Pharmacology Study Guide:

Pharmacology Unit 1:

- Drug receptors
- Dose - response curves.
- Types of antagonists.
- Second messengers.
- Efficacy vs. Potency.

Definitions (use EXAMPLES where appropriate)

- Drug.
- Receptor.
- Pharmacodynamics.
- Agonist / Partial agonist / Antagonist.
- Potency.
- Efficacy.
- ED$_{50}$ / TD$_{50}$ / LD$_{50}$
- Therapeutic index (ie therapeutic ratio).

Pharmacology Unit 2:

Definitions (use EXAMPLES)

- Pharmacokinetics.
- Volume of distribution.
- Clearance.
- Elimination: capacity-limited
  flow-limited
- Zero / First / Mixed order kinetics.
- Half-life. (including formula)
- Bioavailability.
- Extraction ratio.
- First-pass elimination.
- Phase 1 and 2 reactions.
- Enzyme induction and inhibition
Pharmacology Unit 3:

- Inhaled anaesthetic agents:
  * Nitrous Oxide (Important).
  * Volatile agents (Learn as a group rather than individual agents).
    - PK and PD particularly.
    - Need to understand concept of MAC.

- IV anaesthetic agents:
  * Sodium thiopentone
  * Propofol.
  * Ketamine.

- Local anaesthetic agents:
  * Lignocaine.
  * Prilocaine.
  * Bupivacaine.
  * PK / PD / Safe doses / Toxicity of particular note.

Pharmacology Unit 4:

- Non-depolarising muscle relaxants; be familiar with:-
  * Pancuronium.
  * Vecuronium.
  * Atracurium.
  * Rocuronium.
  * There may be a few MCQs about the original NDPMRs eg d-Tubocurarine.

- Depolarising muscle relaxants:-
  * Suxamethonium- IMPORTANT drug.
    - Understand differences vs. NDPMRs.
    - Phase II block.
    - Contraindications / Side effects.
    - Pseudocholinesterase deficiency.

- Dantrolene.
- Malignant Hyperthermia.

- Anatomy & neurotransmitter chemistry of the Autonomic Nervous System.
- Autonomic receptors.
- Presynaptic & postsynaptic regulation.
- Pharmacology of the eye
Pharmacology Unit 5:

**Important:**
- Direct-acting cholinergics (nicotinic / muscarinic).
- Indirect-acting cholinergics (i.e. Cholinesterase inhibitors).
  * alcohols (Edrophonium).
  * carbamates (Neostigmine).
  * organophosphates (including poisoning & Pralidoxime).
- Anticholinergics (Atropine).
- Adrenoceptor types & distribution.
- Second messengers (broad concepts).
- Organ system effects.
- Adrenaline
- Noradrenaline
- Isoprenaline
- Dopamine.
- Dobutamine.

Pharmacology Unit 6:
Revision Week

Pharmacology Unit 7:

**Important:**
- Clinical pharmacology of alpha blockers.
- Alpha blockers:
  - Phenoxybenzamine
  - Phentolamine.
  - Prazosin.
- Beta blockers: - Organ system effects.
- Specific agents: - Propranolol.
  - Metoprolol / Atenolol. ($\beta_1$ selective).
  - Labetalol worthy of superficial knowledge.
  - Esmolol also interesting because of short $T_{1/2}$ and use in SVT.
Know which agents exhibit cardioselectivity, intrinsic sympathomimetic activity, local anaesthetic action etc. (Table 10-2 and common examples of each)

Clinical pharmacology of beta blockers.

Beta blocker toxicity / overdose.

**Pharmacology Unit 8:**

Anti-hypertensive agent classes

Methyldopa:
  * Mechanism of action, bioavailability.

Clonidine:
  * Mechanism of action.

Ganglion-blockers:
  * Know what they do (for MCQs).
  * Know some of their names.
  * Know something about their toxicity. (the reason for their withdrawal from the market)

Hydralazine

Sodium Nitroprusside: Interesting drug, particularly with regard to pharmacokinetics, pharmacodynamics and toxicity.

ACE inhibitors:
  * Generic features.
  * Captopril.
  * Enalapril (is a “prodrug”, NB for MCQs).

Angiotensin receptor blockers (e.g. Losartan)

**Pharmacology Unit 9:**

Nitrates:
  - Need good understanding of PK and PD.
  - Table 12-2 for MCQs / Vivas.

Calcium channel blockers:
  - Dihydropyridines
    - Nifedipine (learn this one as representative).
    - Amlodipine.
    - Felodipine.
-Verapamil.
-Diltiazem.
-Passing familiarity with Nimodipine.

- Review of cardiac contractility and excitation-contraction coupling.
- Review of factors affecting cardiac output. (“cardiac performance”).

- **Digoxin** (Important drug):
  - Particularly PK, PD and interactions.
  - Digoxin toxicity.
  - Digoxin-specific antibodies (Digibind).

- Other drugs used in CHF:
  - Inotropes.
  - Diuretics (covered later)
  - Vasodilators.

**Pharmacology Unit 10:**

- Review of electrophysiology of cardiac conduction.
- Mechanisms of arrhythmias (re-entry etc.).
- Anti-arrhythmic drugs are classified using the **Vaughan-Williams**
  system. (The underlined drugs are important.)

  - Class 1A: **Quinidine / Procainamide** / TCAs
  - Class 1B: **Lignocaine / Phenytoin**
  - Class 1C: **Flecainide**

  - Class 2: Beta-blockers (already covered)
  - Class 3: **Amiodarone** (also Class 1, 2 and 4)
    **Sotalol** (also Class 2)
  - Class 4: Calcium channel blockers (**Verapamil**).

  - Others: **Adenosine,**
    **Digoxin** (already covered).
    **Magnesium.**

**Pharmacology Unit 11:**

**Chapter 15**

- Overview of renal function.
- Classification & mechanism of action of diuretics as a group
Specific drugs:
- carbonic anhydrase inhibitors
- osmotic diuretics
- loop diuretics
- thiazides
- K sparing agents
- aldosterone antagonists

Chapter 35

- Overview of lipoprotein disorders
- HMG CoA Reductase inhibitors (eg simvastatin)
- Niacin (Vit B3)
- Fibrates (eg gemfibrozil)

Pharmacology Unit 12:

- Heparin (unfractionated).
- LMW Heparin.
- Protamine.
- Warfarin.
- Streptokinase.
- t-PA.
- Aspirin (antithrombotic effects).
- Clopidogrel
- Vitamin K.
- Blood products:
  - FFP.
  - Cryoprecipitate.
  - Factor VIII.
  - Factor IX.

Pharmacology Unit 13:

Revision Week
Pharmacology Unit 14:

- Agents used for asthma:
  - Sympathomimetics (salbutamol)
  - Methylxanthine (Theophylline - worth knowing PK/PD/Overdose)
  - Anti muscarinic - Ipratropium.
  - Steroid inhalers
  - Sodium cromoglycate (basic).

Pharmacology Unit 15:

Chapter 43
- Penicillins: Natural penicillins e.g. benzylpenicillin.
  - Anti staphyl penicillins e.g. flucloxacillin
  - Broad-spectrum penicillins e.g. ampicillin.
- Cephalosporins: 4 generations (with examples).
  - Compare / contrast the four generations.
- Vancomycin.

Chapter 44
- Tetracyclines. doxycycline.
- Macrolides. -erythromycin
  - azithromycin
- Chloramphenicol

Pharmacology Unit 16:

Chapter 45
- Aminoglycosides.
  - gentamicin.

Chapter 46
- Sulfonamides.
- Trimethoprim.
- Quinolones.

Chapter 47
- Isoniazid
Pharmacology Unit 17:

Chapter 48

- Azoles - fluconazole

Chapter 49

- Anti-virals:
  - Aciclovir
  - AZT.
  - Amantadine

Chapter 50

- Metronidazole
- Nitrofurantoin
- Antiseptics

Pharmacology Unit 18:

Revision Week

Pharmacology Unit 19:

Chapter 21

- Sites of drug action
- Neurotransmitters

Chapter 22

- Benzodiazepines:
  * Midazolam.
  * Diazepam.
  * Flumazenil.

- Zolpidem
Pharmacology Unit 20:

Chapter 23

- Ethanol:
  * PK (particularly metabolism).
  * PD / Organ system effects.
  * Withdrawal.

- Naltrexone / Disulfiram

- Methanol / Ethylene glycol:
  * Mainly relating to toxicity.

Chapter 24

- Review of seizure types.
- **Phenytoin** (IMPORTANT DRUG):
  * Pharmacokinetics of particular note (variable order kinetics; metabolism becomes saturated within the therapeutic range).
  * Toxicity.
  * Interactions.
- Carbamazepine.
- Some knowledge of: - Phenobarbital
  - Newer drugs eg. Lamotrigine, gabapentin
- Sodium valproate.

Pharmacology Unit 21:

- Antipsychotic agents:
  * Basis of action (Dopamine hypothesis etc).
  * Types:
    - Phenothiazines (Chlorpromazine)
    - Butyrophenones (Haloperidol)
    - Atypical (Olanzapine, risperidone)

- Lithium (with particular reference to overdose).
Pharmacology Unit 22:

- Antidepressants:
  * Basis of action (neurotrophic and monoamine hypothesis).
  * SSRIs: -Fluoxetine as typical agent.
     -Serotonin syndrome.
  * SNRIs: -Venlafaxine
  * TCAs: -Learn features as a group.
     -Main thrust of questions will be toward overdose.
  * Tetracyclics: -Superficial knowledge.
  * MAO inhibitors: -Emphasis on toxicity / overdose.
     -Drug interactions is a good MCQ.

Pharmacology Unit 23:

Chapter 31

- Opioid peptides and receptor types (table 31-1)
- PK / PD /Toxicity etc. as a group.

Specific agents to know:
- Morphine
- Fentanyl
- Codeine
- Tramadol

Need some familiarity with:
- Methadone
- Heroin.

- Buprenorphine (Temgesic) is of interest as a partial agonist.
- Naloxone.

Chapter 32

- GHB
- Cocaine
- Amphetamines

Pharmacology Unit 24:

Revision Week
Pharmacology Unit 25:

Chapter 38

- Anti-thyroid drugs (basic understanding):
  - Thioamides: Carbimazole, Propylthiouracil.
  - Radioactive Iodine.

Chapter 39

- Glucocorticoids:
  - Very important drugs
  - Hydrocortisone.
  - Prednisone.
  - Effects / indications.
  - Table of relative potencies table 39-1 (MCQ)

- Mineralocorticoids:
  - Aldosterone.

Pharmacology Unit 26:

- Insulin secretion / structure / actions (overlap with Physiology).

- Insulin (Important):
  - Preparations.
  - Delivery system.
  - Complications of therapy.

- Oral hypoglycaemics:
  - Learn as groups rather than individual agents.
  - Sulphonylureas.
  - Biguanides.

- Glucagon.
  - Effects.
  - Indications (e.g. Beta-blocker OD, Oesophageal FB).
Pharmacology Unit 27:

• Histamine.

• \( H_1 \) antagonists: -Promethazine.

• 5-HT agonists: -Sumatriptan.

• 5-HT antagonists: -Ondansetron.

• Ergot alkaloids: -Ergotamine.

Pharmacology Unit 28:

• Aspirin (Important drug).
  PK: -Gastric trapping.
  • -Variable-order kinetics.
  • -Acceleration of excretion by urinary alkalinisation.

PD.
Overdose
• Cyclo-oxygenase inhibitors
• Other NSAIDs:
  Know that there are 7 classes.
• Learn generic features rather then individual agents, but know which agents have specific uses e.g. Indomethacin for PDA.

• Paracetamol (Important, especially in overdose.)
  Need some familiarity with Rumack-Matthew nomogram.
• N-acetylcysteine. (basic knowledge e.g. proposed mechanism of action, dose).

• Colchicine (basic knowledge, relating particularly to overdose).
• Allopurinol (basic knowledge only).

Pharmacology Unit 29:

• Antacids.

• H2 antagonists:
Cimetidine as prototype (also interesting for its interactions).
-Familiarity with the others as well.

- Proton pump inhibitors (Omeprazole)
- Metoclopramide
- Passing familiarity with laxatives & anti-diarrheals.
- Prochlorperazine
- Octreotide

**Pharmacology Unit 30:**
Revision Week

**Pharmacology Unit 31:**
Chapter 57
- Pharmacology of chelators

Chapter 58
- Initial management of poisoned patient
- Methods of G-I decontamination.
- Specific antidotes (Table 58-4)
- Substances eliminated by dialysis (table 58-3)
- Common toxic syndromes

**Pharmacology Unit 32:**
Chapter 59
- Drug therapy in pregnancy
- Drug therapy in children

Chapter 60
- Pharmacology in aging
• Major drug groups

Appendix
• Active and passive immunisation