

## Course Syllabus

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### Course Information

**Course Number:** CS 6343.001  
**Course Title:** Cloud Computing – CS  
**Term:** Spring 2017  
**Class Location:** JSOM 2.717 (EECS not available; check CourseBook for any room changes)  
**Class Time:** Every Saturday 12.00PM – 2.45PM (except as notified per email/syllabus)  
**First Meeting:** Sat, Jan 14, 2017  
**Final Exam:** *Date & Location:* TBD  
Testing center reservation: <http://registerblast.com/utdallas/Exam/Select/84690>  
**Grades Due:** Tue May 9, 2017

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### Professor Contact Information & Hours

**Name:** Gurvinder Ahluwalia  
**Email:** [gurvinder.ahluwalia@utdallas.edu](mailto:gurvinder.ahluwalia@utdallas.edu)  
**Office Location:** ECSS 4.403 (by appointment only)  
**Office Hours:** By appointments only. Please email to coordinate schedules.

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### TA Contact Information & Hours

**Name:** Haan Mo Johng  
**Email:** [haanmo.johng@utdallas.edu](mailto:haanmo.johng@utdallas.edu)  
**Office Location:** EECS 3.415  
**Office Hours:** 2.00-3.30 PM Mon/Wed, others by appointment

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

CS 5343 and CS 5348.

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## Course Description

**Context:** Cloud computing is the third era and platform of computing. Like two previous eras and platforms of computing – namely, mainframe and client-server – cloud computing culminates into evolutionary yet massive change at all technology layers, in multiple dimensions of impact, and to various stakeholders. Infrastructure, platform, and application layers are designed, developed, delivered and consumed for elastic scale and subscription ease. The architecture, implementation, and deployment choices impact financial, program, and service delivery dimensions in disruptive manner. Architects, developers and operators equip for new skills and business stakeholders attain market competitiveness. The impact of cloud computing is far reaching technically, financially, institutionally, and socially. The \$3 trillion technology stack across the world is being disrupted and re-ordered.

**Course Description:** This course will primarily focus on technical aspects of cloud computing, with supporting context and relevance to business. The leaning is on cloud computing design, development practices, and cloud technologies. There will be hands on lab assignments and project. This is not a course where you come to learn programming. The course will also provide the learning to collaborate in cross-disciplinary teams that exist real world for cloud technology value to business. Classes will be lecture, slides, white-board, and discussion based. Students will be challenge to analyze technical and integration scenarios. Students will practice and build through labs/projects/assignments individually and in groups. This will use modern vendor/provider/open source technologies and services from industry. The lab and projects will engage programming and / or configuration skills. Programming will not be taught in this course. What this course is not: This is not a course to specialize in Big Data or Hadoop. This is not a course to learn programming or programming languages. The course is developed and delivered with computer science / cloud computing fundamentals in balance with modern and emerging practices of delivering/consuming computing technology and modern development techniques in the industry.

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## Student Learning Objectives/Outcomes

At the end of this course, students are expected to gain the following learning:

1. Understand the foundations, evolution, and architecture of cloud computing
2. Identify and describe the various models of delivery and consumption in cloud computing, their distinctions and relationship.
3. Interpret and advocate the importance of service orientation, architecture layered pattern, and modern architecture and integration paradigms and techniques for cloud
4. Understanding of scalability, overlay, and elasticity in cloud between infrastructure and platform layers in single site and multi-site cloud situations.
5. In depth understanding of key IaaS elements of compute, storage, network
6. In depth understanding key PaaS elements of fabric, services, and integration

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7. Build hands on via lab/project in certain defined areas of IaaS/PaaS cloud using vendor/provider/open source technologies and services available in the market.
  8. Familiarity with SaaS models, data integration and API aspects.
  9. Understanding of hybrid/multi-cloud, cloud integration, and orchestration.
  10. Understanding of cloud-native programming models, devops, and modern development approaches.
  11. Familiarity of cloud at the intersection of other technology domains: Cloud and Internet of Things; Cloud and Big Data, Cloud and Mobile
  12. Be able to relate to the various roles and skills in cloud computing domain expected in the industry.
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## Textbooks, Cases, and other Material

### Reference Books

1. Cloud Design Patterns – Alex Homer, John Sharp, et al, ISBN – [http://www.amazon.com/Cloud-Design-Patterns-Prescriptive-Architecture-ebook/dp/B00ITGHBBS/ref=sr\\_1\\_3?s=digital-text&ie=UTF8&qid=1421999381&sr=1-3&keywords=cloud+engineering](http://www.amazon.com/Cloud-Design-Patterns-Prescriptive-Architecture-ebook/dp/B00ITGHBBS/ref=sr_1_3?s=digital-text&ie=UTF8&qid=1421999381&sr=1-3&keywords=cloud+engineering)
  2. Engineering Software as a Service: An Agile Approach to Cloud Computing – Armando Fox, et al, ISBN – [http://www.amazon.com/Engineering-Software-Service-Approach-Computing-ebook/dp/B00CCEHNUM/ref=sr\\_1\\_1?s=digital-text&ie=UTF8&qid=1421999381&sr=1-1&keywords=cloud+engineering](http://www.amazon.com/Engineering-Software-Service-Approach-Computing-ebook/dp/B00CCEHNUM/ref=sr_1_1?s=digital-text&ie=UTF8&qid=1421999381&sr=1-1&keywords=cloud+engineering)
  3. Cloud Computing: Principles, Systems & Application – Nick Antonopoulos, Lee Gillam, ISBN,
  4. Distributed & Cloud Computing – Hwang, Dongara, & Fox, ISBN 9780123858801 – <http://store.elsevier.com/product.jsp?isbn=9780123858801>
  5. Mastering Cloud Computing – Buyya, Vecchiola, & Selvi, ISBN 9780124095397 – <http://store.elsevier.com/product.jsp?isbn=9780124095397&pagename=search>
  6. Cloud Computing Explained – John Rhoton, ISBN – [http://www.amazon.com/Cloud-Computing-Explained-Implementation-Enterprises/dp/0956355609/ref=pd\\_bxgy\\_b\\_img\\_z](http://www.amazon.com/Cloud-Computing-Explained-Implementation-Enterprises/dp/0956355609/ref=pd_bxgy_b_img_z)
  7. Cloud Computing Architected – John Rhoton, ISBN – [http://www.amazon.com/Cloud-Computing-Architected-Solution-Handbook/dp/0956355617/ref=pd\\_bxgy\\_b\\_img\\_y](http://www.amazon.com/Cloud-Computing-Architected-Solution-Handbook/dp/0956355617/ref=pd_bxgy_b_img_y)
  8. Cloud Computing Protected – John Rhoton, ISBN – [http://www.amazon.com/Cloud-Computing-Protected-Security-Assessment/dp/0956355625/ref=sr\\_1\\_1?s=books&ie=UTF8&qid=1406223741&sr=1-1&keywords=cloud+computing+protected](http://www.amazon.com/Cloud-Computing-Protected-Security-Assessment/dp/0956355625/ref=sr_1_1?s=books&ie=UTF8&qid=1406223741&sr=1-1&keywords=cloud+computing+protected)
  9. Cloud Computing: Concepts, Technology & Architecture (Prentice Hall) – Thomas Erl, et al, ISBN – [http://www.amazon.com/Cloud-Computing-Concepts-Technology-Architecture-ebook/dp/B00CM9V7Q8/ref=sr\\_1\\_1?s=digital-text&ie=UTF8&qid=1405956811&sr=1-1&keywords=cloud+computing](http://www.amazon.com/Cloud-Computing-Concepts-Technology-Architecture-ebook/dp/B00CM9V7Q8/ref=sr_1_1?s=digital-text&ie=UTF8&qid=1405956811&sr=1-1&keywords=cloud+computing)
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## Project / Lab Costs

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Certain costs may be required for lab, assignments and projects that engage commercial or paid cloud/technology services. These costs are to be borne by students individually or in groups. The financial transaction will be directly between the students and the cloud provider. All efforts will be made to use open source software in order to keep such costs at a minimum.

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## Assignments & Academic Calendar

*(Topics, Reading Assignments, Case Studies, Term Project, Due Dates, Exam Dates)*

Week	Date	Module #	Topics
1	Jan 14	<b>Semester Overview</b>	Introductions & Orientation
		<b>Lab &amp; Project Overview</b>	Details TBD. Early outline is below: <ul style="list-style-type: none"><li>• <i>Format:</i> Individual &amp; Group</li><li>• <i>Hands-on:</i> Programming, APIs, compositional, configuration, integration</li><li>• <i>Domains:</i> Cloud, IoT, data/analytics, ML</li></ul>
		<b>Case Study Overview</b>	See below
		<b>Technical / White Paper Overview</b>	TBD

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		<b>Module #1</b>	Cloud Computing Overview & Models
2	Jan 21	<b>Module #2</b>	Cloud Technical Basics – Part 1: <b>Service Orientation</b>
3	Jan 28	<b>Module #2 (cont'd)</b>	Cloud Technical Basics – Part 2: <b>Layered Architecture Pattern, Service Integration Model</b>
4	Feb 04	<b>Module #3</b>	Cloud Technical Basics – Part 1: <b>Virtualization</b> <b>Case Studies:</b> IBM (DLPAR, Micropartitioning, VIOS), Cisco (Virtualization), Microsoft (Hyper V)
5	Feb 11	<b>TBD</b>	TBD
6	Feb 18	<b>Module #3 (cont'd)</b>	Cloud Technical Basics – Part 2: <b>Containerization</b> <b>Case Studies:</b> Robert Goldberg papers, Docker, Linux Containers (LXC, namespaces, cgroups, sVirt, and MAC) Amazon Containers, Google Containers
7	Feb 25	<b>Module #4</b>	Cloud Technical Basics – Part 3: <b>Scaling</b> <b>Case Studies:</b> Right Scale, CloudFoundry, Bluemix, Pivotal
8	Mar 04	<b>TBD/Test</b>	TBD – Mid-Term Test (Scope: All covered so far in semester)
9	Mar 11	<b>TBD</b>	TBD

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10	Mar 18	<b>Holiday</b>	Spring Break
11	Mar 25	<b>Module #5</b>	IaaS – Part 1: Infrastructure as Code <b>Case Studies &amp; Tooling Examples:</b> <a href="#">deploy.php</a> , <a href="#">Application Manifest</a> , <a href="#">Puppet</a> , <a href="#">Chef</a> , <a href="#">IBM Rational Automation Framework</a>
		<b>Module #6</b>	PaaS – Composable Apps, API's, & Service Integration Case Study: <a href="#">CloudFoundry</a> , <a href="#">Bluemix</a> , <a href="#">Pivotal</a> , <a href="#">Heroku</a> , others
12	Apr 01	<b>Module #7</b>	SaaS – Multi-tenant Architectures, API's & Data Integration
		<b>Module #8</b>	Hybrid Cloud and Cloud Integration
13	Apr 08	<b>Module #9</b>	Cloud Management, Orchestration, and DevOps
14	Apr 15	<b>TBD</b>	TBD
15	Apr 22	<b>TBD</b>	<b>TBD – Review or Final</b>
16	Apr 29	<b>TBD</b>	<b>TBD - Final</b>

Notes: Calendar above is subject to change. All planned changes will be communicated and posted. As a norm, class will meet in the designated classroom on campus. On exceptions, where certain industry events require the faculty member to be out of town, the class will “meet” over audio/web conferencing or time provided for self-study and assignments. These will be pre-announced. Regular attendance and participation is required during in-classroom sessions.

## Grading Policy (weight distribution subject to change)

Current score distribution is as below. Changes will be published and notified. There will be on make-ups.

35% -- 1 Final exam

25% -- Labs & Projects

25% -- Mid-term test

15% – 3 Unannounced (best 2 will be considered)

>= 90%: A

>= 85%: A-

>= 80%: B+

>= 75%: B

>= 70%: B-

>= 65%: C+

>= 60%: C

< 60%: F

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## Course & Instructor Policies

**Make-up:** There will be no make up exams or make up for other graded events.

**Extra-Credit:** None

**Late Work:** 5% penalty

**Class Attendance:** UTD rules and policies on attendance will apply.

**Classroom Citizenship:** Encourage and motivate a learning environment for yourself and for others. Be active and engage in discussion. Cite example from real experiences. Visualize and discuss how you would apply to real situations in environments you are familiar with or work at.

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### Technical Support

If you experience any problems with your UTD account you may send an email to: [assist@utdallas.edu](mailto:assist@utdallas.edu) or call the UTD Computer Helpdesk at 972-883-2911.

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### Field Trip Policies Off-campus Instruction and Course Activities

None planned

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### 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 printed 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, Series 50000, Board of Regents, The University of Texas System*, 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) and online at <http://www.utdallas.edu/judicialaffairs/UTDJudicialAffairs-HOPV.html>

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, any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

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.

## **Copyright Notice**

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials, including music and software. Copying, displaying, reproducing, or distributing copyrighted works may infringe the copyright owner's rights and such infringement is subject to appropriate disciplinary action as well as criminal penalties provided by federal law. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. As a UT Dallas student, you are required to follow the institution's copyright policy (Policy Memorandum 84-I.3-46). For more information about the fair use exemption, see <http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm>

## **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**

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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 and 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

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PO Box 830688  
Richardson, Texas 75083-0688  
(972) 883-2098 (voice or TTY)  
[disabilityservice@utdallas.edu](mailto:disabilityservice@utdallas.edu)

If you anticipate issues related to the format or requirements of this course, please meet with the Coordinator of Disability Services. The Coordinator is available to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Services to notify them of your eligibility for reasonable accommodations. Disability Services can then plan how best to coordinate your accommodations.

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.

### **Religious Holidays**

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

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment 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 chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

***These descriptions and timelines are subject to change at the discretion of the Professor.***