PREMED PEERS

STUDENT HANDBOOK

WELCOME TO MCAT101!

Welcome to Premed Peer's 16-week prep course: MCAT101! We are a group of undergraduate student volunteer tutors who have scored above the 90th percentile in the sections we are tutoring. We offer 3 topic sessions, 1 office hours session, and a passage practice session a week. The duration of one session is approximately 1 hour. As a student in our prep course, you will be assigned certain sections to read as well as a few homework questions to complete prior to the session every week. We will provide you with free resources from mcat-review.org and Khan Academy to review the content prior to class. During the session, the tutor will review the homework assignments, provide warm-up questions, briefly review the concepts during the session, and answer any questions you may have. Please keep in mind that our sessions gradually build on one another and follow a structured syllabus. If you are unable to attend the live sessions, you may access the recordings on our website (www. premedpeers.org). Please note that MCAT101 is not intended to act as your primary study schedule for the MCAT, but rather is meant to serve as supplementary assistance. In order to best benefit from the course, please have your own schedule ready and attend MCAT101's sessions to strengthen topics you are weak in. Please also note that our course does not guarantee an MCAT score improvement, as we are a group of volunteers who want to help you learn certain topics.

Payment

Our course will cost $15 a month to help cover our website and administrative costs. We accept payment to our PayPal: https://www.paypal.com/donate/?hosted_button_id=STBNZXHR5R3HC. Payment follows a "pay as you go" format, meaning that you may choose to attend sessions for 1, 2, 3, or 4 months. Below are the payment due dates:

Monday, May 31st
Monday, June 28th
Monday, July 26th
Monday, August 23rd

How to Sign Up

You may express your interest in enrolling in our prep course by donating to our PayPal and filling out this form: https://airtable.com/shruxESfFhwKIoQ6y, which may be found on our website. Filling out the form will also add you to our newsletter listserv, where you will receive our weekly newsletter that features up-to-date opportunities and news in the pre-med world. To opt out of receiving our newsletter, please contact us at info@premedpeers.org. Once you have filled out the form and attached the receipt of payment, please request membership access to our website. Our website membership will grant you access to recordings, the syllabus, weekly homework questions, weekly assigned readings, and our forum. We will accept your membership request when we receive your payment on our PayPal.

Cancelling Your Membership

If you decide that you no longer wish to attend our sessions, please contact us at info@premedpeers.org and we will remove you from our student list.

Office Hours

At the end of each week, we will be hosting office hours for 1 hour in which students may ask content-based questions from the previous week's topic sessions.

Practice Sessions

Our 1 hour-practice sessions consist of reviewing 4 passages. We will send 2 passages a few days before to the practice session which are to be completed prior to the session. We will begin the session by reviewing the 2 homework passages. We will then give you 20 minutes to complete 2 new passages, which will be reviewed afterwards.

Homework

We have provided recommended readings and questions to complete *prior to attending the session* from Khan Academy practice. The answers will be reviewed during the session. To make the most out of the session, please have these questions answered prior to the lesson. These questions and videos are intended to guide your learning, but if you prefer to use other resources, please utilize whichever method works best for you. These resources are especially recommended because during the sessions, we will not be teaching every subsection, but rather providing you with additional practice and answer any questions you may have.

Schedule changes

If there are session cancellations, you will be notified as soon as possible. The tutor responsible for leading the session will record the session when they are available and will upload it to our YouTube unlisted playlist and website. If you are unable to attend the live session, you do not have to notify us and you may be able to access the recording on our website.

GENERAL CHEMISTRY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Recommended Practice
1	Atomic Structure, Periodic Tables, Bonding, Intermolecular Forces, thermodynamics	Subatomic particles, electromagnetic spectrum, excitation and relaxation, quantum models, electron rules, electron configuration, periodicity, periodic trends, formal charge, lewis dot structures, hybridization and shapes, intramolecular forces, intermolecular forces, enthalpy, entropy, Gibbs free energy	Khan Academy Unit: Chemical Processes • Dot Structure • Covalent Bonds • Thermodynamics • Thermochemistry MCAT-review.org: • Electronic Structure • Stoichiometry • Thermodynamics and Thermochemistry
2	Phases and Gases, Kinetics and Equilibrium	States of matter, phase diagrams, heating curves, IMF's, solutions, solubility, kinetic molecular theory, gas laws, Avogadro's law, ideal gas law, real world of gas, Dalton's law, Graham's law, reaction coordinates, reaction rates, reaction mechanism, equilibrium and pressure, reaction quotients, Le Chatlier's principle, changing equilibrium, multiple equilibria, solubility equilibrium, common ion effect	Khan Academy Unit: Chemical Processes • Solubility Equilibria • Equilibrium • Thermochemistry: Phase MCAT-review.org • Phases and Phase Equilibria • Solution chemistry: solubility • Rate Processes in Chemical Reactions
3	Acids and bases	Acid/base definitions, strong vs weak acid/base, qualitative acid dissociation, auto-dissociation and pH, calculating pH	Khan Academy Unit: Chemical Processes • Acid/base equilibria MCAT-review.org • Acids/Bases: acid/base equilibria
4	Acids and bases, cont.	Buffers, strong acid/base titrations, indicators, weak acid/base titrations, diprotic curves	Khan Academy Unit: Chemical Processes • Acid/base equilibria: buffer • Titrations MCAT-review.org • Acid/base equilibria: buffers • Titration
5			
6			
7	Electrochemistry	Redox, cell potential, electroplating, electrochemical cell basics, discharging/recharging batteries, electrochemical cell terms, redox titrations, nuclear decay, half-life and energy changes	Khan Academy Unit: Physical processes: • Electrochemistry MCAT-review.org: • Electrochemistry
8			
9			

GENERAL CHEMISTRY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Recommended Practice
10			
11			
12			
13			
14			
15			
16			

PHYSICS SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Homework
1			
2			
3	Kinematics and Dynamics	Trigonometry and vectors, units and dimensions, displacement and velocity, acceleration, graphs, uniformly accelerated motion, free fall, projectile motion, Newton's first, second, and third laws, gravitation, normal force, friction, inclined planes, tension and pulleys	Khan Academy: Physical processes • From "vectors and scalars" to "forces on inclined planes" MCAT-Review.org • Translational motion • Force, motion and gravitation
4			
5			
6	Circular motion, Torque, Work, and Energy	Uniform circular motion, center of mass, torque, the lever arm, equilibrium, rotational inertia, work, power, kinetic energy, work-energy theorem, potential energy, conservation of mechanical energy, mechanical advantage, efficiency, momentum and impulse, elastic and inelastic collisions	Khan Academy: Physical processes • Work and energy MCAT-Review.org • Force, motion and gravity: uniform circular motion • Equilibrium and momentum • Work and energy
7			
8	Physical Thermodynamics and Fluids	Heat/temperature, heat transfer, first law of thermodynamics, thermodynamic processes, isobaric and isochoric processes, isothermal and adiabatic processes, P-V diagrams, density and pressure buoyant force, floating, flow rate and continuity, ideal fluid flow, Bernoulli's equation	Khan Academy: Physical processes • From "fluids at rest" to "kinetic molecular theory of gases" MCAT-Review.org • Fluids and solids • Thermodynamics
9			
10			
11			
12	Electrostatics, Capacitors, Batteries, Resistors	Electric charge and force, superposition of forces, electric field, electric potential, electric potential energy	Khan Academy: Physical processes • Electrostatics MCAT-Review.org • Electrostatics and electromagnetism
13			

PHYSICS SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Homework
14	Electrostatics, Capacitors, Batteries, Resistors, cont.	Capacitors and batteries, electric field of a capacitor, energy stored by a capacitor, dielectrics, voltage and current, resistance, resistors in combination	Khan Academy: Physical processes • Current and resistors • Capacitors MCAT-Review.org • Electronic circuit elements
15	DC Circuits, Oscillators and Waves, Sound	Kirchhoff's Laws, measurement devices, magnetic force/fields, simple harmonic motion (dynamics and kinematics, energy, pendulums), wave properties and speed, interference and beats, standing waves, intensity, decibel level, Doppler shift	Khan Academy: Physical processes • Magnetism & Sound MCAT-Review.org • Waves and periodic motion • Sound
16	Light, Mirrors and Lenses, Quantum Physics	Electromagnetic radiation, reflection and refraction, total internal reflection, total internal reflection, diffraction and dispersion, polarization, mirrors and lenses, types of images, vision correction	Khan Academy: Physical processes • From "light and electromagnetic radiation" to "reflection and refraction" MCAT-Review.org • Light and geometrical optics

BIOCHEMISTRY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Homework
1			
2	Anaerobic Respiration	Glycolysis, fermentation, gluconeogenesis, pentose phosphate pathway, net energetic results of respiration processes, citric acid cycle, reactions in the cycle	Khan Academy: Biomolecules • Overview of metabolism • Carbohydrate metabolism • Krebs cycle and oxidative phosphorylation MCAT-Review.org • Metabolism: Basic metabolism and glycolysis, gluconeogenesis, and pentose phosphate pathway , Citric acid cycle
3			
4	Aerobic Respiration & Fatty Acid Metabolism	Electron transport chain, fatty acids - digestion, mobilization, transportation, oxidation of fatty acids (saturated vs unsaturated), ketone bodies, anabolism of fats, non-template synthesis - lipids and polysaccharides	Khan Academy: Biomolecules • Krebs cycle and oxidative phosphorylation • Fat and protein metabolism MCAT-Review.org • Metabolism: oxidative phosphorylation, metabolism of fats and protein
5			
6	Enzyme Structure and Function	Function of enzymes as biological catalysts, enzyme classification, 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	Khan Academy: Biomolecules • Enzyme structure and function MCAT-Review.org • Enzymes: enzyme structure and function
7			
8			
9	Control of Enzyme Activity	Kinetics (Michaelis-Menten, cooperativity), feedback regulation, inhibition types (competitive, non-competitive, mixed, uncompetitive), regulatory enzymes (allosteric, covalently-modified enzymes, zymogen)	Khan Academy: Biomolecules • Enzyme kinetics MCAT-Review.org • Enzymes: control of enzyme activity, regulatory enzymes
10			
11			

BIOCHEMISTRY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Homework
12	Biologically important molecules	Structure, stereochemistry, side chains, gabriel malonic ester synthesis, strecker synthesis, amino acids: acid-base chemistry/isolectric point, proteins: peptide bonds and protein hydrolysis/protein structure and denaturation	Khan Academy: Biomolecules • Amino acids and protein MCAT-Review.org • Biologically important molecules: amino acids and proteins
13			
14	Biologically important molecules	Sugars: structure/stereochemistry/classification/mutarotation/reactivity/Benedict's test/glycosidic linkages, lipids: fatty acids and phospholipids	Khan Academy: Biomolecules • Carbohydrates • Fat and protein metabolism MCAT-Review.org • Biologically important molecules: carbohydrates, lipids, phosphorous compounds
15			
16			

ORGANIC CHEMISTRY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Homework
1			
2			
3			
4			
5	Fundamentals, structure, and stability	IUPIAC nomenclature, Saturation and unsaturation, ring strain, induction, resonance, acidity, nucleophiles, electrophiles and LGs, isomers, cyclohexane conformations, chirality, absolute configuration: prioritization, absolute configuration: assigning R&S configurations, stereoisomers, geometric isomers, meso compounds	Khan Academy Unit: Chemical Processes • Stereochemistry • Dot structures: resonance MCAT-review.org • The Covalent Bond: stereochemistry
6	Lab techniques: separation and spectroscopy	Intro to separation techniques, intro to chromatography, SEC, TLC, column chromatography, ion-exchange chromatography, affinity chromatography, gas chromatography, distillations	Khan Academy Unit: Chemical Processes • Separations and purifications MCAT-review.org • Separations and Purifications
7			
8	Lab techniques: separation and spectroscopy (cont.)	Solvent extraction, resolution of enantiomers, intro to spectroscopy, infrared spectroscopy, 1H-NMR: nonequivalent hydrogens/splitting/integration (chemical shift)	Khan Academy Unit: Physical Processes • Infrared and UV/Visible Spectroscopy MCAT-review.org • Separations and Purifications • Molecular Structure and Spectra: NMR
9	Carbonyl chemistry	Intro to substitution reactions, SN2 mechanisms, SN1 mechanism, SN2/1 comparison	Khan Academy Unit: Chemical Processes • Alcohols and Phenols: SN1 and SN2 • Carboxylic acid derivatives: nucleophilic acyl substitution • Carboxylic acids: alpha-substitution of carboxylic acids
10	Carbonyl chemistry	Carbonyl reactivity, tautomerism, nucleophilic addition reactions, hydride reductions, Grignard reaction, intro to hemiacetals and acetals, formation mechanism, imines and enamines, aldol reaction, predicting kinetic vs thermodynamic enolates	Khan Academy Unit: Chemical Processes • Nucleic acids, lipids, and carbohydrates: Keto-enol tautomerization • Aldehydes and Ketones • Kinetics: kinetic and thermodynamic enolates • Alpha-carbon chemistry MCAT-review.org • Aldehydes and Ketones • Keto acids and esters

ORGANIC CHEMISTRY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Homework
11	Carbonyl chemistry	Intro to carboxylic acids: properties and reactivity, carboxylic acid derivatives: nucleophilic addition-elimination/relative reactivity of derivatives, synthesis from COOHs, carbonyl chemistry overview	Khan Academy Unit: Chemical Processes • Carboxylic Acids • Carboxylic Acid Derivatives MCAT-review.org • Carboxylic acids
12			
13			
14			
15			
16			

BIOLOGY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Homework
1	Molecular Biology	Nucleic acids, prokaryotic and eukaryotic genomes, central dogma, mutations (polymerase errors, exogenous and endogenous damage, transposons), repair mechanisms (mismatch repair and nucleotide excision), DNA replication, prokaryotic replication, eukaryotic replication, DNA vs RNA transcription, translation and energy count, tRNA and ribosomes, posttranslational modifications	Khan Academy Unit: Biomolecules • DNA MCAT-Review.org • DNA
2			
3	Viruses, Bacteria, Prions	Viral structures, viral life cycle: lytic, lysogenic and productive cycle, +RNA, -RNA, prions and viroids, bacterial class by structure and living conditions, binary fission, conjugation	Khan Academy Unit: Cells • Prokaryotes/bacteria • Viruses MCAT-Review.org • Microbiology
4			
5	Cells	Protein traffic, cell membrane structure, electrolytes and van't Hoff factor, colligative properties, freezing point depression, vapor pressure, boiling point elevation, osmotic pressure, diffusion, osmosis, tonicity, passive and active transport	Khan Academy Unit: Cells • Cell membrane overview • Transport across a cell membrane MCAT-Review.org: • Gas Phase: Colligative properties • Generalized eukaryotic cell: plasma membrane
6			
7	Cell Transport and Division	G proteins, cytoskeleton and cell junctions, cell cycle, mitosis, cancer: oncogenes, tumor suppressors, apoptosis, meiosis I and II	Khan Academy Unit: Cells • Cell-cell communication • cellular division • cellular development • Cytoskeleton MCAT-Review.org • Generalized eukaryotic cell: cell cycle and mitosis • Genetics: Meiosis • Eukaryotes: control of gene expression
8	Genetics	Classical and non-classical dominance, blood typing, testcross, Mendel's laws, 4 basic single gene crosses, rules of probability, linked genes, Hardy Weinberg, pedigree analysis	Khan Academy Unit: Biomolecules • Mendelian genetics MCAT-Review.org • Genetics
9			
10	Nervous System	Neuron structure, rest potential, action potential, nerve impulses, refractory periods, electrical synapses, chemical synapses, EPSPs, IPSPs, summation	Khan Academy Unit: Organ systems • "Biological basis of behavior" to "neuronal synapses" MCAT-Review.org • Nervous and endocrine system

BIOLOGY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Homework
11	NS Anatomy	Nervous system function, CNS anatomy, PNS, ANS, sensory receptors, eye and vision, ear and hearing	Khan Academy Unit: Processing the environment • "Sensory perception" to "taste and smell" MCAT-Review.org • Nervous and endocrine system
12	Endocrine/Cardiovascular System	Hypothalamus/pituitary gland, cardiovascular and lymphatic system, heart anatomy and heart sounds, blood pressure, cardiac action potential, cardiac conduction system, blood composition and gas transport, non-specific defense and immunity, autoimmunity	Khan Academy Unit: Organ System • Endocrine system • Circulatory system • Hematologic system • Lymphatic system • Immune system MCAT-Review.org • Endocrine system • Circulatory, lymphatic and immune system
13	Excretory System	Kidney anatomy/function, blood pressure regulation, pH regulation, digestive accessory organs, alimentary canal	Khan Academy Unit: Organ System • Renal system • Renal regulation of blood pressure • Gastrointestinal system MCAT-Review.org • Digestive System • Excretory System
14	Muscles and Bones	Skeletal muscle hierarchy, sarcomeres, sliding. filament theory, motor units, muscle energy and oxygen debt, muscle fiber types, cardiac and smooth muscle, connective tissue, long bone anatomy and bone turnover	Khan Academy Unit: Organ System • Muscular system • Skeletal system MCAT-Review.org • Muscle and skeletal system
15	Respiration	Conduction zone, respiratory zone, ventilation and pH regulation, skin	Khan Academy Unit: Organ System • Respiratory system MCAT-Review.org • Respiratory system
16	Reproduction & Development	Testes and spermatogenesis, sperm pathway, sexual function and gender development, external genitalia through uterus, ovary and oogenesis, menstrual cycle, fertilization and cleavage, stem cells, embryonic and fetal stages	Khan Academy Unit: Organ System • Reproductive system MCAT-Review.org • Reproductive system and development

PSYCHOLOGY & SOCIOLOGY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Recommended Practice
1	Research Methods and Sociological Theories	Major sociological theories (functionalism, conflict theory, symbolic interactionism, social constructionism), rational choice, social exchange, feminism, research methods (finding key points of the study, how it gets tested, experimental design, validity, flaws in study design, correlation)	Khan Academy Unit: Society and Culture • Social structures MCAT-review.org • Understanding social structure: theoretical Approaches
2			
3			
4	Social Institutions and Demographics	Social structures, accessibility and availability of healthcare, demography, life expectancy, poverty, socioeconomic status, social stratification and social mobility, status, roles, networks, organizations, culture	Khan Academy Unit: Social inequality Khan Academy Unit: Society and culture • Demographics • Culture MCAT-review.org • Demographic characteristics and processes • Social inequality
5			
6			
7	Social Interactions and Identity	Influence of others, behavior in groups, conformity and obedience, attribution theory and biases, persuasion, identity: personal and social, social interactions, aspects of self-concept, formation of identity	Khan Academy Unit: Individuals and Society • First two bullet points of Self-identity and all of rest MCAT-review.org • Self-identity • Social thinking • Social interactions • Social processes that influence behavior
8			
9	Personality, Motivation, Emotion, and Stress	Life course perspective, big 5 traits, Freud, Erikson, humanist and behaviorist perspectives, social cognitive perspective, behavioral genetics, therapeutic approaches, motivation and behavior, emotion, theories of emotion, stress, intro to attitude and behavior	Khan Academy Unit: Individuals and Society • Self-identity Khan Academy Unit: Behavior • Motivation and attitudes • Theories of attitude and behavior change Khan Academy Unit: Processing the environment • Emotion MCAT-review.org • Individual influences on behavior: personality • Responding to the world: emotion • Attitudes and behavior change • Motivation
10			

PSYCHOLOGY & SOCIOLOGY SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Recommended Practice
11	Psychological Disorders and Consciousness	Major psychological disorders, treatment for disorders, consciousness and sleep, sleep disorders, consciousness-altering drugs, drugs and dependence	Khan Academy Unit: Behavior • Psychological Disorder Khan Academy Unit: Processing the environment • Sleep and consciousness • Drug dependence MCAT-review.org • Psychological disorders • Making sense of the environment: consciousness
12			
13	Learning and Memory	Brain lateralization, limbic system, neuroimaging, memory storage, memory encoding, forgetting, retrieval, interference, other dysfunctions, memory: brain structure, non-associative learning, classical conditioning, operant conditioning	Khan Academy Unit: • Behavior: learning • Processing the environment: memory MCAT-review.org • Attitude and behavior change: Associative learning, observational learning • Making sense of the environment; Memory
14			
15	Sensation, Cognition, and Language	Sensory thresholds and Weber's law, signal detection theory, Gestalt psychology, Baddeley's model of working memory, Jean Piaget's stages of cognitive development, problem-solving, language development and processing	Khan Academy Unit: • Processing the environment: sensory perception, cognition, language MCAT-review.org • Sensory Processing: Sensation • Making sense of the environment: cognition, language
16			

CARS SYLLABUS AND HOMEWORK

Week	Topic	Subtopic	Homework
1	CARS Practice		
2			
3			
4			
5	CARS Practice		
6			
7			
8			
9			
10	CARS Practice		
11			
12			
13	CARS Practice		
14			
15			
16	CARS Practice		

Please note that times will be updated

MCAT101

JUNE SCHEDULE

mon	tues	wed	thurs	fri	sat	sun
	1 Gen Chem Class 1 8:00 PM EST	2 Bio Class 1 8:00 PM EST	3 P/S Class 1 8:00 PM EST	4	5 Office Hours 11:00 AM EST	6 Passage Practice 1:00 PM EST
7	8 Gen Chem Class 2 8:00 PM EST	9 Biochemistry Class 1 8:30 PM EST	10 CARS Class 1 8:00 PM EST	11 Office Hours 8:00 PM EST	12	13 Passage Practice 10:00 AM EST
14	15 Gen Chem Class 3 Time TBD	16 Physics Class 1 6:00 PM EST	17 Biology Class 2 8:00 PM EST	18	19 Office Hours 1:00 PM EST	20 Passage Practice 1:00 PM EST
21	22 Gen Chem Class 4 6:30 PM EST	23 Biochemistry Class 2 8:30 PM EST	24 P/S Class 2 Time TBD	25	26	27 Passage Practice Time TBD
28	29	30				