

# SYLLABUS

## Introduction to Big Data Analytics

Southern University and A&M College  
Baton Rouge, LA 70813

### I. Descriptive Information

- A. **Course Number:** 31354 (CMPS560B-01)
- B. **Course Title:** Big Data Analytics
- C. **Catalog Description:** This course covers the knowledge of big data science. It serves as a graduate level course for graduate students. The focus will be big data computer system, storage, processing, analysis, visualization, and applications. State-of-the-art computational frameworks for big data will be introduced to students. Students will learn the essentials of big data analytics. Delivery of knowledge includes textbook, lectures, and programming projects. Prerequisite: CMPS500
- D. **Instructor's Statement of Course Description:** This course is designed to give the students a deep understanding of big data. The student will complete numerous assignments and projects to reinforce concepts and gain a proficiency in big data analytics, processing, and visualization. Students will have knowledge of big data analytics and be proficient in using state-of-art technologies of big data processing and computational framework design.
- E. **Credit Hours:** 3.0
- F. **Prerequisites:** Operating Systems (SU CMPS 500).
- G. **Intended Audience:** This course is intended for senior students who have successfully completed the programming courses and data structure courses.
- H. **Instructors:**
  - Dr. Shizhong Yang,
  - Office: E105, Thurman Hall
  - Office Hour: Tue/Thr: 2:00 pm ~ 5:00 pm
  - Phone: (225) 771-3113
  - Email: [shizhong\\_yang@subr.edu](mailto:shizhong_yang@subr.edu)

## II. Specification of Course Goals and Objectives

### A. **State of General Goals:** The general goals of the course are to:

1. Provide the essential knowledge for the students to understand big data computer system, storage, management, processing, and visualization
2. Provide training in state-of-the-art big data processing frameworks
3. Provide training in big data applications
4. Provide the students with prerequisite for graduate level study in computer science
5. Prepare the students for industrial career.

### B. **Statement of Course Objectives:** Upon completion of the course, the students will have demonstrated by way of homework assignments, examinations, programming projects the knowledge of:

1. LONI HPC introductions: Linux environment, tools available, account/allocation, Perl, Python
2. Big data storage, processing, analysis, visualization, and applications
3. State-of-the-art computational framework for big data, such as MapReduce.
4. Basic data analysis using R
5. APIs and other tools to scrape the web and collect data
6. Recent advances: quantum computing, important frontier introduction (biomedical & material science)

### C. **Statement of Course Content**

The content of this course will cover:

1. Big data system, storage, processing, analysis, visualization, and applications
2. Theories of data analytics
3. Computational frameworks for big data processing
4. APIs for scraping the web and other data resource

### D. **Program Educational Objectives and Program ABET Outcomes**

This course addresses ABET Program Educational Objectives 1, 2, 3, and 4.

The Educational Objectives of the Computer Science Program are to produce graduates who:

**PEO1:** Successfully enter the competitive job market or pursue advanced study;

**PEO2:** Are proficient in identifying, formulating, and solving a wide range of computing problems;

**PEO3:** Are capable of working collaboratively, and communicating effectively with team members, constituents, and the public;

**PEO4:** Uphold professional and ethical responsibilities, and contribute to society through active engagement.

This course addresses ABET Outcomes 1, 2, and 6.

Each graduate by the time of graduation will demonstrate:

1. An ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solution (ABET Outcome-1),
2. An ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline (ABET Outcome-2),
3. An ability to apply computer science theory and software development fundamentals to produce computing-based solution (ABET Outcome-6).

### **III. Textbook:**

Title: Big Data Fundamentals: Concepts, Drivers & Techniques  
Author: Wajid Khattak, Paul Buhler, Thomas Erl  
Publisher: John Wiley & Sons, Inc  
ISBN: 13: 9780134291079

### **IV. Instructional Procedure**

Instruction in this course consists of formal lectures, programming projects, and presentations.

### **V. Course Requirements**

#### **A. Academic Requirements**

Students are required to take examinations, do assignments and programming projects.

#### **B. Administrative Requirements**

Students are expected to attend all class sessions, take all examination, do all lab assignments and projects. All work must be submitted no later than a given due date set by the instructor.

### **VI. Course Schedule**

- 1, LONI and Linux OS
2. Shell script (Perl) and Python
3. Data processing
4. MapReduce and R
5. Machine learning and artificial intelligence
6. Data visualization

7. Example 1: Face recognition (anti-terrorist, e-pay)
8. Example 2: Yield strength prediction (ML)
9. Example 3: Hardness prediction (ML)
10. Quantum computing
11. Recent advance
12. Project presentation

## **VII. Evaluation of Students**

Homework/Presentation	15%
Midterm	35%
Projects	15%
Final	35%
TOTAL	100%

## **VIII. Grading**

The grading scale is:

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
Below 60%	F