WYŻSZA SZKOŁA BIZNESU
NATIONAL-LOUIS UNIVERSITY

MSc in Computing Science
Core and advanced level curriculum

CSC 447 CONCEPTS OF PROGRAMMING LANGUAGES
Formal methods of syntactic specification of programming languages. Various semantic aspects of modern programming languages: scoping, binding, and parameter passing. Modularity and abstraction mechanisms of modern programming languages. Typing and polymorphism. Exception handling and concurrency. Declarative programming languages. Comparison of modern programming languages and paradigms.

Text book:
Concepts of Programming Languages, Sebesta, Addison-Wesley, 2001. ISBN: 0-201-75295-6

CSC 491 DESIGN AND ANALYSIS OF ALGORITHMS
Methods of designing algorithms including divide-and-conquer, the greedy method, dynamic programming, backtracking, and NP-completeness and approximation algorithms. Emphasis on efficiency issues.

Text Book:
Introduction to Algorithms, Second Edition by Cormen, Leiserson, Rivest, and Stein, McGraw Hill, 2001, ISBN 0070131511

SE 450 OBJECT-ORIENTED SOFTWARE DEVELOPMENT
Principle, techniques and tools of object-oriented modeling, design, implementation, and testing of large-scale software systems. Topics include design patterns, application frameworks, architectural design, and the applications in the software development process to improve the extensibility, maintainability, and reliability of software systems.

Recommended text books:
Object Oriented Software Development Using Java, by Xiaoping Jia, published by Addison-Wesley, second edition, 2002.
Design Patterns, by Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, published by Addison-Wesley, first edition, 1995.
Design Patterns Explained: A New Perspective on Object-Oriented Design, by Alan Shalloway and James R. Trott, published by Addison-Wesley, first edition, 2001.

CSC 434 OBJECT-ORIENTED PROGRAMMING
An introduction to object-oriented concepts and programming. Object-oriented applications, object-oriented database systems, architectural issues in object-oriented systems, and areas of research in object-oriented systems will be examined.

CSC 440 CRYPTOLOGY
Introduction to the methods of cryptography and cryptanalysis. Topics include classical cryptography (codes, monoalphabetic and polyalphabetic substitution ciphers, transposition ciphers), modern block ciphers (such as DES, AES), and public key cryptography (such as RSA). Optional topics include zero-knowledge protocols, information theory, coding theory, error-correcting codes, steganography, stream ciphers, hashing algorithms, quantum cryptography, elliptic curve cryptography, and history

Text book:
Introduction to Cryptography (with Coding Theory), Prentice Hall, ISBN: 0130618144; 1st edition (January 15, 2002)

CSC 444 AUTOMATA THEORY AND FORMAL GRAMMARS
An introduction to the most important abstract models of computation and their applications: finite state machines and pushdown automata. The relationship between formal grammars and automata.

Text Book:
Theory of Computation, A Gentle Introduction by Efim Kinber and Carl Smith, Prentice Hall, 2001, ISBN 0-13-027961-7

CSC 480 FOUNDATIONS OF ARTIFICIAL INTELLIGENCE
This course will provide an in-depth survey of important concepts, problems, and techniques in artifical intelligence. A particular focus and a unifying theme in the course will be the concept of "intelligent agents." No previous knowledge of AI is necessary to take the course. The course is particularly suitable for graduate and advanced undergraduate students who want to gain the technical background necessary to build intelligent systems, or as a preparation for more advanced work in AI. The concepts and techniques learned in this course will be directly applicable to many other areas of computing sciences, including software design, distributed systems, data bases, and information management and retrieval

Text book:
Artificial Intelligence: A Modern Approach, 2nd edition, by Stuart Russell and Peter Norvig. Prentice-Hall, 2003. ISBN 0-13-790395-2

CSC 503 PARALLEL ALGORITHMS
Development, implementation, and applications of parallel algorithms. Models of parallel computation. Parallel sorting, searching and graph algorithms, as well as other parallel algorithms, will be studied and implemented on both simulated and actual parallel machines.

CSC 544 THEORY OF COMPUTATION
Advanced topics in the mathematical foundations of computation. Topics may include random access and Turing machines, recursive functions, algorithms, computability and computational complexity, intractable problems, NP-complete problems.

Text Book:
Michael Sipser, Introduction to the Theory of Computation; Brooks/Cole Pub Co; ISBN: 053494728X

DS 591 DISTRIBUTED ALGORITHMS
Design and analysis of algorithms for solving problems arising in distributed computing, such as resource allocation, distributed agreement, and management of shared data. Distributed computation models and their relationships: synchronous vs. asynchronous vs. partially synchronous, shared memory vs. network models. Algorithms for leader election, graph problems, mutual exclusion, and synchronization in reliable and unreliable networks will be covered.

Text Book:
Distributed Algorithms, by Nancy A. Lynch, Morgan Kaufmann, 1996

CSC 599 TOPICS IN COMPUTER SCIENCE
This is an independent study course.
PREREQUISITE(S): Consent of instructor

TDC 561 NETWORK PROGRAMMING
A high-level understanding of network architectures and distributed applications; client/server models; remote procedure call; examples of applications such as electronic mail and file transfer; network programming.

Text Book:
Network Programming : Networking API: Sockets and XTI by W. Richard Stevens, Volume 1, 2nd edition, 1997 ISBN 0-13-490012-X
Internetworking with TCP/IP : Client-Server Programming by Douglas Comer & David Stevens, Volume III (BSD Unix and ANSI C), 2nd edition, 1996 ISBN 0-13-260969-X

TDC 563 PROTOCOLS AND TECHNIQUES FOR DATA NETWORKS
Advanced topics in TCP/IP including IPv6, routing protocols, multicast routing protocols, and upper layer protocols supporting the new generation of the Internet; compression techniques; SNA and APPN

Text Book:
William Stallings, High-Speed Networks and Internets: Performance and Quality of Service (2nd Edition), Prentice Hall, 2002 Additional Text (Optional): Mark Pataky, Illustrated SNA, Wiley, 1998.

TDC 568 NETWORK MANAGEMENT
Data network management systems. Fault, accounting, configuration, performance and security management using SNMP and other protocols.

Text Book:
Network Management: A Practical Perspective, Allan Leinwand and Karen Fang Conroy, 2ed edition, 1996 by Addison Wesley, ISBN 0-201-60999-1
SNMP++: An Object-Oriented Approach to Developing Network Management Applications (Bk/CD-ROM), 1/e Peter E. Mellquist, Roseville, California Hewlett-Packard Professional Books Published September, 1997 by Prentice Hall PTR (ECS Professional) , ISBN 0-13-264607-2

DS 513 CLIENT/SERVER TECHNOLOGIES
An in-depth study of DCE technologies such as RPC and Kerberos that provide an infrastructure for distributed computing under the client/server model. Global directory services. N-tier client/server database systems. Integration of Web and database technologies through servlets, CGI, and related technologies. This course involves programming.