Contents

1 Introduction to Computer Science 17

Themes
Computer science, programmable devices, programmability, mechanical computer, electronic computer, modern computer, vacuum tubes, transistors, silicon, processing power, global communication systems

Academic vocabulary skills
Common academic terms; pairs of synonyms and antonyms; academic adjectives

Academic note-taking skills
Visual representation of lecture notes

Academic writing skills
The purpose of academic writing
The structure of academic writing genres

Academic communication
The language of caution

2 Operations on Bits 41

Themes
Boolean operations, truth table, logic gates, bit stream, byte, input/output devices, storage devices, nonstorage devices, magnetic disk, magnetic tape, compact disk (CD), DVD, bit map technique, vector technique, video, optical storage devices

Academic vocabulary skills
Abbreviations and acronyms

Academic note-taking skills
Finding key points
Effective note-taking

Academic writing skills
Developing a critical approach
The basic structure of abstracts

Academic communication
Working in groups

Critical thinking skills
Evaluating Internet sources

3 Computer Architecture 75

Themes
von Neumann model, stored-program concept, machine language, machine instruction, CPU, arithmetic/logic unit, control unit, registers, system buses, address bus, data bus, control bus, main memory, integrated circuits, the 'chip', RAM, ROM, cache memory, principle of locality, the machine cycle, RISC, CISC, pipelining, latency, throughput

Academic vocabulary skills
How synonyms work

Academic note-taking skills
Finding research papers

Academic writing skills
Paragraph structure
Topic sentences

Academic communication
Conciseness: How to sound like an expert
Reporting verbs

4 Operating Systems 97

Themes
Virtual environment, batch processing, multiprogramming, time sharing, interrupt, single-user operating system, multi-user operating system, distributed systems, real-time systems, embedded systems, memory manager, process manager, device manager, file manager, partitioning, paging, virtual memory, overlaying, state diagram, deadlock, starvation, user interface

Academic vocabulary skills
Recognizing common expressions

Academic note-taking skills
Note-taking from academic readings – The linear model

Academic writing skills
Paraphrasing

Academic communication
Using examples to clarify a point

5 Networks 129

Themes
OSI model, ISO, physical layer, data-link layer, network layer, transport layer, session layer, presentation layer, application layer, LAN, MAN, WAN, ring topology, bus topology, CSMA/CD, star topology, hub, switch, repeater, bridge, router, gateway, ISP, TCP/IP, electronic mail, SMTP, FTP, TELNET, www, hypertext, hyperlinks, HTTP

Academic vocabulary skills
Time words

Academic note-taking skills
Adding information to sources

Academic writing skills
The effective summary

Academic communication
Brainstorming

6 Algorithms 157

Themes
Calculation, data processing, automated reasoning, intractable problems, nonterminating processes, level of detail, level of understanding, problem-solving, systems analyst, systems designer, heuristics, intuitive judgment, constructs, sequence, decision, repetition, flowchart, pseudocode, verification process, formal logic, specifications, problem domain

Academic vocabulary skills
Talking numbers

Academic note-taking skills
Double-entry responses

Academic writing skills
Cause and effect

Academic communication
Visual representation of data

7 Programming Languages 185

Themes
Machine language, assembly languages, high-level languages, text editor, source file, compiler, preprocessor, commands, translator, subroutines, linker, loader, procedural paradigm, declarative paradigm, deduction, functional paradigm, object-oriented paradigm, objects, associated operations, classes, instances, local variables, global variables

Academic vocabulary skills
Verbs of reference

Academic reading skills
Introductions

Academic writing skills
Cohesion

Academic note-taking skills
Triple-entry response

8 Software Engineering 205

Themes
Software lifecycle, development phase, analysis, user needs, requirements, specifications, design phase, modules, user interface, implementation phase, bottom-up approach, top-down approach, validation testing, defect testing, glass-box testing, black-box testing, documentation, waterfall model, incremental model, prototyping, open-source, extreme programming, modularity, cohesion, coupling

Academic note-taking skills
Argument mapping

Academic writing skills
Definitions
Citations and references

Academic communication
Response questions

9 Data Organization **235**

Themes
Abstract tools, array, data values, indexing, subscripts, one-dimensional arrays, multi-dimensional arrays, matrices, list, stack, LIFO, queue, FIFO, tree structure, node, depth, ancestor, descendant, parent, siblings, data integration, schema, subschema, application layer, database management layer, DBMS, RDBMS, relations, tuple, attribute, instances, base relations, derived relations, domain

Academic note-taking skills
Thinking about titles
Venn diagram

Academic writing skills
Making comparisons
Types of endings

Academic communication
Sentence starter feedback
Metaphors and analogies in computer science

10 Machine Learning **257**

Themes
Hidden structures, training data, pattern recognition, inference, models, hypothesis, feature extraction, feature selection, supervised learning, classification, regression, dependent variable, predictors, semi-supervised learning, unsupervised learning, problem space, reinforcement learning, trial and error, rewards, punishments, cluster analysis, knowledge discovery, deep learning, neural networks, knowledge-based engines, inference engines

Academic note-taking skills
Asking for feedback

Academic writing skills
Argument and discussion

Academic communication
Oral presentation skills

Glossary **277**

Supplements **295**

Bibliography **301**