

**Department of Mathematics and Computer Science  
St. Mary's College  
St. Mary's City  
Maryland 20686-3001**

Semester: Spring 2018  
Course Number: COSC 480.02  
Course Title: Topics in Computer Science: Digital Design and EDA  
Prerequisites: COSC 201  
Meeting Times: Monday, Wednesday and Friday, 9:20 pm to 10:30 am  
Location: Schaefer Hall, Room 160  
Instructor: Simon Read  
Office Location: Schaefer Hall, Room 173  
Office Hours: Refer to <http://faculty.smcm.edu/sread/>  
Telephone Number: ~~Extension 4369 (240-895-4369)~~  
E-Mail Address: [sread@smcm.edu](mailto:sread@smcm.edu)  
Class Web-Site: <http://blackboard.smcm.edu>  
Required Textbook:  
None

**Catalog Description:**

There is an increasing trend towards incorporating custom hardware into systems to enhance performance — Google's Tensor Processing Unit, AWS FPGA tier, BitCoin mining chips and FPGAs in supercomputers. To appreciate the consequences of this we must learn more about the process of hardware design. This course examines the process of designing digital logic systems from basic components. It uses Field Programmable Gate Arrays (FPGAs) and Electronic Design Automation (EDA) tools to allow students to design quite complex digital systems. Either VHDL or Verilog will be presented to allow students to use synthesis tools. The various levels of design from transistor through Systems on a Chip (SoC) will be presented. The course will include a major design project.

**Objectives:**

At the completion of COSC 480, students will be able to explain the aspects of the topic of the course.

At the completion of COSC 480, students will be able to implement problem work in the topic of the course.

At the completion of COSC 480, students will be able to design solutions to large problems in the topic of the course.

**Assessment:**

There are four elements to the grading of this class: two examinations; homework and in-class projects; a design project and a paper review. You will work in pairs for all work except the examinations.

You will take a mid-term (**weight 10%**) and a final (**weight 35%**) examination. Both examinations will be in the “take-home” format.

During the entire semester there will be in-class and homework projects (**total weight 20%**) to help reinforce and put to practical use ideas introduced in lectures.

In the second half of the semester, you will complete a design project using the FPGA development board. This project will be staged to help structure the design process. The project will only be graded at the end of the semester when complete (**weight 15%**).

You will write a peer-review of a classic paper (**weight 10%**); detailed instructions on what is required will be provided. You will give a presentation on this paper to your classmates at the end of the semester (**weight 10%**).

**Methods of Instruction:**

Lecture elements of the class will be used to present the factual element of the course. In-class and homework group activities will be used to develop both critical thinking and problem solving abilities, as well as reinforcing conceptual understanding.

The mid-term and final examinations will be used to improve your ability to apply concepts to problem solving.

The design project will be used to improve your skills using the design language introduced in the first half of the semester and to provide practice for soft skills such as teamwork and project management.

The review of a classic publication will help develop your written communication, critical thinking and academic research skills. The presentation to the class will help develop your verbal communication skills.

Interactions with the instructor outside scheduled class times will be an important part of your learning in this class. You should use the instructor's office hours as time to discuss concepts, homework projects and the paper review.

**Writing Center:**

The Writing & Speaking Center, located in the Library Annex, offers free consultations in writing and speaking for students at all levels and in all disciplines. No matter what you're writing and no matter where you are in the process (generating ideas, drafting, revising or proofreading), the peer tutors in the Center can assist you. These tutors are friendly students and also excellent writers with special training as writing consultants. They would not grade or correct your papers; instead, they'd coach you and help you become a better writer. Similarly, the tutors are also trained to help you plan and practice presentations and other speaking assignments. I encourage you to use the Writing and Speaking Center as much as possible. You can make a one-time or repeating appointment with the Center by visiting their website, [www.smcm.edu/writingcenter](http://www.smcm.edu/writingcenter), and

clicking 'Schedule an Appointment'. At the same website, you can find helpful resources on many writing- and speaking-related topics.

### **Title IX and Sexual Misconduct:**

As stated in the St. Mary's Way, the College is a place where people foster relationships based upon mutual respect, honesty, integrity, and trust. As such, the College is committed to providing an educational, living, and working environment free from all forms of harassment and discrimination for all members of our community. The College prohibits all forms of sexual or gender-based harassment, discrimination or misconduct, including sexual assault, sexual harassment, relationship violence, and stalking.

If you or someone you know has experienced sexual misconduct, you may find information about resources and options on the Campus Rights webpage ([www.smcm.edu/campus-rights](http://www.smcm.edu/campus-rights)) or by contacting the College's Title IX Coordinator, Michael Dunn ([mkdunn@smcm.edu](mailto:mkdunn@smcm.edu) or 240-895-4105). Please note that under College policy, faculty members are required to share any reports of sexual misconduct with Michael Dunn in order to make sure that the College is responding appropriately to address the health and safety needs of members of our community.

There are on-campus confidential resources available, including the counselors at the Wellness Center (240-895-4289) and the Sexual Misconduct Advocacy and Resource Team (SMART) student-run 24/7 hotline (301-904-2015). More information about on- and off-campus confidential resources, as well as medical treatment, law enforcement, and other support services, may be found on the Campus Rights webpage.

### **Policies:**

1. Communications – This course uses the course management software Blackboard. This system will be used to provide: announcements concerning the class; material presented in class; homework assignments; and external links to useful World Wide Web resources. Your grades will be displayed on Blackboard. **You** are responsible for making sure that this grade sheet accurately reflects the grades given for each piece of work.
2. Academic Integrity – Please refer to the Student Handbook Article II Section C for definitions of Cheating, Plagiarism, Falsification and Resubmission of work. Also available as <http://www.smcm.edu/tothepoint/code-of-student-conduct/>. Violations of these types will be dealt with accordingly. Not being familiar with your rights and responsibilities is no excuse.
3. Work "In Groups" – Outside of class and in class, you may discuss *concepts* together. All *assignments* should be completed in pairs (this is known as Pair Programming in industry). This means that you will not exchange code (in person or via email) with classmates other than your teammate. You should neither seek nor accept help from other students. The instructor is available during class assignments and office hours to help you. You should expect to need their help periodically; this is part of the learning experience. It is important to get help from a qualified and trained resource to help you completely understand the material in hand. Since each concept builds on the previous one it is vital to

completely understand each concept. If you feel you don't please seek help from the instructor.

4. Accommodations – It is college policy to provide reasonable accommodations to students who have disabilities as well as being in compliance with The Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973. If you have a disability for which a Letter of Accommodations has been developed with the Coordinator of Disability Support Services please make an appointment with me as early as possible in order to discuss those accommodations. If you have a documented disability and have not met with the Coordinator of Disability Support Services you are encouraged to contact the Office of Academic Services, Glendening Hall, Suite 230, (240) 895-3153 as early as possible for a confidential review of supporting documentation.
5. Late Submissions – Except for unusual, documented circumstances assignments will not be accepted late. This means you should submit whatever you have, even if it is incomplete, before the deadline.
6. Attendance – Attendance in class is an important element of instruction. When you do not attend class not only does your study suffer, but also that of your classmates. Therefore, attendance in class is required. Formal attendance will be taken in every class. In accordance with College policies you are allowed two unexcused absences. Absences will be excused in the case of illness, conflict with athletic events and similar circumstances. Where possible the instructor should be informed in advance of the class.
7. Conduct – Although no penalties will be attached to the following they are rude to both your instructor and class mates. If you *must* speak with one of your classmates, during the lecture phase of the course meeting please do so quietly. Turn cell phones to silent or off during class. During class time computers may only be used for class related activities, such as note taking, trying demonstration projects and in-class worksheets. This means, specifically, no email and no chat clients.
8. Tardiness – Repeated and excessive tardiness is rude to me and your classmates. Again, you get one freebie. Repeated offenses may result in you being told that you were never here for that class period. If you have a legitimate commitment elsewhere that may result in your tardiness, let me know ahead of time.
9. Incompletes – An I (Incomplete) may be given by the instructor only at the request of the student when extraordinary circumstances, such as extended illness or other serious emergency beyond the control of the student, prevent the student from completing a course within the academic term. To qualify for an Incomplete, the extraordinary circumstances must have occurred near the end of the term and the student must have been attending the course regularly throughout the term up until that point.
10. Grading – To earn a C grade, your work must show a strong understanding of the information presented in the course. To earn a B grade your work must show a strong understanding of the information presented in the course **and** an ability to

apply this information in problem solving. To earn an A grade your work must show a strong understanding of the information presented ***and*** an exceptional ability to apply this information in problem solving.

In-class assignments will be graded on a three point scale because they are simple. If nothing is turned in then 0 points will be assigned. If something was turned in, but it was not close to being correct then 1 point will be assigned. If a good attempt was made to answer the given question, but there were errors then 2 points will be assigned, If the solution was complete and correct then 3 points will be assigned. If the assignment lasts more than one class period a 6 or 9 point scale along the same lines will be used.

11. Extra Credit – During the semester extra credit assignments *may* be assigned.