

UNDERGRADUATE PROGRAMS IN INFORMATICS: ACM/IEEE RECOMMENDATIONS & NEW ORGANIZATIONAL MODELS FOR TURKEY

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Outline

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Introduction

- In a joint report by ACM and IEEE published in 2005 [1], “Computing” area was covered in detail and five main disciplines were identified as
 - Computer Engineering (CE)
 - Computer Science (CS)
 - Software Engineering (SE)
 - Information Systems (IS)
 - Information Technologies (IT)

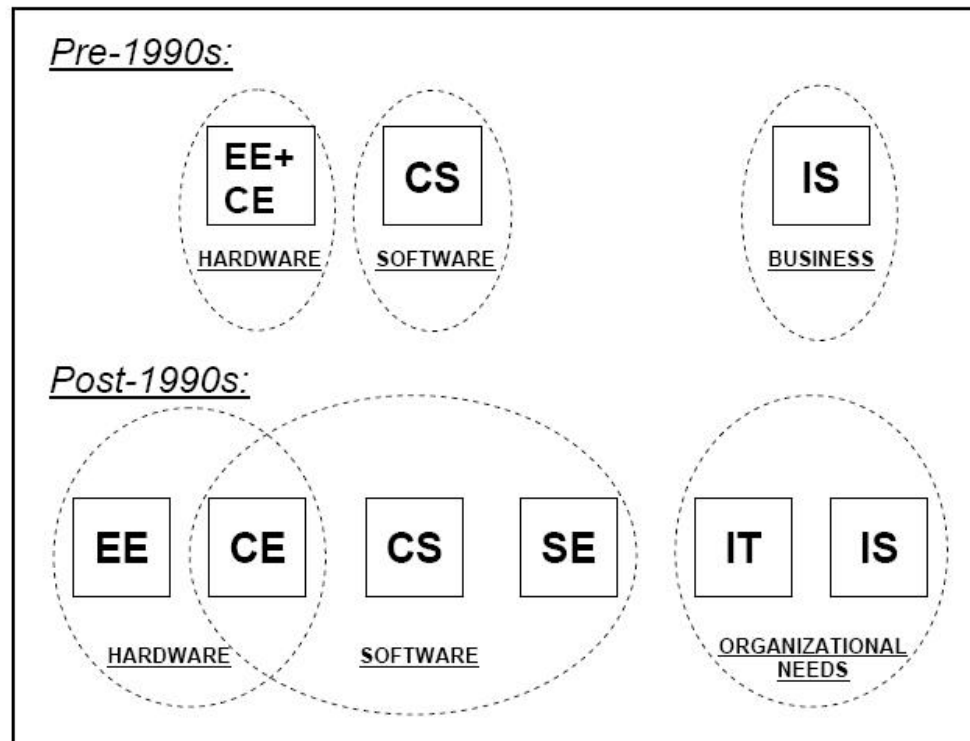
So what!

- Computing = Informatics
- North American view
- Similar to ABET
- IEEE/ACM and ABET is adopted by many (including Turkey)
- Europe = CS and IS are dominant!
- CS \approx CE in Turkey with a few exceptions

Attempts by Turkish Informatics Foundation (TBV) and Heads

- A study group comprising of the heads of the Computer Engineering Departments of the Turkish Informatics Foundation (TBV) has already produced a similar report to identify the areas and academic computing programs in Turkey [2].
- This report concentrates on the Computer Engineering programs and discusses their compliance with the ACM/IEEE recommendations.

Subject Areas



...Subject Areas (IEEE/ACM)

- **Computer Engineering (CE)** deals with the design, manufacturing, programming and hardware/software maintenance of computer based equipment.
- **Computer Science (CS)** is concerned with a wide range of subjects including algorithm design, software development, and theory of computation, intelligent systems, formal languages and bioinformatics.
- **Software Engineering (SE)** deals with the design and development of large scale software.
- **Information Systems (IS)** mainly concerns with the effective use of information technologies within the corporations.
- **Information Technologies (IT):** Two views: (1) considers IT as the whole of Informatics area. (2) considers the IT area as a subject dealing with the technological needs of the corporations.

Comparisons

Topic to be covered	CE		CS		IS		IT		SE	
	M in	M ax	M in	M ax	M in	M ax	M in	M ax	M in	M ax
Programming Fundamentals	4	4	4	5	2	4	2	4	5	5
Integrative Programming	0	2	1	3	2	4	3	5	1	3
Algorithms & Complexity	2	4	4	5	1	2	1	2	3	4
Computer Architecture & Organization	5	5	2	4	1	2	1	2	2	4
Operating Systems Principles & Design	2	4	3	5	1	1	1	2	3	4
Operating Systems Configuration & Use	2	3	2	4	2	3	3	5	2	4
Net Centric Principles & Design	1	3	2	4	1	3	3	4	2	4
Net Centric Use & Configuration	1	2	2	3	2	4	4	5	2	3
Platform Technologies	0	1	0	2	1	3	2	4	0	3
Theory of Programming Languages	1	2	3	5	0	1	0	1	2	4
Human-Computer Interaction	2	5	2	4	2	5	4	5	3	5
Graphics & Visualization	1	3	1	5	1	1	0	1	1	3
Intelligent Systems (AI)	1	3	2	5	1	1	0	0	0	0
Information Management (DB) Theory	1	3	2	5	1	3	1	1	2	5
Information Management (DB) Practice	1	2	1	4	4	5	3	4	1	4
Scientific Computing (Numerical Methods)	0	2	0	5	0	0	0	0	0	0
Legal/ Professional / Ethics / Society	2	5	2	4	2	5	2	4	2	5

	CE		CS		IS		IT		SE	
Information Systems Development	0	2	0	2	5	5	1	3	2	4
Analysis of Business Requirements	2	5	2	4	2	4	3	5	3	5
Engineering Foundations of SW	1	2	1	2	1	1	0	0	2	5
Engineering Economics for SW	1	3	0	1	1	2	0	1	2	3
Software Modeling & Analysis	1	3	2	3	3	3	1	3	4	5
Software Design	2	4	3	5	1	3	1	2	5	5
Software Verification & Validation	1	3	1	2	1	2	1	2	4	5
Software Evolution (maintenance)	1	3	1	1	1	2	1	2	2	4
Software Process	1	1	1	2	1	2	1	1	2	5
Software Quality	1	2	1	2	1	2	1	2	2	4
Computer Systems Engineering	5	5	1	2	0	0	0	0	2	3
Digital Logic	5	5	2	3	1	1	1	1	0	3
Distributed Systems	3	5	1	3	2	4	1	3	2	4
Security: Issues & Principles	2	3	1	4	2	3	1	3	1	3
Security: Implementation and management	1	2	1	3	1	3	3	5	1	3
System Administration	1	2	1	1	1	3	3	5	1	2
Systems Integration	1	4	1	2	1	4	4	5	1	4
Digital Media Development	0	2	0	1	1	2	3	5	0	1
Technical Support	0	1	0	1	1	3	5	5	0	1

Degree Programs in Turkey

Department	Classification	No	Description	2007 intake by general examination
CE	Turkey-Public	26+2	Two departments run 2 sessions during the day (and 1 program is run in the Cyprus extension campus of METU	2681
	Turkey-Foundation (Private)	23	Programs with full scholarship, half scholarship and tuition fee coverage	
	Turkish Republic of Northern Cyprus	5	Eastern Mediterranean University , Girne American University, Near Eastern University, Lefke University, International Cyprus University	366
CS	Turkey	1	Istanbul Bilgi University	90
	Turkish Republic of Northern Cyprus	1		
ISE ^[1]	Turkey	1+2	Istanbul Technical University, Doğuş University, and Atılım University	163
	Turkish Republic of Northern Cyprus	1	Eastern Mediterranean University	40
SE	Turkey	4	Izmir Economy University, Atılım University, Bahçeşehir University, Işık University	166
MIS / IT/IS	Turkey	5	Bilkent University (IT and IS), Yeditepe University (IS and IT), Başkent University (Information and Document Management), Kadir Has Univ. (MIS), Okan Univ. (IS and IT)	250
	Turkish Republic of Northern Cyprus	4	Eastern Mediterranean University, Girne American Univ., Lefke European Univ., Near Eastern University	245

University System & Accreditation in Turkey

- General Entrance Examination after 12 years
- 2007: Admission to 4-year BS programs
250,000/1,750,000
- Informatics: 3900/4001 highly qualified students were admitted
- ABET in CE Departments
 - METU
 - Bilkent

Subject Areas in Turkey

Subject Area	Min (5)	Max (5)
Programming Fundamentals	5	5
Algorithms & Complexity	4	5
Computer Architecture & Organization	4	5
Operating Systems Principles & Design	4	5
Operating Systems Configuration & Use	2	3
Net Centric Principles & Design	3	5
Net Centric Use & Configuration	2	3
Platform Technologies	0	2
Theory of Programming Languages	3	5
Human-Computer Interaction	0	3
Graphics & Visualization	3	5
Intelligent Systems (AI)	3	5
Information Management (DB) Theory	4	5
Information Management (DB) Practice	3	4

...Subject Areas in Turkey

Scientific Computing (Numerical Methods)	2	5
Legal/ Professional / Ethics / Society	0	4
Information Systems Development	2	4
Analysis of Business Requirements	1	4
Engineering Foundations of SW	2	4
Engineering Economics for SW	0	1
Software Modeling & Analysis	3	4
Software Design	3	5
Software Verification & Validation	1	3
Software Evolution (maintenance)	1	1
Software Process	3	5
Software Quality	1	2
Computer Systems Engineering	5	5
Digital Logic	5	5
Distributed Systems	3	4
Security: Issues & Principles	2	4
Security: Implementation & management	1	2
System Administration	1	3

...Subject Areas in Turkey

Digital Media Development	0	1
Technical Support	0	1
Automata Theory & Formal Languages	4	5
Embedded Systems	3	5
Circuits & systems	4	5
Electronics	3	5
Digital Signal Processing	3	5
VLSI Design	0	4
Hardware Testing & Fault Tolerance	0	3
Mathematical Foundations (Discrete Mathematics, Probability and so on)	5	5
Information Systems Organization Management	0	1
Decision Theory	0	3
E-business	0	3
General System Theory	0	1
Risk Management	0	2
Project Management	1	2
Business Requirements Analysis	0	1
Communication	1	4

Discussion

- A straightforward comparison between the two tables reveals the fact that there are major discrepancies in the weights assigned.
- For example, while CE programs in the ACM/IEEE report gives a very little weight to Information Management and Programming Fundamentals, Mathematical Foundations and Algorithms, programs in Turkey, get considerably higher weights.
- Nevertheless, a balance of Hard/Soft topics is maintained in almost all degree programs depending on the background of the academic staff and the interests of the local community.

Restructuring

- Universities with more than 3 departments in the area of informatics should be structured in the form of a faculty. For example, based on the size of the university, a faculty of informatics can be a house for CS, IS and IT departments. Similarly, CE, SE and Information Systems Engineering Departments can be placed in an engineering faculty or in a faculty of informatics.
- When a separate faculty is not possible, it may be feasible to place the CE and SE departments in the faculty of engineering and the others in the faculty of arts and sciences.
- In Turkey, MIS area is not well-defined. Usually, a few numbers of topics are offered by faculty of administrative sciences.

Conclusions

- Several suggestions are made for the development of informatics programs in Turkey:
- The reports prepared by ACM/IEEE and the TBV should be carefully evaluated by the Higher education council.
- Job opportunities and the required informatics personnel should be carefully evaluated a degree programs should be modified to meet the global and local demands.
- Variety of informatics programs should be offered according to the recommendations by the Higher Educational Council. For example, CS programs in the Faculty of Science and Arts should be expanded.

References

1. The Joint Task Force for Computing Curricula, ACM, AIS, & IEEE, “Computing Curricula 2005: The Overview Report”, 2005.
2. Kiper, A., Okatan, A., Güvenir, A., Yazıcı, A., Adalı, E., İnce, F., Akın, L., Karakaş, Ü., Üney, T., Coşkun, V. & Baydere, Ş., A report on Undergraduate Programs in Informatics, 20th Meeting of the Heads of Computer Engineering Departments of TBV, 17-19 November 2005, Haliç University, Istanbul, Turkey.
3. Salman, B. & Bentli, F.B., “*Chamber of Electrical Engineers & Higher Education*”, Electrical Engineering Journal, Vol.44, No.429, pp:11-25, November 2006.