# Mehran University of Engineering and Technology, Jamshoro
## Department of Software Engineering

**ORIGINAL SUBMITTED SYLLABUS**

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|---|---|---|
| **Title of Subject** | : | **Intelligent Software Systems** |
| **Code** | : | **SE805** |
| **Discipline** | : | Software Engineering |
| **Effective** | : | 24 PhDSE Batch & onwards |
| **Pre-requisite** | : | Programming Fundamentals, Machine Learning |
| **Assessment** | : | 10% Sessional 30% Mid Semester 60% Final Semester Examination |
| **Credit Hours** | : | 3 + 0        **Marks:** 100 |
| **Minimum Contact Hours:** | | 42 |

**Objectives of course:**
- AI is transforming many industries. The aim of this course is to understand the capabilities, challenges, and consequences of machine learning and deep learning and to participate in the development of leading-edge AI technology for interdisciplinary sciences.

**Course outline:**
- **Chapter 1:**
  Introduction to Artificial Intelligence (AI), Machine Learning (ML), Feature Selection Techniques, Supervised Machine Learning, Unsupervised Machine Learning, Reinforcement Learning, Neural Networks, Deep Learning (DL), Computer Vision, Natural Language Processing.

- **Chapter 2:**
  Improving AI Networks, Needs and Challenges, ML with Sci-kit Learn, Hyperparameter Tuning, Regularization and Optimization, Evaluation Metrics, ML Case Study for Interdisciplinary AI.

- **Chapter 3:**
  Convolutional Neural Networks (CNN), Convolutions, Pooling, Applications of CNN to Computer Vision Tasks, Introduction to CNNs in Tensorflow, Handling Real-world Image Data, Benchmark Computer Vision Datasets, Evaluation Metrics, Overfitting Prevention, Augmentation, Dropout, Transfer Learning, CNN Case Studies for Computer Vision.

- **Chapter 4:**

  Natural Language Processing (NLP), Word Embeddings, Text processing, Tokenization, Vector Representation, Sequence Models, Recurrent neural networks (RNN), RNN variants, Gated Recurrent Unit (GRU), Long short-term memory, Benchmark NLP Datasets, LSTM applications in TensorFlow, Evaluation Metrics.

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  **Chapter 5:**

  Sequences, Time-Series, ML applied to Time-series, Time-series and forecasting in TensorFlow, RNNs and CNNs for Time-series predictions, Evaluation Metrics, Time-series Prediction Case Study.

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**BOOKS RECOMMENDED**

1. Géron and Aurélien, "Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow". O'Reilly Media, Inc, Latest Edition.
2. Bengio, Yoshua, Ian Goodfellow, and Aaron Courville. "Deep learning". Vol. 1. Cambridge, MA, USA: MIT press, Latest Edition.
3. Charu, C. Aggarwal, "Neural networks and deep learning: a textbook", Spinger, Latest Edition.
4. Patterson, Josh, and Adam Gibson, "Deep learning: A practitioner's approach", O'Reilly Media, Inc., Latest Edition.
5. Chollet, Francois, "Deep learning with Python", Simon and Schuster, Latest Edition.

## Approval:

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|---|---|---|
| **Board of Studies:** | **Resolution No. 2.2** | **Dated: 21-07-2023** |
| **Board of Faculty:** | **Resolution No. 21.10** | **Dated: 07-12-2023** |
| **AS&RB** | **Resolution No.** | |
| **Academic Council:** | **Resolution No.** | |