# Fundamentals of AI – Lesson Plan

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\*\*Fundamentals of AI - 12 Week Lesson Plan (1-hour classes)\*\*  
  
\*\*Week 1: Introduction to Artificial Intelligence\*\*  
  
\* \*\*Topic:\*\* What is AI? Defining AI, its history and subfields.  
\* \*\*Subtopics:\*\*  
 \* Defining Artificial Intelligence: Different perspectives and approaches.  
 \* A brief history of AI: Key milestones and breakthroughs.  
 \* Subfields of AI: Machine Learning, Deep Learning, Natural Language Processing, Computer Vision, Robotics (brief overview).  
\* \*\*Activities:\*\* Brainstorming session on AI applications, short quiz on definitions.  
  
  
\*\*Week 2: Problem Solving and Search Algorithms\*\*  
  
\* \*\*Topic:\*\* Solving problems with AI: Search techniques  
\* \*\*Subtopics:\*\*  
 \* Problem representation: States, actions, goals.  
 \* Uninformed search: Breadth-first search, depth-first search.  
 \* Informed search: A\* search, heuristic functions (basic introduction).  
\* \*\*Activities:\*\* Simple problem-solving exercises (e.g., 8-puzzle), group discussion on heuristic function design.  
  
  
\*\*Week 3: Knowledge Representation and Reasoning\*\*  
  
\* \*\*Topic:\*\* How AI represents and uses knowledge.  
\* \*\*Subtopics:\*\*  
 \* Knowledge representation techniques: Semantic networks, ontologies, logic (propositional and first-order logic - basic introduction).  
 \* Reasoning with knowledge: Inference rules, forward chaining, backward chaining.  
\* \*\*Activities:\*\* Building a simple semantic network, exercises on logical inference.  
  
  
\*\*Week 4: Machine Learning: Introduction and Supervised Learning\*\*  
  
\* \*\*Topic:\*\* The basics of machine learning.  
\* \*\*Subtopics:\*\*  
 \* What is machine learning? Types of machine learning (supervised, unsupervised, reinforcement).  
 \* Supervised learning: Regression and classification problems.  
 \* Simple linear regression example (visual explanation).  
\* \*\*Activities:\*\* Hands-on exercise with a simple linear regression model using a tool like Google Colab (pre-prepared dataset).  
  
  
\*\*Week 5: Supervised Learning Algorithms\*\*  
  
\* \*\*Topic:\*\* Exploring common supervised learning algorithms.  
\* \*\*Subtopics:\*\*  
 \* Decision trees.  
 \* Support Vector Machines (SVM) – intuitive explanation.  
 \* Naive Bayes classifiers (basic concept).  
\* \*\*Activities:\*\* Interpreting decision tree visualizations, comparing different algorithms' strengths and weaknesses.  
  
  
\*\*Week 6: Unsupervised Learning\*\*  
  
\* \*\*Topic:\*\* Discovering patterns in data without labels.  
\* \*\*Subtopics:\*\*  
 \* Clustering: K-means clustering (basic concept and visualization).  
 \* Dimensionality reduction: Principal Component Analysis (PCA) – intuitive explanation.  
\* \*\*Activities:\*\* Visualizing K-means clustering results, interpreting PCA results on a simple dataset.  
  
  
\*\*Week 7: Evaluation Metrics for Machine Learning\*\*  
  
\* \*\*Topic:\*\* Assessing the performance of machine learning models.  
\* \*\*Subtopics:\*\*  
 \* Accuracy, precision, recall, F1-score.  
 \* Confusion matrices.  
 \* ROC curves (basic understanding).  
\* \*\*Activities:\*\* Calculating evaluation metrics for a given confusion matrix, interpreting ROC curves.  
  
  
\*\*Week 8: Introduction to Deep Learning\*\*  
  
\* \*\*Topic:\*\* Neural networks and deep learning.  
\* \*\*Subtopics:\*\*  
 \* Perceptrons and multi-layer perceptrons.  
 \* Activation functions (sigmoid, ReLU).  
 \* Backpropagation (high-level understanding).  
\* \*\*Activities:\*\* Visualizing a simple neural network, understanding the flow of information.  
  
  
\*\*Week 9: Convolutional Neural Networks (CNNs)\*\*  
  
\* \*\*Topic:\*\* Deep learning for image processing.  
\* \*\*Subtopics:\*\*  
 \* Architecture of CNNs: Convolutional layers, pooling layers.  
 \* Applications of CNNs: Image classification, object detection.  
\* \*\*Activities:\*\* Analyzing pre-trained CNN models (e.g., using TensorFlow Hub), understanding their applications.  
  
  
\*\*Week 10: Recurrent Neural Networks (RNNs)\*\*  
  
\* \*\*Topic:\*\* Deep learning for sequential data.  
\* \*\*Subtopics:\*\*  
 \* Architecture of RNNs: Hidden states, time steps.  
 \* Applications of RNNs: Natural language processing, time series analysis.  
\* \*\*Activities:\*\* Understanding the concept of sequence processing, exploring simple RNN examples.  
  
  
\*\*Week 11: Natural Language Processing (NLP) Fundamentals\*\*  
  
\* \*\*Topic:\*\* Working with text data.  
\* \*\*Subtopics:\*\*  
 \* Tokenization, stemming, lemmatization.  
 \* Word embeddings (Word2Vec, GloVe - conceptual understanding).  
 \* Sentiment analysis (basic techniques).  
\* \*\*Activities:\*\* Simple text preprocessing exercises, exploring pre-trained word embeddings.  
  
  
\*\*Week 12: Ethical Considerations and Future of AI\*\*  
  
\* \*\*Topic:\*\* Responsible AI development and future trends.  
\* \*\*Subtopics:\*\*  
 \* Bias in AI systems.  
 \* Privacy concerns.  
 \* Job displacement and societal impact.  
 \* Future directions in AI research.  
\* \*\*Activities:\*\* Class discussion on ethical dilemmas, brainstorming future applications of AI.  
  
  
\*\*Note:\*\* This is a suggested plan. The specific activities and level of detail will need adjustment based on the students' progress and the available resources. Consider incorporating hands-on exercises and projects throughout the course to enhance learning. The use of online tools like Google Colab or similar platforms is highly recommended for practical sessions.

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