Principles of Information Systems

Communication

- E-mail: aalzaidi@uj.edu.sa

- Office Hours: Sunday, Tuesday and Thursday from 9am until 12noon.

Note – Please send an e-mail if you want to book an appointment.
House Rules

- Formal Dress
- No Phone No Laptop on the table
- Once I start talking and you are not in the room you are late, welcome to attend but you will be marked as late.
# Exam and Marks

<table>
<thead>
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<th>Mark</th>
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Source of Studying

1. Textbook
   Author: Ralph Stair & George Reynolds
   Title: “Principles of Information Systems”, Sixth Edition

2. Course Presentation

3. Your own lecture notes
Course Outline

- **PART 1 Information Systems in Perspective**
  - Chapter 1 An Introduction to Information Systems in Organizations

- **PART 2 Technology**
  - Chapter 2 Hardware and Software
  - Chapter 3 Database Systems, Data Centers, and Business Intelligence
  - Chapter 4 Telecommunications, the Internet, Intranets, and Extranets

- **PART 3 Business Information Systems**
  - Chapter 5 Electronic and Mobile Commerce and Enterprise Systems
  - Chapter 6 Information and Decision Support Systems
  - Chapter 7 Knowledge Management and Specialized Information Systems

- **PART 4 Systems Development and Social Issues**
  - Chapter 8 Systems Development

- **PART 5 Information Systems in Business and Society**
  - Chapter 9 The Personal and Social Impact of Computers
Chapter 1
An Introduction to Information Systems in Organizations

Dr. Amer Alzaidi Department of Information Systems
Why Learn About Information Systems in Organizations?

- Information systems used by:
  - Sales representatives
  - Managers
  - Financial advisors

- Information systems:
  - Indispensable tools to help you achieve your career goals
Introduction

- Information system (IS):
  - A set of interrelated components that collect, manipulate, and forecast data and information and provide feedback to meet an objective

- Businesses:
  - Can use information systems to increase revenues and reduce costs
Information Concepts

- Information:
  - One of an organization’s most valuable resources
  - Often confused with the term *data*
Data, Information, and Knowledge

- **Data:**
  - Raw facts

- **Information:**
  - Collection of facts organized in such a way that they have value beyond the facts themselves

- **Process:**
  - Set of logically related tasks

- **Knowledge:**
  - Awareness and understanding of a set of information
Data, Information, and Knowledge (continued)

<table>
<thead>
<tr>
<th>Data</th>
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</tr>
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<tbody>
<tr>
<td>Alphanumeric data</td>
<td>Numbers, letters, and other characters</td>
</tr>
<tr>
<td>Image data</td>
<td>Graphic images and pictures</td>
</tr>
<tr>
<td>Audio data</td>
<td>Sound, noise, or tones</td>
</tr>
<tr>
<td>Video data</td>
<td>Moving images or pictures</td>
</tr>
</tbody>
</table>

**Table 1.1**

Types of Data
Data, Information, and Knowledge (continued)

Figure 1.1
Defining and Organizing Relationships Among Data Creates Information
Data, Information, and Knowledge (continued)

Figure 1.2
The Process of Transforming Data into Information
The Characteristics of Valuable Information

- If an organization’s information is not accurate or complete:
  - People can make poor decisions, costing thousands, or even millions, of dollars

- Depending on the type of data you need:
  - Some characteristics become more important than others
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Definitions</th>
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</thead>
<tbody>
<tr>
<td>Accessible</td>
<td>Information should be easily accessible by authorized users so they can obtain it in the right format and at the right time to meet their needs.</td>
</tr>
<tr>
<td>Accurate</td>
<td>Accurate information is error free. In some cases, inaccurate information is generated because inaccurate data is fed into the transformation process. (This is commonly called garbage in, garbage out [GIGO].)</td>
</tr>
<tr>
<td>Complete</td>
<td>Complete information contains all the important facts. For example, an investment report that does not include all important costs is not complete.</td>
</tr>
<tr>
<td>Economical</td>
<td>Information should also be relatively economical to produce. Decision makers must always balance the value of information with the cost of producing it.</td>
</tr>
<tr>
<td>Flexible</td>
<td>Flexible information can be used for a variety of purposes. For example, information on how much inventory is on hand for a particular part can be used by a sales representative in closing a sale, by a production manager to determine whether more inventory is needed, and by a financial executive to determine the total value the company has invested in inventory.</td>
</tr>
<tr>
<td>Relevant</td>
<td>Relevant information is important to the decision maker. Information showing that lumber prices might drop might not be relevant to a computer chip manufacturer.</td>
</tr>
<tr>
<td>Reliable</td>
<td>Reliable information can be trusted by users. In many cases, the reliability of the information depends on the reliability of the data-collection method. In other instances, reliability depends on the source of the information. A rumor from an unknown source that oil prices might go up might not be reliable.</td>
</tr>
<tr>
<td>Secure</td>
<td>Information should be secure from access by unauthorized users.</td>
</tr>
<tr>
<td>Simple</td>
<td>Information should be simple, not overly complex. Sophisticated and detailed information might not be needed. In fact, too much information can cause information overload, whereby a decision maker has too much information and is unable to determine what is really important.</td>
</tr>
<tr>
<td>Timely</td>
<td>Timely information is delivered when it is needed. Knowing last week’s weather conditions will not help when trying to decide what coat to wear today.</td>
</tr>
<tr>
<td>Verifiable</td>
<td>Information should be verifiable. This means that you can check it to make sure it is correct, perhaps by checking many sources for the same information.</td>
</tr>
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</table>
The Value of Information

- Directly linked to how it helps decision makers achieve their organization’s goals

- Valuable information:
  - Can help people and their organizations perform tasks more efficiently and effectively
What is an Information System?

Information system (IS) is a set of interrelated elements that:
- Collect (input)
- Manipulate (process)
- Store
- Disseminate (output) data and information
- Provide a corrective reaction (feedback mechanism) to meet an objective
What is an Information System? (continued)

The Components of an Information System

Feedback is critical to the successful operation of a system.
Input, Processing, Output, Feedback

- **Input:**
  - Activity of gathering and capturing raw data

- **Processing:**
  - Converting data into useful outputs

- **Output:**
  - Production of useful information, usually in the form of documents and reports

- **Feedback:**
  - Information from the system that is used to make changes to input or processing activities
Manual and Computerized Information Systems

- An information system can be:
  - Manual or computerized

- Example:
  - Investment analysts manually draw charts and trend lines to assist them in making investment decisions

- Computerized information systems:
  - Follow stock indexes and markets and suggest when large blocks of stocks should be purchased or sold
Computer-Based Information Systems

- Single set of hardware, software, databases, telecommunications, people, and procedures:
  - That are configured to collect, manipulate, store, and process data into information

- Technology infrastructure:
  - Includes all hardware, software, databases, telecommunications, people, and procedures
    - Configured to collect, manipulate, store, and process data into information
Computer-Based Information Systems (continued)

Figure 1.4
The Components of a Computer-Based Information System
Computer-Based Information Systems (continued)

- **Hardware:**
  - Consists of computer equipment used to perform input, processing, and output activities

- **Software:**
  - Consists of the computer programs that govern the operation of the computer

- **Database:**
  - Organized collection of facts and information, typically consisting of two or more related data files
Telecommunications, networks, and the Internet:
- The electronic transmission of signals for communications

Networks:
- Connect computers and equipment to enable electronic communication

Internet:
- World’s largest computer network, consisting of thousands of interconnected networks, all freely exchanging information
Intranet:
- Internal network that allows people within an organization to exchange information and work on projects

Extranet:
- Network that allows selected outsiders, such as business partners and customers, to access authorized resources of a company’s intranet
People:
- The most important element in most computer-based information systems

Procedures:
- Include strategies, policies, methods, and rules for using the CBIS
Business Information Systems

- Most common types of information systems:
  - Those designed for electronic and mobile commerce, transaction processing, management information, and decision support

- Some organizations employ:
  - Special-purpose systems, such as virtual reality, that not every organization uses
Business Information Systems (continued)

Figure 1.5

Business Information Systems

Business information systems are often integrated in one product and can be delivered by the same software package.
Business Information Systems (continued)

Figure 1.6
The Development of Important Business Information Systems
Electronic and Mobile Commerce

- E-commerce:
  - Any business transaction executed electronically between:
    - Companies (business-to-business, B2B)
    - Companies and consumers (business-to-consumer, B2C)
    - Consumers and other consumers (consumer-to-consumer, C2C)
    - Business and the public sector
    - Consumers and the public sector
Electronic and Mobile Commerce (continued)

- Mobile commerce (m-commerce):
  - The use of mobile, wireless devices to place orders and conduct business

- E-commerce:
  - Can enhance a company’s stock prices and market value

- Electronic business (e-business):
  - Uses information systems and the Internet to perform all business-related tasks and functions
Electronic and Mobile Commerce (continued)

**Electronic Business**

E-business goes beyond e-commerce to include using information systems and the Internet to perform all business-related tasks and functions, such as accounting, finance, marketing, manufacturing, and human resources activities.

- **Transaction:**
  - Any business-related exchange, such as payments to employees and sales to customers

- **Transaction processing system (TPS):**
  - Organized collection of people, procedures, software, databases, and devices used to record completed business transactions

Figure 1.9

A Payroll Transaction Processing System

In a payroll TPS, the inputs (numbers of employee hours worked and pay rates) go through a transformation process to produce outputs (paychecks).
Enterprise resource planning:

Set of integrated programs that manages the vital business operations for an entire multisite, global organization.
Information and Decision Support Systems

Management information system (MIS):
- Organized collection of people, procedures, software, databases, and devices that provides routine information to managers and decision makers.
Information and Decision Support Systems (continued)

Management Information System

Functional management information systems draw data from the organization's transaction processing system.
Decision support system (DSS):
- Organized collection of people, procedures, software, databases, and devices that support problem-specific decision making
- Can include:
  - A collection of models used to support a decision maker or user (model base)
  - A collection of facts and information to assist in decision making (database)
  - Systems and procedures (user interface or dialogue manager) that help decision makers and other users interact with the DSS
Information and Decision Support Systems (continued)

Figure 1.11
Essential DSS Elements
Specialized Business Information Systems: Knowledge Management, Artificial Intelligence, Expert Systems, and Virtual Reality

- Knowledge management systems (KMSs):
  - Organized collection of people, procedures, software, databases, and devices to:
    - Create, store, share, and use the organization’s knowledge and experience

- Artificial intelligence (AI):
  - Computer system takes on characteristics of human intelligence
Specialized Business Information Systems (continued)

Figure 1.12
The Major Elements of Artificial Intelligence
Specialized Business Information Systems (continued)

- Expert systems:
  - Give computer ability to make suggestions and function like an expert in a particular field

- Virtual reality and multimedia:
  - Virtual reality:
    - Simulation of a real or imagined environment that can be experienced visually in three dimensions
  - Multimedia:
    - Can include photos and images, the manipulation of sound, and special 3D effects
Systems Development

- Systems development:
  - The activity of creating or modifying existing business systems

- Outsourcing:
  - Allows a company to focus on what it does best and delegate other functions to companies with expertise in systems development
Systems Development (continued)

- Systems Investigation
  Understand problem

- Systems Analysis
  Understand solutions

- Systems Design
  Select and plan best solution

- Systems Implementation
  Place solution into effect

- Systems Maintenance and Review
  Evaluate results of solution

Figure 1.14
An Overview of Systems Development
Systems Investigation and Analysis

- Goal of systems investigation:
  - To gain clear understanding of the problem to be solved or opportunity to be addressed

- Systems analysis:
  - Defines the problems and opportunities of the existing system
Systems Design, Implementation, and Maintenance and Review

- **Systems design:**
  - Determines how new system will work to meet business needs defined during systems analysis

- **Systems implementation:**
  - Acquiring various system components defined in design step, assembling them, and putting the new system into operation

- **Systems maintenance and review:**
  - Checks and modifies the system so that it continues to meet changing business needs
Organization:
- Formal collection of people and other resources established to accomplish a set of goals
- A system
- Constantly uses money, people, materials, machines and other equipment, data, information, and decisions
Organizations and Information Systems (continued)

Figure 1.15
A General Model of an Organization
Value chain:
- Series (chain) of activities that includes inbound logistics and warehouse and storage

Supply chain management (SCM):
- Determines:
  - What supplies are required for value chain
  - What quantities are needed to meet customer demand
  - How supplies should be processed into finished goods and services
  - How shipment of supplies and products to customers should be scheduled, monitored, and controlled
Organizations and Information Systems (continued)

**Figure 1.16 The Value Chain of a Manufacturing Company**

Managing raw materials, inbound logistics, and warehouse and storage facilities is called *upstream management*. Managing finished product storage, outbound logistics, marketing and sales, and customer service is called *downstream management*.
Customer relationship management (CRM) programs:
- Help companies manage all aspects of customer encounters
- Can get customer feedback to help design new products and services
Organizational Culture and Change

- **Culture:**
  - Set of major understandings and assumptions shared by a group

- **Organizational culture:**
  - Major understandings and assumptions
  - Influences information systems

- **Organizational change:**
  - How organizations plan for, implement, and handle change
User Satisfaction and Technology Acceptance

- Technology acceptance model (TAM):
  - Specifies the factors that can lead to better attitudes about the information system

- Technology diffusion:
  - Measure of how widely technology is spread throughout an organization

- Technology infusion:
  - Extent to which technology permeates a department
User Satisfaction and Technology Acceptance (continued)

Technology Infusion

President

Vice President

Vice President

Manager

Manager

Manager

Manager

Worker

Worker

Worker

Technology Diffusion

Figure 1.18

Technology Infusion and Diffusion
Competitive Advantage

- Significant and (ideally) long-term benefit to a company over its competition
- Can result in higher-quality products, better customer service, and lower costs
Factors That Lead Firms to Seek Competitive Advantage

- The five-forces model:
  - Rivalry among existing competitors
  - Threat of new entrants
  - Threat of substitute products and services
  - Bargaining power of buyers
  - Bargaining power of suppliers
Strategic Planning for Competitive Advantage

- Strategies:
  - Cost leadership
  - Differentiation
  - Niche strategy
  - Altering the industry structure
  - Creating new products and services
  - Improving existing product lines and service
Strategic Planning for Competitive Advantage (continued)

- Other strategies:
  - Growth in sales
  - First to market
  - Customizing products and services
  - Hiring the best people
  - Innovation
Performance-Based Information Systems

- Major stages in the use of information systems:
  - Cost reduction and productivity
  - Competitive advantage
  - Performance-based management
Figure 1.19
Three Stages in the Business Use of Information Systems
Productivity

- A measure of output achieved divided by input required

- Higher level of output for a given level of input means greater productivity

- Lower level of output for a given level of input means lower productivity

- Productivity = \( \frac{\text{Output}}{\text{Input}} \times 100\% \)
Return on Investment and the Value of Information Systems

- Return on investment (ROI):
  - One measure of IS value
  - Investigates the additional profits or benefits that are generated as a percentage of the investment in IS technology

- Earnings growth:
  - The increase in profit that the system brings
Return on Investment and the Value of Information Systems (continued)

- **Market share and speed to market:**
  - The percentage of sales that a product or service has in relation to the total market

- **Customer awareness and satisfaction:**
  - Performance measurement is based on feedback from internal and external users

- **Total cost of ownership:**
  - The sum of all costs over the life of the information system
Risk

- Managers must consider the risks of designing, developing, and implementing systems
- Information systems can sometimes be costly failures
Careers in Information Systems

- Degree programs:
  - Information systems
  - Computer information systems
  - Management information systems
Roles, Functions, and Careers in IS

- Primary responsibilities in information systems:
  - Operations:
    - System operators primarily run and maintain IS equipment
  - Systems development:
    - Focuses on specific development projects and ongoing maintenance and review
Roles, Functions, and Careers in IS

Primary responsibilities in information systems (continued):

- Support:
  - Provides user assistance in hardware and software acquisition and use, data administration, user training and assistance, and Web administration

- Information service units:
  - A miniature IS department attached and directly reporting to a functional area in a large organization
Typical IS Titles and Functions

- Chief information officer (CIO):
  - Employs the IS department’s equipment and personnel to help the organization attain its goals

- LAN administrators:
  - Set up and manage the network hardware, software, and security processes
Typical IS Titles and Functions (continued)

- Internet careers:
  - Internet strategists and administrators
  - Internet systems developers
  - Internet programmers
  - Internet or Web site operators

- Certification:
  - Process for testing skills and knowledge resulting in an endorsement by the certifying authority
Other IS Careers

- New and exciting careers have developed in security and fraud detection and prevention.

- Other IS career opportunities include being employed by technology companies, such as:
  - Microsoft ([www.microsoft.com](http://www.microsoft.com)), Google ([www.google.com](http://www.google.com)), Dell ([www.dell.com](http://www.dell.com)), and many others.
Working in Teams

- It is always good for IS professionals to:
  - Have good communications skills and the ability to work with other people

- Getting the best team of IS personnel to work on important projects is:
  - Critical in successfully developing new information systems or modifying existing ones
Finding a Job in IS

- Developing an online résumé can be critical to finding a good job.

- Job search approaches:
  - On campus visits
  - Referrals from professors, friends, and family members
  - The Internet:
    - Online job sites
    - Company Web sites
    - Social networking sites
    - Blogs
Global Challenges in Information Systems

- Cultural challenges
- Language challenges
- Time and distance challenges
- Infrastructure challenges
- Currency challenges
Global Challenges in Information Systems (continued)

- Product and service challenges
- Technology transfer issues
- State, regional, and national laws
- Trade agreements
Summary

- **Data:**
  - Raw facts

- **To be valuable, information must be:**
  - Accurate, complete, economical to produce, flexible, reliable, relevant, simple to understand, timely, verifiable, accessible, and secure

- **Types of systems used within organizations:**
  - E-commerce and m-commerce, TPS and ERP, MIS and DSS, and specialized business information systems
Systems development:
- The activity of creating or modifying existing business systems

Organization:
- Formal collection of people and various other resources established to accomplish a set of goals

Information systems personnel typically work in an IS department that employs:
- A chief information officer, systems analysts, computer programmers, and computer operators