



TQF. 3

Bachelor's Degree

Master's Degree

## Course Specification

**Course Codes:** CPE5015

**Course Titles:** Big Data Management

**Credits:** 3(2-2-5)

**Program:** Bachelor of Engineering (Computer Engineering)

**Semester:** 1

**Academic Year:** 2024

**Faculty of Engineering and Industrial Technology**

**Suan Sunandha Rajabhat University**

## Section 1 - General Information

### 1. Course code and course title

Course codes: CPE5015

Course title (English): Big Data Management

ชื่อวิชา (ภาษาไทย): การจัดการข้อมูลขนาดใหญ่

### 2. Credits

3(2-2-5)

### 3. Curriculum and course category

Curriculum: Bachelor of Engineering

Course Category:

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> General Education | <input type="checkbox"/> Specialized Course         | <input type="checkbox"/> Professional Foundation |
| <input type="checkbox"/> Required Course   | <input checked="" type="checkbox"/> Elective Course | <input type="checkbox"/> Internship              |

### 4. Teacher in charge and lecturer

Teacher in charge: Dr.Pongrapee Kaewsaiha

Lecturer: Dr.Pongrapee Kaewsaiha

### 5. Contact

Room Number: 4731

Email: pongrapee.ka@ssru.ac.th

### 6. Semester/Academic year

Semester: 1

Academic Year: 2024

Sections: 001

Number of enrolled students: TBA

### 7. Pre-requisite (if any)

None

### 8. Co-requisite (if any)

None

### 9. Time/Venue

Fri, 08:00-12:00, SSRU

### 10. Last date for preparing and revising this course

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## Section 2 - Aims and Objectives

### 1. Course aims

This course aims to equip students with a comprehensive understanding of big data analysis techniques and their practical applications. Through this course, students will learn the benefits of big data analysis, including how to handle, process, and analyze vast amounts of data to uncover hidden patterns, correlations, and insights. By exploring key methods such as association, clustering, classification, decision trees, Bayes' theorem, and text mining, students will develop the skills necessary to make data-driven decisions and drive business innovation in various domains.

### 2. Course objectives

At the end of this course, students will be able to perform in the following areas of performance:

- 1) Understand the fundamentals of big data and its significance in modern analytics.
- 2) Describe the benefits and challenges associated with big data analysis.
- 3) Apply association techniques to identify relationships within large datasets.
- 4) Implement clustering algorithms to group similar data points and uncover patterns.
- 5) Utilize classification methods, including decision trees and Bayes' theorem, for predictive analytics.
- 6) Conduct text mining to extract valuable information from unstructured data.
- 7) Develop skills in data preprocessing, cleaning, and transformation for analysis.
- 8) Use big data tools and software to perform comprehensive data analysis.
- 9) Interpret and communicate findings from big data analyses effectively.
- 10) Develop the ability to make data-driven decisions based on analytical insights.

### 3. Purposes for developing and revising course

The development of this course is driven by the rapidly growing demand for professionals adept at handling and analyzing vast datasets to drive strategic decision-making and innovation. As organizations increasingly rely on data to gain competitive advantages, there is a critical need for graduates equipped with the skills to perform complex data analyses, uncover valuable insights, and apply these findings to real-world business challenges. By providing students with expertise in key big data techniques, this course prepares them to meet the pressing needs of today's data-driven industries. Graduates with these competencies are highly sought after, capable of transforming data into actionable intelligence, and poised to become leaders in the evolving digital landscape.

## Section 3 - Characteristics and Operations

### 1. Course description

(English) Big data analysis; Benefits of analysis; Association; Clustering; Classifications: decision tree, Bayes' theorem, and text mining

(ไทย) การวิเคราะห์ข้อมูลขนาดใหญ่ ประโยชน์ของการวิเคราะห์ การหาความสัมพันธ์ การจัดกลุ่ม การจำแนกประเภทข้อมูล แบบต่างๆ ต้นไม้ตัดสินใจ ทฤษฎีของเบย์ การวิเคราะห์ข้อความ

### 2. Time length per semester (Lecture/Practice/Self-study hours)

Lecture	Practice	Self-Study	Remedial Class
2 hours/week	2 hours/week	5 hours/week	As needed

### 3. Individual consulting and guidance

#### Self-consulting at the lecturer's office:

Room Number 4724A, Faculty of Industrial Technology, SSRU

Mon., 13:00-15:00 or by appointment

#### Consulting via office telephone/mobile phone:

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#### Consulting via email:

pongrapee.ka@ssru.ac.th

#### Consulting via social media platform:

Line OpenChat

#### Consulting via a web forum:

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## Section 4 - Developing Students' Learning Outcomes

Expected students' learning outcomes are categorized into five domains, developed from curriculum specification (TQF2), as follows:

### 1. Morals and ethics

#### 1.1 Learning outcomes to be developed

- 1) Have knowledge, understanding, and realizing value, morality, ethics, sacrifice, and honesty. Have academic and professional ethics.
- 2) Be disciplined, punctual, and responsible for oneself and society. Be able to comply with organizational and social regulations.
- 3) Be able to take leader and follower roles, work as a team, resolve conflicts and priorities.
- 4) Be open-minded and respect rights, value, and dignity of human beings.
- 5) Have a conscience that considers common interests rather than personal interests.

#### 1.2 Teaching strategies

Establish an organizational culture to instill discipline in students. Emphasis on attending classes on time as well as dressing according to university regulations. Students responsible for group work must be trained to know the responsibilities of being a group leader and being a member of a group. Be honest by not committing fraud in exams or plagiarizing other people's homework. In addition, all instructors must include morality and ethics in teaching all subjects. Also, there are activities to promote morality and ethics, such as honoring students who have done well in benefit the public and sacrifice.

#### 1.3 Assessment & evaluation strategies

- 1) Evaluate from attentiveness and diligence in participating in class activities.
- 2) Assess students' punctuality in class, submission of work, and participation in activities.
- 3) Evaluate the responsibilities of assigned duties.

### 2. Knowledge

#### 2.1 Learning outcomes to be developed

- 1) Have knowledge and understanding of important principles and theories in the course.
- 2) Have knowledge and understanding of other areas related to the course which can be integrated and applied appropriately.
- 3) Have knowledge of operational techniques using experiential learning methods.
- 4) Be able to continuously monitor academic and professional changes both in theory and in practice.

## 2.2 Teaching strategies

Use a variety of teaching methods emphasizing theoretical principles and practical application in real-world environments to keep pace with technological changes. This shall be in accordance with the nature of the course as well as the content of that course.

## 2.3 Assessment & evaluation strategies

- 1) Quiz
- 2) Assignment
- 3) Mid-term and final exams

## 3. Cognitive skills

### 3.1 Learning outcomes to be developed

- 1) Be able to think critically and systematically.
- 2) Be able to search, interpret, process, and evaluate data to identify, analyze, and solve problems creatively.
- 3) Be able to follow up, evaluate, and report results accurately and completely.

### 3.2 Teaching strategies

- 1) Teachers always teach and show rational thinking as an example.
- 2) Presentations and group discussions.
- 3) Provide students the opportunity to practice.

### 3.3 Assessment & evaluation strategies

Assess according to the real situation from the work and practice of students, such as assessing from class presentations, testing using quiz, interviews, etc.

## 4. Interpersonal skills and responsibilities

### 4.1 Learning outcomes to be developed

- 1) Be able to help and facilitate in solving problems in various situations in the group, either as a leader or a team member.
- 2) Have good human relations. Be able to work well with others and adapt well to situations and corporate culture.
- 3) Have responsibility for their own actions and for group work and learning development, both personally and professionally.
- 4) Be able to work and take responsibility for assigned tasks efficiently.

## 4.2 Teaching strategies

Use instructions with activities that involve group work, work that requires coordination with others, across curriculum, across faculties, external parties, external agencies, or work that students need to research information from interviewing other people or experts.

## 4.3 Assessment & evaluation strategies

Assess student behavior and expression in presenting group reports in class and observe the behavior shown in participating in various activities and the completeness and clarity of the information.

# 5. Numerical analysis, communication, and information technology skills

## 5.1 Learning outcomes to be developed

- 1) Be able to use quantitative analysis to make creative decisions in interpretation and suggest ways to solve problems or disputes.
- 2) Be able to communicate effectively both verbally and in writing. Know how to choose a presentation style that is suitable for different problems and audience groups.
- 3) Be able to choose appropriate information technology and communication techniques to collect data, interpretation, and information communication.

## 5.2 Teaching strategies

Organize learning activities in various subjects for students to analyze simulated situations, numerical analysis skills, virtual situations, and propose appropriate solutions. Learn techniques for applying technology in a variety of situations.

## 5.3 Assessment & evaluation strategies

Assess presentation techniques based on theory, selection of technological tools or related mathematics and statistics. Assess the ability to explain the limitations, reasons for choosing different tools, discussions, and case studies that are presented to the class.

**Remark:** The symbol ● means “major responsibility.”

The symbol ○ means “minor responsibility.”

No symbol means “no responsibility.”

## Section 5 - Lesson Plan and Assessment

### 1. Lesson plan

Week/ Session	Content	Teaching Management	Program/Teaching Strategies	Material/Media	Assessment
Week 1	Introduction, Chapter 1 - Fundamental concepts of data science, big data, and AI	On-site Online On-demand	<ul style="list-style-type: none"> <li>- Introduce course outlines.</li> <li>- Introduce the course LMS (Moodle) and provide technical assistance as needed.</li> <li>- Discuss expected outcome and grading criteria.</li> <li>- Introduce the fundamental concepts of data science, big data, and AI.</li> <li>- Complete activities.</li> </ul>	<ul style="list-style-type: none"> <li>- Presentation</li> <li>- Courseware</li> <li>- Quiz</li> </ul>	<ul style="list-style-type: none"> <li>- Attendance record</li> <li>- Activity result</li> </ul>
Week 2	Chapter 2 - Classification problem (k-means clustering)	On-demand	<ul style="list-style-type: none"> <li>- Learn from the courseware.</li> <li>- Provide some examples and practices.</li> <li>- Complete activities.</li> </ul>	<ul style="list-style-type: none"> <li>- Presentation</li> <li>- Courseware</li> <li>- Practice</li> </ul>	<ul style="list-style-type: none"> <li>- Attendance record</li> <li>- Activity result</li> </ul>
Week 3	Group project announcement	On-site Online	<ul style="list-style-type: none"> <li>- Introduce the group project.</li> <li>- Discuss approaches and grading criteria.</li> <li>- Complete activities.</li> </ul>	<ul style="list-style-type: none"> <li>- Presentation</li> <li>- Collaboration</li> </ul>	<ul style="list-style-type: none"> <li>- Attendance record</li> </ul>
Week 4	Chapter 3 - Principal Component Analysis (PCA)	On-demand	<ul style="list-style-type: none"> <li>- Learn from the courseware.</li> <li>- Complete a quiz.</li> </ul>	<ul style="list-style-type: none"> <li>- Courseware</li> <li>- Quiz</li> </ul>	<ul style="list-style-type: none"> <li>- Attendance record</li> <li>- Activity result</li> </ul>
Week 5	Chapter 4 - Association rules	On-demand	<ul style="list-style-type: none"> <li>- Learn from the courseware.</li> <li>- Complete a quiz.</li> </ul>	<ul style="list-style-type: none"> <li>- Courseware</li> <li>- Quiz</li> </ul>	<ul style="list-style-type: none"> <li>- Attendance record</li> <li>- Activity result</li> </ul>



<b>Week/ Session</b>	<b>Content</b>	<b>Teaching Management</b>	<b>Program/Teaching Strategies</b>	<b>Material/Media</b>	<b>Assessment</b>
Week 6	Chapter 5 - Social Network Analysis (SNA)	On-demand	- Learn from the courseware. - Complete a quiz.	- Courseware - Quiz	- Attendance record - Activity result
Week 7	Workshop - Indexing and visualizing web pages	On-site Online	- Create Python scripts - Use web crawler to index webpages and extract data	- Presentation - Practice	- Attendance record - Activity result
Week 8	Chapter 6 - Regression analysis	On-demand	- Learn from the courseware. - Complete a quiz.	- Courseware Quiz	- Attendance record Activity result
Week 9	Mid-term examination	On-site		- Exam paper	- Examination result
Week 10	Chapter 7 - k-nearest neighbors	On-demand	- Learn from the pre-recorded video. - Complete a quiz.	- Recorded video - Quiz	- Attendance record - Activity result
Week 11	Chapter 8 - Support Vector Machine (SVM)	On-demand	- Learn from the pre-recorded video. - Complete a quiz.	- Recorded video - Quiz	- Attendance record - Activity result
Week 12	Chapter 9 - Decision tree	On-demand	- Learn from the pre-recorded video. - Complete a quiz.	- Recorded video - Quiz	- Attendance record - Activity result
Week 13	Chapter 10 - Random forest	On-demand	- Learn from the pre-recorded video.	- Recorded video	- Attendance record
Week 14	Chapter 11 - Neural networks	On-demand	- Learn from the pre-recorded video. - Complete a quiz.	- Recorded video - Quiz	- Attendance record - Activity result
Week 15	Chapter 12 - A/B testing	On-demand	- Learn from the pre-recorded video. - Complete a quiz.	- Recorded video - Quiz	- Attendance record - Activity result
Week 16	Review	On-site Online	- Review lessons	- Presentation - Hand-on activity	- Attendance record - Activity result
Week 17	Final examination	On-site		- Exam paper	- Examination result

## 2. Learning assessment plan

Learning Outcomes	Assessment Activities	Schedule (Week)	Proportion for Assessment (%)
1	Participation record	1-16	10
2, 3, 4, 5	Activities	1-16	30
	Group work	1, 3, 16	20
	Examinations	9, 17	20, 20

## Section 6 - Learning and Teaching Resources

### 1. Required textbooks and materials

Ng, A., & Soo, K. (2017). *Numsense! Data Science for the Layman: No Math Added*.  
Annalyn Ng and Kenneth Soo.

### 2. Documents and important information

Documents suggested by the lecturer

### 3. Recommended resources for extra study

<https://www.w3schools.com/>

## **Section 7 - Course Evaluation and Revising**

### **1. Strategies for evaluation of course effectiveness by students**

Students will complete the evaluation form after the end of the course.

### **2. Strategies for course evaluation by the lecturer**

The lecturer observes the class and collects immediate feedback from students.

### **3. Teaching revision**

The lecturer revises the teaching and learning process based on the questionnaire results.

### **4. Feedback for achievement standards**

The administration committees collect data and analyze students' academic performance each semester.

### **5. Methodology and planning for course review and improvement**

Revise the curriculum, teaching methods, and learning methods by referring to the evaluation results from those involved. Meetings will be held to review the course's effectiveness and improve the curriculum.