

EARLY CURRICULA IN COMPUTER SCIENCE AT THE UNIVERSITY OF ICELAND

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Abstract: With the acquisition of the first computer in 1964, the University of Iceland introduced programming into the engineering curriculum. Subsequently it introduced an applied mathematics curriculum in the Mathematics Department with some emphasis on computer science. In 1976, it offered a separate computer science programme that rather closely matched the recommendations of the ACM Curriculum 78.

Key words: Computing curricula, computer science, applied mathematics

1. INTRODUCTION

This paper treats the development of curricula in computer science at the University of Iceland leading to the establishment of a programme in computer science. The early development took place within the School of Engineering and Science during the period 1965 – 1985. The teaching of information technology in other subject areas at the university such as business administration, library studies, social sciences, and linguistics is outside of the scope of this paper.

The government established the University of Iceland in 1911. The initial lines of studies were theology, medicine, law, and studies of Old Icelandic. During the Second World War, a programme in engineering developed as the customary access to the Technical University in Copenhagen had become impossible due to the German occupation of Denmark. The majority of Icelandic engineers and scientists had studied in Copenhagen until that time. After 1945, an undergraduate programme in

engineering (three years) became a permanent feature of the university curricula and in the late 1960s, the University added BA programmes in mathematics, physics, biology, geography, and geology. The School of Engineering offered these programmes. The early 1970s saw the establishment of the School of Engineering and Natural Science and the awarding of BS degrees in engineering, mathematics, and the natural sciences.

Graduate studies in engineering, mathematics, and the natural sciences started later. In the 1990s, new colleges and universities emerged in Iceland. The University of Reykjavík, a private university sponsored by the Chamber of Commerce, places an emphasis on computer science.

2. FIRST PROGRAMMING COURSE

The University of Iceland acquired its first computer, an IBM 1620, in 1964 (Magnússon 2003). In the academic year 1965-66, FORTRAN II programming became a required part of an “applied mathematics” course in the engineering curriculum. Students of mathematics and physics could also take the FORTRAN course. Figure 1 depicts the description of the course for the academic year 1968-69 (Háskóli Íslands 1968). This course offering for engineers remained unchanged as an introduction to computer programming for the next two decades although the programming language used gradually changed from Fortran II to Fortran 77 and later to C++.

12. HAGNÝTT STÆRÐFRÆÐI

12.21 Fortrannámskeið, B, V, R, (S2)

1968-69

Umsjón : Próf. Magnús Magnússon
Kennari : Dr. Oddur Benediktsson

3. misseri 1F + 1Æ samt. um 13 + 13 h

Forskriftagerð á Fortran II máli miðað við rafreikni Háskólans, IBM 1620. Æfð eru dæmi úr fylkjareikningi og nemendur skulu skila sjálfstæðum loka-dæmum úr öðrum kennslugreinum, svo sem landsmælingu o. fl. Almenn kynning á tölvmum og þeim grundvallarhugtökum, sem reikningur með þeim byggist á.

Figure 1. Fortran course description academic year 1968-69

3. APPLIED MATHEMATICS

In the academic year 1972-73, a new three-year sequence of study, the BS in Applied Mathematics, became a curriculum in the Mathematics Department at the University of Iceland. The core curriculum consisted of mathematical analysis, algebra, and statistics in addition to computer science, numerical analysis, and operations research. A similar degree programme currently exists in that department.

4. COMPUTER SCIENCE

Computer science became a separate three-year BS degree programme at the University of Iceland in 1976. Institutionally, it began in the Mathematics Department and continued there for ten years before becoming an independent department. Figure 2 depicts the initial curriculum in computer science (Háskóli Íslands 1976.)

BS-NÁM Í TÖLVUNARFRÆÐI (T), 1. - 6. MISSERI 1976-77 13

Grein		Náms- ein.	Meðalfjöldi stunda í viku						
nr.	heiti		Misseri						
			1.	2.	3.	4.	5.	6.	
11.11	Stærðfræðigreining I	4	4/3						
11.12	Línuleg algebra og rúmfræði	3	3/2						
11.16	Forritun og tölvur	2	2/1						
11.21	Stærðfræðigreining II	4		4/3					
11.23	Töluleg greining	2		2/1					
11.28	Forritunarsmál	3		3/1					
11.31	Stærðfræðigreining III	3			3/2				
11.32	Líkindareikningar og tölvfræði	2					2/2		
11.34	Bestunarfræði	3			3/2				
11.36	Tölvunothun	3			3/1				
11.46	Rafreiknifræði	3				3/1			
11.49	Gagnavinnsla	3				3/1			
11.56	Gagnasafnsfræði	3					3/1		
11.57	Kerfisgreining	3					2/4		
11.66	Kerfisforritun	3						3/1	
11.67	Kerfishönnun	3						2/4	
Í viðskiptadeild:									
	Rekstrarhagfræði	6	4/2	4/2					
	Bókfersla	3	4/2						
	Reikningshald I	3		2/2					
Samtals		Einingar	59	15	16	9	6	8	6

Figure 2. Computer science core courses academic year 1976-77

Of the 90 credit units required for the BS degree, 59 were mandatory while 31 were electives. Of the 59 obligatory units, 12 were part of the

School of Business Administration (SBA) at University of Iceland. Students commonly selected electives from the engineering course or those offered at the SBA.

Of the core requirement for the three years (six semesters) BS degree in computer science (CS), approximately two semesters were proper to CS, one semester to mathematics, and one semester to business administration, forming a total of about two years of study.

It is instructive to compare the core course to the ACM Curriculum 78 and the ACM Master's Level Recommendations (ACM 1979, 1981) worked out in curriculum committees of the Association for Computing Machinery. In Table 1, the first two columns correspond to the first two of Figure 2. The third column shows the closest possible equivalent to the ACM designation.

Table 1: The 1976-77 computer science course plan compared to the ACM curricula

	Course name	ACM
11.11	Mathematical Analysis I	MA 2
11.12	Linear Algebra and Geometry	MA 3
11.16	Programming and Computers	CS 1
11.21	Mathematical Analysis II	MA 5
11.23	Numerical Analysis	CS 17
11.28	Programming Languages	CS 8
11.31	Mathematical Analysis III	MA
11.32	Probability and Statistics	MA 6
11.34	Optimisation	MA
11.36	Computer Usage	CS 5
11.46	Computer Systems	CS 3
11.49	Data Processing	CS 22
11.56	Database Theory	CS 11
11.57	Systems Analysis	CS 14
11.66	Systems Programming	CS 6
11.67	Systems Design	CS 14
SBA	Economics	
SBA	Bookkeeping	
SBA	Accounting I	

Of the eight designated CS core courses in the ACM Curriculum 78 (1), only CS 7 was not explicitly covered by a core course at the University of Iceland. Courses equivalent to CS 11, CS 14, and CS 17 in the ACM 78

were CS elective courses and CS 22 from a master's level (see above) course named Performance Evaluation.

The 1976-77 core curriculum changed considerably in the subsequent years and the offering of elective courses was increased. By the mid-1980s, discrete mathematics, data structures, algorithms, and distributed processing replaced the SBA courses in the core curriculum, whereas the mathematics was roughly the same and the time for electives remained unchanged.

5. LATER DEVELOPMENTS

In 1985, the School of Engineering and Natural Science split into two separate entities: the School of Engineering and the School of Natural Science. In 1988, an independent Department of Computer Science emerged in the School of Natural Science and a decade later in 1999 it moved to the School of Engineering. The Department initiated a degree programme in software engineering in 2001. In the period from 1968 to 2003, more than 500 hundred students have graduated with the BS degree in computer science from the University of Iceland.

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REFERENCES

1. ACM Curriculum Committee on Computer Science, 1968. "Curriculum 68: Recommendations for the Undergraduate Program in Computer Science," *Communications of the ACM*, March 1968, vol 11, No 3, 151-197.
2. ACM Curriculum Committee on Computer Science, 1979. "Curriculum 78: Recommendations for the Undergraduate Program in Computer Science," *Communications of the ACM*, March 1979, vol 22, No 3, 147-166.
3. ACM Curriculum Committee on Computer Science, 1981. "Recommendations for Master's Level Programs in Computer Science," *Communications of the ACM*, March 1981, vol 24, No 3.
4. ACM Committees on Computer Curricula, 1981. "ACM Recommended Curricula for Computer Science and Information Processing Programs in Colleges and Universities, 1968-1981." Report, ACM 1981. (Note: this report includes the three above listed ACM papers.)
5. Háskóli Íslands. 1968. Kennsluskrá 1968 – '69 reglugerð o.fl. Verkfræðideild.
6. Háskóli Íslands. 1976. Kennsluskrá 1976 – 1977. Verkfræði- og raunvísindadeild.

7. Magnússon, Magnús 2003. "The Advent of the first General Purpose Computer in Iceland and its Impact on Science and Engineering." History of Nordic Computing, Trondheim, 2003.

ENDNOTE

- (1) The core courses were: CS 1 - Computer Programming I, CS 2 - Computer Programming II, CS 3 - Introduction to Computer Systems, CS 4 - Introduction to Computer Organisations, CS 5 - Introduction to File Processing, CS 6 - Operating Systems and Computer Architecture I, CS 7 - Data Structures and Algorithmic Analysis, and CS 8 - Organizations of Programming Languages.