



**Course** CS 6301-501 Software Defined Networking  
**Professor** Timothy L. Culver  
**Term** Fall 2015  
**Meetings** Monday & Wednesday : 7:00pm to 8:15pm GR3.302

---

#### Professor's Contact Information

**Office Phone** 972.883.4523  
**Office Location** ECSS4.403  
**E-mail** [timothy.culver@utdallas.edu](mailto:timothy.culver@utdallas.edu)  
**Office Hours** Wed 8:15 to 8:45 PM, or by appointment

#### General Course Information

**Pre-requisites, Co-requisites, & other restrictions** Prerequisite: CS 5343 with a grade of C or better or equivalent.

**E-mail:** The easiest way to reach me is via e-mail. I make every effort to respond within a few hours. When e-mailing me, please e-mail from your UTD e-mail address. Please include your name, course and section either in the subject or the body of your e-mail (preferably on the first line if not in the subject). This will help me to address your e-mail as quickly as possible.

**Help Desk:** For help with issues regarding your computer, UTD maintains a walk-in help desk. Visit their Web site for details: <http://www.utdallas.edu/ir/helpdesk/>

**Tutoring:** For programming assistance, a tutoring lab will be maintained. The schedule usually comes out a couple of weeks after the semester begins. Once the tutoring schedule for this semester has been released, an announcement will be posted on eLearning. In addition, it is part of the TA's job to help you, so please feel free to engage with him/her at any time. And, of course, I'll be happy to help as well.

#### Required Textbook and Other Course Material

• **Required Textbook:** Software Defined Networks: A Comprehensive Approach : Goransson & Black; Morgan Kaufman ISBN 978-0-12-416675-2

• **Java / C++ Compiler**

- It is recommended that you use Visual Studio C++ 2010 compiler (VC++). Microsoft provides this free to all students. Before downloading, you will need to create a Dreamspark account if you do not already have one (<http://www.utdallas.edu/ir/howto/dreamspark/>). Direct Link: [DreamSpark Web site](#)  
Direct Link: [Visual Studio 2010 Products](#):  
Either the "Express" or "Professional" are acceptable. Please be aware that the "Professional" version is a much larger download, however, and include many other compilers besides C++. If you decide to use that version, just be aware that these xtra compilers are not necessary this semester. For our purposes, the express edition of VC++ 2010 will be perfectly adequate.
- If you intend to use your own computers to write the class assignments, it is important that you get a compiler downloaded, installed, and running on your computer as soon as possible. If you don't have a computer, or if you're having problems getting a compiler installed, you should write your programs in the labs until the problems are resolved. In any case, please note that you are responsible for

getting the programming assignments written and turned in on time. Since there are many computers available on campus, problems with your local machines will not be accepted as an excuse for not doing the assignments.

**Course Prerequisite:** Prerequisite: CS 5390 with a grade of C or better or equivalent.

**Description of Course Content:** SDN (a.k.a. Software Defined Networking) will be reviewed in the class along with technology being leveraged in creating today's SDN applications. Students will get hands on experience with OpenFlow and will deliver a group project for review at the end of the course. Incidentally, SDN is a paradigm shift in telecommunications and network that presents one of the rare tectonic shifts in an industry. 30 years of traditional switch / router development by large equipment vendors will be turned upside down in the next decade leveling the playing field and lowering the barriers to entry into the switch /router marketplace. One of the goals of this class is to prepare students for a market that is going to demand computer scientists and software engineers to deliver the next generation of network switches.

**Student Learning Outcomes:** After successful completion of this course, the student should have an:

- Students will develop a knowledge of historical switching and networks and the knowledge of the evolution to SDN, benefits to companies and carriers.
- Students will have a knowledge of the technology evolution leading to SDN as well as the Open Source role in SDN
- Students will have a knowledge of how SDN works as well as the OpenFlow Specifications
- Students gain a knowledge of the advantages and disadvantages of SDN, API approaches, Hypervisor overlays, and Data Center SDN
- Students gain a knowledge of SDN in different environments ranging from WANs to mobile networks
- Students gain knowledge of the SDN ecosystems
- Students get an industry survey of vendor approaches to implementing SDN
- Students understand the economics of SDN and impacts to the marketplace
- Students have a survey of OPNFV (adopted by AT&T, NTT, and many other carriers) and the Telemanagement Forum's ZOOM approach and create a class project.
- Students have at least two industry visits of carriers and SDN vendors to get a current industry perspective on the reality of SDN

**My Expectations of You:**

- If you feel you are struggling, please talk to me during office hours.
- Attend every class
- Ask questions during lecture, before/after class, during office hours or e-mail me if you do not understand something.
- Read the chapter before the corresponding lecture.
- Bring your textbook to class.
- **Arrive to class on time and remain in class until dismissed.** Arriving late and leaving early cause disruptions to the other students in the class and to me. Should you need to leave early for a valid reason, please notify me in advance and sit near the door to limit the disruption
- **Students causing disruptions such as talking without permission during a lecture will be forced to leave. Disruptions include, and are not limited to, talking in class, playing on your phone, sleeping in class.**
- **Students leaving class early and/or causing disruptions may receive a zero on a previous quiz.**
- No eating in class. No drinks in open containers.
- Silence all cell phones.

**What You Should Expect**

- An open environment dedicated to learning. I do not take kindly to disruptive students as it makes it difficult for students to concentrate and learn the material.
- A minimum of 10 hours outside of class each week in course-related activities (e.g. reading the textbook, studying for quizzes/exams, practicing related problems)
- Quizzes to measure how well you understand the information from each chapter. Assume there will be a quiz every class. It is your responsibility to be prepared. Quizzes will be based on chapter readings, examples from lecture and/or exercises from the book.
- **Challenging exams – apply the knowledge you have learned to the situations on the test. Questions on the test may not be worded exactly as you see them in the book and are designed to make sure that you understand what you are doing rather than regurgitating an example from your notes.**
- Extra credit is generally not given. If I decide to give extra credit, it is typically in the form of an unannounced quiz. Please do not ask for individual extra credit opportunities

**Grading Scale:**

96-100 A 88-89 B+ 78-79 C+ 68-69 D+ Below 60 F  
90-95 A- 82-87 B 72-77 C 62-67 D  
80-81 B- 70-71 C- 60-61 D

**Grade Components:**

- |            |     |
|------------|-----|
| • Mid-term | 20% |
| • Final    | 40% |
| • Project  | 30% |
| • Lab      | 10% |

**General Grade Information:** All grades will be available in eLearning. The Weighted Total column will give you the most accurate information concerning your grade. The weighted total is an approximation of your grade in the class based on the grades currently in eLearning.

**Grade Disputes:** All quizzes and exams will be closed book, closed notes. Quizzes, mini assignments and projects will be graded by a TA. Please address any grading concerns you have regarding quizzes, mini-assignments and projects with the TA. If you have a legitimate issue and are unable to resolve this issue with the TA, please talk to me during my office hours. I am responsible for grading your exams. If you have questions regarding exam grades, please talk to me during my office hours. I do not discuss grades via e-mail. **All grade disputes must be discussed/resolved within 1 week of the grade in question being posted in eLearning.**

**Late Assignments:** Mini-assignments will not be accepted late. Projects will be accepted late at the penalty of 5% per 2 hours late for up to 24 hours past the due date/time.

**Projects:** There will be a class project. Details will be provided the first day of class. The project will be group based and the students will be expected to leverage the technology presented to deliver SDN capabilities.

**Mini-Assignments:** Mini-assignments are short assignments that can be done in the course of a few hours. This may include writing code, writing pseudo code, describing output, finding errors or answering conceptual questions. These assignments will generally be due the next class meeting.

**Exams:** Exams will primarily cover chapters as listed below in the tentative course schedule. Students are expected to be able to apply knowledge from earlier chapters in conjunction with the tested chapters. Exams will include a variety of question types including multiple choice, short answer and programming exercises. An exam should not be missed except form the most extreme circumstances (hospitalization, death of an immediate family member). A make-up exam may be given to students with a valid reason (and documentation) for missing the exam. Otherwise, the missed exam grade will be zero. The allowance of a make-up exam is at the sole discretion of the instructor. Makeup exams must be completed within 48 hours of the date and time of the exam.

**Tentative Class Schedule** will be provided at the beginning of the semester.

#### **Field Trip Policies**

##### **Off-campus Instruction and Course Activities**

Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address [http://www.utdallas.edu/BusinessAffairs/Travel\\_Risk\\_Activities.htm](http://www.utdallas.edu/BusinessAffairs/Travel_Risk_Activities.htm)

Additional information is available from the office of the school dean. Below is a description of any travel and/or risk-related activity associated with this course.

#### **Student Conduct & Discipline**

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, A to Z Guide, which is provided to all registered students each academic year. The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3, and in Title V, Rules on Student Services and Activities of the university's Handbook of Operating Procedures.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

#### **Academic Integrity**

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings. Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

**Email Use**

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

**Withdrawal from Class**

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

**Student Grievance Procedures**

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's Handbook of Operating Procedures. In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint a nd convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

**Incomplete Grade Policy**

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.

**Disability Services**

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:

The University of Texas at Dallas, SU 22

PO Box 830688

Richardson, Texas 75083-0688

(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.