



### CS280 Elements of Data Processing

<b>Instructor Information</b>	<p>Shuxi Wang          Home Institution: University of International Business and Economics          Email: wangshuxi@uibe.edu.cn          Office Hours: Determined by Instructor</p>		
<b>Term</b>	December 13, 2021 - January 7, 2022	<b>Credits</b>	4 units
<b>Class Hours</b>	Monday through Friday, 120 mins per teaching day		
<b>Discussion Sessions</b>	2.5 hours each week, conducted by teaching assistant(s)		
<b>Total Contact Hours</b>	66 contact hours (1 contact hour = 45 mins, 3000 mins in total)		
<b>Required Texts (with ISBN)</b>	<p>Recommended texts:          J. Han, M. Kamber and J. Pei, Data Mining: Concepts and Techniques, 3<sup>rd</sup> ed., Morgan Kaufmann, 2012. ISBN: 978-0-12-381479-1.          Bing Liu, Web Data Mining, Springer, 2011. ISBN: 978-3-642-26891-5.</p>		
<b>Prerequisite</b>	<p>Students are expected to have completed one of computer programming courses such as Python, C++, Java, C#, etc. or have good knowledge of one of such programming languages.</p>		



## Course Overview

This course covers both theoretical foundations and practical techniques and tools for data processing. Topics include data representation, cleaning, transformation and analysis, visualization, privacy, clustering and classification methods, information retrieval, data and web mining, model evaluation.

## Learning Outcomes

The students will be able to:

1. Have a fundamental understanding on data, data representation and storage, processing, visualization, and management.
2. Identify and use current data processing techniques, skills, and tools to perform effective data processing and analysis.
3. Have a basic knowledge of information retrieval, data mining, recommender systems, and model evaluation.

## Program Outcomes

This course addresses the following program outcomes:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to use current techniques, skills, and tools necessary for computing practice
- The capability for critical and independent thinking and skills for lifelong learning
- Respect for academic integrity and the ethics of scholarship



**Grading Policy**

Quizzes	30%
Presentation	10%
Assignments	10%
Midterm	20%
Final Exam	30%

**Grading Scale is as follows**

Number grade	Letter grade	GPA
90-100	A	4
85-89	A-	3.7
80-84	B+	3.3
75-79	B	3
70-74	B-	2.7
67-69	C+	2.3
65-66	C	2
62-64	C-	1.7
60-61	D	1
≤59	F (Failure)	0



**Class Schedule**

Date	Lecture	Readings
Day 1	Why Processing Data, Data Representation, Type of Attributes, Basic Statistical Description of Data	HKP: 3.1, 2.1-2.2
Day 2	Data Integration and Cleaning: Missing Values and Outlier Detection and Removal	HKP: 3.2, 12.1-12.2
Day 3	Transformation by Normalization, Discretization by Binning	HKP: 3.5.1-3.5.3
Day 4	Data Dimension Reduction	HKP: 3.4
Day 5	Text Preprocessing and Information Retrieval Query languages and processing	L: 6.1-6.3, 6.5-6.6
Day 6	Entropy and Information Gain	HKP: 8.2.2
Day 7	Association Rules	L: 2.1-2.2
Day 8	Data Visualization, Clustering and Clustering Visualization	HKP: 2.3, 10.1-10.2 L: 4.2
Day 9	Presentation	
Day 10	Midterm	
Day 11	Classification Methods: Decision Trees, K-Nearest Neighbor	HKP: 8.2, 9.5.1 L: 3.9
Day 12	Classification Methods: Naïve Bayes, Combining Classifiers	HKP: 8.3



Day 13	Experimental Design and Evaluations	HKP: 8.5.1-8.5.5 L: 6.4
Day 14	Link Analysis and Social Network Analysis	L: 7.1
Day 15	Link Analysis and Social Network Analysis	L: 7.1
Day 16	PageRank	L: 7.3
Day 17	Assessing Correlations and Recommender Systems	HKP: 2.4.7 L:12.4
Day 18	Data Preprocessing and Web Usage Mining	L: 12.1-12.3
Day 19	Data Linkage, Privacy and Bloom Filters, Social and Ethical Implications of Big Data Analytics, Cloud Computing Project	HKP: 13.4
Day 20	Final Exam	

\* Fee-paying (non-exchange) program held by School of Continuing Education, SJTU.

\* 此课程由上海交通大学继续教育学院开设，所提供课程不包括在上海交通大学与海外高校校级合作的学分互认范畴之内。