**CATALOG DESCRIPTION: CMPS 535. NEURAL NETWORKS** (Credit 3 hrs.). This course will consider design, architecture, and implementation of neural networks. Neural networks are becoming increasingly versatile due to their ability to solve difficult nonlinear problems that are not solvable using traditional methods. Inherently parallel design and ability to interact with the environment make neural networks ideal for large applications. Topics include neural networks as emerging technology, perceptrons, associative memory networks, radial-basis networks, spline networks, recurrent networks, neural learning, gradient descent method and back-propagation. Issues related to neuro-computing hardware and neuro-VLSI implementation will be discussed. Neural networks will be examined as problem solving tools as compared with the fuzzy systems and expert systems. Prerequisite: consent of instructor.

**PREREQUISITE:** An undergraduate degree in computer science or engineering. In particular, students are required to have knowledge of CMPS-200, CMPS-201, and CMPS-270.

**INSTRUCTOR:** Sudhir K. Trivedi, Ph.D. Computer Science, Ph.D. Mathematics, Professor of Computer Science.

**TEXTBOOK:** Fundamentals of Neural Networks by Laurene V. Fausett, Prentice Hall, New Jersey, 1994, ISBN 0133341860.

**REFERENCES:**

1. Hands-On Neural Networks with TensorFlow 2.0 by Paolo Galeone, Packt Publishing, 2019, ISBN 9781789615555.

2. Naturally Intelligent Systems by Maureen Caudill and Charles Butler, MIT Press, Cambridge, 1992, ISBN 0262531135.

3. Neural Networks: a Comprehensive Foundation (2nd Edition) by Simon Haykin, Prentice Hall, New Jersey, 1998, ISBN 0132733501.

4. Industrial Applications of Neural Networks by Lakhmi C. Jain and V. Rao Vemuri, CRC Press, Boca Raton, 1998, ISBN 0849398029.

5. Fusion of Neural Networks, Fuzzy Systems and Genetic Algorithms: Industrial Applications by Lakhmi C. Jain and N. M. Martin, CRC Press, Boca Raton, 1998, ISBN: 0849398045.

6. Neural Networks: A Systematic Introduction by Raul Rojas, Springer, 1996, ISBN 3540605053

7. A Brief Introduction of Neural Networks by David Kriesel, dkriesel.com, 2011

**GOALS:** The goals of this course are to introduce the students to neural nets as problem solving tools and to expose them to advanced concepts such as adaptive resonance theory, back-propagation, radial-basis nets, recurrent nets, and fuzzy systems.

**TOPICS:** The topics that will be covered in this class include, but are not limited to, ADALINE, perceptrons, associative memory networks, radial-basis networks, recurrent networks, gradient descent method, and back-propagation. General issues related to neuro-computing hardware and

neuro-VLSI implementation will be discussed. Neural nets will be examined as problem solving tools as compared with the other technologies such as fuzzy systems, expert systems, and genetic algorithms.

**CLASS SCHEDULE:** 9:30 – 11:50 AM on Mondays and Wednesdays, Room 130, Computer Science Building

**OFFICE HOURS:** 11:00 – 3:30 MW or by appointment

**OFFICE:** N101, Thurman Hall

**OFFICE PHONE AND EMAIL:** 225-771-4385; sudhir_trivedi@subr.edu

**COURSE REQUIREMENTS:** Students are expected to know the code of student conduct and are responsible for their own work. Plagiarism will not be tolerated. Students must take examinations and finish their assignments in time. There may be unannounced quizzes in the beginning of some classes. So, be in time and try not to miss classes. Late assignments may be considered with due penalties. Attendance is strongly encouraged; however, merely attending classes does not guarantee a passing grade.

**EVALUATION AND GRADING:** Curve, if any, will be at the end of the semester and will be intended to benefit those students who have made sincere efforts to improve their performance in the class. Makeup exams may be given after establishment of legitimate excuse only. Standard grading scale will be followed. Following is a tentative distribution of various components of the course:

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| Test-1 | 30% | Class project/ term paper and presentation | 30% |
| Test-2 (Final) | 30% | Programs/homework/quizzes/class participation | 10% |

**PROCEDURES/SPECIFICATIONS FOR PREPARATION OF TERM PAPER:**

1. Write your own English; ABSOLUTELY NO cut and paste from the Internet.
2. Follow technical English writing with clear and short sentences; no orphans or widows.
3. Spell check extensively and make sure your grammar is correct.
4. Double spaced, 12 Times Roman, 1½-inch margin on the left and 1-inch margin on all other sides.
5. 5-7 pages; 8-10 PowerPoint Slides.
6. If you are reproducing a line or paragraph from somewhere, it must be placed in quotes and properly referenced. All work should be properly referenced. Not doing so may be considered plagiarism.