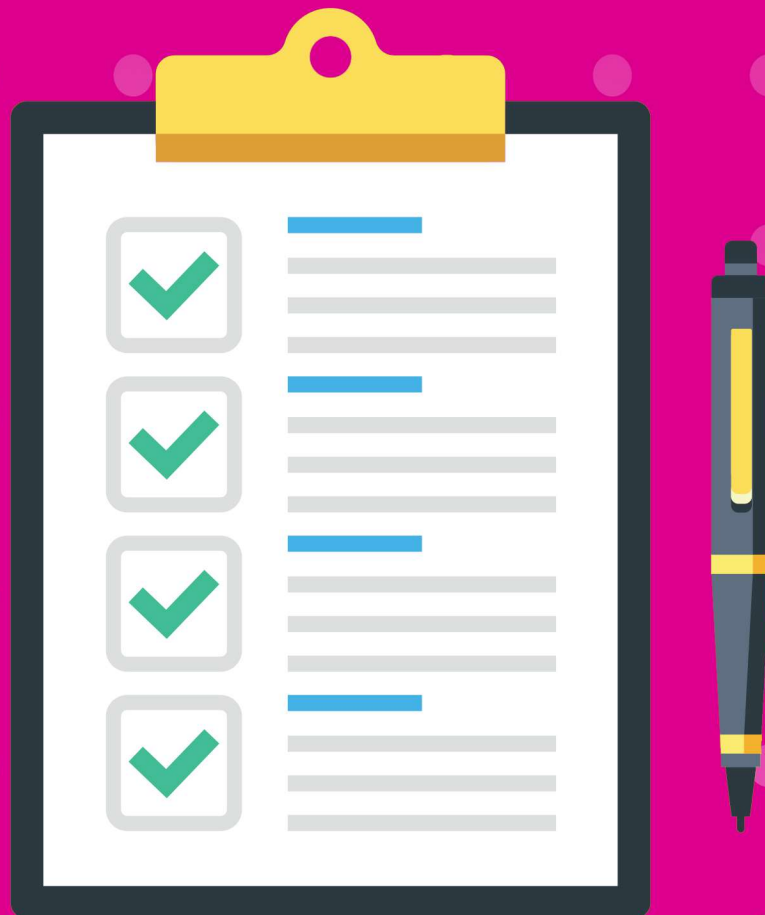


Mag^{✓✓}sh's

Complete List of MCAT Topics

Compiled Directly from AAMC



mcats.magoosh.com



“The MCAT is many things: long, complex, broad, a time crunch...”

Good news? **The AAMC tells you exactly what to study.** You might have discovered this for yourself while perusing their website and coming across several **lists of topics students need to know** (29, to be exact). The problem is they don't make the lists available in one place.

We have done exactly that for you! We scanned their lists, put all the terms together, and then collapsed a few terms here and there so that you could see **all of them in one place**. You'll see that each major section has a number and letter at the top. These correspond to the **Foundational Concepts** as laid out by the AAMC.

Use these lists how you see fit! Some students I've talked to like to **print them out and check off the concepts** as they review each content area. Others use them to get their bearings as they watch lessons. Others still just use them as proof to friends and family members that the MCAT is big, broad, and burly. I hope this resource supports your studies and gets you that much closer to your **target score and dream career!**”

- Kat Thomson, Magoosh MCAT Expert

Kat Thomson has a PhD from UC San Francisco with degrees in medical sociology and health psychology. Since 2005, she has been teaching pre-med and nursing students across the US. Kat collaborates with other experts to create quality MCAT products, and above all, she enjoys she enjoys mentoring students. While Kat does love feline cats, she happens to be allergic to them, adding a new dimension to the concept of autoimmunity.



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Biological & Biochemical

1a. Structure and Function of Proteins and Amino Acids

- ❑ **Amino Acids:** Absolute configuration at the α position; Amino acids as dipolar ions
- ❑ **Classifications** (Acidic or basic, hydrophobic or hydrophilic)
- ❑ **Amino Acid Reactions:** Sulfur linkage [cysteine and cystine]; peptide linkage in proteins, hydrolysis
- ❑ **Protein Structure** (1st, 2nd, 3rd, and 4th degree structures)
- ❑ **Roles of proline, cystine, hydrophobic bonding in 3rd degree protein structures**
- ❑ **Conformational stability** (denaturing and folding, hydrophobic interactions, solvation layer [entropy])
- ❑ **Separation techniques** (Isoelectric point, Electrophoresis)
- ❑ **Non-Enzymatic Protein Function** (Binding, immune system, motors)
- ❑ **Enzyme classification by reaction type, function of enzymes in catalyzing biological reactions**
- ❑ **Reduction of activation energy**
- ❑ **Substrates and enzyme specificity**
- ❑ **Active Site Model, Induced-fit Model**
- ❑ **Mechanism of catalysis** (cofactors, coenzymes, water-soluble vitamins)
- ❑ **Effects of local conditions on enzyme activity**
- ❑ **Kinetics** (general/catalyst, Michaelis-Menten, cooperativity)
- ❑ **Feedback regulation**
- ❑ **Inhibition** (competitive, noncompetitive, mixed, uncompetitive)
- ❑ **Regulatory enzymes** (allosteric enzymes, covalently-modified enzymes, zymogen)

Biological & Biochemical

1b. Transmission of Genetic Information From Gene to the Protein

- ❑ **Nucleotides and nucleosides** (sugar, phosphate backbone, pyrimidine, purine residues)
- ❑ **Deoxyribonucleic acid, double helix, Watson-Crick model of DNA**
- ❑ **Base pairing specificity: A with T, G with C**
- ❑ **DNA denaturation, reannealing, hybridization**
- ❑ **Mechanism of DNA replication: separation of strands, specific coupling of free nucleic acids**
- ❑ **Semi-conservative nature of replication, specific enzymes involved in replication**
- ❑ **Origins of replication, multiple origins in eukaryotes**
- ❑ **Replicating the ends of DNA molecules**
- ❑ **DNA Repair during replication, repair of DNA mutations**
- ❑ **Central Dogma: DNA → RNA → protein, the triplet code**
- ❑ **Codon–anticodon relationship, degenerate code, wobble pairing**
- ❑ **Codons: missense, nonsense, initiation, termination codons**
- ❑ **Messenger RNA (mRNA), transcription/mechanisms of transcription**
- ❑ **Transfer RNA (tRNA); ribosomal RNA (rRNA)**
- ❑ **mRNA processing in eukaryotes, introns, exons**
- ❑ **Ribozymes, spliceosomes, snRNPs, snRNAs**
- ❑ **Functional and evolutionary importance of introns**
- ❑ **Translation: Roles of mRNA, tRNA, rRNA, role and structure of ribosomes**
- ❑ **Initiation, termination cofactors**
- ❑ **Post-translational modification of proteins**

Biological & Biochemical

1b. (continued)

- ❑ **Cancer:** as a failure of normal cellular controls, oncogenes, tumor suppressor genes
- ❑ **Regulation of chromatin structure**
- ❑ **DNA methylation, role of non-coding RNAs**
- ❑ **Recombinant DNA and Biotechnology** (gene cloning, restriction enzymes, DNA libraries)
- ❑ **Generation of cDNA, Hybridization, Expressing cloned genes**
- ❑ **Polymerase chain reaction**
- ❑ **Gel electrophoresis and Southern blotting**
- ❑ **DNA sequencing, analyzing gene expression, determining gene function**
- ❑ **Practical applications of stem cells and DNA technology:** medical applications, human gene therapy, pharmaceuticals, forensic evidence, environmental cleanup, agriculture
- ❑ **Safety and ethics of DNA technology**

Biological & Biochemical

1c. Transmission of Heritable Information Across Generations & the Processes That Increase Genetic Diversity

- ❑ **Mendelian Concepts**, phenotype and genotype
- ❑ **Gene, Locus, allele**: single and multiple
- ❑ **Homozygosity and heterozygosity**
- ❑ **Wild-type, recessiveness, complete dominance, co-dominance**
- ❑ **Incomplete dominance, leakage, penetrance, expressivity**
- ❑ **Hybridization**: viability
- ❑ **Gene pool**
- ❑ **Significance of meiosis**, important differences between meiosis and mitosis
- ❑ **Segregation of genes** (Independent assortment, linkage)
- ❑ **Recombination** (single crossovers, double crossovers, synaptonemal complex, tetrad)
- ❑ **Sex-linked characteristics, sex determination** (few genes on Y chromosome, extranuclear inheritance)
- ❑ **General types of mutation, DNA sequencing, advantageous vs deleterious mutation**
- ❑ **Types of mutations**: random, translation error, transcription error, base substitution, inversion, addition, deletion, translocation, mispairing
- ❑ **Inborn errors of mutation**, relationship of mutations to carcinogens
- ❑ **Genetic drift**
- ❑ **Synapsis** or crossing-over mechanism for increasing genetic diversity
- ❑ **Hardy-Weinberg Principle**
- ❑ **Testcross** (Backcross; concepts of parental, F1, and F2 generations)
- ❑ **Gene mapping**: crossover frequencies, **biometry**: statistical methods
- ❑ **Natural selection Fitness concept** (differential reproduction, group selection, evolutionary success)
- ❑ **Speciation** (polymorphism, adaptation & specialization, outbreeding, bottlenecks)
- ❑ **Evolutionary time as measured by gradual random changes in genome**

Biological & Biochemical

1d. Structure and Function of Proteins and Amino Acids

- ❑ **Bioenergetics/thermodynamics**
- ❑ **Free energy/Keq, equilibrium constant**, relationship of the equilibrium constant and ΔG°
- ❑ **Concentration, Le Châtelier's Principle**
- ❑ **Endothermic/exothermic reactions**
- ❑ **Free energy: G**, Spontaneous reactions and ΔG°
- ❑ **Phosphoryl group transfers and ATP** (ATP hydrolysis $\Delta G \ll 0$; ATP group transfers)
- ❑ **Biological oxidation-reduction** (half-reactions, soluble electron carriers, flavoproteins)
- ❑ **Carbohydrates**: nomenclature and classification, common names, absolute configuration
- ❑ **Cyclic structure and conformations of carbohydrate hexoses**
- ❑ **Epimers and anomers**
- ❑ **Hydrolysis of the glycoside linkage**
- ❑ **Monosaccharides, disaccharides, polysaccharides**
- ❑ **Glycolysis, Gluconeogenesis, and the Pentose Phosphate Pathway**
- ❑ **Glycolysis** (aerobic), **substrates and products, feeder pathways**: glycogen, starch metabolism)
- ❑ **Fermentation** (anaerobic glycolysis)
- ❑ **Gluconeogenesis pentose phosphate pathway, net molecular and energetic results of respiration**
- ❑ **Principles of Metabolic Regulation**
- ❑ **Regulation of metabolic pathways, maintenance of a dynamic steady state**
- ❑ **Regulation of glycolysis and gluconeogenesis**
- ❑ **Metabolism of glycogen, regulation of glycogen synthesis and breakdown**
- ❑ **Allosteric and hormonal control**

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Biological & Biochemical

1d. (Continued)

- ❑ Citric Acid Cycle
- ❑ Acetyl-CoA production, reactions of the cycle, substrates and products
- ❑ Regulation of the cycle, net molecular and energetic results of respiration processes
- ❑ Description and metabolism of fatty acids
- ❑ Digestion, mobilization, and transport of fats
- ❑ Oxidation of fatty acids
- ❑ Saturated and unsaturated fats
- ❑ Ketone bodies, anabolism of fats
- ❑ Non-template synthesis: biosynthesis of lipids and polysaccharides
- ❑ Metabolism of proteins
- ❑ Oxidative Phosphorylation
- ❑ Electron transport chain and oxidative phosphorylation, substrates and products, features of the pathway
- ❑ Electron transfer in mitochondria (NADH, NADPH, Flavoproteins, Cytochromes)
- ❑ ATP synthase, chemiosmotic coupling, proton motive force
- ❑ Net molecular and energetic results of respiration processes
- ❑ Regulation of oxidative phosphorylation, mitochondria, apoptosis, oxidative stress
- ❑ Hormonal Regulation and Integration of Metabolism
- ❑ Higher level integration of hormone structure and function
- ❑ Tissue specific metabolism
- ❑ Hormonal regulation of fuel metabolism
- ❑ Obesity and regulation of body mass

Biological & Biochemical

2a. Assemblies of Molecules, Cells, and Groups of Cells Within Single/Multicellular Organisms

- ❑ **Plasma Membrane, function in cell containment, composition of membranes**
- ❑ **Lipid components** (Phospholipids and phosphatides, Steroids, Waxes)
- ❑ **Protein components, fluid mosaic model**
- ❑ **Membrane dynamics, solute transport across membranes**
- ❑ **Osmosis:** Colligative properties; osmotic pressure
- ❑ **Passive and active transport; sodium/potassium pump**
- ❑ **Membrane channels, potential, and receptors**
- ❑ **Exocytosis and endocytosis**
- ❑ **Intercellular junctions:** gap junctions, tight junctions, desmosomes
- ❑ **Defining characteristics of eukaryotic cells: membrane bound nucleus, organelles, mitotic division**
- ❑ **Nucleus:** Compartmentalization, storage of genetic information
- ❑ **Nucleolus:** location and function
- ❑ **Nuclear envelope, nuclear pores**
- ❑ **Mitochondria:** site of ATP production, inner and outer membrane structure, self-replication
- ❑ **Lysosomes:** membrane-bound vesicles containing hydrolytic enzymes
- ❑ **Endoplasmic reticulum:** Rough and smooth components, rough endoplasmic reticulum site of ribosomes
- ❑ **Endoplasmic reticulum membrane: structure, membrane biosynthesis, secreted proteins**
- ❑ **Golgi apparatus:** general structure and role in packaging and secretion
- ❑ **Peroxisomes:** organelles that collect peroxides
- ❑ **Cytoskeleton:** general function in cell support and movement
- ❑ **Microfilaments:** composition and role in cleavage and contractility
- ❑ **Microtubules: composition and role in support and transport**
- ❑ **Intermediate filaments, role in support**
- ❑ **Composition and function of cilia and flagella**
- ❑ **Centrioles, microtubule organizing centers**
- ❑ **Tissues Formed From Eukaryotic Cells:** epithelial cells, connective tissue cells

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Biological & Biochemical

2b. The Structure, Growth, Physiology, and Genetics of Prokaryotes and Viruses

- ❑ **Cell Theory:** history and development, impact on biology
- ❑ **Classification and Structure of Prokaryotic Cells**
- ❑ **Prokaryotic domains:** archaea, bacteria
- ❑ **Major classifications of bacteria by shape:** Bacilli, Spirilli, Cocci
- ❑ **Bacteria:** lack of nuclear membrane and mitotic apparatus, and typical eukaryotic organelles
- ❑ **Presence of cell wall in bacteria, Flagellar propulsion, mechanism**
- ❑ **Growth and Physiology of Prokaryotic Cells**
- ❑ **Bacteria:** Reproduction by fission, high degree of genetic adaptability, acquisition of antibiotic resistance
- ❑ **Bacteria:** Exponential growth, existence of anaerobic and aerobic variants
- ❑ **Parasitic and symbiotic, Chemotaxis**
- ❑ **Genetics of Prokaryotic Cells:** plasmids, extragenomic DNA
- ❑ **Transformation:** incorporation into bacterial genome of DNA fragments from external medium
- ❑ **Conjugation and Transposons in prokaryotic cells**
- ❑ **Virus Structure:** nucleic acid and protein, enveloped and nonenveloped
- ❑ **Viruses lack organelles and nucleus**
- ❑ **Viruses:** Structural aspects of typical bacteriophage
- ❑ **Viruses:** Genomic content — RNA or DNA
- ❑ **Viruses:** Size relative to bacteria and eukaryotic cells
- ❑ **Virus Life Cycle:** Self-replicating biological units that must reproduce within specific host cell
- ❑ **Generalized phage and animal virus life cycles** (attachment to host, replication, release)
- ❑ **Transduction:** transfer of genetic material by viruses
- ❑ **Retrovirus life cycle:** integration into host DNA, reverse transcriptase, HIV
- ❑ **Prions and viroids:** subviral particles

Biological & Biochemical

2c. Processes of Cell Division, Differentiation, and Specialization

- ❑ **Mitotic process:** prophase, metaphase, anaphase, telophase, interphase
- ❑ **Mitotic structures:** (Centrioles, asters, spindles, Chromatids, centromeres, kinetochores)
- ❑ **Nuclear membrane breakdown and reorganization**
- ❑ **Mechanisms of chromosome movement**
- ❑ **Phases of cell cycle:** G0, G1, S, G2, M
- ❑ **Loss of cell cycle controls in cancer cells**
- ❑ **Oncogenes, apoptosis**
- ❑ **Gametogenesis by meiosis** (ovum and sperm: formation, morphology, genetic contributions)
- ❑ **Reproductive sequence:** fertilization; implantation; development; birth
- ❑ **Embryogenesis:** Stages of early development (order and general features of each)
- ❑ **Formation of primary germ layers** (endoderm, mesoderm, ectoderm)
- ❑ **Neurulation, Neural crest**
- ❑ **Environment-gene interaction in germ layer development**
- ❑ **Cell specialization:** (determination, differentiation, tissue types)
- ❑ **Cell-cell communication in development**
- ❑ **Pluripotency: stem cells**
- ❑ **Gene regulation in development**
- ❑ **Programmed cell death**
- ❑ **Existence of regenerative capacity in various species**
- ❑ **Senescence and aging**

Biological & Biochemical

3a. Structure and Function of Proteins & Amino Acids

- ❑ **Major Functions of nervous system:** (integration of body systems, adaptive capability)
- ❑ **Organization of vertebrate nervous system**
- ❑ **Sensor and effector neurons**
- ❑ **Sympathetic and parasympathetic nervous systems:** antagonistic control
- ❑ **Reflexes:** Feedback loop, reflex arc, role of spinal cord and supraspinal circuits
- ❑ **Integration of nervous system with endocrine system:** feedback control
- ❑ **Cell body:** site of nucleus, organelles
- ❑ **Dendrites:** branched extensions of cell body
- ❑ **Axon:** structure and function
- ❑ **Myelin sheath, Schwann cells, insulation of axon**
- ❑ **Nodes of Ranvier:** propagation of nerve impulse along axon
- ❑ **Synaptic activity:** transmitter molecules
- ❑ **Resting potential:** electrochemical gradient
- ❑ **Action potential:** Threshold, all-or-none, Sodium/potassium pump
- ❑ **Excitatory and inhibitory nerve fibers:** summation, frequency of firing
- ❑ **Glial cells, neuroglia**
- ❑ **Electrochemistry: Concentration cell:** direction of electron flow, Nernst equation
- ❑ **Biosignalling**
- ❑ **Gated ion channels** (voltage, ligand)
- ❑ **Receptor enzymes**
- ❑ **G protein-coupled receptors**
- ❑ **Lipids** (description, structure, steroids, terpenes, and terpenoids)
- ❑ **Function of endocrine system:** specific chemical control at cell, tissue, and organ level
- ❑ **Definitions of endocrine gland, hormone**
- ❑ **Major endocrine glands and types of hormones:** names, locations, products
- ❑ **Neuroendocrinology** — relation between neurons and hormonal systems
- ❑ **Cellular mechanisms of hormone action**
- ❑ **Transport of hormones:** blood supply
- ❑ **Specificity of hormones:** target tissue
- ❑ **Regulation by second messengers**

Biological & Biochemical

3b. Structure and Function of the Main Organ Systems

- ❑ **Respiratory System:** Gas exchange, thermoregulation
- ❑ **Structure of lungs and alveoli**
- ❑ **Breathing mechanisms** (Diaphragm, rib cage, differential pressure, resiliency and surface tension effects)
- ❑ **Thermoregulation:** nasal and tracheal capillary beds; evaporation, panting
- ❑ **Particulate filtration:** nasal hairs, mucus/cilia system in lungs
- ❑ **Alveolar gas exchange** (diffusion, differential partial pressure, Henry's Law)
- ❑ **pH control**
- ❑ **Circulatory System Functions** (circulation of oxygen, nutrients, hormones, removal of metabolic waste)
- ❑ **Four-chambered heart:** structure and function
- ❑ **Endothelial cells**
- ❑ **Systolic and diastolic pressure**
- ❑ **Pulmonary and systemic circulation**
- ❑ **Arterial and venous systems** (arteries, arterioles, venules, veins)
- ❑ **Capillary beds** (mechanisms of gas and solute exchange, heat exchange, peripheral resistance)
- ❑ **Plasma, chemicals, blood cells**
- ❑ **Erythrocyte production and destruction; spleen, bone marrow**
- ❑ **Regulation of plasma volume**
- ❑ **Coagulation, clotting mechanisms**
- ❑ **Oxygen transport by blood:** Hemoglobin, hematocrit, oxygen content, oxygen affinity
- ❑ **Structure and functions of lymphatic system**
- ❑ **Lymphatic transport of proteins and large glycerides**
- ❑ **Production of lymphocytes involved in immune reactions**

Biological & Biochemical

3b. (Continued)

□ Immune System

- ▶ **Innate** (nonspecific) vs **adaptive** (specific) **immunity**
- ▶ **Adaptive immune system cells:** T-lymphocytes, B-lymphocytes
- ▶ **Innate immune system cells** (macrophages, phagocytes)
- ▶ **Tissues & immune system** (Bone marrow, Spleen, Thymus, Lymph nodes)
- ▶ **Concept of antigen and antibody**
- ▶ **Antigen presentation, Clonal selection, Antigen-antibody recognition**
- ▶ **Recognition of self vs. non-self, autoimmune diseases**
- ▶ **Major histocompatibility complex**

□ Digestive System

- **Ingestion:** Saliva as lubrication and source of enzymes, Ingestion; esophagus, transport function
- **Stomach:** Structure, function, storage and churning of food
- **Stomach:** Low pH, gastric juice, mucal protection against self-destruction
- **Stomach's production of digestive enzymes, site of digestion**
- **Liver:** Structure, production of bile, role in blood glucose regulation and detoxification
- **Pancreas:** enzymes and relationship to small intestines
- **Small Intestine:** Function and structure of villi, enzymes, site of digestion, neutralization of stomach acid
- **Large Intestine:** Absorption of water, Bacterial flora
- **Rectum:** storage and elimination of waste, feces
- **Digestion and muscular control, peristalsis**
- **Digestion and nervous control:** the enteric nervous system
- **Excretory System & homeostasis:** (Blood pressure, Osmoregulation, Acid-base balance, nitrogenous waste)
- **Kidney structure, Cortex, Medulla**
- **Nephron structure**
- **Formation of urine:** Glomerular filtration, Counter-current multiplier mechanism

Biological & Biochemical

3b. (Continued)

- ❑ **Formation of urine:** Glomerular filtration, Counter-current multiplier mechanism
- ❑ **Storage and elimination:** ureter, bladder, urethra
- ❑ **Osmoregulation:** capillary reabsorption of H₂O, amino acids, glucose, ions
- ❑ **Muscular control:** sphincter muscle
- ❑ **Male and female reproductive structures and their functions**
- ❑ **Hormonal control of reproduction**
- ❑ **Male and female sexual development**
- ❑ **Female reproductive cycle**
- ❑ **Pregnancy, parturition, lactation**
- ❑ **Muscle System:** Important functions, Peripheral circulatory assistance, thermoregulation (shivering reflex)
- ❑ **Structure of three basic muscle types:** striated, smooth, cardiac
- ❑ **Muscle structure & control of contractions:** T-tubule system, contractile, apparatus, sarcoplasmic reticulum
- ❑ **Contractile velocity of different muscle types**
- ❑ **Regulation of cardiac muscle contraction**
- ❑ **Neuromuscular junction, motor end plates**
- ❑ **Muscles and Sympathetic and parasympathetic innervation**
- ❑ **Voluntary and involuntary muscles**
- ❑ **Structural characteristics of striated, smooth, and cardiac muscle**
- ❑ **Organization of contractile elements:** actin and myosin filaments, crossbridges, sliding filament model
- ❑ **Sarcomeres:** "I" and "A" bands, "M" and "Z" lines, "H" zone
- ❑ **Presence of troponin and tropomyosin**
- ❑ **Calcium regulation of contraction**
- ❑ **Skeletal System:** functions: rigidity, support, calcium storage
- ❑ **Skeletal system:** structure
- ❑ **Bone structure:** Calcium/protein matrix, Cellular composition of bone
- ❑ **Cartilage and ligaments:** structure and function
- ❑ **Skin:** Structure and functions, Layer differentiation, cell types
- ❑ **Skin & functions in homeostasis, osmoregulation, and thermoregulation**
- ❑ **Hair, erectile musculature**
- ❑ **Sweat glands, location in dermis**
- ❑ **Vasoconstriction and vasodilation in surface capillaries**
- ❑ **Physical properties of nails, calluses, hair**
- ❑ **Hormonal control:** sweating, vasodilation, and vasoconstriction

Chemical & Physical

4a. Translational motion, energy, work, forces, & equilibrium in living systems

- ❑ Physics units and dimensions
- ❑ Vectors, components
- ❑ Vector addition
- ❑ Speed, velocity (average and instantaneous)
- ❑ Acceleration
- ❑ Newton's First Law, Inertia
- ❑ Newton's Second Law ($F=ma$)
- ❑ Newton's Third Law, forces equal and opposite
- ❑ Friction, static and kinetic
- ❑ Center of mass
- ❑ Equilibrium (overview)
- ❑ Vector analysis of forces acting on a point object
- ❑ Torques, lever arms
- ❑ Work done by a constant force
- ❑ Mechanical advantage
- ❑ Work kinetic Energy Theorem
- ❑ Conservation forces
- ❑ Kinetic Energy
- ❑ Potential Energy (gravitational, local, spring)
- ❑ Conservation of energy
- ❑ Power, units (of energy point systems)
- ❑ Amplitude, frequency, phase
- ❑ Transverse & longitudinal waves: wavelength & propagation speed

Chemical & Physical

4b. Importance of Fluids for the Circulation of Blood, Gas Movement, & Gas Energy

- Density, specific gravity
- Buoyancy, Archimedes' Principle
- Hydrostatic pressure (Pascal's Law, formula for hydrostatic pressure)
- Viscosity: Poiseuille Flow
- Continuity equation
- Concept of turbulence at high velocities
- Surface tension
- Bernoulli's equation
- Venturi effect, pitot tube
- Arterial and venous systems; pressure and flow
- Absolute temperature, (K) Kelvin Scale
- Pressure, simple mercury barometer
- Molar volume at at 0°C and 1 atm = 22.4 L/mol
- Ideal gas (definition, ideal gas law, Boyle's Law, Avogadro's Law)
- Kinetic molecular theory of gases
- Heat capacity at constant volume and at constant pressure
- Boltzmann's Constant
- Deviation of real gas behavior from Ideal Gas Law (qualitative, quantitative, Van der Waals' Equation)
- Partial pressure, mole fraction
- Dalton's Law relation partial pressure to composition

Chemical & Physical

4c. Electrochemistry and Electrical Circuits and Their Elements

- ❑ Electrostatics
- ❑ Charge, conductors, charge conservation, insulators
- ❑ Coulomb's Law
- ❑ Electric fields, field lines, field and charge distribution
- ❑ Electrostatic energy, electric potential
- ❑ Current $I = \Delta Q / \Delta t$, sign conventions, units
- ❑ Electromotive force, voltage
- ❑ **Resistance:** Ohm's Law $I = V/R$, resistors, resistivity $\rho = R A / L$
- ❑ **Capacitance:** parallel plates, charged capacitors, dielectrics
- ❑ **Conductivity:** metallic, electrolytic
- ❑ ElectroMeters
- ❑ Definition of magnetic field, motion of charged particles in magnetic fields; Lorentz force
- ❑ Electrolytic cell, electrolysis, anode, cathode
- ❑ Electrolyte, Faraday's Law
- ❑ Electron flow, oxidation, reduction at the electrodes
- ❑ Galvanic or Voltaic cells, half-reactions
- ❑ Reduction potentials, cell potential, direction of electron flow
- ❑ Concentration cell
- ❑ Batteries
- ❑ Electromotive force, Voltage
- ❑ Lead-storage batteries, nickel-cadmium batteries
- ❑ Myelin sheath, Schwann cells, insulation of axon
- ❑ Nodes of Ranvier: propagation of nerve impulse along axon

Chemical & Physical

4d. How Light and Sound Interact with Matter

- ❑ Production of sound
- ❑ Relative speed of sound in solids, liquids, and gases
- ❑ Intensity of sound, decibel units, log scale
- ❑ Attenuation (Damping)
- ❑ Doppler Effect
- ❑ Pitch, resonance in pipes and strings
- ❑ Ultrasound, shock waves
- ❑ Concept of Interference; Young Double-slit Experiment
- ❑ Thin films, diffraction grating, single-slit diffraction
- ❑ Other diffraction phenomena, X-ray diffraction
- ❑ Polarization of light: linear and circular
- ❑ Properties of electromagnetic radiation
- ❑ Velocity equals constant c , *in vacuo*
- ❑ Electromagnetic radiation consists of perpendicularly oscillating electric and magnetic fields; direction of propagation is perpendicular to both
- ❑ Classification of electromagnetic spectrum, photon energy $E = hf$
- ❑ Visual spectrum, color
- ❑ Infrared region (intramolecular vibrations and rotations)
- ❑ Recognizing common characteristic group absorptions, fingerprint region
- ❑ Visible region (absorption, complementary colors, carotene)
- ❑ Effect of structural changes on absorption (e.g., indicators)
- ❑ Ultraviolet region (π -Electron and non-bonding electron transitions, conjugated systems)
- ❑ NMR spectroscopy (protons in a magnetic field; equivalent protons, spin-spin splitting)
- ❑ Optics: Reflection from plane surface: angle of incidence equals angle of reflection
- ❑ Refraction, refractive index n ; Snell's law: $n_1 \sin \theta_1 = n_2 \sin \theta_2$
- ❑ Dispersion, change of index of refraction with wavelength
- ❑ Conditions for total internal reflection
- ❑ Spherical mirrors (center of curvature, focal length, real and virtual images)
- ❑ Thin lenses: converging and diverging, lens strength, diopters
- ❑ Use of formula $1/p + 1/q = 1/f$, with sign conventions
- ❑ Lens aberration
- ❑ Optical instruments, the human eye

Chemical & Physical

4e. Atoms, Nuclear Decay, Electronic Structure, and Atomic Chemical Behavior

- ❑ Orbital structure of hydrogen atom, principal quantum number n , number of electrons per orbital
- ❑ Ground state, excited states
- ❑ Absorption and emission line spectra
- ❑ Use of Pauli Exclusion Principle
- ❑ Paramagnetism and diamagnetism
- ❑ Conventional notation for electronic structure
- ❑ Bohr atom
- ❑ Heisenberg Uncertainty Principle
- ❑ Effective nuclear charge
- ❑ Photoelectric effect
- ❑ **Alkali metals, alkaline earth metals:** their chemical characteristics
- ❑ **Halogens:** their chemical characteristics
- ❑ **Noble gases:** their physical and chemical characteristics
- ❑ **Transition metals, representative elements, metals and non-metals**
- ❑ **Oxygen group**
- ❑ **Valence electrons**
- ❑ **First and second ionization energy** (prediction from electronic structure for elements in other rows/areas)
- ❑ **Electron affinity**, variation with group and row
- ❑ **Electronegativity**, comparative values for elements and important groups
- ❑ **Electron shells and the sizes of atoms & ions**
- ❑ **Stoichiometry, molecular weight, empirical vs molecular formula**
- ❑ **Metric units commonly used in the context of chemistry**
- ❑ **Description of composition by percent mass**
- ❑ **Mole concept, Avogadro's number N_A**
- ❑ **Definition of density**
- ❑ **Oxidation number, common oxidizing and reducing agents, disproportionation reactions**
- ❑ **Description of reactions by chemical equations**
- ❑ **Conventions for writing and balancing chemical equations** (including redox equations)
- ❑ **Limiting reactants, theoretical yields**

Chemical & Physical

5a. Unique Nature of Water and its Solutions

- ❑ Brønsted–Lowry definition of acid, base
- ❑ Ionization of water, definition of pH (pH of pure water)
- ❑ K_w , its approximate value ($K_w = [H^+][OH^-] = 10^{-14}$ at 25°C , 1 atm)
- ❑ Conjugate acids and bases (e.g., NH_4^+ and NH_3)
- ❑ Strong acids and bases (e.g., nitric, sulfuric)
- ❑ Weak acids and bases (e.g., acetic, benzoic)
- ❑ Dissociation of weak acids and bases with or without added salt
- ❑ Hydrolysis of salts of weak acids or bases
- ❑ Calculation of pH of solutions of salts of weak acids or bases
- ❑ Equilibrium constants K_a and K_b : $\text{p}K_a$, $\text{p}K_b$
- ❑ Buffers, influence on titration curves
- ❑ Ions in Solutions
- ❑ Anion, cation: common names, formulas and charges for familiar ions (e.g., NH_4^+ ammonium, PO_4^{3-} phosphate, SO_4^{2-} sulfate)
- ❑ Hydration, the hydronium ion
- ❑ Solubility, units of concentration (e.g., molarity)
- ❑ Solubility product constant; the equilibrium expression K_{sp}
- ❑ Common-ion effect, its use in laboratory separations
- ❑ Complex ion formation, complex ions and solubility
- ❑ Solubility and pH
- ❑ Titration (indicators, neutralization, interpretation of the titration curves, redox titration)

Chemical & Physical

5b. Translational Motion, Forces, Work, Energy and Equilibrium in Living Systems

- ❑ **Covalent bonds**
- ❑ **Lewis Electron Dot formulas** (resonance structures, formal charge, Lewis acids and bases)
- ❑ **Partial ionic character** (electronegativity in determining charge distribution, Dipole Moment)
- ❑ **σ and π bonds**
- ❑ **Hybrid orbitals:** sp^3 , sp^2 , sp and respective geometries
- ❑ **Valence shell electron pair repulsion and the prediction of shapes of molecules** (e.g., NH_3 , H_2O , CO_2)
- ❑ **Structural formulas** (for molecules involving H, C, N, O, F, S, P, Si, Cl)
- ❑ **Delocalized electrons and resonance in ions and molecules**
- ❑ **Multiple bonding** (effect on bond length and bond energies, rigidity in molecular structure)
- ❑ **Stereochemistry of covalently bonded molecules**
- ❑ **Isomers** (structural, stereoisomers [diastereomers, enantiomers, cis/trans isomers], conformational isomers)
- ❑ **Polarization of light, specific rotation**
- ❑ **Absolute and relative configuration** (conventions for writing R, S, E and Z forms)
- ❑ **Hydrogen bonding**
- ❑ **Dipole Interactions**
- ❑ **Van der Waals' Forces** (London dispersion forces)

Chemical & Physical

5c. Separation and Purification Methods

- **Extraction:** distribution of solute between two immiscible solvents
- **Distillation**
- **Chromatography:** Basic principles involved in separation process
- **Column chromatography** (gas-liquid; high pressure liquid)
- **Paper chromatography and thin-layer chromatography**
- **Separation and purification of peptides and proteins**
- **Electrophoresis**
- **Quantitative analysis** (determining how much of a given substance is in the larger sample)
- **Chromatography** (size-exclusion; ion-exchange; affinity)
- **Racemic mixtures, separation of enantiomers (OC)**

Chemical & Physical

5d. Separation, Function, and Reactivity of Biologically-Relevant Molecules

- **Nucleotides and nucleosides:** composition (sugar phosphate backbone, pyrimidine, purine residues)
- **Deoxyribonucleic acid:** DNA; double helix
- **Amino acids:** description, absolute configuration at the α position, dipolar ions
- **Classification of amino acids** (acidic or basic, hydrophilic or hydrophobic)
- **Synthesis of α -amino acids** (Strecker Synthesis, Gabriel Synthesis)
- **Peptides and proteins:** reactions (sulfur linkage [cysteine; cystine], peptide linkage for proteins, hydrolysis)
- **Primary, secondary, and tertiary structure of proteins**
- **Isoelectric point, conformational stability** (hydrophobic interactions solvation layer [entropy])
- **Quaternary structure, denaturing and folding**
- **Non-enzymatic protein functions:** binding, immune system, motor
- **Lipids:** description, types (triglycerides, steroids, phospholipids and phosphatides)
- **Lipids storage:** triacylglycerols, **free fatty acids:** saponification
- **Structure of sphingolipids and waxes**
- **Signals/cofactors of:** fat-soluble vitamins; steroids; prostaglandins
- **Carbohydrate nomenclature and classification, common names**
- **Carbohydrate:** Absolute configuration; cyclic structure; conformations of hexoses
- **Epimers and anomers**
- **Hydrolysis of the glycoside linkage**
- **Keto-enol tautomerism of monosaccharides, disaccharides and polysaccharides**
- **Aldehydes and Ketones:** description; nomenclature; physical properties
- **Nucleophilic addition reactions at C=O bond** (acetal, hemiacetal, imine, enamine, hydrine, cyanohydrin)

Chemical & Physical

5d. (Continued)

- ❑ **Oxidation of aldehydes, reactions at adjacent positions:**
enolate chemistry
- ❑ **Keto-enol tautomerism** (α -racemization)
- ❑ **Aldol condensation, retro-aldol**
- ❑ **Kinetic versus thermodynamic enolate**
- ❑ **Effect of substituents on reactivity of C=O; steric hindrance**
- ❑ **Acidity of α -H; carbanions**
- ❑ **Alcohols:** Description, nomenclature; physical properties (acidity, hydrogen bonding)
- ❑ **Alcohol reactions:** Oxidation; substitution reactions: SN1 or SN2; protection of alcohols; preparation of mesylates and tosylates
- ❑ **Carboxylic Acids:** Description, nomenclature, physical properties
- ❑ **Carboxyl group reactions** (amides [and lactam], esters [and lactone], anhydride formation)
- ❑ **Carboxyl:** reduction, decarboxylation, reactions at 2-position, substitution
- ❑ **Acid Derivatives (Anhydrides, Amides, Esters):** Description, Nomenclature, Physical properties
- ❑ **Acid Derivative reactions:** Nucleophilic substitution; transesterification; hydrolysis of amides
- ❑ **Relative reactivity of acid derivatives**
- ❑ **Acid Derivatives:** steric effects, electronic effects, strain (e.g., β -lactams)
- ❑ **Phenols: oxidation and reduction (e.g., hydroquinones, ubiquinones):**
biological $2e^-$ redox centers
- ❑ **Polycyclic and Heterocyclic Aromatic Compounds**
- ❑ **Biological aromatic heterocycles**

Chemical & Physical

5e. Principles of Chemical Thermodynamics & Kinetics

- ❑ **Enzyme classification by reaction type**
- ❑ **Enzyme Mechanism:** (Substrates, active site model, induced-fit model, cofactors, vitamins)
- ❑ **Enzyme Kinetics** (catalysis, Michaelis-Menten, cooperativity, how local conditions affect activity)
- ❑ **Enzyme Inhibition and Regulation** (allosteric, covalently modified)
- ❑ **Bioenergetics/thermodynamics** (Free energy/ K_{eq} , Concentration)
- ❑ **Phosphorylation/ATP** (ATP hydrolysis $\Delta G \ll 0$; ATP group transfers)
- ❑ **Biological oxidation-reduction** (Half-reactions, Soluble electron carriers, Flavoproteins)
- ❑ **Thermodynamic system** – state function
- ❑ **Zeroth Law** – concept of temperature
- ❑ **First Law** – conservation of energy in thermodynamic processes
- ❑ **PV diagram:** work done = area under or enclosed by curve
- ❑ **Second Law** – concept of entropy (measure of “disorder, entropy for gas, liquid, crystal states)
- ❑ **Measurement of heat changes (calorimetry), heat capacity, specific heat**
- ❑ **Heat transfer** – conduction, convection, radiation
- ❑ **Endothermic/exothermic reactions**
- ❑ **Enthalpy, H , and standard heats of reaction and formation**
- ❑ **Hess' Law of Heat Summation**
- ❑ **Bond dissociation energy as related to heats of formation**
- ❑ **Spontaneous reactions and ΔG°**
- ❑ **Coefficient of expansion**
- ❑ **Heat of fusion, heat of vaporization**
- ❑ **Dependence of reaction rate on concentration of reactants:** (rate law, rate constant, reaction order)
- ❑ **Rate-determining step**
- ❑ **Dependence of reaction rate upon temperature**
- ❑ **Activation energy:** (Activated complex or transition state)
- ❑ **Interpretation of energy profiles showing energies of reactants, products, activation energy, and ΔH**
- ❑ **Use of the Arrhenius Equation**
- ❑ **Kinetic control versus thermodynamic control of a reaction**
- ❑ **Catalysts**
- ❑ **Equilibrium in reversible chemical reactions**
- ❑ **Law of Mass Action**
- ❑ **Equilibrium Constant**
- ❑ **Application of Le Châtelier's Principle**
- ❑ **Relationship of the equilibrium constant and ΔG°**

Psychological & Sociological

6a. Sensing The Environment

- ❑ Sensory Processing
- ❑ Threshold
- ❑ Weber's Law
- ❑ Signal detection theory
- ❑ Sensory adaptation
- ❑ Psychophysics
- ❑ Sensory pathways
- ❑ Types of sensory receptor
- ❑ Structure and function of the eye
- ❑ Visual pathways, parallel processing, feature detection
- ❑ Structure and function of the ear
- ❑ Auditory processing
- ❑ Sensory reception by hair cells
- ❑ Somatosensation
- ❑ Taste, taste buds, chemoreceptors
- ❑ Olfactory cells/chemoreceptors
- ❑ Pheromones
- ❑ Olfactory pathways in the brain
- ❑ Kinesthetic sense
- ❑ Vestibular sense
- ❑ Bottom-up/Top-down processing
- ❑ Perceptual organization (depth, form, motion, constancy)
- ❑ Gestalt principles

Psychological & Sociological

6b. Making Sense of the Environment

- ❑ Selective attention, Divided attention
- ❑ Information-processing model
- ❑ Piaget's stages of cognitive development
- ❑ Cognitive changes in late adulthood
- ❑ Role of culture in cognitive development
- ❑ Influence of heredity and environment on cognitive development
- ❑ Biological factors that affect cognition
- ❑ Types of problem solving
- ❑ Barriers and approaches to effective problem solving
- ❑ Heuristics and biases (e.g., overconfidence, belief perseverance)
- ❑ Theories of intelligence
- ❑ Influence of heredity and environment on intelligence (variations in intellectual ability)
- ❑ States of consciousness
- ❑ Stages of sleep, sleep cycles, circadian rhythms, dreaming
- ❑ Sleep-wake disorders
- ❑ Hypnosis and meditation
- ❑ Consciousness-altering drugs (types of, effects on nervous system)
- ❑ Drug addiction and the reward pathway in the brain
- ❑ Memory
- ❑ Encoding Process of encoding information
- ❑ Storage Types of memory storage (e.g., sensory, working, long-term)
- ❑ Semantic networks and spreading activation
- ❑ Recall, recognition, and relearning, retrieval cues
- ❑ The role of emotion in retrieving memories (psychological, biological)
- ❑ Aging and memory
- ❑ Memory dysfunctions (e.g., Alzheimer's disease, Korsakoff's syndrome)
- ❑ Decay Interference
- ❑ Memory construction and source monitoring
- ❑ Changes in synaptic connections underlie memory and learning
- ❑ Neural plasticity
- ❑ Long-term potentiation
- ❑ Theories of language development (e.g., learning, Nativist, Interactionist)
- ❑ Influence of language on cognition
- ❑ Brain areas that control language and speech

Psychological & Sociological

6c. Responding to the World

- ❑ **Three components of emotion** (cognitive, physiological, behavioral)
- ❑ **Universal emotions** (fear, anger, happiness, surprise, disgust, and sadness)
- ❑ **Adaptive role of emotion**
- ❑ **Theories of emotion** (James–Lange theory Cannon–Bard theory Schachter–Singer theory)
- ❑ **The role of biological processes in perceiving emotion**
- ❑ **Brain regions involved in the generation and experience of emotions**
- ❑ **The role of the limbic system in emotion**
- ❑ **Emotion and the autonomic nervous system**
- ❑ **Physiological markers of emotion** (signatures of emotion)
- ❑ **The nature of stress**
- ❑ **Appraisal Different types of stressors** (e.g., cataclysmic events, personal)
- ❑ **Effects of stress on psychological functions**
- ❑ **Stress outcomes/response to stressors**
- ❑ **Emotional Behavioral Managing stress** (e.g., exercise, relaxation, spirituality)

Psychological & Sociological

7a. Individual Influences on Behavior

- ❑ Neurons (e.g., the reflex arc)
- ❑ Neurotransmitters and their influence on behavior
- ❑ Structure and function of the peripheral and central nervous system
- ❑ Forebrain, Midbrain, Hindbrain, Lateralization of cortical functions
- ❑ Methods used in studying the brain
- ❑ The spinal cord
- ❑ Components of the endocrine system
- ❑ Effects of the endocrine system on behavior
- ❑ Genes, temperament, and heredity
- ❑ Adaptive value of traits and behaviors
- ❑ Interaction between heredity and environmental influences
- ❑ Influence of genetic and environmental factors on the development of behaviors
- ❑ Regulatory genes and behavior
- ❑ Genetically based behavioral variation in natural populations
- ❑ Prenatal development
- ❑ Motor development
- ❑ Developmental changes in adolescence
- ❑ Theories of personality (psychoanalytic, humanistic, trait, social/cognitive, behaviorism)
- ❑ Situational approach to explaining behavior
- ❑ Biomedical versus biopsychosocial approaches to understanding behavior
- ❑ Types of psych disorders, rates, and classification
- ❑ Anxiety disorders; Obsessive-compulsive disorder; Trauma- and stressor-related disorders
- ❑ Somatic symptom and related disorders
- ❑ Depressive disorders, Bipolar and related disorders
- ❑ Schizophrenia
- ❑ Dissociative disorders, Personality disorders
- ❑ Biological bases of: schizophrenia, depression, Alzheimer's, Parkinson's
- ❑ Stem cell-based therapy
- ❑ Factors that influence motivation (instinct, arousal, drives, needs)
- ❑ Theories (Drive reduction, incentive, cognitive, need-based)
- ❑ Biological and social motivators that regulate behavior (e.g., hunger, sex drive)
- ❑ Motivation, behavior, and substance addiction
- ❑ Components of attitudes (i.e., cognitive, affective, and behavioral)
- ❑ How behavior influences attitudes (e.g., foot-in-the door phenomenon, role-playing effects)
- ❑ Cognitive dissonance theory

Psychological & Sociological

7b. Social Processes that Influence Social Behavior

- ❑ How the Presence of Others Affects Individual Behavior
- ❑ Social facilitation
- ❑ Deindividuation
- ❑ Bystander effect
- ❑ Social loafing
- ❑ Social control
- ❑ Peer pressure
- ❑ Conformity
- ❑ Obedience
- ❑ Group Decision-making Processes
- ❑ Group polarization
- ❑ Groupthink
- ❑ Normative and Deviant Behavior
- ❑ Social norms
- ❑ Sanctions
- ❑ Folkways, mores, and taboos
- ❑ Anomie
- ❑ Deviance
- ❑ Perspectives on deviance (e.g., differential association, labeling theory, strain theory)
- ❑ Aspects of collective behavior (e.g., fads, mass hysteria, riots)
- ❑ Socialization
- ❑ Agents of socialization (e.g., the family, mass media, peers, workplace)

Psychological & Sociological

7c. Attitude and Behavior Change

- ❑ Habituation and Dishabituation
- ❑ Associative Learning
- ❑ Classical conditioning
- ❑ Neutral, conditioned, and unconditioned stimuli
- ❑ Conditioned and unconditioned response
- ❑ **Processes:** acquisition, extinction, spontaneous recovery, generalization, discrimination
- ❑ Operant conditioning
- ❑ Processes of shaping and extinction
- ❑ **Types of reinforcement:** positive, negative, primary, conditional
- ❑ **Reinforcement schedules:** fixed-ratio, variable-ratio, fixed-interval, variable-interval
- ❑ Punishment
- ❑ Escape and avoidance learning
- ❑ The role of cognitive processes in associative learning
- ❑ Biological processes that affect associative learning
- ❑ Observational Learning
- ❑ Modeling Biological processes that affect observational learning
- ❑ Mirror neurons
- ❑ Role of the brain in experiencing vicarious emotions
- ❑ Applications of observational learning to explain individual behavior
- ❑ Theories of Attitude and Behavior Change
- ❑ Elaboration likelihood model
- ❑ Social cognitive theory
- ❑ **Factors that affect attitude change** (e.g., changing behavior, message and target, social factors)

Psychological & Sociological

8a. Self-Identity

- Self-concept, self-identity, and social identity
- self-esteem, self-efficacy, and locus of control
- Different types of identities (e.g., race/ethnicity, gender, age, sexual orientation, class)
- Formation of Identity
- Theories of identity development (e.g., gender, moral, psychosexual, social)
- Influence of social factors on identity formation
- Influence of individuals (e.g., imitation, looking-glass self, role-taking)
- Influence of groups (e.g., reference group)
- Influence of culture and socialization on identity formation

8b. Social Thinking

- Attributional processes (e.g., fundamental attribution error, role of culture in attributions)
- How self-perceptions shape our perceptions of others
- How perceptions of the environment shape our perceptions of others
- Prejudice and Bias
- Processes that contribute to prejudice
- Power, prestige, and class
- The role of emotion in prejudice
- The role of cognition in prejudice
- Stereotypes Stigma
- Ethnocentrism
- Ethnocentrism vs. cultural relativism
- Processes Related to Stereotypes
- Self-fulfilling prophecy
- Stereotype threat

Psychological & Sociological

8c. Social Interactions

- Elements of Social Interaction
- Types of status (e.g., achieved, ascribed)
- Role, role conflict, role strain, role exit
- Primary and secondary groups
- In-group vs. out-group
- Group size (e.g., dyads, triads)
- Networks
- Organizations
- Formal organization
- Bureaucracy and characteristics of an ideal bureaucracy
- Perspectives on bureaucracy (e.g., iron law of oligarchy, McDonaldization)
- Expressing and detecting emotion
- The role of gender in the expression and detection of emotion
- The role of culture in the expression and detection of emotion
- Presentation of self
- Impression management
- Front stage versus back stage self (Dramaturgical approach)
- Verbal and nonverbal communication
- Animal signals and communication
- Attraction, aggression, and attachment
- Social support
- Biological explanations of social behavior in animals
- Foraging behavior
- Mating behavior and mate choice
- Applying game theory
- Altruism
- Inclusive fitness
- Discrimination
- Individual versus institutional discrimination
- Relationship between prejudice and discrimination
- How power, prestige, and class facilitate discrimination

Psychological & Sociological

9a. Understanding Social Structure

- ❑ Sociological theories and perspectives
- ❑ Microsociology vs. macrosociology
- ❑ Functionalism
- ❑ Conflict theory
- ❑ Symbolic interactionism
- ❑ Social constructionist perspective
- ❑ Exchange-rational choice theory
- ❑ Feminist theory
- ❑ Social Institutions
- ❑ Educational institution
- ❑ Hidden curriculum
- ❑ Teacher expectancy
- ❑ Educational segregation and stratification
- ❑ Institution of the family
- ❑ Forms of kinship
- ❑ Diversity in family forms
- ❑ Marriage and divorce
- ❑ Violence in the family (e.g., child abuse, elder abuse, spousal abuse)
- ❑ Religion Religiosity
- ❑ Types of religious organizations
- ❑ Religion and social change (e.g., modernization, secularization, fundamentalism)
- ❑ Government and economy
- ❑ Power and authority
- ❑ Comparative economic and political systems
- ❑ Division of labor
- ❑ Health and medicine
- ❑ Medicalization
- ❑ The sick role
- ❑ Delivery of health care
- ❑ Illness experience
- ❑ Social epidemiology
- ❑ Elements of culture (e.g., beliefs, language, rituals, symbols, values)
- ❑ Material versus symbolic culture
- ❑ Culture lag and culture shock
- ❑ Assimilation and multiculturalism
- ❑ Subcultures and countercultures
- ❑ Mass media and popular culture
- ❑ Evolution and human culture
- ❑ Transmission and diffusion of culture

Psychological & Sociological

9b. Demographic Characteristics & Processes

- ❑ Demographic structure of society
- ❑ Aging and the life course
- ❑ Age cohorts
- ❑ Social significance of aging
- ❑ Sex versus gender
- ❑ The social construction of gender
- ❑ Gender segregation
- ❑ Race and ethnicity
- ❑ The social construction of race
- ❑ Racialization Racial formation
- ❑ Immigration status
- ❑ Patterns of immigration and intersections with race and ethnicity
- ❑ Sexual orientation
- ❑ Demographic shifts and social change
- ❑ Theories of demographic change (i.e., Malthusian theory and demographic transition)
- ❑ Population growth and decline (e.g., population projections, population pyramids)
- ❑ Fertility, migration, and mortality
- ❑ Fertility and mortality rates (e.g., total, crude, age-specific)
- ❑ Patterns in fertility and mortality
- ❑ Push and pull factors in migration
- ❑ Social movements
- ❑ Relative deprivation
- ❑ Organization of social movements
- ❑ Movement strategies and tactics
- ❑ Globalization
- ❑ Factors contributing to globalization (e.g., technology, economic interdependence)
- ❑ Perspectives on globalization
- ❑ Social changes in globalization (e.g., civil unrest, terrorism)
- ❑ Industrialization and urban growth
- ❑ Suburbanization and urban decline
- ❑ Gentrification and urban renewal

Psychological & Sociological

10a. Social Inequality

- ❑ Spatial Inequality
- ❑ Residential segregation
- ❑ Neighborhood safety and violence
- ❑ Environmental justice (location and exposure to health risks)
- ❑ Social class
- ❑ Aspects of social stratification
- ❑ Social class and socioeconomic status
- ❑ Class consciousness and false consciousness
- ❑ Cultural capital and social capital
- ❑ Social reproduction
- ❑ Power, privilege, and prestige
- ❑ Intersectionality (e.g., race, gender, age)
- ❑ Socioeconomic gradient in health
- ❑ Global inequalities
- ❑ Patterns of social mobility
- ❑ Intergenerational and intragenerational mobility
- ❑ Vertical and horizontal mobility
- ❑ Meritocracy
- ❑ Poverty
- ❑ Relative and absolute poverty
- ❑ Social exclusion
- ❑ Health disparities (e.g., class, gender, and race inequalities in health)
- ❑ Healthcare disparities (e.g., class, gender, and race inequalities in health care)