

Contents

Abstract — VII

1 Introduction to Informatics — 1

- 1.1 Basics of Informatics — 1
 - 1.1.1 Historical Background — 3
 - 1.1.2 Famous People in the History of Computing — 6
 - 1.1.3 Areas of Computer Science — 7
 - 1.1.4 Theoretical and Applied Informatics — 8
 - 1.1.4.1 Theoretical Informatics — 9
 - 1.1.4.2 Applied Informatics — 10
- 1.2 Relationship with Some Fundamental Sciences — 12
 - 1.2.1 Informatics and Mathematics — 13
 - 1.2.2 Informatics and Mathematical Logic — 14
 - 1.2.3 Informatics and Cybernetics — 15
 - 1.2.4 Informatics and Electronics — 15
 - 1.2.5 Informatics and Linguistics — 16
 - 1.2.6 Informatics vis-à-vis Psychology and Sociology — 17
 - 1.2.7 Informatics and Economics — 18
- 1.3 Information Theory — 19
 - 1.3.1 Quantities of Information — 21
 - 1.3.1.1 Units for Measuring Computer Information — 21
 - 1.3.1.2 Quantities of Information in Information Theory — 22
 - 1.3.2 Coding Theory — 24
 - 1.3.3 Semiotics — 25
 - 1.3.3.1 Computational Semiotics — 27

2 Algorithmics — 30

- 2.1 The Science of Algorithms — 30
 - 2.1.1 Algorithm Design — 31
 - 2.1.2 Algorithmic Complexity Theory — 34
 - 2.1.3 Algorithm Analysis — 38
- 2.2 Data Science (Datalogy) — 41
 - 2.2.1 Raw Data — 41
 - 2.2.2 Data Structures — 43
 - 2.2.3 Data Analysis (Data Analytics) — 45
 - 2.2.4 Data Mining — 47

3 Computer Programming — 52

- 3.1 Computer Programming Languages — 52
 - 3.1.1 A Very Brief History of Languages and Programming Paradigms — 52

3.1.2	Syntax and Semantics of Programming Languages	56
3.1.3	Design and Implementation	61
3.2	Software Engineering	65
3.2.1	Software Development Process	66
3.2.2	Software Design Methods	71
3.2.3	Computer-Aided Software Engineering	73
3.3	Information Technology Project Management	75
3.3.1	The IT Project Management Stages	77
3.3.2	Approaches to Managing IT Project Activities	79
3.3.3	IT Team and IT Managers	81

4 Information Systems — 84

4.1	Information Systems Basic	84
4.1.1	Organized Collection of Data (Databases)	85
4.1.2	Discovering IS Functionality	88
4.2	Analysis and Modeling of Information Systems	89
4.2.1	Brief Introduction to the Unified Modeling Language	89
4.2.2	Modeling the Architecture of Information System	94
4.3	Design of Business Information Systems	96
4.3.1	Business Process Modeling Notation	97
4.3.2	Business Process Reengineering	99
4.3.3	Software Measurement	102
4.4	Human Factors in Information Systems	103
4.4.1	Human Computer Interaction in Software Development	104
4.4.2	User Centered Development Methodology	106

Bibliography — 107

Index — 110