Development of an IT Curriculum

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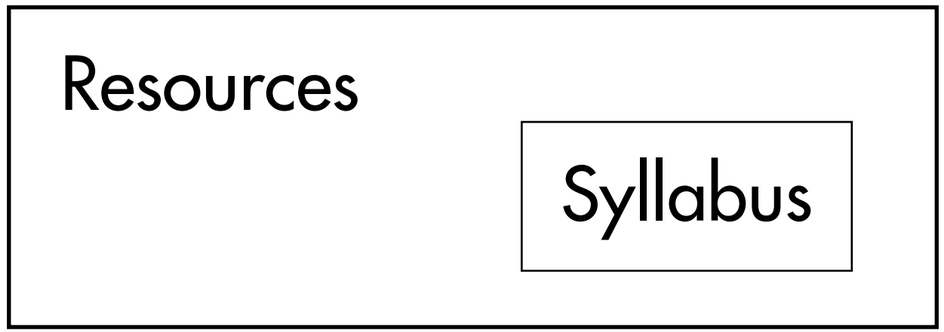
Curriculum

A **curriculum** consists of everything that promotes learners' intellectual, personal, social and physical development. As well as lessons and extracurricular activities, it includes approaches to teaching, learning and assessment, the quality of relationships within university, and the values embodied in the way the university operates.



Curriculum: A Framework for a Syllabus

Curriculum
A Framework for a Syllabus

Resources

Faculty Members: Academics and Practicians

Facility: Electricity, Clima control, etc.

Computing Infrastructure: Up to date hardware, software, and technical support, computer centre

Laboratory: Structured, open/public, specialized

Classroom: IT teaching resources, Multimedia Computer System, Internet

Library: Analog and digital access to journals, proceedings, monographs, reference books

Syllabus Design Guidelines

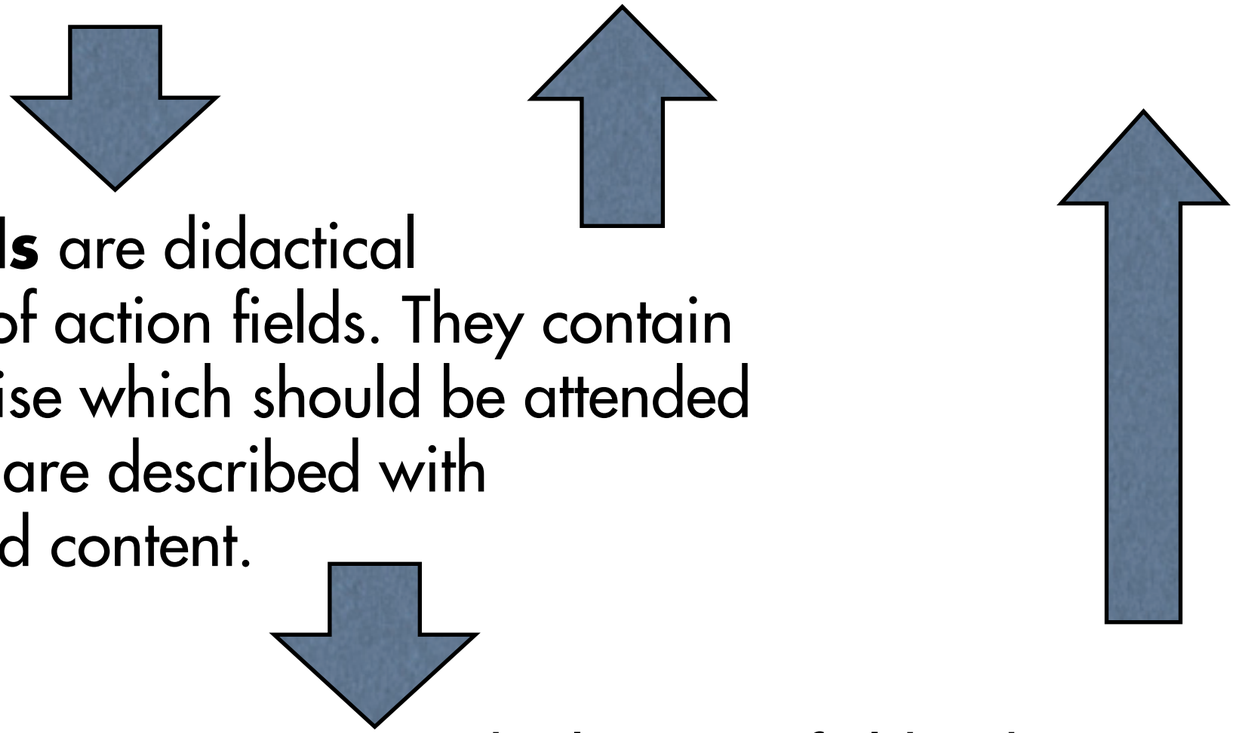
Syllabus Aims

Real-World Basis

The curriculum should have a significant **real-world basis**.

Learning Areas

Action fields are real-life tasks that should be managed. Action fields are multi-dimensional, they connect professional, individual and social problems.



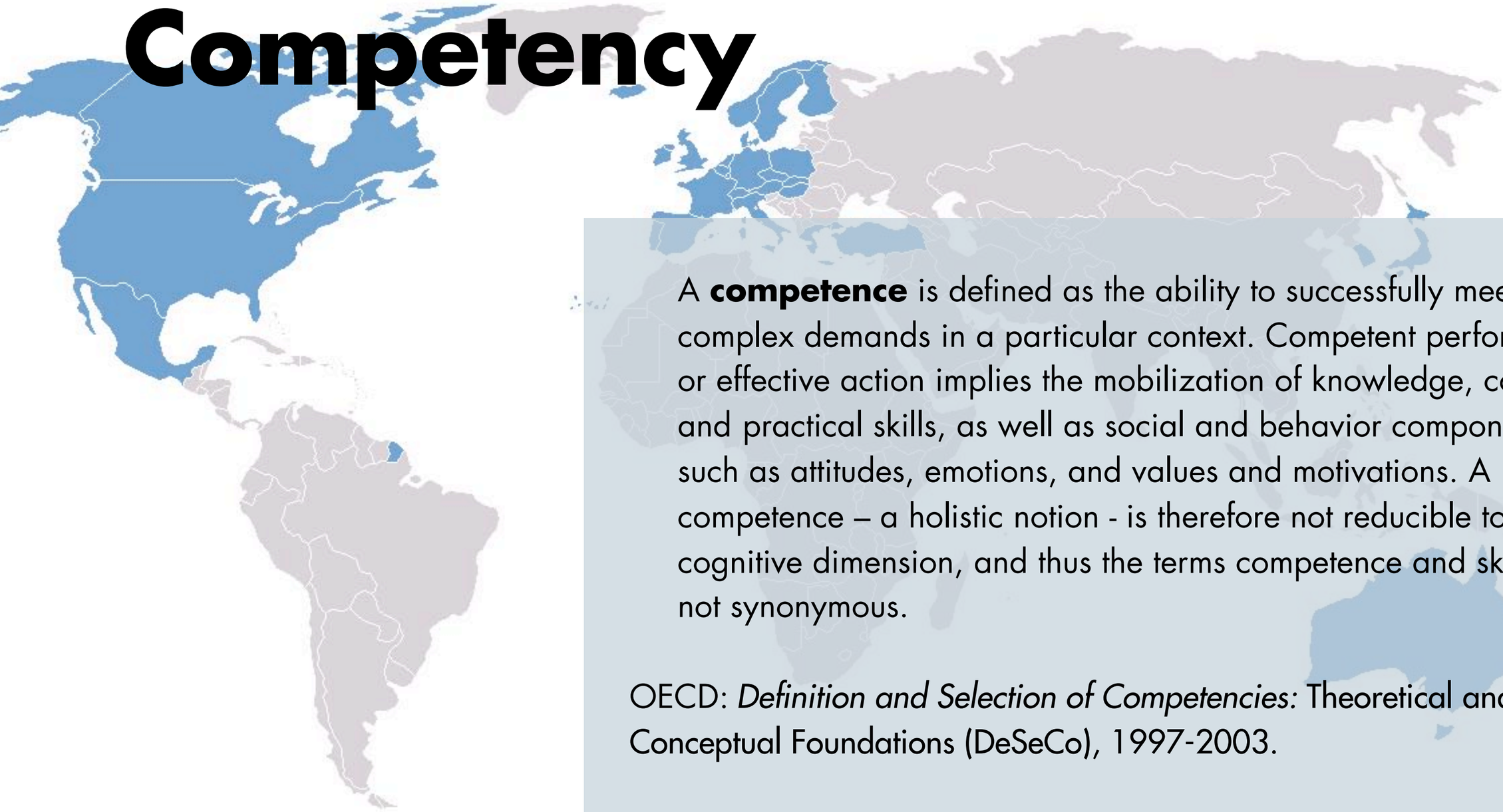
Learning fields are didactical transformations of action fields. They contain a complex exercise which should be attended practically. They are described with competencies and content.

Learning situations concretise the learning fields. They are the result of a didactical reflection of professional, individual and social action fields.

Outcomes

Curriculum designers and instructors must think in terms of **outcomes**.

Competency



A **competence** is defined as the ability to successfully meet complex demands in a particular context. Competent performance or effective action implies the mobilization of knowledge, cognitive and practical skills, as well as social and behavior components such as attitudes, emotions, and values and motivations. A competence – a holistic notion - is therefore not reducible to its cognitive dimension, and thus the terms competence and skill are not synonymous.

OECD: *Definition and Selection of Competencies:* Theoretical and Conceptual Foundations (DeSeCo), 1997-2003.

ANALYTICAL AND CRITICAL THINKING		
Organizational Problem Solving	**Ethics and Professionalism**	**Creativity**
Problem solving models, techniques, and approaches Personal decision making Critical thinking Methods to collect, summarize, and interpret data Statistical and mathematical methods	Codes of conduct Ethical theory Leadership Legal and regulatory standards Professionalism - self directed, leadership, time management Professionalism - commitment to and completion of work	Creativity concepts Creativity techniques The systems approach
BUSINESS FUNDAMENTALS		
Business Models	**Functional Business Areas**	**Evaluation of Business Performance**
Contemporary and emerging business models Organizational theory, structure, and functions System concepts and theories	Accounting Finance Marketing Human Resources Logistics and Manufacturing	Benchmarking Value chain and value network analysis Quality, effectiveness, and efficiency Valuation of organizations Evaluation of investment performance
INTERPERSONAL, COMMUNICATION, AND TEAM SKILLS		
Interpersonal	**Team Work and Leadership**	**Communication**
Listening Encouraging Motivating Operating in a global, culturally diverse environment	Building a team Trusting and empowering Encouraging Developing and communicating a vision/mission Setting and tracking team goals Negotiating and facilitating Team decision making Operating in a virtual team environment Being an effective leader	Listening, observing, interviewing, and documenting Abstraction and precise writing Developing multimedia content Writing memos, reports, and documentation Giving effective presentations

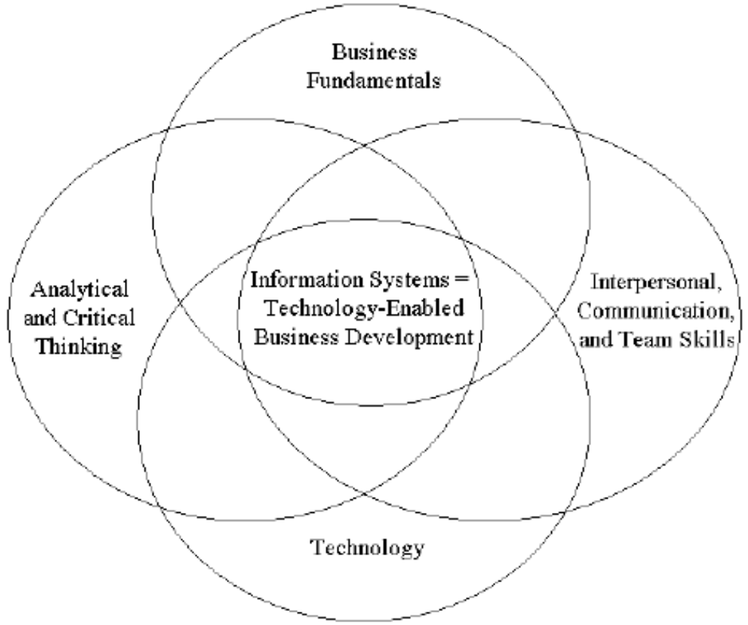
TECHNOLOGY			
Application Development	**Internet Systems Architecture and Development**	**Database Design and Administration**	**Systems Infrastructure and Integration**
Programming-principles, objects, algorithms, modules, testing Application development – requirements, spec's, development Algorithmic design, data, object, and file structures Client-server software development	Web page development Web architecture design and development Design and development of multi-tiered architectures	Modeling and design, construction, schema tools, and DB Systems Triggers, stored procedures, design and development of audit controls Administration: security, safety, backup, repairs, and replicating	Computer systems hardware Networking (LAN/WAN) and telecommunications LAN/WAN design and management Systems software Operating systems management Systems configuration, operation, and administration

INFORMATION SYSTEMS = TECHNOLOGY-ENABLED BUSINESS DEVELOPMENT		
Systems Analysis and Design, Business Process Design, Systems Implementation, IS Project Management		
Strategic utilization of information technology and systems IS planning IT and organizational systems	Systems analysis Logical and physical design Design execution Testing	Deployment Maintenance Use of IT Customer service

Association for Computing Machinery (ACM)

Association for Information Systems (AIS)

Association of Information Technology Professionals (AITP)



Information Science: Expected Outcomes

Principles

The underlying and enduring **principles** of computer science should be emphasized, rather than details of the latest or specific tools.

Microsoft Office

OpenOffice.org

Basic IT Knowledge

Computer Science – Core Units

Discrete Structures (DS)
Programming Fundamentals (PF)
Algorithms and Complexity (AL)
Architecture and Organization (AR)
Operating Systems (OS)
Net-Centric Computing (NC)
Programming Languages (PL)
Human-Computer Interaction (HC)
Graphics and Visual Computing (GV)
Intelligent Systems (IS)
Information Management (IM)
Social and Professional Issues (SP)
Software Engineering (SE)
Computational Science and Numerical Methods (CN)

The core refers to those units required of all students in all computer science degree programs

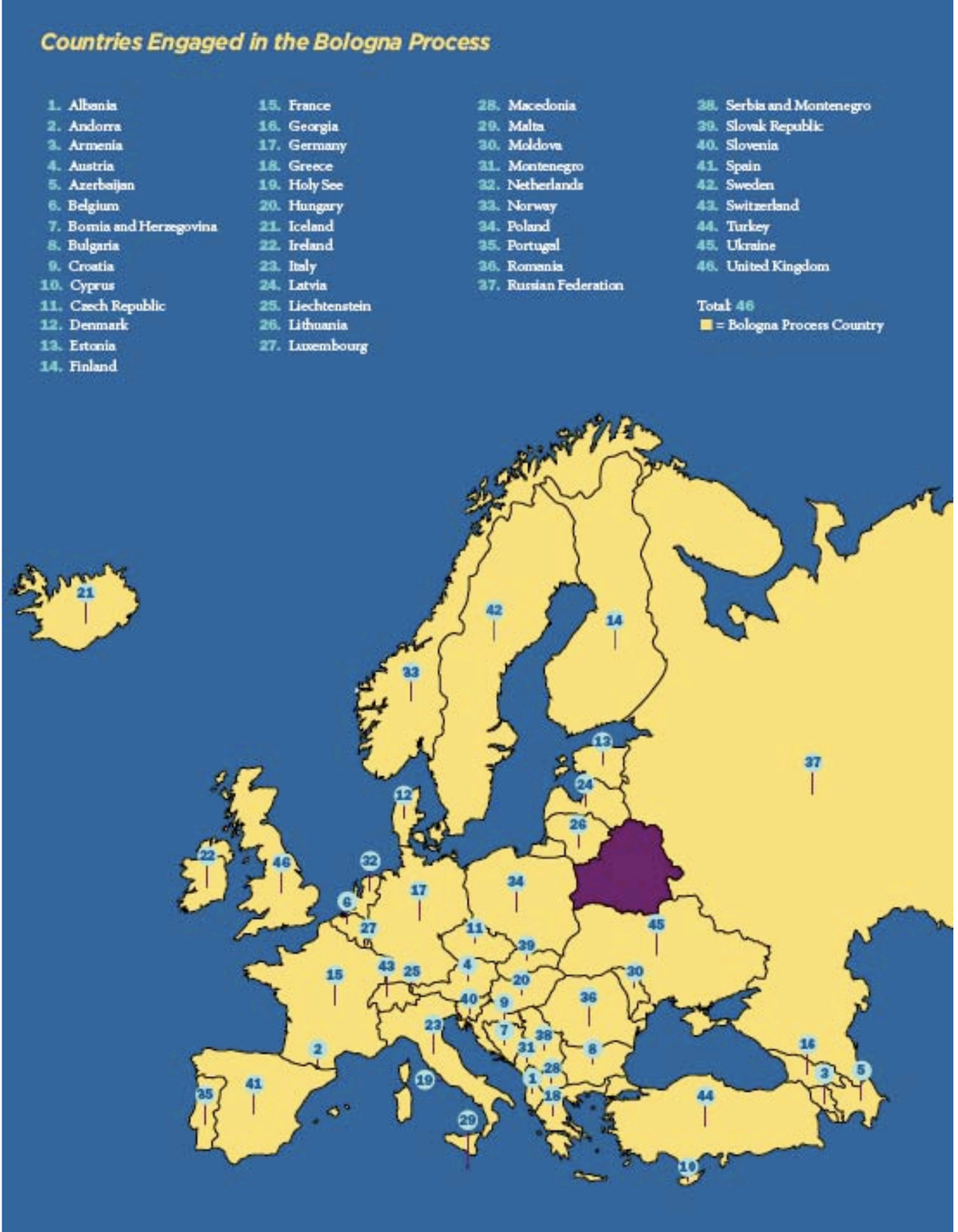
The core is not a complete syllabus.

Core units are not necessarily those taken in a set of introductory courses early in the undergraduate syllabus

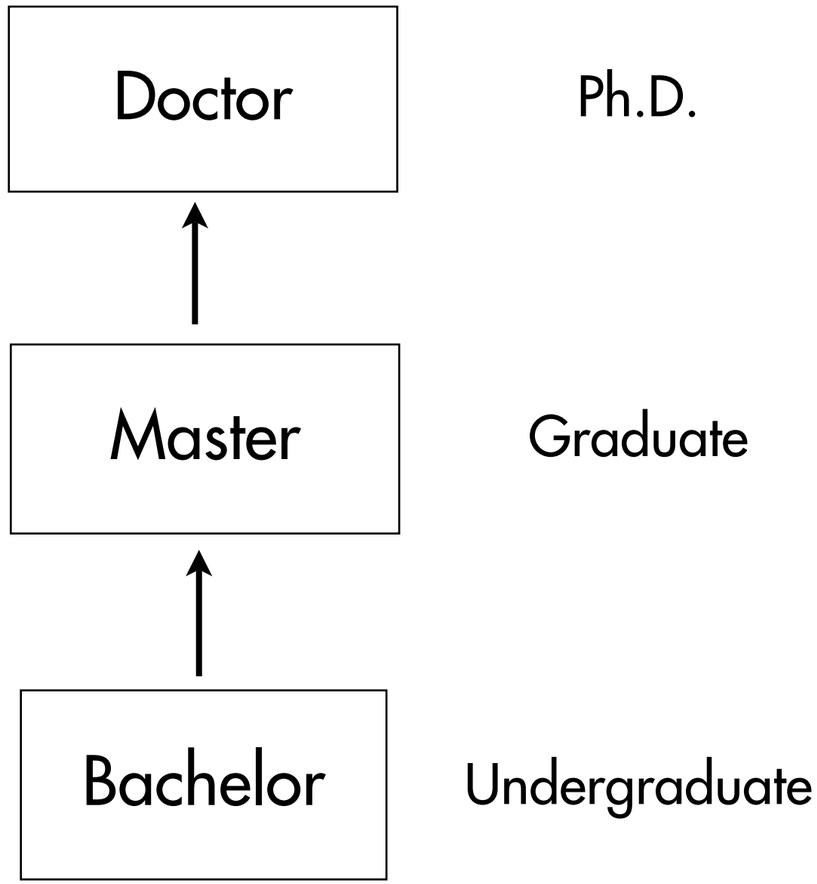
Syllabus Organisation

Maturity

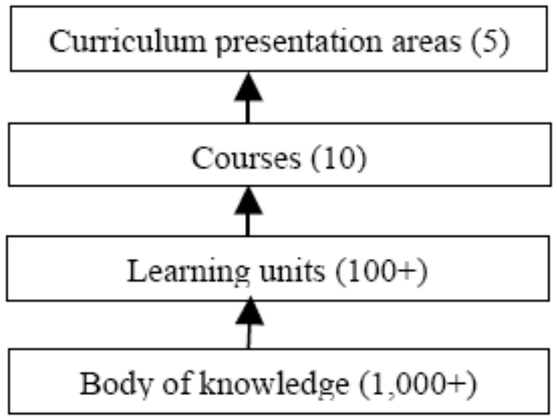
Learning certain computer science topics requires **maturity**, so these topics should be taught towards the end of the curriculum, while other material should be taught earlier to facilitate gaining that maturity.



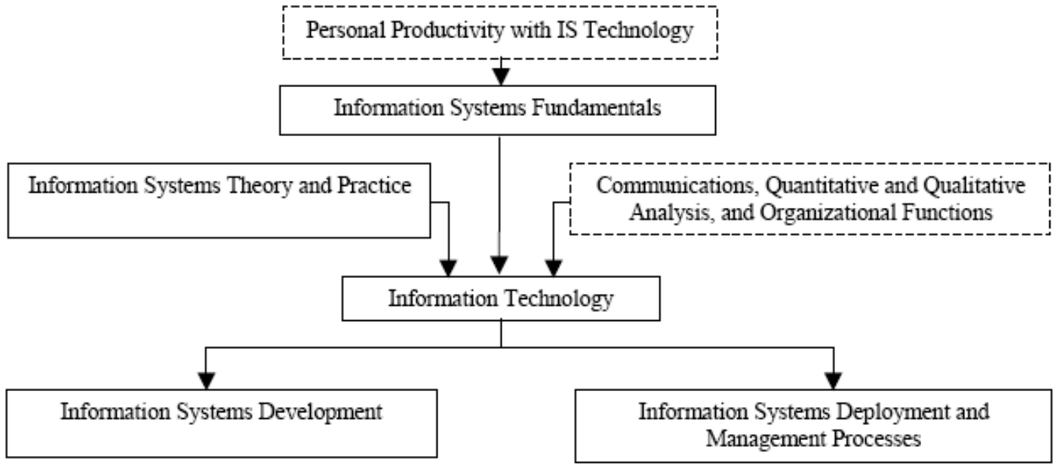
Bologna Process



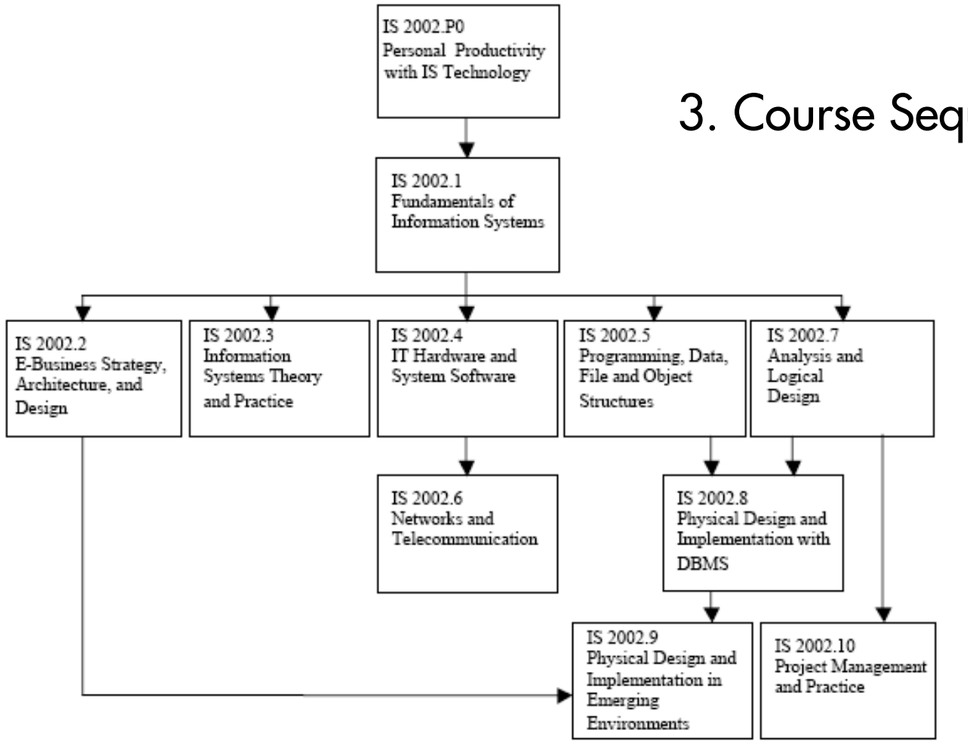
Design Levels



1. Sylabus Architecture



2. Presentation Areas



3. Course Sequence

IS 2002.1 – Fundamentals of Information Systems (Prerequisite: IS 2002.P0)

Learning Unit Number	Learning Unit Goal
5	to introduce systems and quality concepts
6	to provide an introduction to the organizational uses of information to improve overall quality
7	to present hardware, software, and related information technology concepts
8	to provide concepts and skills for the specification and design or the re-engineering of organizationally related systems of limited scope using information technology
9	to show how information technology can be used to design, facilitate, and communicate organizational goals and objectives

4. Learning Units

Sequencing Strategies

Integration First

IT Fundamentals

Programming Fundamentals

Computing Platforms

IT Systems

Web Systems

Networking

Databases

Human-Computer Interaction

Information Assurance and Security

Pillars First

IT Fundamentals

Programming Fundamentals

Fundamentals of Networking

Fundamentals of Web Systems

Fundamentals of Information Management

Fundamentals of Human-Computer Interaction

System Administration and Maintenance

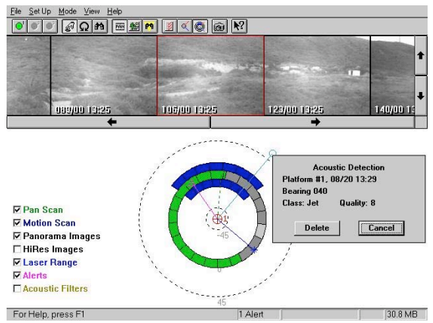
Integrative Programming

Information Assurance and Security

Professionalism

Ethical, legal, and **economic** concerns, and the notion of what it means to be a professional, should be raised frequently.

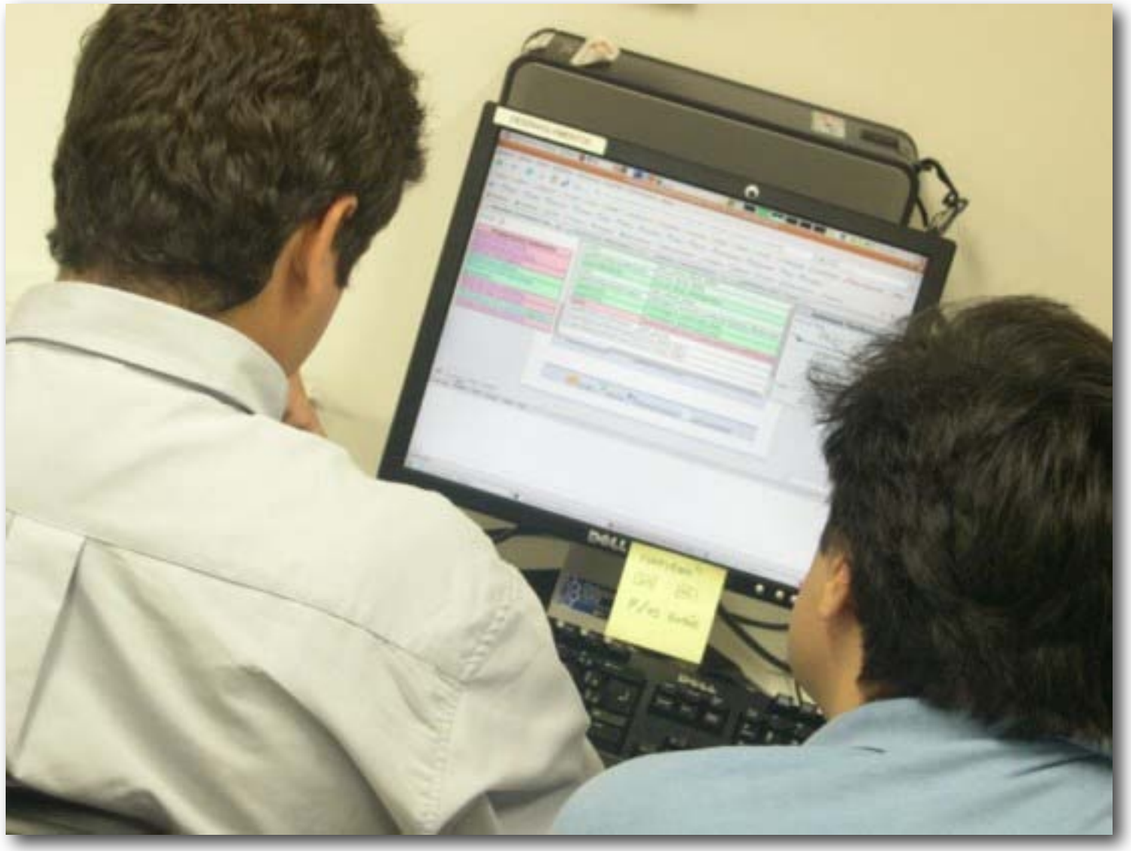
Military Research



Personal Skills

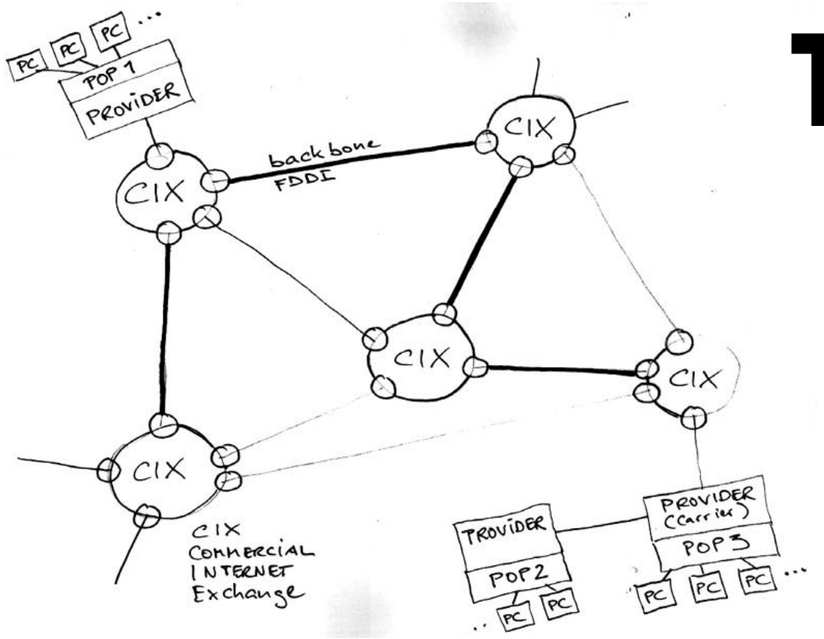
Students should be trained in certain **personal skills** that transcend the subject matter.

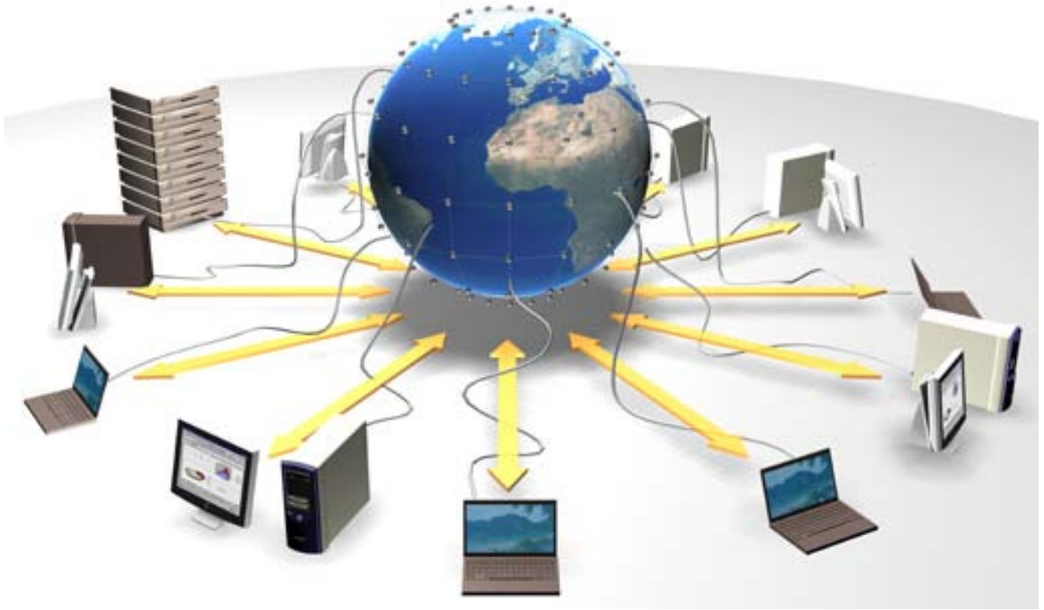
Computer Work is Teamwork



Flexibility

Curriculum designers must strike an appropriate balance between **coverage of material**, and **flexibility** to allow **for innovation**.





Technological Change

- The World Wide Web and its applications
- Networking technologies, particularly those based on TCP/IP
- Systems administration and maintenance
- Graphics and multimedia
- Web systems and technologies
- Service-oriented architecture
- E-commerce technologies
- Relational databases
- Client-server technologies
- Interoperability
- Technology integration and deployment
- Object-oriented event-driven programming
- Sophisticated application programmer interfaces (APIs)
- Human-computer interaction
- Security
- Application domains

Syllabus Teaching

Instructors

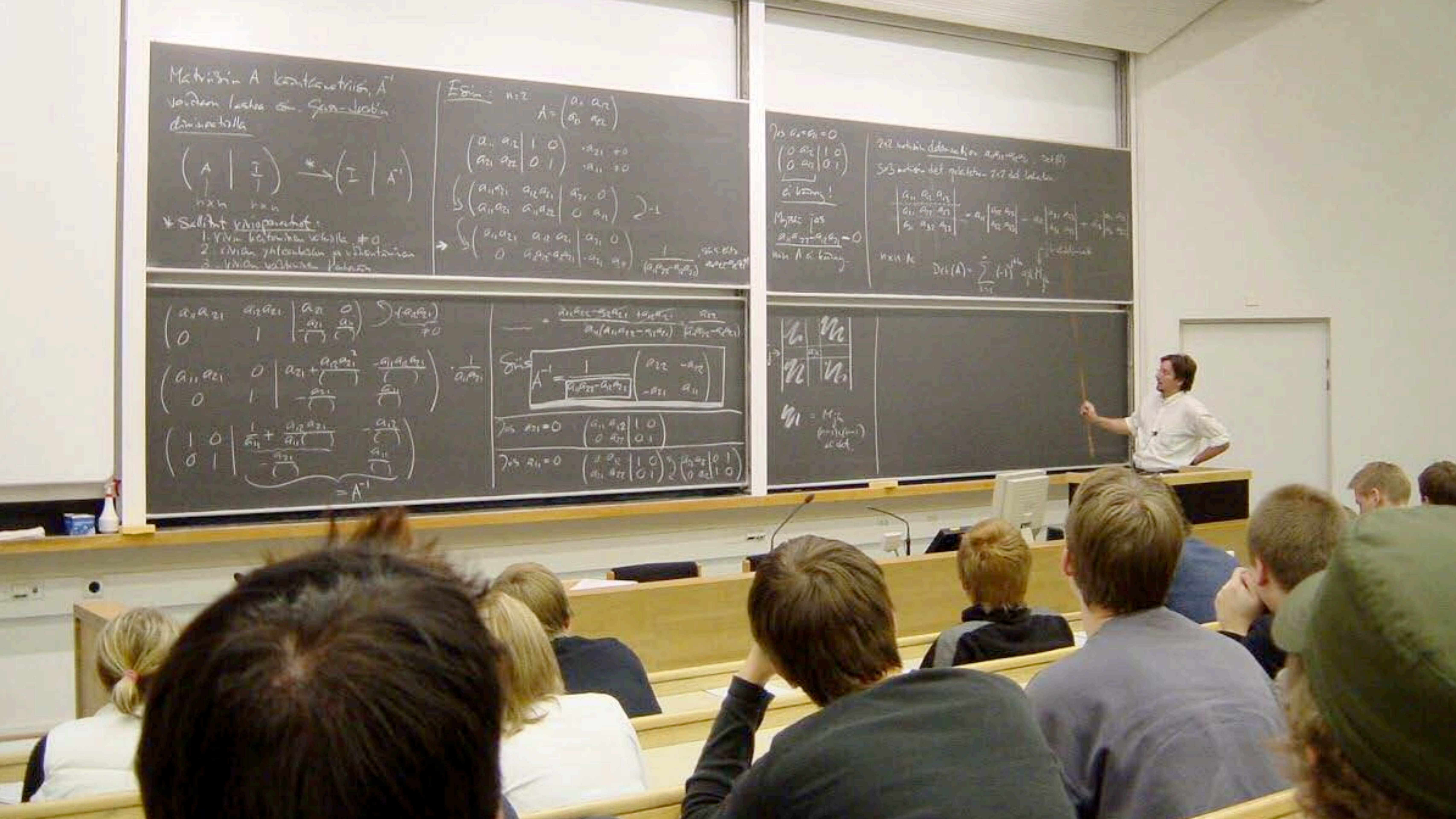
Curriculum designers and instructors must have sufficient relevant knowledge and experience and understand the character of their **topic.**

Examples

In order to ensure that students embrace certain important ideas, care must be taken to motivate students by using interesting, concrete and convincing **examples**.

Variety of Methods

Computer Science education in the 21st century needs to move beyond the lecture format: It is therefore important to encourage consideration of a **variety of teaching and learning approaches**.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Thank You