AMCIS 2020

IS2020

UPDATING THE MODEL CURRICULUM

IS 2020 --- time for review and revision

IS 2010 (Topi, et al)

IS 2002 (Gorgone, et al)

IS’97 (Longenecker et al)

IS’90 (Longenecker, et al)

DPMA ’86 (DPMA)

IS’81 (Nunamaker, et al)

IS’72 (Teichroew, et al)
PANEL SCHEDULE

▸ Introduction
▸ Key principles identified by the Exploratory Taskforce
▸ Articulation of concerns with IS2010 model curriculum
▸ Changing industry expectations: adequacy of IS2010
▸ Current model curriculum trends - competency models
▸ Draft: IS2020 Competencies / Curriculum Map
  ▸ sample competency statement, knowledge/skills
▸ IS2020 project schedule
▸ Open discussion
▸ Please feel free to ask/comment at any point!
IS2020 CURRICULUM TASKFORCE

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GUIDING PRINCIPLES (EXPLORATORY TASKFORCE)

The model curriculum should:
1. represent a consensus from the IS community.
2. be designed to help IS programs produce competent and confident entry-level graduates well suited to workplace responsibilities.
3. guide but not prescribe.
4. be flexible and adaptable to most IS programs.
5. not be restricted to a specific application domain.
6. determine whether the model curriculum must have a core of content that is common to all IS programs globally.
7. not focus on specific issues related to pedagogy.
8. be coordinated and aligned with CC2020.
PRELIMINARY TIMELINE  (weekly virtual taskforce meetings)

- First F2F meeting - Cancun, 8/2019
- AIS AMCIS - Cancun, 8/2019
- EDSIGCon - Cleveland, 11/2019
- Second F2F meeting - Munich 12/2019
- AIS SIGEd, Munich 12/2019
- ACM SIGCSE - Portland, 3/2020 Moved to virtual format
- ACM-SIGMIS – Nuremberg, 6/2020 Moved to virtual format
- AIS-AMCIS – Salt Lake City, 8/2020 Moved to virtual format
- EDSIGCon - Clearwater, 11/2020 Moved to virtual format
- Target First Draft: AIS ICIS – Hyderabad, 12/2020
- Publication of guidelines, targeted for spring/summer 2021
- IS2020 as a living document
PREVIOUS APPROACHES

- IS curricula (IS 2002, IS 2010, and MSIS 2016) have been represented mainly through courses: Core and Electives
  - For each course, defined learning objectives and topics
  - Emphasis on a course-specific view
- IS 2010: Specified program-level graduate capabilities at a high level of abstraction, but no mapping to the course level

Source: MSIS 2016: Global Competency Model for Graduate Degree Programs in Information Systems
For those readers who know IS 2002 well and in order to illustrate recent changes in the field, this section will discuss the differences between IS 2010 and the previous curriculum recommendation, IS 2002.

There are several major differences between the course recommendations in these two independent volumes. The following list these major differences and describes in detail why the task force implemented these changes.

1. Status of Application Development in the curriculum. One of the more noticeable changes to the IS model curriculum is the removal of application development (IS 2002.5 Programming, Data, File, and Object Structures) from the prescribed core. It is important to understand that although application development is not included in the core, it has not been removed from the IS program, and the task force acknowledges that a strong case can be made for inclusion of programming, computational thinking, data structures, and related material in an IS program (see, for example, Topi et al., 2008). Application development can still be offered in most IS programs. By offering application development as an elective the IS 2010 model curriculum increases its reach into non-business IS programs while also creating flexibility for curricula that choose to include an application development course. The programs that want to go even further and include a sequence of programming courses can choose from approaches introduced either in the Computer Science or in the Information Technology curriculum volumes (CS 2008 or IT 2008, respectively).

2. Inclusion of both enterprise architecture and IT infrastructure – The IS 2002 model curriculum includes both an IT Hardware and System Software course (IS 2002.4) and a Network and Telecommunication course (IS 2002.6) to edify the concepts and practices related to IT infrastructure. The IS 2010 model curriculum proposes a different approach, which integrates the material included in IS 2002 into IS 2010.5 IT Infrastructure course and introduces a new IS 2010.3 Enterprise Architecture course that focuses on concepts...
IS 2010 ACM/AIS CURRICULUM GUIDELINES FOR INFORMATION SYSTEMS

Website Data from 44 Information Systems Departments

1. Foundations of Information Systems (100% required)
2. Data and Information Management (91% required, 9% elective)
3. Enterprise Architecture (24% required, 12% elective, 64% not evident)
4. IS Project Management (35% required, 24% elective, 41% not evident)
5. IT Infrastructure (35% required, 24% elective, 41% not evident)
6. Systems Analysis and Design (38% required, 24% elective, 38% not evident)
7. IS Strategy, Management, and Acquisition (41% required, 18% elective, 41% not evident)
Learning Outcomes and Competencies

- Learning Outcome (LO)
  
  ▶ “relate to the knowledge, skills, and behaviours that students acquire as they progress through the program” (ABET)
  
  ▶ Example: Acquire system requirements specification skills

- Competency (CE)
  
  ▶ *What an individual is able to **DO** on completing a course* (Baumgartner and Shankararaman. 2013)

- CC2020
  
  Competencies = Knowledge (K) + Skills (S) + Dispositions (D)
  
  Competency Leaf Framework: In the context of a competency, a disposition helps to order knowledge and skill in context; to connect the ability (knowledge and skill) with the follow-through of the appropriate behavior. (Frezza et al., 2018)
Competencies = Knowledge (K) + Skills (S) + Dispositions (D)

- **Knowledge** - a fact/idea that enables satisfactory performance of relevant tasks
- **Skill** - a degree of mastery in applying a fact/idea to achieve a valued outcome
- **Dispositions** - values and motivation that moderates skilled behavior to influence a quality of professional performance
COMPETENCY BASED IS 2020 ACM/AIS CURRICULUM GUIDELINES FOR INFORMATION SYSTEMS

**Foundations**
- Foundations of Information Systems

**Data/Information**
- Data / Info. Management (incl. Database)
- Data / Business Analytics (incl. Data Mining, AI, BI)
- Data/Info. Visualization

**Technology**
- IT Infrastructure (incl. Networking, Cloud)
- Secure Computing
- Emerging Technologies (e.g. IOT, blockchain, etc.)

**Development**
- Systems Analysis & Design
- Application Development / Programming
- Object-oriented Paradigm
- Web/Mobile programming
- User Interface Design

**Organizational Domain**
- Ethics, use and implications for society
- IS Management & Strategy
- Digital Innovation
- Business Process Management

**Integration**
- IS Project Management
- IS Practicum

**Required content**
- Elective / Recommended
SAMPLE COMPETENCY
DIGITAL INNOVATION

Competency Statement:

New information technologies are transforming how innovations are created, distributed, and commercialized. Explores theoretical and practical aspects of emerging and existing digital innovation, their potential impact, disruption, and transformation on business and society. It is advised that this should occur through practical hands-on application and theoretical business modeling. The practical implications of digital innovation and entrepreneurship focus on the practices for digital innovation creation, distribution, and commercialization as well as the necessary digital strategies for management.

Competencies:
1. Articulate and critically reflect on the unique features that an application of emerging technology may offer.
2. Demonstrate knowledge of the role of digital business technologies in social and mobile domains.
3. Identify and critique characteristics necessary for digital innovation.
4. Identify and validate an opportunity to develop a new digital business model
5. Identify and evaluate key issues related to implementation and infrastructure issues.
6. Identify and assemble the required resources, processes, and partners to bring a digital business model to fruition
7. Practically demonstrate the investigation and application of a new innovation

Competence 1: Articulate and critically reflect on the unique features that an application of emerging technology may offer.

Knowledge/Skill Pairs:

<table>
<thead>
<tr>
<th>Knowledge Element</th>
<th>Skill Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emerging digital technology areas</td>
<td>1 - Remember</td>
</tr>
<tr>
<td>Methods to learn about emerging technology areas</td>
<td>3 - Apply</td>
</tr>
<tr>
<td>Methods to articulate and critically reflect offerings of a particular new digital technology</td>
<td>3 - Apply</td>
</tr>
</tbody>
</table>
The IS ethics, sustainability, use, and implications for society competency area is concerned with practices associated with the ethical use of information systems and the ethical use of the information and data captured by such systems; designing, implementing, and using computing resources in a sustainable environmentally conscious manner; and competencies associated with how information systems may be used and created for the benefit of society.

1. Ethics, within the information systems ecosystem, reflects agreed moral codes of practices and control associated with the use of information systems through the: collection of data, the creation & storage and its sharing of information. As such ethical codes that govern both the use or dissemination of data must apply to both the information systems and the society in which it exists. The information system practitioner must be cognizant of these ethical codes and its implications for society.

   Students will explore and understand the societal implications of disseminating information.

2. Information systems sustainability reflects an imperative that such systems and their data sources must be adaptable, relevant to all stake-holders and support the maintenance of data captured by such systems; through its design, implementation, and use of computing resources. Such data is constantly transformed through sustainable process, actions and performance to support the organization, individual and society at large.
SAMPLE COMPETENCIES
IS ETHICS, SUSTAINABILITY, USE AND IMPLICATIONS FOR SOCIETY

1. Explore and understand aspects of ethical behaviour regarding the collection of data.
2. Explore and understand the moral issues surrounding the storage and use of data.
3. Understand widely used ethical philosophies and how to apply them to situations that lead to ethical computing practices.
4. Investigate ethical codes of practice and their implications for society.
5. Understand aspects of sustainability and adaptable systems and data sources.
6. Explore stakeholders and their relevance to IS.
7. Investigate sustainable processes, actions and performance to support organisations.
8. Investigate sustainable processes, actions and performance to support the individual.
9. Investigate sustainable processes, actions and performance to support society at large.
### Competency 1:
Explore and understand aspects of ethical behaviour regarding the collection of data.

<table>
<thead>
<tr>
<th>Knowledge Element</th>
<th>Skill Level (Bloom’s Cognitive Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>International laws and regulations governing the collection of data</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>Country specific laws and regulations governing the collection of data</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>State and local laws governing the collection of data</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>How data is collected via mobile devices</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>How data is collection via websites</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>How data is collected via social media</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>How data is collected via email</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>How data is collected via wearable devices</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>How data is collection via websites</td>
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<td>2 - Understand</td>
</tr>
<tr>
<td>How data is collected via email</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>Common ethical philosophical frameworks</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>Basic principles governing ethical decision making</td>
<td>2 - Understand</td>
</tr>
</tbody>
</table>
A key function of any information system is an ability to transform data into information in support of organizational or personal goals. The software that developed in parallel to operate computer hardware has evolved to extend the utility of computation has evolved into myriad applications that are both pervasive and ubiquitous in everyday life. Thus, the principle importance of this facet of the IS curriculum is twofold:

1. **Programming** is the language of computation and logic that sequences and orders instructions to computing hardware in a manner that realizes both correct results and discernable results. Logical structures, algorithms, arithmetic facilities, and the ability to input, store, transform, and output data that can be purposefully used to inform decisions and automated intentional processes are at the heart of learning to program. To program a computer is to meet the computer “in the middle” such that the growing capabilities of data and computing can be purposefully guided. Programming is meant to shape the mind and reasoning such that human requirements for data and computing outcomes can be expressed and perfected.

2. **Application Development** is the purposeful application of programming fundamentals to craft usable and useful software artifacts and systems to solve actionable business and organizational problems where the power and automation of computing and data processing is warranted. Elements of design, to include reconciliation between human social systems and data and information systems, support a software/systems development life-cycle where the industry and craft software realization extend capabilities of software and programming code elements and our understanding of fit and resonance with the human end-users of these systems. In this regard, an information systems perspective on application development, although akin to software engineering, includes the necessary elements of human-computer interaction, user experience, and other sociological and psychological components that constitute user and organizational acceptance and satisfaction.
SAMPLE COMPETENCIES
APPLICATION DEVELOPMENT AND PROGRAMMING

Programming-Related Competencies:
1. Develop data storage strategies using primitive data types in a computer’s volatile memory
2. Apply data transformations using arithmetic, assignment, and transpositional operators
3. Develop predicate expressions using relational and logical operators
4. Express algorithmic problem solving using sequence, selection, and repetition structures
5. Modularize the algorithmic and operating capabilities of a program using functions, methods, subroutines or similar organizing structures.
6. Select and utilize appropriate linear and non-linear data structures to maintain and manage sets of related data in non-volatile memory.
7. Utilize Object-Oriented concepts in the organization and structuring of programs for behavior and concept management

Application Development Related Competencies:
8. Conduct a systematic requirements analysis to determine the basic facts used to organize the application of programming effort to solve a problem or reach a goal
9. Formalize and communicate requirements in a manner that is comprehensible for all stakeholders that will determine the success of the software system
10. Specify the software system architecture such that the principal components and dependencies of the system are visible and comprehensible for all involved in shaping the materials of design and construction
11. Identify the lateral components and libraries that the designed and developed system will depend on
12. Develop the programming code implementation that realizes the system architecture and design.
13. Test all developed programming code components to ensure fidelity, consistency, and fit.
14. Maintain software throughout deployment and utilization such that extant or new intentions and requirements are accommodated such that the intended purpose will function.
15. Adopt, or adapt, an appropriate software systems process methodology such that people, resources, design requirements and other dynamic considerations allow for correctness and utility.
16. Establish and maintain the appropriate dialog among stakeholders that ensure a degree of communication and information transparency to maintain the viability of the software system.
**Competency 3:**

Develop predicate expressions using relational and logical operators

<table>
<thead>
<tr>
<th>Knowledge Element</th>
<th>Skill Level (Bloom’s Cognitive Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How mathematical expressions resolve multiple operations to a single value</td>
<td>2 - Understand</td>
</tr>
<tr>
<td>Develop Boolean predicates utilize relational operators</td>
<td>3 - Apply</td>
</tr>
<tr>
<td>Develop compound predicate expressions using logical operators</td>
<td>3 - Apply</td>
</tr>
<tr>
<td>The relationship between logical operations and computer processor architectures</td>
<td>2 - Understand</td>
</tr>
</tbody>
</table>
IS2020 AS A LIVING DOCUMENT

▪ Purpose: Designing IS2020 as a ‘living artifact’, to be continuously debated and updated based on ongoing insights and developments from academic and professional communities

▪ Initial ideas/questions:
  ▪ Interactive digital platform/forum/apps?
  ▪ Annual panels in academic/professional conferences?
  ▪ Permanent joint committee?
  ▪ Other?
Comment/feedback tool coming soon for you to contribute to this process.