



**Academia de Studii Economice**  
**Departamentul de Informatică și Cibernetică Economică**

Calea Dorobanți, 15-17, Sector 1, București, 010552 (camera 2314)

Tel.: +40 21 319 19 00, ext. 319, 336, Fax: +40 21 311 20 66

www.dice.ase.ro

**Contest Topics for Professor**  
**Position 24, 2020-2021, semester 2**

**Disciplines: Data Structures, Mobile Devices and Applications.**

**Data Structures**

1. Standard and software developer-defined data types. Pointers. Models and requirements for defining, initializing, using and readability of data in the source program. Stack memory and Heap memory. Quality indicators for using the memory
2. Noncontiguous dynamic data structures: simple linked list and double linked list – definition, allocation and use. Stack and queue – definition, allocation and use.
3. Sparse matrix: definition, allocation and use. Heterogeneous and contiguous data structures. Implementation of the sparse matrices by arrays and heterogeneous data structures
4. The graph data structure: characteristics, definition, allocation and use. Traversal algorithms of the graph. Connectivity and connectivity paths algorithms.
5. Tree data structures: arbitrary tree structures and binary trees – definition, allocation and use. Structure trees: characteristics, implementation and operations. Evaluation of a mathematical expression using structure trees.
6. Tree data structures: binary search tree – definition, allocation and use.
7. Balanced trees and self-balancing search trees: balanced binary trees, AVL trees, Red-Black trees – definition, characteristics and operations.
8. The B-tree data structure: definition, properties, allocation, algorithms and implementation of the fundamental operations (insertion and deletion).
9. Hash tables: characteristics, hash functions, operations, collision avoidance mechanisms.
10. Heap data structure – definition, allocation and use. Priority queues.
11. Data compression: characteristics, classification and data compression algorithms. Conversions of data structures: characteristics of conversion process, conversion types, productive elements at process level, respectively at application level.

**Bibliography:**

1. Ion Ivan, Marius Popa, Paul Pocatilu (coordonatori), *Structuri de date*, Editura ASE, București, 2008, România.
2. Ion Smeureanu, Marian Dărdală, *Programarea in limbajul C/C++*, Editura CISON, București, 2001, România.



**Academia de Studii Economice**  
**Departamentul de Informatică și Cibernetică Economică**

Calea Dorobanți, 15-17, Sector 1, București, 010552 (camera 2314)

Tel.: +40 21 319 19 00, ext. 319, 336, Fax: +40 21 311 20 66

[www.dice.ase.ro](http://www.dice.ase.ro)

3. Saumeyendra Sengupta, Carl Phillip Korobkin, *C++ Object Oriented Data Structures*, Springer Verlag, New York, 1994, Statele Unite ale Americii.
4. William Ford, William Topp, *Data Structures with C++*, Prentice Hall, New Jersey, 1996, Statele Unite ale Americii.
5. E. Demaine, *Advanced Data Structures*, 2003, [http://courses.csail.mit.edu/6.897/spring03/scribe\\_notes](http://courses.csail.mit.edu/6.897/spring03/scribe_notes), Statele Unite ale Americii.

### **Mobile Devices and Applications**

1. Mobile devices: classifications (mobile phones, smartphones, tablets), hardware architecture
2. Technologies for mobile communications: Restricted area data communications (PAN, WLAN), extended area data communications (data technologies over the GSM network)
3. Operating systems for mobile devices: OS architecture; presentation of Android, iOS, Windows Phone, BlackBerry OS, Bada
4. Mobile applications: features, components, specific elements of interaction with users; technologies for implementing mobile applications
5. Developing applications for the Android platform: User interface: windows, containers, controls, menus, event handling, fragments, containers, lists, and adapters. Network access - asynchronous operations, XML, and JSON file processing. Persistent data storage on the device: files, shared preferences files, SQLite databases. Network databases. Two-dimensional graphics. Use of predefined services. Obtaining the geographical position. Using maps in applications. Use of predefined content providers. Message receivers. Verification, validation, and publication of applications.

### **Bibliography:**

1. P. Pocatilu, I. Ivan, A. Visoiu, F. Alecu, A. Zamfiroiu, B. Iancu, *Programarea aplicatiilor Android*, Editura ASE, Bucuresti, 2015, România.
2. P. Pocatilu, *Programarea dispozitivelor mobile*, Editura ASE, București, 2012, România.
3. Catalin Boja, Cristian Ciurea, Mihai Doinea, *Android mobile applications: a practical development guide*, Editura ASE, Bucuresti, 2015, România.
4. Android Developers, <http://developer.android.com/index.html>, Statele Unite ale Americii
5. Android Development Basics2, <https://play.google.com/store/apps/details?id=com.aviyehuda.androidcard2>, Statele Unite ale Americii



**Academia de Studii Economice**  
**Departamentul de Informatică și Cibernetică Economică**

Calea Dorobanți, 15-17, Sector 1, București, 010552 (camera 2314)

Tel.: +40 21 319 19 00, ext. 319, 336, Fax: +40 21 311 20 66

[www.dice.ase.ro](http://www.dice.ase.ro)

6. Wei-Meng Lee, *Beginning Android 4 Application Development*, Wiley, Statele Unite ale Americii, 2012.
7. E. Burnette, *Hello, Android: Introducing Google's Mobile Development Platform, 2nd Edition*, The Pragmatic Bookshelf, 2009.
8. M. Aydin, *Android 4: New features for Application Development*, Packt Publishing, 2012.
9. M. Etoh (Ed), *Next Generation Mobile Systems 3G and Beyond*, John Wiley & Sons, 2005.
10. B. Fling, *Mobile Design and Development*, O'Reilly, 2009.

Prof. univ. dr. Ion SMEUREANU