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| **Course Title** | | Formal Languages and Automata Theory | | | | |
| **Code** | |  | | | **Course Credits** | 3 |
| **Course**  **Description** | | * Introduce concepts in automata theory and theory of computation * Identify different formal language classes and their relationships * Design grammars and recognizers for different formal languages * Prove or disprove theorems in automata theory using its properties * Determine the decidability and intractability of computational problems | | | | |
|  | **Learning outcome** | At the end of the course the student will:   * Acquire insights into the relationship among formal languages, formal grammars, and automata. * Design a deterministic finite state machine to accept a specified language. * Generate a regular expression to represent a specified language. * Convert among equivalently powerful notations for a language, including among DFAs, NFAs, and regular expressions, and between PDAs and CFGs. * Design grammars and automata (recognizers) for different language classes | | | | |
| **Related research areas** | Compiler Design, Formal Methods, Natural Language Processing | | | | |
| **Major topics** | **Chapter 1: Introduction to Formal Languages and Automata Theory**   * + Alphabets and Strings   + Languages   + Grammar   + Automata   **Chapter 2: Finite Automata**   * + Deterministic Finite Automaton (DFA)   + Non Deterministic Finite Automata (NFA)   + NFA with Є transitions   + Equivalence of DFA and NFA   + NFA to DFA Conversion and Minimization of DFA   **Chapter 3: Regular Languages and Regular Grammars**   * + Regular expression and equivalence to FA   + Algebraic laws for regular expressions   + Pumping lemma and applications   + Properties of regular languages   **Chapter 4**: **Context-Free Grammars and Languages**   * + Context Free Grammar   + Derivation trees and Sentential forms   + Rightmost and Leftmost derivation of strings   + Ambiguity of Grammar and Language   + Simplification of CFGs * Chmosky Normal Form (CNF) and * GreibachNormal Form (GNF)   + Pumping Lemma for Context Free Languages   **Chapter 5:** **Pushdown automaton (PDA)**   * + Definition and Model of pda   + Acceptance of CFL * Acceptance by Final State and * Acceptance by Empty State and its Equivalence.   + Equivalence of CFL and PDA & Interconversion.   + Introduction to DCFL and DPDA.   + Linear Bounded Automata(LBA) * Context Sensitive Grammars * Context Sensitive Languages | | | | |
| **Assessment** | **Parameter** | **Weight** | | **Remark** | |
| Quiz | 10 | |  | |
| Assignment / Presentation | 10 | |
|  | Project /seminar | 10 | |
| Mid exam | 30 | |
| Final exam | 40 | |
|  | **Total** | 100 % | |  | |
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|  | **Related references** | **An Introduction to Formal Languages and Automata** (Third Edition), Johns and Bartlett Publishers Inc. 2001. (Text Book) | |  | | |
| William J.M.Levelt,  **An Introduction to the theory of formal languages and Automata**, 2008 | |  | | |