2013-2014 LONG SIGNATURE SHEET

UNC CHARLOTTE

Proposal Number: **__SIS 10-07-13_____**

Proposal Title: _____ Establish a graduate level course: Cloud Data Storage ITIS 6320 / ITIS 8320

Originating Department: _____SIS_____

TYPE OF PROPOSAL: UNDERGRADUATE_____ GRADUATE__X____ UNDERGRADUATE & GRADUATE____

(Separate proposals sent to UCCC and Grad. Council)

DATE RECEIVED	DATE CONSIDERED	DATE FORWARDED	ACTION	SIGNATURES
Sep. 12 2013	Oct. 7, 2013	Oct. 7 2013	***Approved***	DEPARTMENT CHAIR Mary Maher
Oct. 7 2013	Oct. 18, 2013	Oct. 18, 2013	***Approved***	COLLEGE CURRICULUM COMMITTEE CHAIR A. Srinivas SRINIVAS AKELLA
Oct. 18 2013	Nov. 13, 2013	Nov. 14 2013	***Approved***	COLLEGE FACULTY CHAIR (if applicable) Kalpathi Subramanian
Nov. 14 2013	Nov. 20, 2013	Nov. 20, 2013	***Approved***	COLLEGE DEAN Yi Deng
			Approved	GENERAL EDUCATION (if applicable; for General Education courses)
			Approved	UNDERGRADUATE COURSE & CURRICULUM COMMITTEE CHAIR **(for undergraduate courses only)**
11-26-13	1-14-14	2-10-14	***Approved***	GRADUATE COUNCIL CHAIR **(for graduate courses only)** Alan R. Freitag ALAN R. FREITAG
				FACULTY GOVERNANCE ASSISTANT **(Faculty Council approval on Consent Calendar)**
				FACULTY EXECUTIVE COMMITTEE **(if decision is appealed)**

Revised 07/31/13
OAA/mjw

UNC CHARLOTTE

LONG FORM

COURSE AND CURRICULUM PROPOSAL

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*To: Graduate Council

From: College of Computing and Informatics

Date: November 14, 2013

Re: The establishment of a new course: ITIS 6320/8320 Cloud Data Storage

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The Long Form is used for major curriculum changes. Examples of major changes can include: creation of a new major, creation of a new minor, creation of a new area of concentration, or significant changes (more than 50%) to an existing program (Note: changing the name of an academic department does not automatically change the name(s) of the degree(s). The requests must be approved separately by the Board of Governors.)

Submission of this Long Form indicates review and assessment of the proposed curriculum changes at the department and collegiate level either separately or as part of ongoing assessment efforts.

University of North Carolina at Charlotte

New Graduate Course and Curriculum Proposal from the Department of Software and Information Systems

Title: Cloud Data Storage

A. Proposal Summary and Catalog Copy

1. Summary

The Department of Software and Information Systems proposes to add a new course, ITIS 6320/8320 Cloud Data Storage, to its graduate (Masters) curriculum. This course is intended for SIS majors at the MS and PhD level.

2. Proposed Catalog Copy

ITIS 6320/8320 Cloud Data Storage (3 credit hours) Prerequisite: Full graduate standing or department approval. This course will cover the design and implementation of cloud storage and big data systems and the architecture and characteristics of components on which cloud storage systems are built. Topics to be covered include storage device hardware, file systems, mirroring and RAID, array coding techniques, storage area networks (SAN), network-attached storage (NAS), cloud storage and big data, DB in clouds, relational storage models, key value stores and other No-SQL mechanisms, data consistency and availability in the cloud, cloud data privacy and security. *(On demand)*

B. Justification

1. Identify the need addressed by the proposal and explain how the proposed action meets the need.

There is an increasing trend towards cloud data storage and big data analysis. This is driven by paradigm "moving computation is cheaper than moving data" for cloud computing systems. This triggered a high demand for computing professionals with knowledge and skills in cloud storage and big data analytics. This course will prepare students to be ready for designing and implementing cloud storage systems for big data analysis.

2. Discuss prerequisites/co-requisites for course(s) including class-standing.

Knowledge of computing system and discrete mathematics are required. The course will help students get hold of the cloud storage techniques with hands on projects and assignments.

3. Demonstrate that course numbering is consistent with the level of academic advancement of students for whom it is intended.

The course is intended for graduate students interested in techniques and applications in cloud data storage. It is usually taken in conjunction with the other graduate courses offered by SIS Department. This course can be taken at any time by students during their graduate study.

4. In general, how will this proposal improve the scope, quality and/or efficiency of programs and/or instruction?

This course will be one of the first courses that SIS department will develop in order to prepare its graduate students to be familiar with the advanced techniques for applied cloud computing environments. It is complementary with the ITCS 6190 "Cloud Computing for Data Analysis" that CS department is proposing. Though ITCS 6190 focuses on computational technologies that support Big Data computation, this course will concentrate on the storage techniques.

C. Impact

1. What group(s) of students will be served by this proposal? (Undergraduate and/or graduate; majors and/or non-majors, others?

This course is designed for students in graduate population who want to learn new techniques for cloud big data storage. Students with an understanding of computer architecture and Internet technologies will get to know underlying technologies for cloud data storage from coding to architecture design.

2. What effect will this proposal have on existing courses and curricula?

a. When and how often will added course(s) be taught?

ITIS 6320/8320 will be taught every other semester (Fall or Spring).

b. How will the content and/or frequency of offering of other courses be affected?

There should be no impact on the content or frequency of offering of other courses.

c. What is the anticipated enrollment in course(s) added (for credit and auditors)?

The anticipated enrollment of ITIS 6320/8320 is approximately 15-20 students per class.

d. How will enrollment in other courses be affected?

The course is not expected to significantly change the enrollment of other courses.

e. If course(s) has been offered previously under special topics numbers, give details of experience including number of times taught and enrollment figures.

Dr. Yongge Wang is teaching the topic course ITIS6320 at Fall 2013 for the first time. There are 18 students in the class and the students have great interests and expectations in this course.

f. Identify other areas of catalog copy that would be affected, e.g., curriculum outlines, requirements for the degree, etc.

This course will be added to the graduate MSIT concentrations.

D. Resources Required to Support Proposal

1. Personnel

a. Specify requirements for new faculty, part-time teaching, student assistant and/or increased load on present faculty.

No new or part-time faculty is required in order to offer this course; nor will this course introduces an increased teaching load on present faculty.

b. List by name qualified faculty members interested in teaching the course(s).

Faculty qualified to teach this course includes Dr. Yongge Wang, Dr. Yuliang Zheng, and most faculty in data security are able to teach this course.

2. Physical Facility

The College of Computing and Informatics (CCI) has the basic hardware and software infrastructure needed to cover this course.

3. Equipment and Supplies

No additional equipment or supplies are needed for the proposed course.

4. Computer

Any computer laboratory on campus or personal computer will suffice as a computational platform for this course.

5. Audio-Visual

Current facilities are adequate to support this course.

6. Other Resources

None needed.

7. Indicate source(s) of funding for new/additional resources required to support this proposal.

None needed.

E. Consultation with the Library and Other Departments or Units

1. Library Consultation

Consultation was initiated on September 12, 2013 and approved by Library on 09/12/2013

2. Consultation with Other Departments or Units

This course is not expected to overlap with other graduate courses on campus. Consultation with the following Departments has been initiated: Department of Computer Science on September 12, 2013 and the Department of Bioinformatics and Genomics on September 12, 2013.

F. Initiation and Consideration of the Proposal

1. Originating Unit

Approved by the Department of Software and Information Systems on 10/07/2013. Approved by the College of Computing and Informatics Graduate Committee on 10/18/2013. Approved by faculty of the College of Computing and Informatics on 11/13/2013

2. Other Considering Units

Approved by the Graduate Committee of the Department of Computer Science on 09/18/2013. Approved by the Department of Bioinformatics and Genomics on 10/07/2013.

G. Attachments

Attachment 1. ITIS 6320/8320 Course Outline and Suggested Textbooks

Attachment I. ITIS 6320/8320 Course Outline and Suggested Textbooks

ITIS 6530/8530 Course Outline

1. Course Number and Title: ITIS 6320 Cloud Data Storage
2. Catalog Description: Full graduate standing or department approval. This course will cover the design and implementation of cloud storage and big data systems and the architecture and characteristics of components on which cloud storage systems are built. Topics to be covered include storage device hardware, file systems, mirroring and RAID, array coding techniques, storage area networks (SAN), network-attached storage (NAS), cloud storage and big data, DB in clouds, relational storage models, key value stores and other No-SQL mechanisms, data consistency and availability in the cloud, cloud data privacy and security. *(On demand)*

a. For a new course or revisions to an existing course, check all the statements that apply:

___ *This course will be cross listed with another course.*
___ *There are prerequisites for this course.*
___ *There are corequisites for this course.*
___ *This course is repeatable for credit.*
___ *This course will increase/decrease the number of credits hours currently offered by its program.*
___*This proposal results in the deletion of an existing course(s) from the degree program and/or catalog.*

3. Prerequisites: Full graduate standing or department approval.
4. Course objectives:

- To introduce students to cloud big data storage techniques and architecture.
- To familiarize students with the various coding design and implementation techniques tied to cloud data storage systems.
- To provide students with hands-on experience by developing cloud storage prototype systems.

5. Instruction Method:

- Lectures / guest lectures
- In-class activities and discussions
- Individual and group and projects
- Student demonstrations and presentations

6. Means of student evaluation: Student evaluation will be based upon the following:

- Course midterm and final examinations. Two exams accounts for 40% of the grade.
- Two Individual and group projects. Two projects accounts for 30% of the grade
- One Research presentation. Accounts for 20% of the grade
- Other assignment. Accounts for 10% of the grade.

7. University Policy:

- The course upholds all university academic integrity policies. Under no circumstances should a student present other people's work as his/her own. The

UNC Charlotte Academic Integrity Code can be found at: https://legal.uncc.edu/policies/up-407

- Class attendance is mandatory, unless a student obtains written permission from the instructor.
- Students will be assigned grades of A, B, C, or U. Each of these class activities will graded according to the established criteria and the final grade will be offered based on the accumulation of these grades. Typically, A will be given for a total of 90 and above, B will be given for a total of 80 and above, C will be given for a total of 70 and above, U will be given for a total of below 70.
- No Additional requirements

8. Suggested textbooks

- Greg Schulz: Cloud and virtual data storage networking, ISBN-13: 978-1439851739, Auerbach Publications, 2011.
- Hitachi Data Systems Academy: Storage Concepts: Storing And Managing Digital Data (Volume 1). ISBN-13: 978-0615656496, 2012.
- EMC education services. Information Storage and Management: Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments, ISBN-13: 978-1118094839, Wiley, 2012.
- Reference book: IBM Redbook "Introduction to Storage Area networks and System Networking". http://www.redbooks.ibm.com/redbooks/pdfs/sg245470.pdf

9. Outline of topics

- Storage device hardware introduction
- File systems
- Erasure coding and array coding
- RAID array coding techniques
- Storage area networks (SAN)
- Network-attached storage (NAS)
- Cloud storage and big data
- Cloud and big data file systems: Hadoop Distributed File System (HDFS), GFS, Windows Azure file systems, Amazon S3 file systems
- Programming with HDFS, GFS, Azure, and Amazon S3
- DB in clouds
- Relational storage models
- Key value stores and other NoSQL techniques
- Data consistency and availability in the cloud
- Cloud data privacy and security
- Personal cloud storage systems design and implementation

Appendix II: Library Consolation

UNCCHARLOTTE

J. Murrey Atkins Library

Consultation on Library Holdings

To: Dr. Yongge Wang

From: Dr. Melanie Sorrell

Date: 9/12/013

Subject: ITIS 6320/8320: Cloud Data Storage

Summary of Librarian's Evaluation of Holdings:

Evaluator: Dr. Melanie Sorrell Date: 9/12/13

Check One:

1. Holdings are superior ____
2. Holdings are adequate __x__
3. Holdings are adequate only if Dept. purchases additional items. ____
4. Holdings are inadequate ____

Comments:
This is a proposal for a new graduate level course, which includes student presentations and projects. Library holdings should be adequate to support student research for this course (see list of items held by subject heading below). Students will have access to relevant databases including INSPEC, Science Direct, Compendex, ACM Digital Library, and Wiley Online Library.

LC Subject Heading	Total items held
Data management	1332 monographs
Virtual storage (Computer science)	10 monographs
Storage area networks (Computer networks)	7 monographs
Cloud computing	65 monographs
IEEE transactions on cloud computing	Journal title
Journal of the Association for Computing Machinery	Journal title
ACM SIGMOD Record	Journal title

Melanie Sorrell

Evaluator's Signature

9/12/13

Date

Appendix III: Supporting memos from affected departments

Reply | Reply All | Forward | Junk | Close

comment by 10/7: course proposal on Cloud Storage

No title defined [CCI-SIS-FACULTY@LISTSERV.UNCC.EDU] on behalf of Yuliang Zheng [yzheng@UNCC.EDU]

Sent: Monday, September 30, 2013 8:30 AM
To: CCI-SIS-FACULTY@LISTSERV.UNCC.EDU
Attachments: ITIS6320CloudStorage.pdf (546 KB)

SIS faculty,
Attached is a new masters level course proposal.
It has been approved by the dept grad committee,
and ready to be reviewed & voted by the faculty.

Please email me your vote
(approval/disapproval, with/without comments),
by COB Oct 7, Monday.

If no vote is received from you by the deadline,
it will be counted as approval.

Thanks,
Yuliang

Reply | Reply All | Forward | Junk | Close

new course proposal from SIS

Yuliang Zheng [yzheng@uncc.edu]

Sent: Tuesday, October 08, 2013 10:37 PM
To: Akella, Srinivas
Cc: Wang, Yongge
Attachments: ITIS6320CloudStorage.docx (2 MB)

Srinivas, I am attaching a new course proposal
from SIS. It has been approved by the SIS and
I am passing it over to you for approval/comments
by the CCI grad committee.
Consoltation with both CS and BioInfo has
been completed too.
Thanks,

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Yuliang

UNC CHARLOTTE

CCI Faculty Intranet

College of Computing and Informatics

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- Committees
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Consent Calendar

Items placed on the consent calendar will remain open for discussion by CCI faculty for 7 days. Please note the start date and the expiration date. At the end of this period, the status will be changed and the proposal will be considered approved by the CCI faculty. Any CCI faculty may bring any of these proposals to the next CCI faculty meeting for a more detailed discussion. Email the CCI faculty president to start this process.

Title	Attachment	Start Date	Expiration Date	Status
New graduate course ITIS 6011/8011	itis6011-8011.pdf	11/27/2013	12/06/2013	Approved
ITIS 4011: Interaction Design Studio	itis4011.pdf	11/27/2013	12/06/2013	Approved
ITCS 4991: Adding Honors Section for Undergraduate Thesis	itcs4991H.pdf	11/27/2013	12/06/2013	Approved
Establishment of a new course ITCS 6152/8152	ITCS6152-RobotMotionPlanning.pdf	11/26/2013	12/05/2013	Approved
Revising Requirements of MSIT	msit_rev_sf.pdf	11/25/2013	12/03/2013	Approved
Cross-listing of DSBA 6100	ITCS6100_sf.pdf	11/25/2013	12/03/2013	Approved
ITIS BA Conc. In Cyber Security	ITIS_BA_Conc_Cyb_Sec.pdf	11/18/2013	11/25/2013	Approved
ITIS 5221: Name Change	ITIS5221_SF_NameChange.pdf	11/18/2013	11/25/2013	Approved
ITIS 6230: Changing Course Description	ITIS6230.pdf	11/14/2013	11/21/2013	Approved
ITIS 6150: Prereq Changes	ITIS6150.pdf	11/14/2013	11/21/2013	Approved
ITCS 6124:Prereq Changes	ITCS6124-1Nov2013.pdf	11/05/2013	11/12/2013	Approved
ITIS6320: Cloud Storage	ITIS6320CloudStorage.pdf	10/31/2013	11/07/2013	Approved
Bioinformatics: Grad Program Revisions	BINF-10-11-13.pdf	10/31/2013	11/07/2013	Approved