CGS Agenda Item: 16-50
Effective Fall 2017

Eastern Illinois University
New Course Proposal
CIT 4823, Big Data and Cloud Computing

Banner/Catalog Information (Coversheet)

1. **_X___New Course or _____Revision of Existing Course**

2. **Course prefix and number:** ___ CIT 4823_____

3. **Short title:** ___ Big Data _____

4. **Long title:** _____ Big Data and Cloud Computing_____

5. **Hours per week:** _2__ Class _2_ Lab _3__ Credit

6. **Terms:** ___ Fall ___ Spring ___ Summer _X__ On demand

7. **Initial term**: _X__ Fall ___ Spring ___ Summer Year: _2017_____

8. **Catalog course description:** __(2-2-3) Introduction to concept and technology of big data and predictive analytics, including capture, transfer, storage, query, exploration, visualization and other relevant applications of large data-sets.

9. **Course attributes: N/A**

   General education component: _____N/A_____

   ___ Cultural diversity ___ Honors ___ Writing centered ___ Writing intensive ___Writing active

10. **Instructional delivery**
    Type of Course:

    ___ Lecture ___ Lab _X__ Lecture/lab combined ___ Independent study/research

    ___ Internship ___ Performance ___ Practicum/clinical ___ Other, specify: _____

    Mode(s) of Delivery:

    __X_ Face to Face _X__ Online ___ Study Abroad

    _X_ Hybrid, specify approximate amount of on-line and face-to-face instruction__~ 51% Face-to-face and 49% online____

11. Course(s) to be deleted from the catalog once this course is approved. _NONE_____

12. **Equivalent course(s):** __NONE_____

    a. Are students allowed to take equivalent course(s) for credit? ___ Yes _X__ No

13. **Prerequisite(s):** _AET 3163 or equivalent _____

    a. Can prerequisite be taken concurrently? ___ Yes _X__ No

    b. Minimum grade required for the prerequisite course(s)? _C__

    c. Use Banner coding to enforce prerequisite course(s)? _X__ Yes ___ No

d. Who may waive prerequisite(s)?

___ No one _X__ Chair ___ Instructor ___ Advisor ___ Other (specify)

14. Co-requisite(s): __NONE_____

15. Enrollment restrictions

a. Degrees, colleges, majors, levels, classes which <u>may</u> take the course: _ 75 hours in CIT major or graduate students of TEC

b. Degrees, colleges, majors, levels, classes which may <u>not</u> take the course: __ALL OTHERS_____

16. Repeat status: _X__ May not be repeated ___ May be repeated once with credit

17. Enter the limit, if any, on hours which may be applied to a major or minor: ___

18. Grading methods: _X__ Standard ___ CR/NC __ Audit ___ ABC/NC

19. Special grading provisions:

___ Grade for course will <u>not</u> count in a student's grade point average.

___ Grade for course will <u>not</u> count in hours toward graduation.

___ Grade for course will be removed from GPA if student already has credit for or is registered in: _____

___ Credit hours for course will be removed from student's hours toward graduation if student already has credit for or is registered in: _____

20. Additional costs to students:
Supplemental Materials or Software_____

Course Fee _X__No ___Yes, Explain if yes_____

21. Community college transfer:

___ A community college course may be judged equivalent.

_X__ A community college may <u>not</u> be judged equivalent.

Note: Upper division credit (3000+) will <u>not</u> be granted for a community college course, even if the content is judged to be equivalent.

Rationale, Justifications, and Assurances (Part I)

1. _X__Course is required for the major(s) of __Computer and Information Technology
   ___ Course is required for the minor(s) of __ _____
   ___Course is required for the certificate program(s) of _____
   ___ Course is used as an elective
2. **Rationale for proposal**: A new undergraduate major program in Computer and Information Technology will be offered starting Fall 2017. The content of this course has been identified as a part of the core content for this undergraduate program.
3. **Justifications for (answer N/A if not applicable)**
   Similarity to other courses: N/A
   Prerequisites: Material in this course is built on the knowledge of AET 3163 and uses its concepts and knowledge as a foundation for this new course CIT 4823.
   Co-requisites: N/A
   Enrollment restrictions: _Completion of 75 hours in CIT major or graduate students of TEC
   Writing active, intensive, centered: N/A
4. **General education assurances (answer N/A if not applicable)**
   General education component: N/A
   Curriculum: N/A
   Instruction: N/A
   Assessment: N/A
5. **Online/Hybrid delivery justification & assurances (answer N/A if not applicable)**
   Online or hybrid delivery justification: *The content and structure for this course relies upon independent research, in-depth group discussion, and video based lecture. As compared to many lab courses already offered in technology area, this course requires online delivery of lecture and discussion and face-to-face lab activities for applied projects. For content delivered online, the course employs online video presentations, structured web discussions focused on reading assignments, and linked to articles submitted to the instructor. Students are required to draw on research and review of articles to discuss and develop fundamental procedural knowledge of application. Discussions invite students to explore in more detail the required knowledge and procedures to create various web publishing tools and media. Discussions and examinations will be administered and submitted via the online course management tool. Three years ago this course would have been impossible to be delivered online. Since then, several video tools are now available for editing and manipulation. Many software design companies have made their software tools more readily accessible for*

students. The Internet connection speed for many users has increased thereby allowing for higher quality rich media instruction to be delivered. Finally, the course management tools that the university now uses allows there to be a richer interaction between students and faculty. To accommodate this situation, many of the given activities may be completed in a hybrid format.

Instruction: *This course employs instructor led online presentations, student reading assignments, student applied design assignments, peer critique and troubleshooting, student presentations, and examinations. After reviewing the instructor led presentations and completing the student reading assignments, students will be required to draw on what they have read and then to apply it to a context of creating graphics for personal or organizational applications. While working on these projects, students may engage in the activity of troubleshooting or critique while posting their work in an online discussion board for both classmates and the instructor to provide feedback and guidance. Presentations will provide learners a forum to share the results of their work and receive further feedback. Reading assignments, applied projects, and examinations will be administered, collected, and/or submitted via the online course management tool. Presentations may also be delivered in the course tool or face-to-face. All faculty who will deliver this course online are/will be OCDi (or appropriate equivalent) trained.*

Integrity: *Work submitted online, such as discussions and examinations, will be substantiated via learners providing citation in APA format and submitting related articles to quantify work. Further, the length, frequency, quality, and integrity of discussion posts can be monitored via the online course management tool. Examinations will require the same of learners and additionally will use software tools to check work for the integrity and authenticity of submitted assignments. The examinations will be time restricted and of sufficient length to prohibit consultation of unauthorized sources. Work submitted face-to-face in applied lab projects will be checked for authenticity via the individualized nature of project completion. Requirements for projects will require learners to engage in activities that require creation of original content for either themselves or local entity.*

Interaction: *For online content, the course employs email, web-based discussions, exploration of off-site Internet resources, web-based presentations, web chat rooms and lab based applied project work. The instructor will communicate with students through the online discussion board and web-based discussions. Email may also be a tool used for the*

instructor to communicate with an individual student or to post course announcements. The learners for this course may also communicate with one another for these tools. During digital office hours, the instructor will remain available for discussion during certain times and communicate using a chat room tool in the learning management system. For face-to-face interaction, the instructor may communicate synchronously with the learners during open lab activities and during office hours. The learners are also free to communicate with other learners during lab activities.

Model Syllabus (Part II)

Please include the following information:

1. Course number and title
CIT 4823 – Big Data and Cloud Computing

2. Catalog description
Introduction to concept and technology of big data and predictive analytics, including capture, transfer, storage, query, exploration, visualization and other relevant applications of large data-sets.

3. Learning objectives.
Upon completion of this course, students will be able to:

a) Demonstrate the basic concepts of Big Data and Data Scientist. (SL1-3, CT 1-5, WR1-3, Grad 3)
b) Demonstrate the basic knowledge of the core tools to analyze Big Data. (CT 1-5, WR 1-3, QR 1-4, Grad 1, 2, 3)
c) Demonstrate the basic knowledge of Map-Reduce. (CT 1-5, WR 1-3, QR 1-4, Grad 1, 2)
d) Query and explore data and identify the different kinds of analysis that can be applied to big data. (CT 1-5, WR 1-3, QR 1-4, Grad 1, 2, 3)
e) Demonstrate the basic understanding of data network structure, data clusters and graph analytics. (CT 1-5, WR 1-3, QR 1-4, Grad 1, 2)
f) Build and demonstrate a project for Big Data ecosystems. (SL 1-4, CT 1-5, WR 1-3, QR 1-4, Grad 1, 2, 3, 4)

Graduate Learning Goals

Objective	Depth of content knowledge	Critical thinking and problem solving	Oral and/or written communication	Advance scholarship through research and creative activity
(a)	X		X	
(b)	X	X	X	
(c)	X	X		
(d)	X	X	X	
(e)	X	X		
(f)	X	X	X	X

Undergraduate Learning Goals

Objective	Speaking and Listening	Critical Thinking	Writing and Critical Reading	Quantitative Reasoning	Responsible Citizenship
(a)	X	X	X		
(b)		X	X	X	
(c)		X	X	X	
(d)		X	X	X	
(e)		X	X	X	
(f)	X	X	X	X	X

4. Course materials.

This will include lecture notes, online resources (such as online tutorials, research papers), etc as well as the following book:

Provost, F., & Fawcett, T. (2013). "Data Science for Business: What you need to know about data mining and data-analytic thinking". Sebastopol, CA: O'Reilly.

5. Weekly outline of content.

The below is a tentative weekly outline of the content:

Face-to-Face / Online Modality:

Week	Topics	Activities
1	Introduction of Big Data & Data Scientists	
2	Introduction to Hadoop	• Lab 1
3	Hadoop & Map Reduce – I	
4	Hadoop & Map Reduce – II	• Lab 2
5	Query & Explore Data – I	
6	Query & Explore Data – II	• Lab 3
7	Analysis & Interpretation of Big Data	• Lab 4
8	Data Network Structure	• Midterm
9	Adaptability of Data Network Structure	• Lab 5
10	Introduction to Clusters	
11	Advanced/Complex Clusters	• Lab 6
12	Graph Analytics	•
13	More Graph Analytics	• Lab 7
14	Other Emerging Tools & Technologies within Big Data Start Developing Final Project	• Final Exam
15	Final Project Demos & Report	• Final Project • Research Paper (only for Graduate Students)

Hybrid Modality:

Week	Topics	Activities
1	Introduction of Big Data & Data Scientists	
2	Introduction to Hadoop	• Lab 1
3	1. & Map Reduce – I	
4 Face to Face Meetings: 8 am to 5 pm	Question/Answers/Review Sessions of Weeks 1 to 3 Hadoop & Map Reduce – II	• Lab 2
5	Query & Explore Data – I	
6	Query & Explore Data – II	• Lab 3
7	Analysis & Interpretation of Big Data	• Lab 4
8 Face to Face Meetings: 8 am to 5 pm	Question/Answers/Review Sessions of Weeks 5 to 7 Data Network Structure	• Midterm
9	of Data Network Structure	• Lab 5
10	Introduction to Clusters	
11	Advanced/Complex Clusters	• Lab 6
12	Graph Analytics	•
13	More Graph Analytics	• Lab 7
14 Face to Face Meetings: 8 am to 5 pm	Question/Answers/Review Sessions of Weeks 9 to 13 Other Emerging Tools & Technologies within Big Data Start Developing Final Project	• Final Exam
15	Final Project Demos & Report	• Final Project • Research Paper (only for Graduate Students)

6. Assignments and evaluation, including weights for final course grade.

	Undergraduate	Graduate
Lab assignments	40 %	40 %
Exams	30 %	25 %
Class Projects	30 %	25 %
Research Paper	N/A	10 %
Total	100 %	100 %

7. Grading scale.
A = 90% or above, B = 80 – 89%, C = 70 – 79%, D = 60 – 69%, F = Below 60%

8. Correlation of learning objectives to assignments and evaluation.

Objective	Assignments (40%)	Projects (20%)	Midterm (15%)	Final (15%)	Research Paper (10%)
a. Demonstrate the basic concepts of Big Data and Data Scientist. (SL1-3, CT 1-5, WR1-3, Grad 3)	X		X		X
b. Demonstrate the basic knowledge of the core tools to analyze Big Data. (CT 1-5, WR 1-3, QR 1-4, Grad 1, 2, 3)	X		X		X
c. Demonstrate the basic knowledge of Map-Reduce. (CT 1-5, WR 1-3, QR 1-4, Grad 1, 2)	X	X	X	X	X
d. Query and explore data and identify the different kinds of analysis that can be applied to big data. (CT 1-5, WR 1-3, QR 1-4, Grad 1, 2, 3)	X	X		X	X
e. Demonstrate the basic understanding of data network structure, data clusters and graph analytics. (CT 1-5, WR 1-3, QR 1-4, Grad 1, 2)	X	X		X	X
f. Build and demonstrate a project for Big Data ecosystems. (SL 1-4, CT 1-5, WR 1-3,		X			X

QR 1-4, Grad 1, 2, 3, 4)					

Date approved by the department or school: 2/16/16
Date approved by the college curriculum committee: 4/25/2016
Date approved by the Honors Council *(if this is an honors course):* Date approved by CAA: 4/28/2016 CGS: 5-3-16