronics

Steven L. Stiff

University of Montana - Missoula College, steven.stiff@umontana.edu

Let us know how access to this document benefits you.

Follow this and additional works at: <https://scholarworks.umt.edu/syllabi>

Recommended Citation

Stiff, Steven L., "EET 227.01: Digital Electronics" (2013). *Syllabi*. 219.
<https://scholarworks.umt.edu/syllabi/219>

This Syllabus is brought to you for free and open access by the Course Syllabi at ScholarWorks at University of Montana. It has been accepted for inclusion in Syllabi by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.

Missoula College UM
Department of Applied Computing and Electronics

Course Number and Title: EET 227 Digital Electronics
Term: Fall 2013
Semester Credits: 4
Prerequisites: EET 105 *DC Circuit Analysis*, or consent of instructor

Faculty Contact Information

Faculty	Office	Office Hours
Steven (Steve) L. Stiff	GH08-I	M: 11:10 AM – 12:00 PM
Phone: 243-7913	MC East Campus	T, R: 1:10 PM – 2:00 PM
Email: steven.stiff@umontana.edu		or by appointment

Class Meeting Times and Final Exam

Section 01 (CRN 72951)

Day, Time, and Location

Lecture MWF, 9:10am – 10:00am, HB05
Lab R, 9:10am – 11:00am, HB05

Final Exam

R, 12/12/13, 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:

- Kleitz, W. (2012) *Digital Electronics: A Practical Approach with VHDL, 9th Edition*. Upper Saddle River, NJ: Pearson Education, Inc.
ISBN-13: 9780132435789
- Kleitz, W. (2008) *Laboratory Manual to Accompany Digital Electronics, 8th Edition*. Upper Saddle River, NJ: Pearson Education, Inc.
ISBN-13: 9780132239820
- 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

Evaluation and Grading Criteria:

Assessment	Grading Scale
Assignments, quizzes, projects, etc. 35.0%	100% - 90% A
Laboratories 30.0%	90% - 80% B
Exams 35.0%	80% - 70% C
Attendance (Bonus) 2.0%	70% - 60% D

Course Policies**Online Component:**

Various components of the course will be delivered via [UMOnline \(http://umonline.umt.edu/\)](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 UMOonline.

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 Policy:

- 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*).

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](http://life.umt.edu/vpsa/student_conduct.php). All students need to be familiar with the Student Conduct Code. It is available for review or can be downloaded at http://life.umt.edu/vpsa/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 [Academic Support Center \(ASC\)](#) scheduling form for my signature at least 3 days prior to the scheduled test date (the ASC requires the signed form at least two days prior to testing). ASC contact information is available at <http://www.cte.umt.edu/academics/academicsupport/>.

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/catalog/acad/acadpolicy/default.html>. 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.

EET 227 Course Outline (Tentative)**Unit 1: Introduction to Digital Electronics**

- 1.1 Introduction to Digital Electronics
 - a. Number Systems and Codes
 - b. Digital Electronic Signals and Switches
- 1.2 Basic Logic Gates
 - a. AND, OR, and NOT
 - b. NAND and NOR

Unit 2: Combinatorial Logic

- 2.1 Boolean Algebra and Reduction Techniques
 - a. Boolean Algebra
 - b. Karnaugh Mapping
 - c. De Morgan's Theorem
- 2.2 Exclusive OR and Exclusive-NOR Gates
- 2.3 Arithmetic Operations and Circuits
 - a. Half Adder
 - b. Full Adder
- 2.4 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