**12-Weeks Computer Vision** with **Machine Learning Curriculum** formatted for structured planning and mentoring.

It blends theory, coding, projects, and emerging trends—perfect if you want to explore industry, research, or entrepreneurial paths.

This layout supports progress tracking, goal-setting, and weekly reflection. ✨

**🎓 Computer Vision Curriculum**

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| **Week** | **Focus Area** | **Learning Goals** | **Projects & Practice - Tools & Skills** |
| 1 | Math & Programming Foundation | Basic math: linear algebra, calculus, probability, Python for ML | Solve vector problems, write NumPy & Matplotlib code |
| 2 | Machine Learning Basics | Understand core ML concepts: supervised learning, loss functions, optimization | Train a logistic regressor & decision tree by Scikit-learn |
| 3 | Classical Computer Vision | Learn Image filtering, edge detection, histogram equalization, feature descriptors | Build image filters with OpenCV |
| 4 | Deep Learning Foundations | Learn backpropagation, activation functions, batch training | Train a simple neural net on MNIST by PyTorch or TensorFlow |
| 5 | CNNs for Image Classification | Apply CNNs to an image, Convolutions, pooling, architecture tuning | Build an image classifier with CNN & ResNet, TorchVision |
| 6 | Object Detection | Train models to locate objects in images, bounding boxes, anchor boxes | Train YOLOv8 or use pre-trained Faster R-CNN |
| 7 | Segmentation Techniques | Pixel-level classification with U-Net, DeepLab, Mask R-CNN | Segment images (medical, satellite) |
| 8 | Vision Transformers & Attention | Learn ViT, Swin Transformer, sparse attention | Fine-tune a ViT model for classification |
| 9 | Generative & Creative Models | Understand GANs, VAEs, and Diffusion models | Generate images using StyleGAN or Stable Diffusion |
| 10 | Multimodal & Captioning Models | Combine images with text for intelligent tasks (CLIP, BLIP, Flamingo) | Build an image captioning or VQA system |
| 11 | Deployment & Edge Optimization | Export and optimize models for production, quantize, use ONNX, TensorRT, TFLite | Deploy a mobile-ready detection system |
| 12 | Ethics, Explainability, and Portfolios | Explore bias detection, fairness, Grad-CAM, mentorship prep, transparency, career strategies | Create a portfolio and plan next career steps |

**🧭 Optional Tracks Based on Career Goals**

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|  | ·        💼 **Industry Path**: Focus extra time on deployment, optimization, mobile-ready models  ·        🧪 **Research Path**: Spend more time on transformers, self-supervised learning, NeRF  ·        🚀 **Startup Path**: Add real-world projects like fashion try-on, smart retail, AR |

**💡 Extras to Boost Your Journey**

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|  | ·        📚 **Reading List**: CS231n lectures, papers from CVPR/ICCV, ArXiv CV trending models  ·        🧪 **Datasets**: COCO, ImageNet, ADE20K, Cityscapes, LFW, CelebA, MNIST  ·        🎥 **Courses**: Fast.ai, DeepLearning.ai, Coursera ML & CV specializations  ·        🌐 **Communities**: Papers with Code, Hugging Face, CVPR Discords, Reddit r/computervision |