INSTRUCTOR NAME: Bobby (Robert) Yost

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OFFICE: DMC 125

DEPT/COURSE #:INST 140

PHONE: 360-752-8361

QTR/YEAR: Winter 2018

MEETING TIMES/DAYS:Monday through Friday 12:00 to 5:00

CREDITS: 5

Theory Hours: 33 Guided Practice Hours: 44 Field Based Experience Hours: 00

## COURSE TITLE:

Digital I

## COURSE DESCRIPTION:

A comprehensive focus on the concepts, terminology, components and circuits that combine to form basic digital systems with lab work and projects.

## COURSE PREREQUISITE:

INST 135 with a minimum grade of “C-“

## LEARNING OUTCOMES

At the end of this course, the student should be able to:

| Learning Outcomes | Methods of Assessment |
| --- | --- |
| Describe and use timing diagrams | Written proportional exam question requiring proper application of timing diagram to circuit. Homework questions relating to the topic will be assessed through daily “prep” quizzes. |
| Describe the use of the seven basic logic gates and their respective truth tables | Written proportional exam question requiring full understanding of 7 basic logic gates and their truth tables. Lab assessment – Circuit construction that requiring prediction of circuits associated truth table and measurement of actual truth table – Mastery (100% competence) required, with no limit on re-tries prior to deadline. |
| Analyze the internal circuitry for both the TTL and CMOS families | Written proportional exam question requiring description, and application of TTL and CMOS families. Logic probe project will require construction of circuit to determine logic levels of both TTL and CMOS families. |
| Write Boolean equations for combinational logic applications, and draw schematic diagrams from Boolean expressions | Proportional exam questions requiring correct application of Boolean equations and associated schematic creation based on application. Lab assessment – Construction of digital circuits given an anticipated outcome and partial schematic – Mastery (100% competence) required, with no limit on re-tries prior to deadline. |
| Simplify Boolean expressions with Boolean Rules and/or Karnaugh mapping, including the use of De Morgan’s theorem | Proportional exam questions requiring application of Boolean rules and/or Karnaugh mapping. Lab Assessment – Construction of digital circuits based on expected outcome which may require application of Boolean rules as seen through equivalent circuits – Mastery (100% competence) required, with no limit on re-tries prior to deadline. |
| Determining the weighting factors for decimal, binary, octal, and hexadecimal systems and the conversions from one system to another | Written proportional exam question requiring application of, and correct conversion between, each numeration system. |
| Perform “two’s complementation” mathematics | Written proportional exam question requiring proper math associated with “two’s complement” process. |
| Describe the format of several binary codes (BCD, Gray, Binary, and Hexadecimal) and their use | Written proportional exam questions requiring application of, and correct conversion between, each numeration system. |

## COURSE OUTLINE:

A course calendar in electronics format (Excel spreadsheet) resides on the Y: network drive, and also in printed paper format in classroom DMC 143, for convenient student access. This calendar is updated to reflect schedule changes resulting from employer recruiting visits, interviews, and other impromptu events. Course worksheets provide comprehensive lists of all course assignments and activities, with the first page outlining the schedule and sequencing of topics and assignment due dates. These worksheets are available in PDF format at http://www.ibiblio.org/kuphaldt/socratic/doc/topical.html

METHODS OF INSTRUCTION: **(check all that apply)**

Lecture

Lab

Discussion

Independent Study

Instructor Demonstrations

## REQUIRED STUDENT TEXT(S), SUPPLIES, AND MATERIALS:

•Textbook – Digital Electronics, by William Kleitz

•Textbook (Supplement) – Lessons In Electric Circuits, Volume IV (Digital), by Tony R. Kuphaldt

•Can be accessed for free at: <http://www.ibiblio.org/kuphaldt/electricCircuits/>

•Textbook (Supplement) – Lessons In Industrial Instrumentation, by Tony R. Kuphaldt

•Can be accessed for free at: <http://www.ibiblio.org/kuphaldt/socratic/sinst/>

•INST 140 (Digital 1) Worksheets, by Tony R. Kuphaldt

• Can be accessed for free at: <http://www.ibiblio.org/kuphaldt/socratic/doc/topical.html>

•Scientific Calculator (TI-36X Pro recommended!)

•Fluke 87V multi-meter or equivalent

•Third quarter Core Electronics part kit (available through BTC bookstore)

•Tool set (detailed list handed out on Day 1 of first quarter)

## STUDENT REQUIREMENTS/EXPECTATIONS:

The student is expected to study all discussion questions and assigned readings in preparation for each day. A general rule for college-level coursework is 2 to 3 hours of study per hour of lecture. In the event of an unavoidable absence, students are responsible for keeping pace with the class schedule by contacting their classmates for assignments and submitting completed homework to the instructor on time. Assignments need to show all work in order to receive full credit, not just the answer. Students are required to have their tools with them for ALL lab exercises.

Critically important learning objectives are assessed at a “mastery” level which means students must demonstrate 100% competence, with opportunities to re-try if necessary. Failure to meet each and every course mastery standard by the published deadline will result in a failing grade for the course.

## ASSIGNMENTS, EVALUATION, AND GRADING STANDARDS:

• Mastery objectives: Construction, analysis and demonstration of all lab objectives and Mastery

question on each exam = 50%  
• Proportional exam score = 30% (3 exams at 10% each)  
• Project = 20%

• Quiz penalty = -1% per failed quiz

• Lab Troubleshooting penalty = -1% per lab troubleshooting incomplete by deadline  
• Tardiness penalty = -1% per incident (1 “free” tardy per course)  
• Absence penalty = -1% per hour (12 hours “sick time” per quarter)  
• Extra credit = +5% per project (assigned by instructor based on individual learning needs)  
  
All grades are criterion-referenced (i.e. no grading on a “curve”)  
100% ≥ A ≥ 95% 95% > A- ≥ 90%  
90% > B+ ≥ 86% 86% > B ≥ 83% 83% > B- ≥ 80%  
80% > C+ ≥ 76% 76% > C ≥ 73% 73% > C- ≥ 70% (minimum passing course grade)  
70% > D+ ≥ 66% 66% > D ≥ 63% 63% > D- ≥ 60% 60% > F  
  
Absence on a scheduled exam day will result in a 0% score for the proportional exam unless you provide  
documented evidence of an unavoidable emergency.  
If you fail a mastery exam question, you must re-take a different version of that mastery exam question on a different day. Multiple re-tries are allowed. There is no penalty levied on your course grade for re-taking mastery exam questions, but failure to successfully pass a mastery exam question by the due date will result in a failing grade (F) for the course.  
  
If any other “mastery” objectives are not completed by their specified deadlines, your overall grade  
for the course will be capped at 70% (C- grade), and you will have one more school day to complete the  
unfinished objectives. Failure to complete those mastery objectives by the end of that extra day (except in the case of documented, unavoidable emergencies) will result in a failing grade (F) for the course.

Individual preparation for Socratic dialogue sessions is measured by a “prep quiz” and/or personal  
inspection of your work by the instructor. In the event of absence, these scores may be credited by having your preparatory work and demonstration of understanding reviewed at any time before the end of the quarter in a one-on-one dialogue with the instructor.  
  
Extra credit opportunities exist for each course, and may be assigned to students upon request. The  
student and the instructor will first review the student’s performance on feedback questions, homework, exams, and any other relevant indicators in order to identify areas of conceptual or practical weakness. Then, both will work together to select an appropriate extra credit activity focusing on those identified weaknesses, for the purpose of strengthening the student’s competence. A due date will be assigned (typically two weeks following the request), which must be honored in order for any credit to be earned from the activity. Extra credit may be denied at the instructor’s discretion if the student has not invested the necessary preparatory effort to perform well (e.g. lack of preparation for daily class sessions, poor attendance, no feedback questions submitted, etc...)

## ADDITIONAL STUDENT RESOURCES:

Accessibility: BTC and your instructor are committed to the principle of universal learning. This means that our classroom, our virtual spaces, our practices, and our interactions be as inclusive as possible. Mutual respect, civility, and the ability to listen and observe others carefully are crucial to universal learning.

If you have difficulty reading, hearing or seeing content, or any other difficulties that might negatively impact your potential to succeed in this course, you may be eligible to receive help from our Accessibility Resources Office. If you feel you may benefit from an accommodation, contact Accessibility Resources ideally at the start of the quarter. (You may contact them at any time during the quarter.) This office is located in the **Admissions and Student Resource Center, Room 106. Call 360-752-8450 or email** [**ar@btc.edu**](mailto:ar@btc.edu). If you qualify for academic accommodations, the Accessibility Resources Office will forward a letter of accommodation to your instructor, who will, with you, work out the details of any accommodations needed for this course.

Campus Emergencies: If an emergency arises, your instructor may inform you of actions to follow. You are responsible for knowing emergency evacuation routes from your classroom. If police or university officials order you to evacuate, do so calmly and assist those needing help. You may receive emergency information alerts via the building enunciation system, text message, email, or BTC’s webpage, Facebook and Twitter. Refer to the emergency flipchart in your room for more information on specific types of emergencies.

Tutoring:Drop-in tutoring is available at no cost to students when classes are in session. Tutors are recruited in all subjects where tutoring assistance is requested. The Tutoring Center is located in Building H, Rooms 9 and 15. To request tutoring or to apply to be a tutor, please contact the Tutoring Center at 360.752.8499 or visit [www.btc.edu/tutoring](http://www.btc.edu/CurrentStudents/TutoringCenter/indexTutoringCenter.aspx)for additional information and to access the Tutoring Request Form and the current drop-in tutoring schedule.

Advising & Career Services:Academic & Career Advisors are available to assist with: Exploring and choosing the career that fits you best; Developing an educational plan and selecting the courses to get you started and progress toward your goals; Assistance with academic success strategies; Job and internship searching resources including resume and cover letter development, mock interviews and more; Connecting with employers to explore job opportunities. This office is located in the Admissions and Student Resource Center, Room 106. Call 360-752-8345 or email [advising@btc.edu](mailto:advising@btc.edu).

Financial Aid: Students seeking Financial Aid should begin by completing a FAFSA at [FAFSA.ed.gov](file:///\\btc-nas1.bellingham-tech.edu\sleibrant\Syllabi%20Project\Syllabus%20Template%2016-17\FAFSA.ed.gov). Students who have completed a FAFSA can check their status by logging in to their student Financial Aid Portal on the BTC website. Visit the Financial Aid office in CSB 101, call at 360-752-8351, or email at [finaid@btc.edu](mailto:finaid@btc.edu) for assistance or additional resources. You may also qualify for additional funding support through Workforce Funding & Student Support. Apply at [http://www.btc.edu/workforcefunding](http://www.btc.edu/CurrentStudents/FinancialResources/WorkForceFunding.aspx)or stop by Campus Services, Room 102 for more information.

Library:The BTC Library is located on the third floor of the Campus Center Building with an inviting atmosphere that includes a view of Bellingham Bay. The Library offers a variety of services and technology to meet the educational needs of students by providing professional, high-quality service and assistance.

The Library houses a physical collection of 12,000 books and media as well as online resources that include access to 120,000 eBooks and 20+ databases (8,000 full-text online journals) to use for research in prerequisite classes and specific programs; one-on-one assistance is offered for reference and research needs. The Library also is the open computer lab on campus and consists of 80 computers with 40+ software programs. A variety of equipment is available for check out that includes laptops and iPads. Assistance is offered with hardware and software questions, online learning and any technology-related question during all open hours; there is also a HelpDesk with specific hours to help with technology needs. Media-enhanced rooms are available for group study.

Contact the Library by phone at 360.752.8383 or via email at [Library@btc.edu](mailto:Library@btc.edu), or visit the website: [www.btc.edu/library](http://www.btc.edu/CurrentStudents/Library/indexLibrary.aspx).