DOCTORAL (PHD) STUDIES

COURSE UNIT DESCRIPTION

Course unit title	Scientific areas	Faculty	Institute, department
Knowledge-based information systems engineering	Informatics Engineering (T 007)	Kaunas Faculty; Faculty of Mathematics and Informatics	Institute of Social Sciences and Applied Informatics; Institute of Data Science and Digital Technologies

Study method	Number of credits	Study method	Number of credits
Lectures	1 (P)	Consultations	2
Individual works	3	Seminars	1 (P)

Summary

Aim: studies of the CASE tools based on different information systems engineering methodologies in the main stages of the life cycle of the information system, and to develop the ability to design and evaluate the intelligence services (iSOA) infrastructure based on wireless networks.

Content:

1. Analysis of the IS engineering evolution. Knowledge-based IS engineering principles. The qualitative differences between traditional IS engineering and knowledge-based IS engineering. Domain knowledge modeling based on a modified value chain. The elicitation and application of the domain model in knowledge-based information system engineering. Modified workflow models based functional user requirements. Domain model-based generation of UML diagrams.
2. The concept of causality in engineering. MDA / MDD. Modified MDA scheme including causal activity domain models. Normalization of business models using the concept of causality.
3. CASE tools: classification, topology, components, variety of supported methods. Principles of application of UML-based CASE tools for the information system engineering LC steps: business modeling, user requirements development, design and software code generation steps.
4. The peculiarities of the application of CASE tools in traditional and knowledge-based engineering of the information systems. ENV 12204, ENV 40003, UEML, WFMC TC00-1003 based enterprise modeling in CASE Tools. Investigating the domain modeling in the knowledge-based CASE tools, and analysis of application generation capabilities. The generation options of UML diagrams: Use Case diagrams, Sequence, Activity, Class diagrams. Perspectives of the domain (enterprise) modeling using MDA approach for information system development in CASE tools.
5. Multi-layer wireless network architecture: principles and standards, mobile communication protocols WAP, mID, 4G, 5G and higher; GPS; Radio Frequency (RF) networks, IP networks; Context-aware networks.
6. Methods and tools for developing smart services. Artificial intelligence systems: robots, vending machines, controllers; the operational sensor networks, and the Internet of Things technologies operating in the wireless network environment.
7. Program agents, multi-agent systems and their development platforms. Architecture and development tools for automated control and intelligent monitoring systems.

Practical assignments: Doctoral students will have to design an information system project based on a knowledge-based methodology for some domain (enterprise), and provide component-based architecture for intelligent service system built on the wireless network environment. The MAGIC DRAW CASE tool recommended, it is required to prepare a project report and submit it for evaluation.

Main literature
Lopata A. Gudas S. Žiniomis grindžiama sistemų inžinerija (Mokomoji knyga). ISBN 978-609-433-061-2. UAB TEV 2011, 230 p.
Gudas, S.; Valatavičius, A. Extending model-driven development process with causal modeling approach // Data science: new issues, challenges and applications / Dzemyda, Gintautas, Bernatavičienė, Jolita, Kacprzyk, Janusz (Eds.). Cham: Springer, 2020. ISBN 9783030392499. eISBN 9783030392505. p. 111-143. (Studies in Computational Intelligence, ISSN 1860-949X, eISSN 1860-9503 ; vol. 869). DOI: 10.1007/978-3-030-39250-5_7.
Paige Baltzan, Amy Phillips. Business Driven Information Systems 5th Edition. ISBN-13: 978-0073402987 ISBN-10: 0073402982. McGraw-Hill Education; 5 edition (March 26, 2015). 512 p.
Halpin T., Krogstie J., Proper E. Innovations in Information Systems Modeling: Methods and Best Practices (Advances in Database Research) Information Science Reference; 1 edition (December 26, 2008) ISBN-10: 160566278X, ISBN-13: 978-1605662787. 374 p.
Turban E., Sharda R. Decision Support and Business Intelligence Systems, Prentice Hall; 9 edition (February 5, 2010), ISBN-10: 013610729X, ISBN-13: 978-0136107293, 780 p
Dzemydienė, D.; Naujikienė, R.; Dzindzalieta, R. Elektroninių paslaugų įgyvendinimo sprendimai. Monografija. Registrų Centro leidykla: Vilnius. 2016.
Clint Smith, Daniel Collins. Wireless Networks. Design and integration LTE, EVDO, HSPA, and WiMAX. 3rd Edition. 2014.
Ashton, K. That 'Internet of Things' Thing. In the real world, things matter more than ideas. RFID Journal, 22 June 2009. http://www.rfi djournal.com/articles/view?4986.
Stuart Russell, Peter Norvig. Artificial Intelligence: A Modern Approach (3rd Edition). Pearson Education Limited. 2014.
Thomas H. Davenport, Paul Michelman. The AI Advantage: How to Put the Artificial Intelligence Revolution to Work (Management on the Cutting Edge). The MIT Press. 2018.

Lecturer(s) (name, surname)	Science degree	Main publications
Audrius Lopata	Dr.	https://www.researchgate.net/profile/Audrius-Lopata/research
Saulius Gudas	Dr.	http://www.elaba.mb.vu.lt/dmsti/?aut=Saulius+Gudas
Dalė Dzemydienė	Dr.	http://www.elaba.mb.vu.lt/dmsti/?aut=Dalė+Dzemydienė