

CS6301-507 Course Syllabus

Course Information

CS6301-507

Software Defined Networking

Fall 2016

Professor Contact Information

Name	Timothy L. Culver
E-mail address	tlc130230@utdallas.edu
Office	ECSS 4.403
Office Phone	972-883-4523
Office Hours	
E-mail:	24/7
On-Campus:	W 6:00 – 6:45 PM
Or by appointment	

Course Pre-requisites, Co-requisites, and/or Other Restrictions

CS 5390 with a grade of C or better or equivalent.

Course Description

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 Objectives/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

Required Textbooks and Materials

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

:

Suggested Course Materials

The professor will provide links to various other study materials during the course.

Assignments & Academic Calendar

All dates are subject to change at the discretion of the instructor.

Date	Topic	Assignment
8/22	Introduction	Read Ch. 1
8/24	Why SDN? Project Proposal Discussion	Read Ch. 2
8/29	Why SDN?	Read Ch. 3
8/31	Genesis of SDN	Read Ch. 4
9/5	Labor Day Holiday	
9/7	How SDN Works Census Day – Last day to drop with “W”	Read Ch. 5
9/12	The OpenFlow Specification	
9/14	The OpenFlow Specification Lab 1 Due	Read Ch. 6
9/19	OpenFlow Tutorial (online) Research Paper Proposal Due	Read Ch. 7
9/21	Alternative Definitions of SDN	
9/26	Place Holder for Speaker	
9/28	SDN Vendors	
10/3	Place Holder for Speaker	
10/5	Alternative Definitions of SDN	Read Ch. 6
10/10	NFV	
10/12	Mid-term Review	Study for exam
10/17	Mid-term	
10/19	Evaluating SDN Vendors	
10/24	Thanksgiving Holiday	
10/26	Thanksgiving Holiday	
10/31	OpenFlow Simulators	Read Ch. 8
11/2	SDN in Other Environments	Read Ch. 11
11/7	OPNFV and ETSI	Read Ch. 9
11/9	SDN Open Source	Read Ch. 10
11/14	Players in the SDN Ecosystem	
11/21	Winter Break	
11/23	Winter Break	
11/28	SDN Applications plus Business Ramifications Predictions by the Professor	Read Ch. 12
11/30	SDN Futures	Read Ch. 13
12/5	Project Presentations by Class Project Due	
12/7	Final Exam Review	Study for Final
TBD	Final	

Grading Policy

Grading Scale:

96-100 A	88-89 B+	76-79 C+	Below 70 F
90-95 A-	82-87 B	70-75 C	
	80-81 B-		

<http://catalog.utdallas.edu/2016/graduate/policies/grades>

Grade Components:	Mid-term	20%
	Quizzes	25%
	Class Participation	05%
	Labs	05%
	Final	20%
	Project	25%

Note that the professor has the right to change grading criterion at his or her discretion.

If you have not attended a class by the 3rd class, your final grade will be downgraded a full letter grade. Three consecutive absences will lead to a drop of one letter grade. Four consecutive absences will result in a F.

If you are not present for the quiz, you receive a zero.

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.

Participation: This part of your grade will be based on your participation in class. Examples of participation include

- Asking questions in class
- Participating in class discussions
- Presentations before the class (e.g. lab, project, etc.)

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. Make-up exams must be completed within 48 hours of the date and time of the exam.

Course & Instructor Policies

- 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

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Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

“As a Comet, I pledge honesty, integrity, and service in all that I do.”

UT Dallas Syllabus Policies and Procedures

Sharing Confidential Information

Students considering sharing personal information in email, in person, or within assignments or exams should be aware that faculty members and teaching/research assistants are required by UT Dallas policy to report information about sexual misconduct to the UT Dallas Title IX Coordinator. Per university policy, faculty have been informed that they must identify the student to the UT Dallas Title IX Coordinator. Students who wish to have confidential discussions of incidents related to sexual harassment or sexual misconduct should contact the Student Counseling Center (972-883-2527 or after hours 972-UTD-TALK or 972-883-8255), the Women's Center (972-883-8255), a health care provider in the Student Health Center (972-883-2747), the clergyperson (or other legally recognized religious advisor) of their choice, or an off-campus resource (i.e., rape crisis center, doctor, psychologist). Students who are sexually assaulted, harassed, or victims of sexual misconduct, domestic violence, or stalking, are encouraged to directly report these incidents to the UT Dallas Police Department at 972-883-2222 or to the Title IX Coordinator at 972-883-2218. Additional information and resources may be found at <http://www.utdallas.edu/oiec/title-ix/resources>.

Campus Carry

The University's concealed handgun policy is posted on the campus carry website: <https://www.utdallas.edu/campuscarry/>

Technical Support

If you experience any issues with your UT Dallas account, contact the UT Dallas Office of Information Technology Help Desk: assist@utdallas.edu or call 972-883-2911.

UT Dallas provides eLearning technical support 24 hours a day/7 days a week. The services include a toll free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service. Please use this link to access the UTD eLearning Helpdesk: <http://www.utdallas.edu/elearning/eLearningHelpdesk.html>.

Field Trip Policies, Off-Campus Instruction and Course Activities

Off-campus, out-of-state, foreign instruction/travel, and course-related field trip activities are subject to state law and University policies and procedures regarding travel and risk-related activities.

Detailed information regarding this policy, in accordance to *Texas Education Code*, Section 51.950, can be accessed at the UT Dallas Policy Navigator, <http://policy.utdallas.edu/utdbp3023>, and at <http://www.utdallas.edu/administration/insurance/travel>. Additional information is available from the office of the school dean.

Student Conduct and Discipline

The University of Texas System (Regents' Rule 50101) 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 UT Dallas online catalogs (<http://catalog.utdallas.edu>).

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 Student Code of Conduct, UTDSP5003 (<http://policy.utdallas.edu/utdsp5003>). Copies of these rules and regulations are available to students in the Office of Community Standards and Conduct, where staff members are available to assist students in interpreting the rules and regulations (SSB 4.400, 972-883-6391) and online at <https://www.utdallas.edu/conduct/>.

A student at the University neither loses their 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 its 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 demonstrates a high standard of individual honor in his or her scholastic work.

Academic Dishonesty: Academic dishonesty can occur in relation to any type of work submitted for academic credit or as a requirement for a class. It can include individual work or a group project. Academic dishonesty includes plagiarism, cheating, fabrication, and collaboration/collusion. In order to avoid academic dishonesty, it is important for students to fully understand the expectations of their professors. This is best accomplished through asking clarifying questions if an individual does not completely understand the requirements of an assignment.

Additional information related to academic dishonesty and tips on how to avoid dishonesty may be found here: <https://www.utdallas.edu/conduct/dishonesty/>.

Copyright Notice

It is the policy of the University of Texas at Dallas to adhere to the requirements of the United States Copyright Law of 1976, as amended, (*Title 17, United States Code*), including ensuring that the restrictions that apply to the reproduction of software are adhered to and that the bounds of copying permissible under the fair use doctrine are not exceeded. Copying, displaying, reproducing, or distributing copyrighted material may infringe upon the copyright owner's rights. Unauthorized distribution of copyrighted material, including unauthorized peer-to-peer file sharing, may subject students to appropriate disciplinary action as well as civil and criminal penalties. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. For more information about the fair use exemption, see <http://copyright.lib.utexas.edu/copypol2.html>. As a UT Dallas student, you are required to follow UT Dallas' copyright policy (UTDPP1043 at <http://policy.utdallas.edu/utdpp1043>) and the UT System's policy, UTS107 at <http://www.utsystem.edu/board-of-regents/policy-library/policies/uts107-use-copyrighted-materials>.

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. All official student email correspondence will be sent only to a student's UT Dallas email address and UT Dallas will only consider email requests originating from an official UT Dallas student email account. This allows the University to maintain a high degree of confidence in the identity of each individual's corresponding via email and the security of the transmitted information. The University of Texas at Dallas furnishes each student with a free email account that is to be used in all communication with university personnel. The Office of Information Technology provides a method for students to have their UT Dallas mail forwarded to other email accounts. To activate a student UT Dallas computer account and forward email to another account, go to <http://netid.utdallas.edu>.

Class Attendance

Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. Three consecutive absences will lead to a drop of one letter grade. Four consecutive absences will result in a F.

Withdrawal from Class

The administration at UT Dallas has established deadlines for withdrawal from any course. These dates and times are published in the Comet Calendar (<http://www.utdallas.edu/calendar>) and in the Academic Calendar (<http://www.utdallas.edu/academiccalendar>). It is the student's responsibility to handle withdrawal requirements from any class. In other words, a professor or other instructor cannot drop or withdraw any student unless there is an administrative drop such as the following:

- Have not met the prerequisites for a specific course
- Have not satisfied the academic probationary requirements resulting in suspension
- Office of Community Standards and Conduct request
- Have not made appropriate tuition and fee payments
- Enrollment is in violation of academic policy
- Was not admitted for the term in which they registered

It is the student's responsibility to complete and submit the appropriate forms to the Registrar's Office and ensure that he or she will not receive a final grade of "F" in a course if he or she chooses not to attend the class after being enrolled.

Student Grievance Procedures

Procedures for student grievances are found in university policy UTDSP5005 (<http://policy.utdallas.edu/utdsp5005>). In attempting to resolve any student grievance regarding disputes over grades, application of degree plan, graduation/degree program requirements, and thesis/and dissertation committee, adviser actions and/or decisions, evaluations, and/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 originated.

Incomplete Grade Policy

As per university policy, incomplete grades may be given, at the discretion of the instructor of record for a course, when a student has completed at least 70% of the required course material but cannot complete all requirements by the end of the semester. An incomplete course grade (grade of 'I') must be completed within the time period specified by the instructor, not to exceed eight (8) weeks from the first day of the subsequent long semester. Upon completion of the required work, the symbol 'I' may be converted into a letter grade (A through F). If the grade of Incomplete is not removed by the end of the specified period, it will automatically be changed to F.

AccessAbility Services

It is the policy and practice of The University of Texas at Dallas to make reasonable accommodations for students with properly documented disabilities. However, written notification from the Office of Student AccessAbility (OSA) is required. If you are eligible to receive an accommodation and would like to request it for this course, please discuss it with your professor and allow one week advance notice. Students who have questions about receiving accommodations, or those who have, or think they may have, a disability (mobility, sensory, health, psychological, learning, etc.) are invited to contact OSA for a confidential discussion. OSA is located in the Student Services Building, SSB 3.200. They can be reached by phone at 972-883-2098, or by email at studentaccess@utdallas.edu.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities, including examinations and travel time for the observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, of the *Texas Tax Code*.

Students are encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment.

Excused students will be allowed to take missed exams or complete assignments within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the President of UT Dallas or from the President's designee. The chief executive officer or designee must take into account the legislative intent of *Texas Education Code* 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

Resources to Help You Succeed

The Office of Student Success operates the Student Success Center (SSC, <http://www.utdallas.edu/studentsuccess>), which offers assistance to students in the areas of writing, mathematics, communication, multiple science fields, reading, study skills, and other academic disciplines. These services are available through individual and small group appointments, workshops, short courses, and a variety of online and instructional technologies. All students enrolled at UT Dallas are eligible for these services.

The **Math Lab** gives short-term and semester long support for a variety of introductory and advanced mathematics courses. Students may drop in to visit with a math tutor on a regular basis. Comet card is required.

The **Writing Center** offers a collaborative learning environment for one-to-one and small group assistance with general and advanced writing assignments and overall writing skills. Scheduling an appointment is strongly recommended, but walk in appointments are possible if a tutor is available.

The **Peer Tutoring** program offers free tutoring assistance in multiple locations for many of the historically challenging undergraduate subjects at UT Dallas. Tutoring sessions, offered every weekday on a drop-in basis, are one-on-one or in a small group format. The sessions are designed to meet students' individual questions and needs related to course/subject concepts. All peer tutors are current UT Dallas students who made an A- or better in the course and have a strong faculty/staff recommendation. Students should check the Student Success Center website each semester for subject offerings and session times.

The Peer-Led Team Learning (PLTL) program provides an active, engaged learning experience for students who meet in small groups once a week with a Peer Leader who helps guide them through a potentially difficult gateway course. Students that attend sessions regularly typically earn a half to a whole letter grade higher than students that do not participate in the PLTL program.

Supplemental Instruction (SI) provides free, peer-facilitated weekly study sessions for students taking historically difficult courses. SI sessions encourage active, collaborative learning based on critical thinking and transferable study skills. SI leaders attend lectures, take notes, and read assigned material just like the enrolled students. Students should check the SSC website for subject and session times.

The **Communication Lab (CommLab)** offers one-on-one and group consultations where you will gain practical feedback for improving oral and group presentations.

Success Coaches are available for individual student appointments to discuss study skills, time management, note taking, test taking and preparation, and other success strategies.

The Student Success Center's main office is located in the McDermott Library Building and can be contacted by calling 972-883-6707 or by sending an email to ssc@utdallas.edu.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.