# USF Sarasota-Manatee - New Undergraduate Course Proposal Form

1. **College/School Contact Information**

   Tracking Number          Date & Time Submitted
   107                      2016-01-11 10:53:39.0

   Discipline               College/School          Budget Account Number
   Information Technology   BU - Business           380700004

   Contact Person           Phone                   Email
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2. **Course Information**

   Prefix          Number          Full Title
   CIS             4342            NoSQL Databases
   Is the course title variable?                    N
   Is a permit required for registration?           N
   Are the credit hours variable?                   N
   Credit Hours      Section Type                        Grading Option
   3                 Class Lecture (Primarily)           Regular

   Abbreviated Title (30 characters maximum)
   NoSQL Databases

5. Prerequisites
   COP 2250, with a minimum grade of C-
6. Corequisites
7. Co-Prerequisites
8. Course Description
   This course covers various types of unstructured data management technologies, also known as NoSQL databases, such as Columnar, Key-Value, Graphic and Document databases; their schema-free characteristics (ACID) for storage, retrieval and data quality.
9. **Justification**

   (This section is critical since the APC members will make their decision based on the information provided here. The information should be in the following outline form.)

   A. Indicate how this course will strengthen the Undergraduate Program. Is this course necessary for accreditation or certification?

The demands of our DBs are changing! NoSQL is replacing the ~40 year old DB technologies which are very limiting in their use with modern web technologies. NoSQL is the new technology of choice (used by Google, Amazon,&.), driven by Big Data Big Users, the Internet of Things, and Cloud Computing.

B. What specific area of knowledge is covered by this course which is not covered by courses currently listed?

NoSQL and Big Data go hand-in-hand. These are emerging technologies and there is a high demand for them. The material in this course is not covered by any existing course we offer.

C. What is the need or demand for this course? (Indicate if this course is part of a required sequence in the major.) What other programs would this course service?

This course/concentration will increase visibility and demand for the IT Program. There is a growing demand in the market for expertize in these emerging technologies.

D. Has this course been offered as Selected Topics/Experimental Topics course? If yes, what was the enrollment?

No. This course will be offered in the Spring 2016 semester.

E. How frequently will the course be offered? What is the anticipated enrollment?

This course will be offered once per year. Anticipated enrollment is approximately 20 students.

F. Do you plan to drop a course if this course is added? If so, what will be the effect on the program and on the students? (If dropping/deleting a course please complete the nonsubstantive course change form.)

This course is part of a new concentration (Big Data) being proposed. The concentration involves defining 3 new courses and incorporating existing courses as well. The IT Program will be enhanced by offering this latest emerging technology and students will have an additional choice of specialization.

G. What qualifications for training and/or experience are necessary to teach this course? (List minimum qualifications for the instructor.)

Required qualifications are a Master's degree with 18 graduate credit hours in the discipline. A PhD in a relevant area is highly recommended.

10. **Other Course Information**

A. Objectives

1. Understand the importance of NoSQL databases in modern-day computing and business 2. Enable students to appreciate the conceptually different Unstructured Data characteristics 3. Provide an overview of Columnar, Graphic, Document and KVP NoSQL databases 4. Enable students to create a NoSQL database and populate it 5. Provide ability to Search and Retrieve from NoSQL DB 6. Ensure Quality of Data in NoSQL DB 7. Position students for Big data related courses to enable them to pursue Big data technologies in their careers

B. Learning Outcomes

1. An ability to design and implement NoSQL database to meet desired needs of the organizations(c) 2. An ability to use the techniques, skills, and tools necessary to develop NoSQL databases in Software engineering. (i) 3. An ability to use and apply the technical concepts and practices of NoSQL (Aggregate-oriented) databases. (j)

C. Major Topics

1. Introduction to NoSQL Databases 2. Data types (Unstructured) and Characteristics (4 x V); Databases, Tools, Context (differentiating between SQL and NoSQL) 3. Creating a Flexible Data model for unstructured data. 4. Data structures in NoSQL Databases: (e.g. key-value, graph, or document)  Key Characteristics ACID (atomicity, concurrency, isolation, and durability) 5. Columnar NoSQL DB: Hbase, Cassandra 6. Storing large, unstructured data sets, Using existing (external) large datasets 7. Key-Value-Pairs (KVP) NoSQL DB: Oracle, CouchDB, Riak 8. Retrieval of Unstructured data 9. Document-centric NoSQL DB: MongoDB, MarkLogic 10. SqOop(Sequel  Hadoop)  ETL (Extract, Transform, Load) 11. Data Quality in NoSQL DB  Scrubbing 12. Security in NoSQL DB  Role based, Ongoing 13. Integration topics in NoSQL DB (external databases, Hadoop) 14. Challenges to NoSQL usage unstructured queries (inability of ad-hoc table joins), and non-standard interfaces (business challenge includes previous investments in relational)

D. Examples of Course Textbooks and Course Readings

- Professional NoSQL by Shashank Tiwari, Wrox Publishers - Getting Started with NoSQL by Gaurav Vaish, Packt Publishing

11. **Syllabus**

Please submit an electronic copy of your syllabus to Rhonda Moraca, moraca@sar.usf.edu.