Mid Term 2 Syllabus:

Gradient Descent Variations - I

1-Problems with vanilla gradient descent

2- First-order methods: Resilient Propagation (Rprop)

3-Second-order methods

* Taylor series approximation
* Newton's Method for finding stationary points
* Quickprop

Gradient Descent Variations - II

* Momentum-based first-order methods
* Momentum
* Nesterov Accelerated Gradient
* RMSprop
* ADAM

Automatic Differentiation

* Analytic vs Automatic Differentiation
* Linear Regression via Automatic Differentiation
* Logistic Regression via Automatic Differentiation

Regularization - I

1-Primer on ML

* Capabilities of polynomials
* Everything contains noise
* Overfitting vs Generalisation

2-Regularization Methods

* Weights Penalty
* Early Stopping
* Data Augmentation
* Label Smmoothing

Regularization - II

* Dropout
* BatchNorm

Convolutional Neural Networks

* Padding
* Stride
* Pooling