1) The Joy of Computing using Python – online

Course layout

* Motivation for Computing
* Welcome to Programming!!
* Variables and Expressions : Design your own calculator
* Loops and Conditionals : Hopscotch once again
* Lists, Tuples and Conditionals : Lets go on a trip
* Abstraction Everywhere : Apps in your phone
* Counting Candies : Crowd to the rescue
* Birthday Paradox : Find your twin
* Google Translate : Speak in any Language
* Currency Converter : Count your foreign trip expenses
* Monte Hall : 3 doors and a twist
* Sorting : Arrange the books
* Searching : Find in seconds
* Substitution Cipher : What’s the secret !!
* Sentiment Analysis : Analyse your Facebook data
* 20 questions game : I can read your mind
* Permutations : Jumbled Words
* Spot the similarities : Dobble game
* Count the words : Hundreds, Thousands or Millions.
* Rock, Paper and Scissor : Cheating not allowed !!
* Lie detector : No lies, only TRUTH
* Calculation of the Area : Don’t measure.
* Six degrees of separation : Meet your favourites
* Image Processing : Fun with images
* Tic tac toe : Let’s play
* Snakes and Ladders : Down the memory lane.
* Recursion : Tower of Hanoi
* Page Rank : How Google Works !!

2) Deep learning IITRopar – online

Course layout

**Week 1**:  (Partial) History of Deep Learning, Deep Learning Success Stories, McCulloch Pitts Neuron, Thresholding Logic, Perceptrons, Perceptron Learning Algorithm
**Week 2**:  Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, Gradient Descent, Feedforward Neural Networks, Representation Power of Feedforward Neural Networks
**Week 3**:  FeedForward Neural Networks, Backpropagation
**Week 4**:  Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam, Eigenvalues and eigenvectors, Eigenvalue Decomposition, Basis
**Week 5**:  Principal Component Analysis and its interpretations, Singular Value Decomposition
**Week 6**:  Autoencoders and relation to PCA, Regularization in autoencoders, Denoising autoencoders, Sparse autoencoders, Contractive autoencoders
**Week 7**:  Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods, Dropout
**Week 8**:  Greedy Layerwise Pre-training, Better activation functions, Better weight initialization methods, Batch Normalization
**Week 9**:  Learning Vectorial Representations Of Words
**Week 10**: Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Fooling Convolutional Neural Networks
**Week 11**: Recurrent Neural Networks, Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs
**Week 12**: Encoder Decoder Models, Attention Mechanism, Attention over images

3) Immunology – online

Course layout

**Week 1:** Introduction to immune System, Immune cell types, Hematopoiesis, B and T lymphocytes, NK cells, Lymphoid organs (primary and secondary)
**Week 2:** Features of/introduction to inflammation, Adaptive immune system, Innate Immune system
**Week 3:** Antibody structure, Generation of antibody diversity
**Week 4:**Generation of antibody diversity and TCR rearrangement
**Week 5:** Major histocompatibility complex, Antigen presentation, APCs
**Week 6:** Immuno-diffusion assay, ELISA (Sandwich), Immuno-blotting, flowcytometry.
**Week 7:** T-cell development, negative/positive selection,co-stimulatory molecules.
**Week 8:** Humoral immunity/Cell-mediated immunity, T cell subtypes: Th1, Th2, Th17, Tregs etc.
**Week 9:** B-cell maturation/activation BCR signaling, memory B and T cell
**Week 10:**Pro-inflammatory and anti-inflammatory cytokines,cell polarization/Complement activation (classical/alternate), hypersensitivity
**Week 11:**Autoimmunity, host vs graft reaction
**Week 12:**Active immunization Vaccines, , Vaccine production, passive immunization. , polyclonal and monoclonal antibodies

# 4) Aircraft Propulsion

Course layout

**Week 1:**    Introduction to Gas turbines and Aircraft Propulsion

**Week 2**:    Aircraft propulsion

**Week 3:**    Ideal and Real cycle analysis

**Week 4:**    Ideal and Real cycle analysis

**Week 5:**    Real cycles

**Week 6:**    Real cycles

**Week 7:**    Engine performance and Engine components

**Week 8:**    Centrifugal Compressors

**Week 9:**   Axial Compressors

**Week 10:**  Axial and Radial Turbines

**Week 11:**  Turbine cooling methods and Component matching

**Week 12:**  Blade design and cascade theory

# 5) System Design Through VERILOG

Course layout

**Week-1**:Introduction to Verilog
**Week-2**:Gate level modelling

**Week-3**:Behavioral modelling I
**Week-4**:Behavioral modelling II

**Week-5**:Data flow modelling

**Week-6**:Switch level modelling
**Week-7**:Synthesis of combinational logic using verilog
**Week-8**:Synthesis of sequential logic using verilog