Phase 1 – SDN Basics

- **Week 1**
  - Read: Kreutz et al., *"Software-Defined Networking: A Comprehensive Survey"* (Proc. IEEE, 2015).
  - Draw SDN architecture diagram (Control plane, Data plane, APIs).
  - Write a half-page note: "What is SDN? Why security is a concern?"
- **Week 2**
  - Read: *SDN as a Defence Mechanism: A Comprehensive Survey* (2023/24).
  - Summarize SDN threats (DDoS, controller attacks).
  - Draft a 1-paragraph introduction for your paper.

Phase 2 – IDS Landscape

- **Week 3**
  - Read: *Survey on Intrusion Detection Systems in SDN* (IEEE Access, 2024).
  - Extract IDS categories (signature, anomaly, hybrid).
  - Make a table: Method | Dataset | Metrics | Gaps.
- **Week 4**
  - Read: *Systematic Literature Review on Cyber Attack Detection in SDN* (2024).
  - Expand your IDS table.
  - Write: "Most IDS in SDN are anomaly-based; few explore deep learning."

Phase 3 – Deep Learning for IDS

- **Week 5**
  - Read: *Anomaly and Intrusion Detection using Deep Learning in SDN: A Survey* (2024).
  - Note which models (CNN, AE, RNN, Transformer) are used.
  - Compare DL vs ML approaches.
- **Week 6**
  - Read: *Survey on IDS Datasets for SDN* (ETASR, 2024).
  - Select **2 datasets**: NSL-KDD (lightweight) + CIC-IDS2017 (realistic).
  - Write: "Datasets chosen + reason for selection."

Phase 4 – RNN Focus

- **Week 7**
  - Read: Recent RNN/LSTM IDS papers (C-RADAR 2024, BiLSTM IDS 2024).
  - Note: Where RNN works well, where it struggles (latency).
- **Week 8**
  - Write your **gap statement**:
    "RNNs are underexplored in SDN IDS despite sequential modeling

strengths. Prior works lack real-time optimization + attention mechanisms.”

Phase 5 – Experimentation

- **Week 9**
  - Set up dataset preprocessing pipeline (NSL-KDD, CIC-IDS2017).
  - Train a simple **ML baseline** (Random Forest, SVM).
- **Week 10–11**
  - Train a **CNN/DNN baseline** (non-sequential DL).
  - Record metrics (Accuracy, Precision, Recall, F1).
- **Week 12–13**
  - Implement **RNN (LSTM/GRU)** model.
  - Evaluate against baselines.
- **Week 14**
  - Enhance with **Attention Mechanism**.
  - Record improvements in metrics & inference speed.
  - Save graphs (ROC, confusion matrix, accuracy trends).

Phase 6 – Writing Paper

- **Week 15**
  - Draft **Abstract + Introduction**.
  - Insert SDN diagram + motivation.
- **Week 16**
  - Draft **Related Work** (based on surveys & your IDS table).
- **Week 17**
  - Write **Proposed Method** (RNN + attention model, dataset preprocessing).
- **Week 18**
  - Write **Experiments & Results** (tables + graphs).
- **Week 19**
  - Write **Discussion + Conclusion**.
  - Highlight: “Tradeoff between accuracy and latency.”
- **Week 20**
  - Proofread full paper.
  - Format according to target **conference template** (IEEE, Springer, Elsevier).
  - Submit 🎉.

✅ This checklist ensures that in **5 months** you’ll go from **reading surveys → finding gaps → building RNN IDS → writing a publishable paper**.