**ABET Course Syllabus – CS3186**

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| **Code** | CS3186 | **Credits** | 3 |
| **Title** | Introduction to Automata Theory | **Coordinator** | Vladimir Akis |

**Course Information**

1. **Catalog Description:** Formal approach to automata theory; finite state machines, regular expressions, regular languages, context free languages and Turing machines. Develops mathematical foundation for computer science.
2. **Prerequisites:** CS 2013, CS2148.
3. **Contact Hours:** Lecture 3 hours /week
4. **Required/Elective:** This course is a required course in the BS program.

**Textbook**

Formal Languages and Automata", Peter Linz, 4th Edition, Jones & Bartlett

**Course Goals**

The Student Learning Outcomes that are addressed by the course are:

*SLO #1. Students will be able to apply concepts and techniques from computing and mathematics to both theoretical and practical problems.*

*SLO #3. Students will have a strong foundation in the design, analysis, and application of many types of algorithms.*

*SLO #5. Students will have the training to analyze problems and identify and define the computing requirements appropriate to their solutions.*

Other outcomes of instruction: At the end of the course students are able to:

* Enhance their problem solving and presentation skills as they prepare solutions to several conceptual questions and present them in class.
* Solve problems that require the formulation and find their solution.
* Understand the basics of Chomsky Hierarchy of languages.

**Topics covered**

* Mathematical Preliminaries and Notations
* Languages, Grammars, Automata
* Regular Languages, Regular Grammars, Regular Expressions
* Properties of Regular Languages
* Finite Automata
* Context-Free Languages
* Context-Free Grammars
* Derivation Trees
* Context-Free Grammars and Programming Languages
* Chomsky Normal Form
* Greibach Normal Form
* Pushdown Automata
* Context-Free Grammars for Pushdown Automata
* A Pumping Lemma for Linear Languages
* A Pumping Lemma for Context-Free Languages
* Turing Machines
* Time complexity
* Space complexity