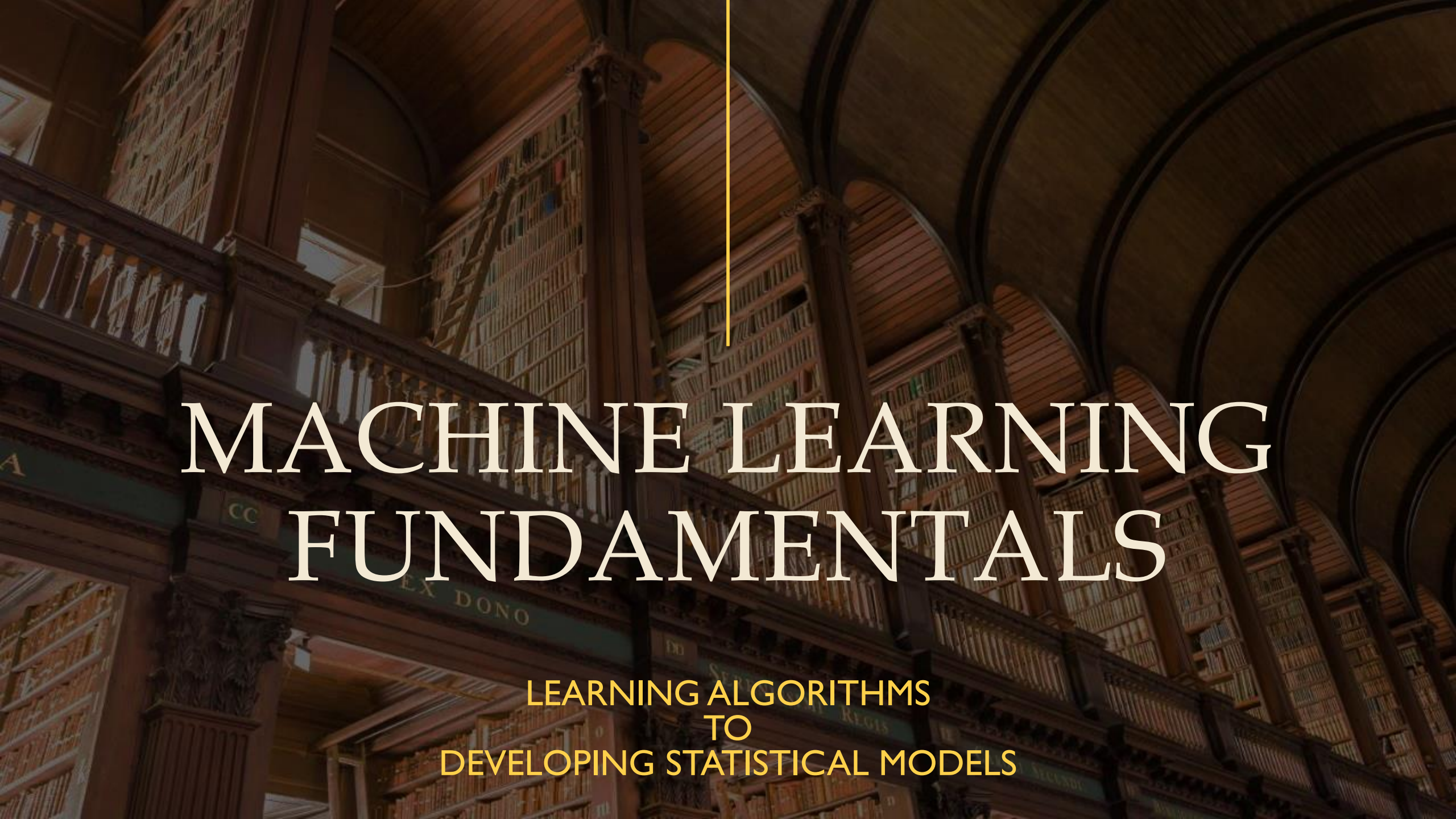

MACHINE LEARNING
FUNDAMENTALS
LEARNING ALGORITHMS
TO
DEVELOPING STATISTICAL MODELS

INTRODUCTION

- Intro to Machine Learning
- Which Algorithms Are Covered in This Course?

BASIC CONCEPTS

- Basic Algebra
- Probability Theory
- Optimisation Theory

REGRESSION – P1

- Linear Regression: Basics
- Implementing LR in Python
- Non-linear Regression
- Elbow
- Polynomials
- RBF
- Implementing NLR in Python

REGRESSION – P2

- Robust Regression
- Implementing RR in Python
- Regression Tunning
- Mid-term Project

CLASSIFICATION

- Generative Models
- GM in Python
- Discriminative Models
- DM in Python
- Risk Analysis
- Non-parametric Models

LINEAR CLASSIFIERS

- Perceptron
- Perceptron in Python
- Linear Fisher Analysis
- Fisher in Python
- Mid-term Project

SUPPORT VECTOR MACHINE

- Intro to SVM
- Optimisation with SVM
- SVM in Classification
- SVM-classifier in Python
- SVM in Regression
- SVM-Regressor in Python
- Mid-term Project

ARTIFICIAL NEURAL NETWORKS

- Introduction
- ANN Structure
- Optimisation Based on Differentiation
- Gradient Descent
- Deep ANN
- Classification with ANN in Python
- Regression with ANN in Python

DECISION TREE

- Introduction
- Splitting
- Gini Index
- Entropy
- Training Error
- DT: Pros and Cons
- DT Pruning
- Use Case of DT in Regression

FEATURE ENGINEERING

- Introduction
- Principle Component Analysis
- Dimensionality Reduction Techniques
- PCA in Python
- Autoencoders Concepts
- Autoencoders in Python
- Bonus: ICA

CLUSTERING

- Introduction
- Distance Evaluation Metrics
- Distance Measurements
- Expectation Maximisation
- DB-SCAN
- K-Means
- Mean-Shift
- Clustering in Python

COMPLEMENTARY TOPICS

- L1 and L2 Norms / Regulation
- Data Augmentation
- Hyper Parameter Tunning
- Bagging
- Boosting
- Bagging and Boosting in Python
- Model Evaluation

NOTES

WEBSITES

- Depends On Instructor

PREREQUISITES

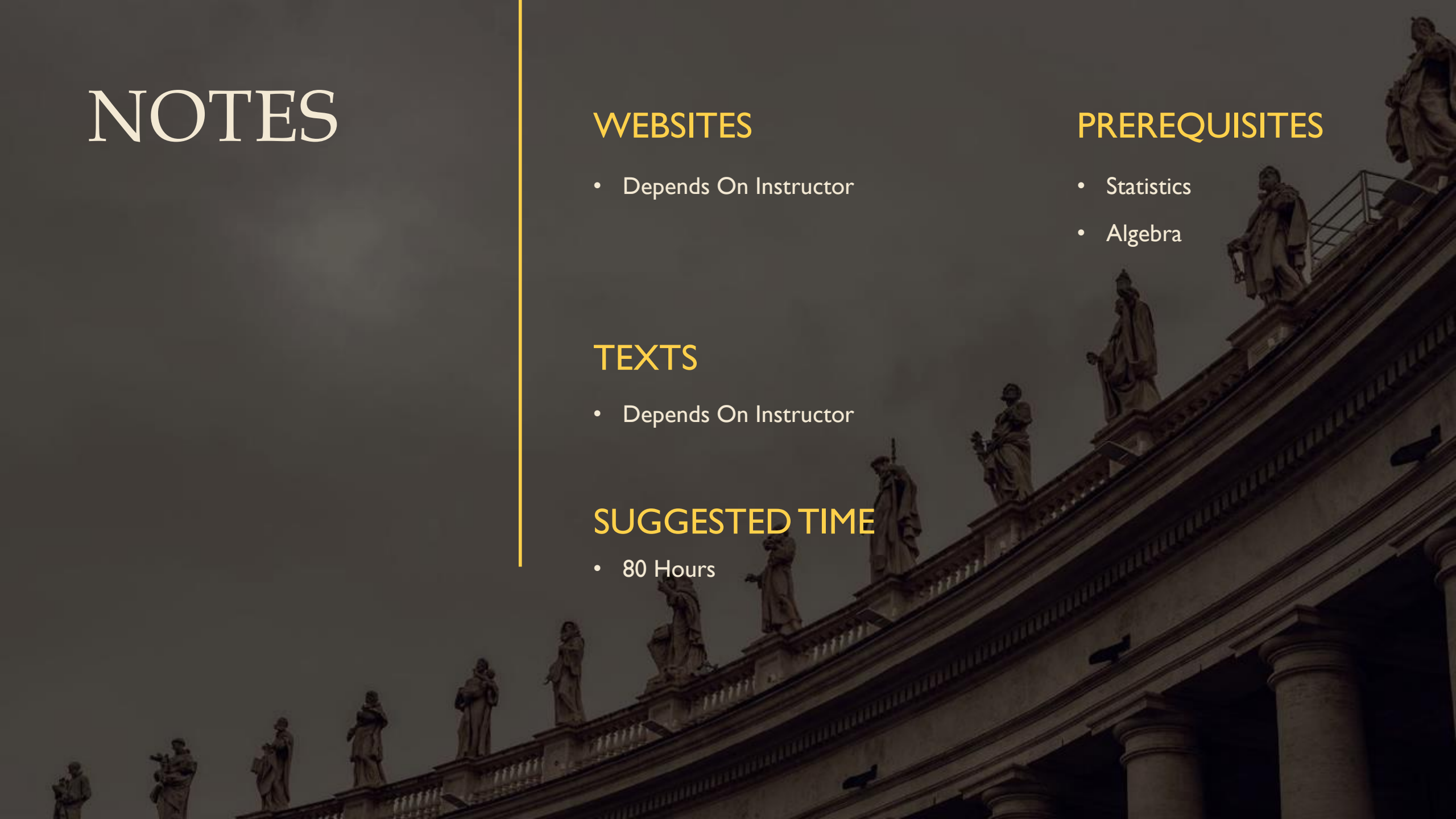
- Statistics
- Algebra

TEXTS

- Depends On Instructor

SUGGESTED TIME

- 80 Hours



DOCUMENT HISTORY

Author	Version	Revision	Date / Time	Department	Validity
Mehdi Shokri	1.0.0		17-05-2023	AI	3 Months