About the Department

The Social Science Computing Department was established in 1994 in recognition of the increasing importance of social computing to the academic and professional development of students in the Faculty and the impact of computing disciplines on scholarship in the social sciences.

Since 1994, we have taught a number of undergraduate courses. Students can choose courses from our department during their third and fourth year in the Faculty. These students graduate with a minor in Social Science Computing.

In 2006 the Graduate Program was established. Our teaching and research connects disciplines across the social sciences: politics, economics, sociology, psychology, geography, history, philosophy with disciplines in computing as well as the natural and physical sciences.

Study

At the undergraduate level there are two compulsory courses for all Faculty students to provide an introduction to Social Computing. There are seven courses in the Minor providing an introduction to information-based societies, Internet studies and computational modeling in the social sciences. All courses are based on lectures and labs.

Students will learn about:

Complex social systems

The student is introduced to modeling techniques and models classification in particular computer modeling and simulation as a method to study social systems.

Students learn about dynamic models and chaos with examples of growth and predator-prey models; evolutionary models such as genetic algorithms and neural networks. Students also learn about interacting models such as cellular automata and artificial societies with applications related to cooperation and conflict, opinion dynamics, artificial stock markets.

Data, information and knowledge in society

The student will be introduced to database systems, information sciences and information systems that are helpful for solving social science problems. Databases are everywhere. For example, banks, hospitals, universities, and airlines and telecommunication companies.

Database systems are designed to manage large data which is so important to support decisions in most organizations. The student explores the ways in which collections of data are organized, stored, and analyzed. Topics include relational databases, basic ideas of data mining (the art of discovering useful information from large amount of data) and data visualization as a powerful tool to condense diffused verbal information into a compact and quickly understood graphical images.

Students will learn about geographic information systems, knowledge-based and decision support systems sciences and web-based systems.
Internet studies

The Internet has quickly become a central part of our work and life. Its amazing success goes beyond the wildest dreams of its inventors. Our courses are designed for students who use computers and the Internet but don't fully understand how it all works.

In addition our courses aim at raising the awareness of students about how Economic growth and technology are inextricably linked and how technology has the potential to radically change the way politics and administration are conducted and experienced.

Students learn about components of the computer, networks, the Internet and how it works, web-site development, and more. Through discussions of current events, students are exposed to the digital society, social networks, and latest e-technologies by high-lighting current concepts, challenges, and applications related to e-commerce, e-government, and e-politics.

**Undergraduate Courses**

<table>
<thead>
<tr>
<th>Compulsory</th>
</tr>
</thead>
<tbody>
<tr>
<td>First year Computer applications in modern information-based societies (1)</td>
</tr>
<tr>
<td>Second year Computer applications in modern information-based societies (2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third year Information infrastructure</td>
</tr>
<tr>
<td>Applied information systems</td>
</tr>
<tr>
<td>Database management systems</td>
</tr>
<tr>
<td>Fourth year Electronic-commerce systems</td>
</tr>
<tr>
<td>Electronic-government systems</td>
</tr>
<tr>
<td>Decision-support systems</td>
</tr>
<tr>
<td>Computational modelling for the social sciences</td>
</tr>
</tbody>
</table>
**Computer applications in modern information societies (1): SSC1511**

**Category:** Compulsory course for all Faculty students

| **Aims** | The Internet has quickly become a central part of our work and life. The amazing success of the Internet goes beyond the wildest dreams of its inventors. This course designed for students who use computers and the Internet but don't fully understand how it all works, this course fills in the gaps. In addition this course aims at raising the awareness of students about how economic growth and technology are inextricably linked and how technology has the potential to radically change the way politics and administration are conducted and experienced |
| **Learning outcomes** | Upon completion of the course the student should have acquired basic knowledge concerning: (1) components of the computer, (2) networks, (3) the Internet and how it works, (4) website development, (5) digital society, (6) e-commerce, e-politics and e-government technologies. Students learn how to compare new media and explain how they can be effectively used in e-commerce and e-politics |
| **Skills** | The course stimulates students to produce computer-based solutions of relevant problems. Students are assisted in: communicating effectively with a range of audiences; functioning effectively on teams to accomplish a common goal; developing skills needed to become an effective problem solver when facing challenging or difficult situations. |
| **Content** | Major topics covered in the course: (1) Introduction to the world of computer; (2) Computer’s Hardware; (3) Computer’s Software; (4) Networks; (5) Web Design; (6) Introduction to E-commerce; (7) Introduction to E-politics |
**Computer applications in modern information societies (2): SSC1521**

**Category:** Compulsory course for all Faculty students

| Aims | The social sciences are not a single unified discipline with a common approach, methodology, and orientation. However, there are some general concepts and methodologies that are applicable across the social sciences. This course provides an introduction to some of these concepts and methodologies: systems thinking, information systems and databases, programming concepts and social simulation. We provide an insight into the mix of technical and social matters that shape our current society and the advances that could be achieved by social simulation. |
| Learning Objectives | Students should be able to  
1. Differentiate between the scientific and the system approach of problem solving  
2. Learn the first steps to design a computer program.  
3. Gain an understanding of new methods in studying topics in the social sciences like cellular automata, simulations, genetic algorithms and agent based modelling. |
| Skills | The course stimulates students to use the system approach to think about solutions of relevant problems. |
| Content | Major topics covered in the course:  
**Introduction to Systems approach**  
**Database System and Information System**  
Introduction to the main concepts of database systems  
The relational data model  
Introduction to information systems and types of information systems  
Examples of database systems and information systems  
**Programming Concepts**  
Problem solving and algorithms  
Algorithms, flowcharts and pseudocode  
Introduction to programming concepts  
**Social Simulation**  
Introduction to complex systems and agent-based social simulation  
Difference between the agent-based approach and the mathematical approach  
Examples in social simulation and complex systems |
**Information Infrastructure: SSC3511**

**Category:** Optional course for minor students

| Aims | 1. Introducing the students to the basic concepts of information societies and the roles of data / information in business activities.  
2. Introducing information infrastructure as a building block of the human knowledge, communication, collaboration, and networking for better intellectual practices  
3. Introducing the student to the tools and mechanisms of modern communication-based activities to maximize the benefits from the accumulations of human knowledge and practices.  
4. Recognizing applied examples from Banking, Financial agencies, and governmental organizations. |
|---|---|
| Learning outcomes | Understanding the roles of the information infrastructure technologies for better thinking and enhancing the practices of businesses and services.  
Increasing the competitive advantage of student by learning the first steps to design web pages. |
| Skills | Computing skills, information synthesis are assisted |
| Content | Introduction to Information Infrastructure: The key aspects of information infrastructure, the internet as the most popular and widespread information infrastructure.  
Network computing: Discovery, communication and collaboration; the communication process and goals, the future of internet communication; understanding of the collaboration concept.  
Data management: Focus on data mining techniques and tasks. Focus on data visualization using Geographical Information systems (GIS), the integration of GISs and global positioning systems.  
Web-based data management system: Vulnerability and computer crimes: protecting information resources and security on the web  
**Applied Information Systems: SSC3521**

**Category:** Optional course for minor students

| Aims | 1. Exploring the roles of applied information systems in modern business societies.  
2. Introducing the basic concepts and definitions, the components, and the life cycle of applied information systems (IS).  
3. Introducing the main types of IS (transaction processing systems; management information systems; decision support systems; expert systems; geographic information systems; web-based information systems)  
4. Introducing some successful examples of IS in the fields of business applications. |
| Learning outcomes | The student should have:  
1. A comprehension of concepts and definitions of IS: IS classifications  
2. An awareness of role of IS and fields of applications |
| Skills | Students should be able to employ computerized management information systems to handle business data i.e. to store, organize, update, manipulate and analyze data to extract information so as to solve business problems and to contribute to business success. |
| Content | 1. Introducing data, database management systems, and information technology as the main building blocks of IS.  
2. The role of IS in the problem solving approach.  
3. Designing IS as a tool for business planning and as an analytic support to information needs.  
4. Basic IS concepts, characteristics, and the life cycle.  
5. Types of applied IS (TPS- MIS- DSS-GIS-Internet-based IS)  
6. Examples of applications of different types of IS's in real life activities of organizational systems, knowledge-based systems, and decision support systems with emphasis on Internet based IS. |
Database Management Systems: SSC3531

**Category:** Optional course for minor students

| Aims | The course provides an introduction to database concepts, data models, data definition/manipulation languages and relational database design. The major goal is to gain familiarity with the basic technical concepts of database management systems and to be able to design databases. |
| Learning outcomes | Students should be able to:  
1. Produce a conceptual design of a database using EER modelling  
2. Convert the conceptual design to a logical design using the relational model  
3. Express queries to the relational model using SQL  
4. Perform normalization as necessary for good relational database design  
5. Construct a database schema  
6. Enter data, perform updates, and query a database using one or more application database software packages  
7. Produce a formal document and presentation for database semester project. |
| Skills | Assist the student to:  
1. Analyze a problem and identify and define the computing requirements appropriate to its solution.  
2. Communicate effectively with a range of audiences. Since database administrators and others involved with database software and hardware must develop good communication skills.  
3. Function effectively on teams to accomplish a common goal. |
| Content | Major topics covered in the course  
1. Introduction to database systems and concepts.  
2. Entity relationship (ER) modelling  
3. Enhanced Entity relationship (EER) modelling  
4. Relational database model  
5. Mapping EER to a relational model  
6. Structured query language (SQL)  
7. Practical database design and tuning  
8. Functional dependencies and normalization  
9. New trends in databases (data mining, data warehouses) |
**Electronic-commerce systems: SSC4511**

**Category:** Optional course for minor students

| Aims | 1. Enable students to understand how e-commerce systems have become instrumental to people, institutions, businesses and governments around the globe  
| | 2. Define and describe basic concepts and components of e-commerce systems  
| | 3. Comprehend strategic business planning for the Internet  
| | 4. Describe the many aspects that shape e-commerce systems in the future |

| Learning outcomes | At the end of the course students should be able to:  
| | 1. Compare between e-commerce & e-business  
| | 2. Evaluate a BM website from the perspective of BM components  
| | 3. Make a BM that serves specific issues  
| | 4. Evaluate a BM website from the perspective of BM security dimension |

| Skills | Students learn how to relate concepts and definitions of business models, security dimensions, electronic payment systems, electronic auctions and social networks and how to analyze them within an interactive environment. |

| Content | Major topics covered:  
| | 1. Introduction to e-commerce concept  
| | 2. E-commerce & e-business  
| | 4. Applied e-commerce business models  
| | 5. E-commerce communication security  
| | 6. Payment systems and in e-commerce  
| | 7. Ethical, social and political challenges and limitations triggered by the deployment and expanded use of e-commerce systems and nature of online auctions and its types.  
| | 8. The future roles of the e-commerce systems |
**Electronic-government systems: SSC4521**

**Category:** Optional course for minor students

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<tr>
<th>Aims</th>
<th>The target of this course is to lay the foundations of e-government as an emerging interdisciplinary area of research and practice and stressing the potential offered by Internet for a greater interactivity between the public and political spheres.</th>
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</table>
| Learning Outcomes | Upon completion of the course the student should be able to:  
1. Explain how the Internet is disrupting old political behaviours and enabling new innovative approaches to governance and advocacy  
2. Define Internet impact on State-citizen relationship  
3. Distinguish between digital divide and digital citizenship  
4. Identify virtual communities (such as e-learning and social network communities)  
5. Explain how the Web is changing traditional government/politics  
6. Analyse different types of digital representation and identify “two-way forms of communication”  
7. Classify different types of e-participation (e-petitioning, online referenda and e-consultation)  
8. Critique the old political assumptions of central control and scarce resources  
9. Discuss power shifts from secrecy to transparency, from mass media to the networked public sphere |
| Skills | The student should gain the skills of:  
1. Practicing democracy without the limits of time, space and other physical conditions, using e-services (e.g. e-Voting, e-campaigning and Micro targeting),  
2. Conducting on line advocacy campaign using on-line techniques (blogs, social networks, RSS) |
| Content | Major topics:  
Internet Freedom and its Discontents  
The Politics of the Internet  
Digital Citizenship  
Virtual Communities  
Digital Democracy  
E-participation  
On-line advocacy (the 2008 Barack Obama campaign as an example)  
Digital parliaments  
Two way forms of Communication between citizen and Government  
Internet and the Changing Conception of Power |
### Decision Support Systems: SSC4531

**Category:** Optional course for minor students

| Aims                                                                 | 1. The study of decision support systems and intelligent systems for social scientists decision-makers  
2. Building and implementing decision support systems  
3. Using decision support systems in making decisions |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Learning outcomes                                                   | The student should gain:  
1. Comprehension of concepts in the study of decision support and intelligent systems  
2. Appreciation of advantages and limitations decision support and intelligent systems  
3. Awareness of different types of decision support systems  
4. Necessary tools and procedures for building decision support systems |
| Skills                                                              | Analytical skills; computing skills |
| Content                                                             | Main topics covered  
1. Organized information needs and flow  
2. Emergence of DSS  
3. Introduction to DSS  
4. Structure and components of DSS  
5. Types of DSS: personal and group  
6. DSS development approaches and tools  
7. Knowledge acquisition, representation  
8. Intelligent systems and intelligent DS  
9. Case studies |
## Computational modelling for the social sciences: SSC4541

**Category:** Optional course for minor students

| Aims                                                                 | 1. To enable students to be aware of the most widely used social modelling approaches and well-known models  
|                                                                     | 2. To be able to use simulation software apply and apply to well-known social models |
| Learning outcomes                                                   | At the end of the course students should be able to:  
|                                                                     | 1. Describe, deal with and apply the most widely used social computational models  
|                                                                     | 2. Use simulation software  
|                                                                     | 3. Interpret simulation results |
| Skills                                                              | Modelling skills; information synthesis and computing skills are assisted |
| Content                                                             | Major topics covered  
|                                                                     | 1. Modelling and models classification; mathematical foundations; computer modelling versus analysis  
|                                                                     | 2. Dynamic simulation models; chaos; growth models; systems simulation  
|                                                                     | 3. Evolutionary models; genetic algorithms; neural networks; examples in politics and economics  
|                                                                     | 4. Micro-analytic and multi-level simulation  
|                                                                     | 5. Multi-agent models; cellular automata; artificial societies  
|                                                                     | 6. Examples: logistic growth model, prisoner’s dilemma game, cobweb model, game of life, opinion dynamics  
|                                                                     | 7. Introduction to NETLOGO |
**Employment possibilities**

Our graduates may find employment in:
- Research centers studying economic, social and political behavior
- In planning departments of public and private institutions
- Analysis of online data and economic patterns in internet companies

**Further studies in social science computing**

If you wish to continue your study in social science computing here are some of the possibilities in Egypt and abroad

**In Egypt**
The department offers an MSC program in social science computing

**Abroad**
Here are some of the university degrees
- George Mason University
  - Computational social science: Masters in interdisciplinary studies
  - [www.css.gmu.edu](http://www.css.gmu.edu)
  - PhD program in computational social sciences
  - [http://socialcomplexity.gmu.edu/phd.php](http://socialcomplexity.gmu.edu/phd.php)
  - Internet-related studies
  - The Oxford internet institute offers a Masters program in social science of the Internet
  - [http://www.oii.ox.ac.uk/](http://www.oii.ox.ac.uk/)