

Bachelor Exam Requirements

Subject: Information Technology

Academic year 2024/2025

1. **Fundamental principles of PCs and their architecture** (history, von Neuman, Harvard, processor, cards, peripheral devices, memory types, RAID, RAM, ROM, Cache, HDD, CD, DVD, FLASH).
2. **Principles of computer networks** (RM ISO/OSI, topology, protocols, Ethernet, IP, network cards, WIFI, VPN).
3. **Principles of operating systems** (classification, types, processes and their management, system resources, user interface, Windows).
4. **Object-oriented modelling and programming** (essential terminology, principles and applications. Software process. UML. Event-driven programming).
5. **Software process** (basic concepts, principles, procedures, tools, life cycle of IS, modelling phases).
6. **Database and database system** (main functions, history, data models, comparison of DB systems, architectures of DBMS, data security, parallel processing).
7. **Conceptual modelling** (E-R model and its graphical representation, relation model, relationships among entities, normal forms, relation algebra, SQL).
8. **Process modelling** (basic principles, process decomposition, BPMN, best practices in process modelling, related modelling techniques).
9. **Basic principles of business informatics** (fundamental concepts, principles of ICT use, classifications, information resources, types of IS, roles of humans in ICT).
10. **Systems theory** (main principles, definitions of a system, classifications, GST and related theories, structure, behaviour, feedback and its types).
11. **Systems engineering** (history, system engineer and related roles, standards and norms, requirements, SysML, soft systems).
12. **Systems analysis, dynamics and cybernetics** (main ideas, types of tasks, methods, mutual interrelationship).
13. **Knowledge applications** (knowledge, knowledge representation, knowledge application life-cycle, development of an application, expert, knowledge engineer, knowledge acquisition and storing).
14. **Ontologies and semantic web** (semantic web and its historical background, architecture of the semantic web, metadata, querying, inferencing, linked data, linked data vocabularies, ontologies and their categories, ontological developmental tools, ontological design patterns, ontological representation languages).
15. **Internet and information** (organisational structure, history, RFC documents, domains, technical requirements, threats, information process, search engines, mark-up languages, styling and scripting languages).
16. **Basic statistical concepts** (types of variables, data gathering, statistics in practice, data analysis, descriptive statistics, tables, graphs, mean, modus, median).
17. **Probability** (rules for probability calculations, random variable, continuous and discrete variable, distribution functions, parameters).

Literature:

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- Buitelaar, P., Cimiano, P.: Ontology Learning and Population: Bridging the Gap between Text and Knowledge. IOS Press, 2008
- Bureš V.: Systems thinking and systems sciences, Gaudeamus, 2009.
- Daconta, M.C., et al.: The Semantic Web. Wiley, 2003
- Ferber, J.: Multi-Agent Systems: An Introduction to Distributed Artificial Intelligence (Addison-Wesley, 1999)
- Gustafson, J.M. HTML5 Web Application Development By Example. Beginner's guide. Packt Publishing, 2013. ISBN 978-1-84969-594-7
- Hvorecký J., Kelemen J.: Readings in Knowledge Management, Iura Edition, 2011
- Jennings, N., Wooldridge, M. (eds): Agent Technology - Foundations, Applications, and Markets (Springer, 1998)
- Luck, M., Ashri, R., D'Inverno, M.: Agent-based Software Development (Artech House, 2004)
- Mellor R.: Knowledge management and information systems: strategies for growing organizations. Palgrave Macmillan. 2011
- Nilsson, N.: Artificial Intelligence - A New Synthesis (Morgan Kaufmann, 1998)
- Orand B., Villarreal J.: Foundations of IT Service Management: The ITIL Foundations Course in a Book, CreateSpace Independent Publishing Platform, 2011
- Handbook of Applied Cryptography: <http://www.cacr.math.uwaterloo.ca/hac/>
- Russell, S., Norvig, P.: Artificial intelligence - a Modern Approach (Prentice Hall, 2003)
- Schiesser R.: IT Systems Management, Prentice Hall, Boston, 2010
- Staab, S., Studer, R. (Eds.): Handbook on Ontologies. Springer, 2004
- Stuckenschmidt, H., van Harmelen, F.: Information Sharing on the Semantic Web. Springer, 2005
- Sward D.: Measuring the Business Value of Information Technology, Intel Press, 2006
- Turban, E. a kol.: Decision Support and Business Intelligence Systems (9th Edition), Prentice Hall, 2010
- Vidal J.M.: Fundamentals of Multiagent System Textbook <http://www.multiagent.com/fmas> (online, 2007)
- Vlassis, N.: A Concise Introduction to Multiagent Systems and Distributed AI http://staff.science.uva.nl/~mmaris/class_2006_2007/cimasdai.pdf (online, 2007)