<table>
<tr><td>Course title</td><td colspan="4">Mechanisms of disease and therapeutics I</td></tr>
<tr><td>Course code</td><td colspan="4">MD-301</td></tr>
<tr><td>Course type</td><td colspan="4">Required</td></tr>
<tr><td>Level</td><td colspan="4">1st cycle: undergraduate</td></tr>
<tr><td>Year / Semester</td><td colspan="4">Year 3 / Semester 5 (Fall)</td></tr>
<tr><td>Teacher’s name</td><td colspan="4">Danny Alon-Ellenbogen</td></tr>
<tr><td rowspan="2">ECTS</td><td rowspan="2">20</td><td>Large Group Learning per Week</td><td>Tutorials per Week</td><td>Small group work per Week</td></tr>
<tr><td>10</td><td>4</td><td>4</td></tr>
<tr><td>Course purpose and objectives</td><td colspan="4">Cardiovascular system
1. Describe the diagnostic criteria, pathophysiology, and classifications of hypertension, including primary and secondary forms, along with their associated risk factors and complications.
2. Explain the significance of lifestyle modifications and pharmacotherapy for managing hypertension, including the mechanisms, uses, and adverse effects of various antihypertensive medications.
3. Identify the mechanisms of venous thromboembolism (VTE), including risk factors, clinical presentations, and their relationship to conditions such as deep vein thrombosis (DVT) and pulmonary embolism (PE).
4. Outline the principles of haemostasis, coagulation, and fibrinolysis, and describe how these processes relate to VTE and conditions such as disseminated intravascular coagulation (DIC) and the impact of COVID-19 on coagulation.
5. Interpret ECG findings and utilize clinical assessments to diagnose coronary artery disease (CAD) and acute coronary syndrome (ACS), recognizing the various forms of angina and myocardial infarction.
6. Explain the pharmacology of cardiovascular medications, including antiplatelet agents, thrombolytics, lipid-lowering drugs, and heart failure therapies, detailing their mechanisms of action and therapeutic roles.
7. Describe the epidemiology, public health implications, and prevention strategies for hypertension, VTE, CAD, and heart failure, including the prognosis and complications associated with each condition.
8. Understand the pathophysiology and clinical management of heart failure, addressing the roles of various physiological systems and pharmacological treatments aimed at improving heart function and patient outcomes.
9. Recognize and classify cardiac conduction abnormalities, including bradycardia and tachycardia, and describe their clinical significance, associated symptoms, and management strategies.</td></tr>
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10. Employ diagnostic tools like echocardiograms, X-rays, and laboratory investigations to assess cardiovascular conditions, while effectively integrating lifestyle recommendations into patient management for prevention and treatment.

Respiratory system

11. Learners will grasp the basic pathophysiological mechanisms underlying obstructive and restrictive lung diseases, including specific conditions such as asthma, COPD, bronchial disorders, and pneumonia, as well as the formation of granulomas and neoplasms.
12. They will be able to identify the clinical signs and symptoms of various lung disorders, recognize differential diagnoses, and interpret pulmonary function tests and imaging results for accurate assessment of obstructive and restrictive lung diseases.
13. Knowledge of the stepwise management of these conditions will be acquired, including pharmacologic treatments such as β-2 agonists, corticosteroids, and anti-cancer drugs, along with an understanding of the role of a multidisciplinary team in patient care.
14. Learners will also understand the epidemiological aspects, risk factors, and public health implications of lung diseases, alongside strategies for prevention, including vaccination and lifestyle modifications.
15. They will analyze the prognosis of various pulmonary conditions, identifying factors that influence disease progression and patient outcomes while discussing implications for management and treatment planning.
16. Additionally, they will discuss the importance of drug mechanisms, resistance patterns, smoking cessation strategies, and evidence-based interventions in improving outcomes for patients with lung diseases.
17. Describe the pathophysiology and clinical consequences of glomerular diseases, including the differentiation between primary and secondary glomerulopathies, nephrotic and nephritic syndromes, and acute glomerulonephritis.
18. Explain the diagnostic tools used in evaluating glomerular disease, including laboratory tests and renal biopsy, and outline management strategies based on the underlying aetiology.
19. Discuss the causes and pathophysiology of tubulointerstitial diseases and their clinical presentations, as well as the importance of fluid and electrolyte management in their treatment.

Renal system

20. Describe the pathophysiology and clinical consequences of renal vascular diseases and hypertension, including the effects of renal artery stenosis and the management options available, such as angioplasty and pharmacotherapy.
21. Outline the causes and physiological effects of urinary tract obstruction, along with the necessary diagnostic approaches and management strategies tailored to the aetiology of obstruction.
22. Explain the causes and distinctions between acute kidney injury and chronic kidney disease, including their clinical presentations, investigative methods, and management options, such as renal replacement therapy.
23. Describe the pathological features and risk factors of kidney and urinary tract tumors, including Renal Cell Carcinoma and Transitional Cell Carcinoma, along with the diagnostic approaches and therapeutic strategies employed in their management.
24. Discuss the pharmacological treatments relevant to various renal conditions, including nephrotoxicity considerations, the management of hypertension, anaemia, and bone

	mineral disorders in chronic kidney disease, and the therapeutic agents used in treating renal malignancies. 25. Assess the global health impact of renal diseases including their incidence, prevalence, and contribution to the overall burden of chronic kidney disease and related complications.
Learning outcomes	**Cardiovascular system** **<u>Theme 1: Hypertension</u>** ***Mechanisms of disease*** 1. Describe the diagnostic criteria for hypertension and its stages. 2. Describe the pathophysiology of hypertension, based on an understanding of cardiovascular parameters that affect cardiac output and systemic vascular resistance. 3. Categorise hypertension as primary ('essential') and secondary and identify the most common causes of secondary hypertension. 4. Explain the mechanism by which different risk factors (e.g. smoking, alcohol, increased blood glucose, dyslipidaemias, etc) can cause hypertension. 5. Describe the significance of 1) identifying risk factors, 2) investigating causes and 3) identifying complications, that could increase the risk of cardiovascular disease, in a hypertensive patient. 6. Define obstructive sleep apnoea (OSA) and explain its aetiology, pathophysiology and signs and symptoms. Explain how OSA is associated with hypertension. 7. Define pulmonary hypertension and describe its risk factors and pathophysiology. ***Clinical assessment and management*** 8. Describe the clinical presentation, differential diagnosis and investigations for hypertension. 9. Describe the risk factors associated with hypertension. 10. Describe how other common risk factors combine with hypertension in causing vascular disease. 11. Identify the lifestyle modifications recommended for people with hypertension. *Clinical pharmacology and therapeutics* 12. Describe the pharmacology (mechanism of action, adverse effects, clinical indications, place in therapy, mode of administration) of drugs used in the management of hypertension, including calcium channel blockers, angiotensin receptor blockers, angiotensin-converting enzyme inhibitors, thiazide diuretics and beta-blockers. 13. Outline the rationale for the use of hydralazine, methyldopa, renin inhibitors, aldosterone antagonists and alpha-adrenergic receptor blockers in the management of hypertension. ***Impact of disease*** 14. Describe the epidemiology and public health implications of hypertension.

15. Describe the prognosis and complications of hypertension.
16. Describe prevention strategies for hypertension.
17. Distinguish between observational and interventional studies
18. Explain the design, purpose, and strengths/limitations of cross-sectional studies (including ecological studies)

Theme 2: Venous thromboembolism

Mechanisms of disease

19. Define embolus and identify the different types.
20. Compare arterial and venous thrombi and describe their risk factors.
21. Explain the contribution of "Virchow's triad" to the formation of deep vein thrombosis.
22. Describe the mechanisms leading to Venous Thrombo-Embolism (VTE), including genetic and acquired factors.
23. Explain the difference between provoked and unprovoked pulmonary embolism (PE).
24. Define Disseminated intravascular coagulation (DIC), its causes and clinical implications.
25. Define the relationship between COVID-19 and blood coagulability.
26. Explain the difference between hypoxia and hypoxaemia and list their causes.
27. Define and classify respiratory failure (Type I & II, acute & chronic).
28. Explain respiratory failure in terms of basic applied physics laws (Dalton's law of partial pressures, Boyle's law of gases, Fick's law of diffusion).

Clinical assessment and management

29. Describe the common clinical presentation and differential diagnosis of deep vein thrombosis (DVT) and PE.
30. Outline laboratory investigations needed to define a coagulation disease.
31. Outline the DVT and PE Wells scores and the criteria for diagnosing DVT and PE.
32. Describe the investigations for pulmonary embolus (CTPA, V/Q scan, and conventional (invasive) pulmonary angiography).
33. Define D-dimers and explain their clinical application.
34. Identify the CXR features of PE.
35. Explain the ABG changes and discuss the difference between the reason of hypoxaemia and V:Q mismatch in asthma and PE.
36. Outline lifestyle modifications for DVT prevention.

Clinical pharmacology and therapeutics

37. Describe the mechanism of action, adverse effects, clinical indications, mode of administration and place in therapy of anticoagulant drugs, including warfarin, heparins, hirudins and direct, oral anticoagulants (DOACs).

Impact of disease

38. Describe the epidemiology and public health implications of DVT and PE.
39. Describe the prognosis and complications of DVT and PE.
40. Describe prevention strategies for DVT and PE.

Epidemiology and public health

41. Explain the design, purpose, and strengths/limitations of case-control studies.

Theme 3: Coronary Artery Disease

Mechanisms of disease

42. Describe the classification of dyslipidaemias, risk factors and causes.
43. Describe the pathophysiology of atherosclerosis and its complications, including its impact on coronary and other vascular systems.
44. Define and distinguish between the different forms of angina pectoris (causes, presentation, risk factors).
45. Define the terms ischemic heart disease (IHD) and coronary artery disease (CAD) and describe their pathophysiology and causes.
46. Define acute coronary syndrome and differentiate between its types, including STEMI and NSTEMI.
47. Describe the changes to cardiac tissue if reperfusion is not performed timely in acute MI.
48. Identify MI complications over time (hours-weeks).
49. Outline how structural abnormalities in parts of the vascular systems, other than coronary circulation, (e.g. carotid, femoral, renal, mesenteric, etc.), result in clinical syndromes.
50. Outline multifactorial inheritance and the role of genetic factors in the aetiology of common medical conditions such as ischaemic heart disease and diabetes mellitus.

Clinical assessment and management

51. Identify a normal 12-lead ECG in terms of the rate, rhythm, axis, waves, complexes, intervals and segments and describe their relationship to cardiac electrical activity.
52. Explain how ECG leads correspond to the anatomical location of the heart and its blood supply.
53. Describe the steps of reading an electrocardiogram.
54. Describe the normal ECG findings in athletes.
55. Describe the presentation and diagnostic criteria for IHD, CAD, acute MI (STEMI and NSTEMI), including the use of ECG and cardiac markers.
56. Recognize conditions that confound ECG diagnosis of MI.
57. Describe the different cardiac markers and explain the time course and significance of alterations in circulating cardiac markers post-MI.
58. Recognize possible complications of MI during hospitalization.

59. Explain the difference in acute management of STEMI and NSTEMI.
60. Describe the processes of Percutaneous Coronary Intervention (PCI) and (Coronary Artery Bypass Graft surgery (CABG), explain the risks, benefits, indications, and contraindications.
61. Explain what is an echocardiogram, which structures of the heart can be seen and what pathologies can be detected in an echocardiogram.

Pharmacology and therapeutics

62. Describe the pharmacology (mechanisms of action, adverse effects, clinical indications, therapeutic roles) of commonly used cardiovascular drugs including:
    a. Antiplatelet drugs (aspirin, ADP antagonists, dipyridamole, GP receptor antagonists)
    b. Thrombolytic drugs (streptokinase, tPA)
    c. Lipid-lowering agents (statins, fibrates, cholesterol absorption inhibitors, niacin, PCSK9 Inhibitors)
    d. Drugs used to treat angina (beta-blockers, calcium channel blockers, nitrates)
    e. Drugs used to treat angina (beta-blockers, calcium channel blockers, nitrates)

Impact of disease

63. Describe the epidemiology and public health implications of CAD and ACS.
64. Describe the prognosis and complications of CAD and ACS.
65. Describe prevention strategies for CAD and ACS.
66. Explain how culture affects people's understanding of risk and risky behaviour.

Medical Ethics

67. Outline ethical considerations with concepts of risk and categoriess of risky behaviourbehaviours and definitions of individuals-at-risk patienthood.

Epidemiology and public health

68. Explain the design, purpose, and strengths/limitations of cohort studies
69. Identify appropriate study designs to answer specific epidemiological research questions.

Psychology

70. Identify the psychosocial factors contributing to the development of cardiovascular disease.
71. Outline the impact that psychosocial factors have on cardiovascular disease.
72. Identify psychological conditions often considered to be linked to cardiovascular disease.
73. Describe the different ways in which personality and illness might be causally linked.
74. Describe the Type-A behaviour pattern and its link to cardiovascular disease.
75. Define cancer prone personality.

76. Describe Type-D personality and its link to coronary artery disease.

<u>Theme 4: Heart Failure</u>

Mechanisms of disease

77. Explain the terminology commonly used in clinical settings in referring to different types of heart failure, including congestive heart failure (CHF), systolic heart failure, diastolic heart failure, left-sided heart failure, right-sided heart failure, high-output heart failure.
78. Describe the risk factors and pathophysiology of heart failure, including the role of the sympathetic nervous system, the renin-angiotensin-aldosterone system, the anti-diuretic hormone and natriuretic peptides.
79. Describe how deranged preload, afterload and contractility lead to reduced stroke volume and reduced cardiac output in a heart failure patient.
80. Describe the Frank-Starling law of the heart and use it to explain how changes in cardiovascular parameters in heart failure affect cardiac performance.
81. Explain the LaPlace equation and use it to explain the effect of cardiac dilatation and remodelling on the tension in the heart muscle.
82. Explain how heart failure can be developed after a myocardial infarction.
83. Discuss the involvement of the Starling law of the capillary fluid exchange, the renin-angiotensin-aldosterone system and the lymphatic system in the pathophysiology of oedema.
84. Describe the pathophysiology of oedema in heart failure.
85. Discuss the pathophysiology of oedema and provide clinical examples.

Clinical assessment and management

86. Describe the presentation, differential diagnosis, examination findings and investigations in a patient with suspected heart failure.
87. Describe the diagnostic criteria for heart failure.
88. Identify the X-ray, ECG and echocardiography features of heart failure.
89. Describe the management of a patient in acute and chronic heart failure.
90. Define haemodynamic stability and explain when a patient is haemodynamically unstable.

Pharmacology and therapeutics

91. Describe the pharmacology (mechanism of action, adverse effects, clinical indications, therapeutic roles) of:
    a. Diuretics (loop diuretics, thiazide diuretics, potassium-sparing diuretics)
    b. Drugs used to treat acute (diuretics, nitrates, inotropes e.g. dobutamine) and chronic heart failure (ACEIs, ARBs, ARNIs, beta-blockers, aldosterone antagonists, SGT-2 inhibitors and digoxin).

Impact of disease

92. Describe the epidemiology and public health implications of heart failure.

93. Describe the prognosis and complications of heart failure.
94. Describe prevention strategies for heart failure.

Theme 5: Conduction abnormalities

Mechanisms of disease

95. Revise the conduction of the heart.
96. Classify cardiac dysrhythmias according to the heart rate.
97. Classify the types of bradycardia and explain the mechanisms related to the different types.
98. Define syncope and identify its common causes.
99. Define palpitations/tachycardia and identify its triggers and more serious causes and any red flags that warrant medical attention.
100. Explain the significance of differentiating between supra-ventricular and ventricular tachyarrhythmias and explain which of these are of the greater concern.
101. Explain what is meant by 'aberrant conduction' and 're-entry pathways' and why these might be of clinical importance.
102. Define atrial fibrillation, and describe its risk factors, pathophysiology and classification.

Clinical assessment and management

103. Recognize ECG features associated with cardiac arrhythmias (incl. AF, A.flutter, V.tach, V.fib, Heart block, Bundle Branch Blocks).
104. Define prolonged QT interval and its clinical significance.
105. Describe the ECG findings in rare conditions, such as Brugada syndrome.
106. Explain what is a holder monitor and its use in clinical practice.
107. Describe the clinical presentation, differential diagnosis and investigations for atrial fibrillation.
108. Identify the ECG features of atrial fibrillation.
109. Outline the management of atrial fibrillation, including strategies for rate- and rhythm-control and anti-coagulation for stroke prevention.

Pharmacology and therapeutics

110. Describe the indications, mechanism of action, and adverse effects of class I-IV antiarrhythmic drugs.
111. Outline the pharmacology of other unclassified anti-arrhythmic drugs.

Impact of disease

112. Describe the epidemiology and public health implications of atrial fibrillation.
113. Describe the prognosis and complications of atrial fibrillation.
114. Describe prevention strategies for atrial fibrillation.

<u>Theme 6: Valvular heart disease</u>

Mechanisms of disease

115. Revise the heart valve's function and characteristics (e.g., location, structure, site of auscultation).
116. Describe the most common types of valvular heart disease, their common causes and pathophysiology (e.g. aortic stenosis, mitral stenosis, mitral regurgitation, etc)
117. Define murmur, identify the common types and explain how to differentiate between them.
118. Identify the common causes of the different types of murmurs (including both valvular and non-valvular causes)
119. Define mitral valve regurgitation (MVR), its causes and pathophysiology.
120. Define infective endocarditis, its causes and pathophysiology, including native and prosthetic valve endocarditis.
121. Describe the most common congenital heart diseases.

Clinical assessment and management

122. Describe the clinical presentation for the most common types of valvular heart disease.
123. Identify the location on the precordium where you can best listen to the different cardiac murmurs.
124. Describe the clinical presentation, differential diagnosis, investigations and management of MVR.
125. Distinguish between the clinical indications and contraindications for open-valve surgery and trans-catheter valve replacement procedures.
126. Define atrial myxoma and explain why it should be considered in differential diagnosis for patients presenting with mitral valve dysfunction.
127. Describe the clinical presentation, differential diagnosis, investigations and management of infective endocarditis.

Impact of disease

128. Describe the epidemiology and public health implications of MVR and infective endocarditis.
129. Describe the prognosis and complications of MVR and infective endocarditis.
130. Describe the complications of valve replacement surgery (including mitral and aortic).
131. Describe prevention strategies for valvular heart disease and infective endocarditis.
132. Outline ethical and legal issues in cardiovascular disease management
133. Critically analyse dilemmas related to patient affordability of care and allocation of life-saving interventions in cardiovascular care

134. Describe challenges for decision-making in case of terminal conditions and medical futility and terminal conditions, with reference to patient autonomy, quality of life, family wishes.

135. Examine ethical-legal-professional issues and guidelines regarding withdrawing/withholding or continuing life-sustaining treatments.

Epidemiology and public health

136. Apply and interpret measures of morbidity and mortality to describe the burden of disease (including life expectancy (LE); health-adjusted life expectancy (HALE); quality-adjusted life years (QALYs); and disability-adjusted life years (DALYs)

137. Identify and use sources of reliable information on the burden of disease

138. Explain the value of age-standardisation in comparing burden of disease

139. Interpret measures of association (risk ratios, odds ratios, rate ratios).

Climate Change and Health

140. Examine the direct and indirect impacts of climate change on mortality rates and the occurrence of injuries

Respiratory system

<u>Theme 1: Obstructive Lung Disorders</u>

Mechanisms of Disease

1. Outline the basic pathophysiology of obstructive lung diseases, including mechanisms leading to respiratory insufficiency and failure (hypoxia, hypoxemia, hypercapnia)
2. Describe the pathophysiological features of bronchial asthma, chronic bronchitis, emphysema, and bronchiectasis.Explain congenital structural and functional disorders of the lungs and diaphragm.
3. Describe the genetics of cystic fibrosis and other genetic diseases that involve transmembrane channels
4. Describe the pathogenic mechanisms and the clinical features in type I, II, III, IV and V hypersensitivity reactions.
5. Name the main primary and secondary mediators in allergies and describe their main roles.
6. Describe the pathogenesis and the clinical features of allergies.
7. Describe the clinical spectrum of atopic disorders.
8. Demonstrate the relevance of a detailed clinical history in the diagnosis of allergy.
9. Interpret a positive Sp IgE result and differentiate 'IgE sensitization' from 'clinical allergy'.

Clinical Assessment and Management

10. For asthma, COPD, emphysema, and sleep apnoea, describe the signs and symptoms.
11. Using pressure–volume curves, explain how diseases like emphysema and asthma affect lung compliance, lung volume, and airway resistance.

12. Describe the differential diagnosis and investigations, including ABG changes and CXR features.
13. Explain the stepwise management of obstructive lung diseases, emphasising the role of a multidisciplinary team in patient care.

Pharmacology and therapeutics

14. Describe the mechanism of action, adverse effects, and therapeutic roles of β-2 agonists, methylxanthines, leukotriene inhibitors, lipoxygenase inhibitors, and anti-inflammatory drugs in asthma treatment.
15. Explain the role of monoclonal antibodies in asthma treatment.
16. Describe the mechanism of action, adverse effects, and therapeutic roles of drugs used in the treatment of COPD, such as expectorants, mucolytics, and cough suppressants.

Impact of Disease

17. Explain the epidemiology, risk factors, and public health implications of obstructive lung diseases, including asthma, COPD, emphysema, and sleep apnoea.
18. Discuss the prognosis of obstructive lung diseases and the factors influencing disease progression and patient outcomes.
19. Discuss strategies for the prevention of obstructive lung diseases, including lifestyle modifications and relevant vaccinations.
20. Epidemiology and public health
21. Define and describe the concepts of a confounder and a mediator and how to distinguish them.
22. Explain methods to control for confounding.
23. Describe and interpret effect modification or interactions.

Psychology

24. Outline the role of sleep.
25. Outline the different stages of sleep.
26. Describe the impact of total and selective sleep deprivation.
27. Describe the most common sleep disorders.
28. Outline the available treatments on sleep disorders.

<u>Theme 2: Restrictive Lung Disorders</u>

Mechanisms of Disease

29. Outline the basic pathophysiology of restrictive lung diseases, including neonatal and adult respiratory distress syndrome
30. Describe the pathophysiological mechanisms of various pneumoconiosis and hypersensitivity pneumonitis, providing examples.
31. Define and describe the pathophysiology of restrictive lung diseases of unknown aetiology, such as sarcoidosis, interstitial pneumonitis, and eosinophilic pneumonitis.
32. Explain granuloma formation and its role in conditions like Wegener granulomatosis, sarcoidosis, and Lofgren syndrome.

Clinical Assessment and Management

33. Describe the clinical characteristics and presentation of restrictive lung diseases, including symptoms and signs.
34. Explain how pulmonary function testing can be used to distinguish between causes of chronic dyspnoea and identify restrictive patterns.
35. Discuss the application of advanced imaging techniques, such as high-resolution CT and bronchoscopy in diagnosing restrictive lung diseases.
36. Describe the mechanism of action, indications, and side effects of anti-inflammatory drugs and corticosteroids, as well as anti-fibrotic agents in the management of restrictive lung diseases.
37. Outline the principles of oxygen administration in different disease states and its role in managing restrictive lung disorders.

Impact of Disease

38. List the causes of restrictive pulmonary disease and discuss their epidemiological significance.
39. Describe the public health implications of exposure to environmental and occupational factors leading to pneumoconiosis.
40. Discuss the prognosis of restrictive lung diseases and the factors influencing disease progression and patient outcomes.
41. Discuss strategies for preventing restrictive lung diseases, focusing on minimizing exposure to known environmental and occupational risk factors.

Theme 3: Pulmonary Infections

Mechanisms of Disease

42. Explain the pathophysiology of different forms of pneumonia, including lobar pneumonia, bronchopneumonia, and chronic pneumonia.
43. Define lung abscess and describe its pathophysiological features.
44. Describe the typical pathological findings of pulmonary tuberculosis and non-tuberculous mycobacterial infections.

Clinical Assessment and Management

45. Describe the clinical presentation of pneumonia, including signs and symptoms.

	46. Describe the clinical presentation of viral respiratory infections caused by respiratory viruses, e.g., RSV, rhino- and coronaviruses, and influenza. 47. Explain the differential diagnosis and investigations for pneumonia. 48. Explain the clinical and therapeutic importance of pneumonia classification (typical vs. atypical, community-acquired vs. hospital-acquired). 49. Describe the CXR features of pneumonia and outline the criteria for hospital admission following an acute pneumonia infection. 50. Discuss the use of molecular diagnostic tools in identifying respiratory pathogens and guiding treatment decisions. 51. Explain the mechanisms of action, side effects, clinical uses, indications, and contraindications of beta-lactams, tetracyclines, quinolones, macrolides, and anti-mycobacterial drugs. 52. Explain the mechanisms of action, side effects, clinical uses, indication and contraindications of antiviral drugs used for the treatment of influenza and coronavirus. 53. Discuss the involvement of a multidisciplinary team in the management of pneumonia and other pulmonary infections. 54. Discuss the seasonality of flu viruses, the concept of genetic drift or shift, and the public health strategies for prevention and management of influenza. 55. Define active and passive immunization with examples, describing their mode of action. 56. Define herd immunity and illustrate its importance using specific examples. 57. Outline the criteria for an effective vaccine, including the significance of immunogenicity. 58. Describe examples of clinically-important vaccines and strategies, including their mode of function, advantages and disadvantages. 59. Briefly outline new vaccine strategies that may lead to future vaccines. *Epidemiology and Public Health* 60. Discuss the Global burden (mortality, prevalence, incidence, risk factors, prevention and cost) of healthcare associated infections and antimicrobial resistance *Psychology* 61. Identify the psychosocial factors contributing to the development of respiratory infections and asthma. 62. Describe current psychological interventions for respiratory conditions. 63. Outline the efficacy of psychological interventions for respiratory conditions. *Medical Ethics* 64. Describe ethical considerations in environmental health risks and key issues facing vulnerable populations (ie low-income or ethnic communities, low health literacy) 65. Explain the significance of maintaining balance between individual rights and public health concerns.

66. Describe ethical considerations in disease vaccination strategies, including ethical-legal issues related to children and community vaccination.
67. Describe the significance of children's right to health and the responsibilities and challenges in the implementation of child rights in healthcare.

Impact of Disease

68. Describe the epidemiology, risk factors, and public health implications of pneumonia, including community-acquired and hospital-acquired infections.
69. Discuss the role of multidrug-resistant (MDR) microorganisms in hospital-acquired infections and their impact on public health.
70. Discuss the prognosis of pneumonia and other pulmonary infections, including factors influencing disease course and patient outcomes.
71. Discuss strategies for preventing pulmonary infections, focusing on vaccination, infection control measures, and reducing exposure to risk factors.
72. Define the characteristics, virulence factors and clinical syndromes caused by Pseudomonas aeruginosa and Acinetobacter baumanii, Bordetella, Moraxella, Legionella, Haemophilus influenzae.

Theme 4: Neoplastic Disorders of the Respiratory System

Mechanisms of Disease

73. Define the concept of neoplasia and explain the development of cancer in based on the current understandings of cell growth, division and differentiation
74. Revise the role of oncogenes and tumour suppressor genes in the development of cancer.
75. Discuss the cellular and molecular mechanisms of metastasis including the role of angiogenesis
76. Explain the clinical manifestations of metastases of common cancers using knowledge of the anatomy of the relevant organs, their blood supply and lymphatic drainage.
77. Describe the role of oncogenes and tumor suppressor genes in the development of lung neoplasia, and outline the types of DNA repair genes that, when mutated, lead to cancer predisposition.
78. Describe the benign and malignant tumors of the upper respiratory tract, mediastinum, chest wall, and pleura.
79. Observe and describe adenocarcinoma, squamous cell carcinoma, alveolar cell carcinoma, and small cell carcinoma of the lung.
80. Describe the clinical features of the main cancer predisposition syndromes.

Clinical Assessment and Management

81. Discuss the importance of histological diagnosis of cancer and describe methods for obtaining a biopsy.
82. Discuss the role of blood tests (including tumour markers) in the investigation and management of cancers.

	83. Describe the principles underlying commonly used investigative tools in cancer. including ultrasound, CT scan, MRI, Bone scan, PET scan. Compare and contrast the indications for each modality in a given case. 84. Explain the mechanism of action and major side effects of the most common forms of chemotherapy, hormone therapy and monoclonal antibody therapy 85. List and classify different types of anti-cancer drugs used for lung cancer, including protein kinase inhibitors and immunotherapy, and describe their mechanisms of action, clinical uses, interactions, and adverse effects. 86. Explain the role of pharmacogenomics in tailoring the role of lung cancer treatment and improving patient outcomes. 87. Discuss the concept of adjuvant and neo-adjuvant treatment and their roles in managing lung malignancies. 88. Compare and contrast treatment with curative intent versus palliative intent and discuss the indications for each. 89. Define radiotherapy and explain how it can be used to treat cancer. 90. Outline the purpose of conformal radiotherapy. 91. Explain the criteria for selecting appropriate isotope sources for radiotherapy. 92. Describe the safety considerations in radiotherapy. 93. Describe the different pharmacological principles used in aiding smoking cessation. ***Impact of Disease*** 94. Explain the role of environmental factors as initiators and promoters of cancer and discuss public health measures to mitigate the harm. 95. Explain the role of environmental factors, such as smoking, as initiators and promoters of lung cancer, and discuss public health measures to mitigate these risks. 96. Describe evidence-based smoking cessation interventions and the role of the multidisciplinary team in their implementation. 97. Explain the principles behind recommended lung cancer screening programs, including their benefits and potential drawbacks. 98. Discuss the prognosis of lung cancer and other respiratory neoplasms, including factors influencing disease progression and patient outcomes. *Epidemiology and Public Health* 99. Identify systematic error, selection and information bias in different study designs and differentiate from random error. 100. Differentiate between the concepts of validity and reliability. 101. Differentiate between internal and external validity. 102. Describe and Explain the concept of causality. 103. Differentiate between causation and association. *Climate Change and Health*

104. Examine the direct and indirect impacts of climate change on respiratory diseases and the mechanisms involved.

Medical Ethics

105. Understand the principles of palliative care and its ethical grounding in medical practice.

106. Identify and critically analyze ethical dilemmas in palliative care and end of life clinical practice

Renal system

<u>Theme 1: Glomerular diseases</u>

Mechanisms of disease

107. Outline the causes of glomerular injury and discuss the pathogenesis and pathophysiology of common glomerular diseases.

108. Discuss the role of the immune system in glomerular disease.

109. Distinguish between primary glomerulopathies and those associated with systemic disease such as diabetes mellitus (secondary glomerulopathies).

110. Define nephrotic and nephritic syndromes and acute glomerulonephritis.

Clinical assessment & management

111. Describe the clinical presentation and differential diagnosis for glomerular disease.

112. Discuss the use of blood and urine tests in the investigation of glomerular disease, including the use of immunological tests.

113. Outline the use of renal biopsy in the diagnosis of glomerular disease.

114. Outline the management of glomerular disease according to aetiology

Pharmacology & Therapeutics

115. Discuss the mode of action and adverse effects of immunosuppressive agents in the management of glomerular disease.

Impact of disease

116. Discuss the incidence & prevalence of glomerular disease, its role as a cause of chronic renal disease and its contribution to the global health burden.

<u>Theme 2: Tubulointerstitial diseases</u>

Mechanisms of disease

117. Outline the causes of tubulointerstitial disease and discuss the role of urinary tract infections, drugs, immunological factors, metabolic abnormalities and genetic disorders in their pathogenesis.

118. Describe the pathophysiology of tubulointerstitial diseases and explain the resulting disturbance of water & electrolyte and acid-base homeostasis.

Clinical assessment & management

119. Describe the clinical presentation and differential diagnosis for tubulointerstitial disease.

120. Discuss the use of blood and urine tests in the investigation of tubulointerstitial disease, including the use of immunological tests.

121. Outline the use of imaging, including in the assessment of vesico ureteric reflux (VUR), and renal biopsy in the diagnosis of tubulointerstitial disease.

122. Outline the management of tubulointerstitial diseases according to aetiology.

123. Explain the importance of fluid & electrolyte regulation in the management of tubulointerstitial disease.

Pharmacology & Therapeutics

124. Discuss safety considerations in the use of potentially nephrotoxic drugs.

125. Discuss the use of antimicrobial agents in the treatment of lower and upper urinary tract infection and outline the use of prophylactic antibiotics.

126. Discuss the mode of action and adverse effects of immunosuppressive agents in the management of tubulointerstitial disease.

Impact of disease

127. Discuss the incidence & prevalence of tubulointerstitial disease, its role as a cause of chronic renal disease and its contribution to the global health burden.

Theme 3: Diseases of the renal vasculature and hypertension

Mechanisms of disease

128. Describe the mechanism of progressive kidney damage resulting from disorders of the renal vasculature, focussing on the effects of hypertension, atherosclerosis and microangiopathies.

129. Explain the role of renal artery stenosis in the development of hypertension.

Clinical assessment & management

130. Describe the clinical presentation and differential diagnosis for renal vascular disease

131. Discuss the use of blood and urine tests in the investigation of vascular renal disease including clotting screen and an aldosterone assay.

132. Explain the role of doppler studies and angiography in the assessment of vascular renal disease.

133. Outline the use of nuclear medicine techniques in the assessment of differential renal function.

134. Outline the management of vascular renal disease according to aetiology.

135. Discuss the role of angioplasty in the management of renal artery stenosis.

Pharmacology & Therapeutics

136. Discuss the pharmacological treatment strategy of hypertension in the context of renal disease considering possible adverse effects.

137. Discuss the pharmacological treatment of underlying disorders such as atherosclerotic and thrombotic disease.

Impact of disease

138. Discuss the significance of hypertension as a cause of chronic renal disease and the contribution of renal artery stenosis to the aetiology of secondary hypertension.

139. Discuss the impact of renal vascular disease on the global health burden.

Epidemiology and Public Health

140. Explain the design and purpose of randomized and non-randomized clinical trials, as well as their strengths and weaknesses.

141. Describe the reasons for and the methods of randomisation, blinding, and placebo controls.

142. Compare and contrast the statistical analysis methods in clinical trials, highlighting the strengths and limitations of each.

Psychology

143. Identify the role of psychological factors on the onset and exacerbation of urinary and urological conditions.

144. Describe assessment of psychosocial impacts of urological diseases.

145. Outline Psychological and Behavioral Interventions and their effectiveness in managing symptoms and improving outcomes in patients with urological disorders.

Medical Ethics

146. Outline ethical issues in clinical trials

Theme 4: Obstruction of the urinary tract

Mechanisms of disease

147. Outline the main causes, including congenital ones, of obstruction of the urinary tract and describe the pathophysiology of obstruction.

148. Describe the mechanisms of development of urinary calculi.

Clinical assessment & management

149. Describe the clinical presentation and differential diagnosis for obstruction of the urinary tract and correlate the clinical features with the level of obstruction.

150. Discuss the use of blood and urine tests in the investigation of urinary obstruction.

151. Discuss the use of imaging, functional studies and cystoscopy in the investigation of urinary obstruction.

152. Outline the management of urinary tract obstruction according to aetiology.

Pharmacology & Therapeutics

153. Discuss the mode of action and adverse effects of drugs used in benign prostatic hyperplasia.

154. Discuss the mode of action and adverse effects of drugs used in benign prostatic hyperplasia.

Impact of disease

155. Discuss the incidence and prevalence of the conditions causing urinary tract obstruction and outline the health burden of the different causes on a global scale.

<u>Theme 5: Acute kidney injury and chronic kidney disease</u>

Mechanisms of disease

156. Outline the prerenal, renal and post-renal causes of acute kidney injury and discuss the pathophysiology of acute kidney injury depending on the specific cause.

157. Outline the causes of chronic kidney disease including diabetes mellitus, hypertension, glomerular, tubulointerstitial, vascular and obstructive disease and discuss the pathophysiology of progressive renal insufficiency depending on the specific cause.

Clinical assessment & management

158. Describe the clinical presentation of acute kidney injury and chronic renal disease, discuss the differential diagnosis and identify the key differences between these two states of renal impairment.

159. Describe the clinical manifestations and complications of end stage kidney disease.

160. Discuss the investigation of acute kidney injury with blood & urine tests and imaging studies and outline the management of the underlying causes and the role of renal replacement therapy.

161. Discuss the investigation and monitoring of progressive renal impairment and explain the use of estimated glomerular filtration state (eGFR).

162. Outline the management of chronic kidney disease including renal dialysis and transplantation.

163. Explain the immunological basis for transplantation rejection.

164. Define the different types of graft tissue (autograft, isograft, allograft, xenograft).

Pharmacology & Therapeutics

165. List drugs and agents that are nephrotoxic.

166. Discuss dose alterations for drugs cleared by the kidneys.

167. Outline the rationale for the use of diuretics in acute kidney injury and chronic renal disease.

168. Outline the pharmacological management of hypertension, anaemia and mineral & bone disease in the context of chronic kidney disease.

169. Discuss the incidence of acute kidney injury and the prevalence of chronic kidney disease according to the underlying aetiology as well as the global health burden of progressive renal insufficiency.

Impact of disease

Epidemiology and Public Health

	170. Discuss the incidence of acute kidney injury and the prevalence of chronic kidney disease according to the underlying aetiology as well as the global health burden of progressive renal insufficiency. 171. Explain the patient/family/clinical experiences of organ donation and transplantation, with respect to social determinants cultural and systemic aspects, and ethical implications. (Sociology integrated with Medical Ethics). 172. Discuss and practise the sociological and ethical principles of organ donation and transplantation. (Sociology integrated with Medical Ethics). *Medical Ethics* 173. Identify the ethical-legal issues in organ donation, including organ donation systems, and xenotransplantation 174. Outline strategies for allocation of organs to individuals on the waiting lists for transplantation with reference to the underlying guiding principles 175. Critically analyse dilemmas in organ donation in terms of individual patient autonomy, public good and ethical principles of medical practice 176. Debate xenotransplation with reference to clinical application of animal to human organ transplantation and in terms of human vs animal value of life *Epidemiology and Public Health* 177. Apply and interpret absolute risk (AR), absolute risk percent (AR%); population attributable risk (PAR), and population attributable risk percent (PAR%) 178. Interpret statistics that describe the effectiveness and safety of treatments in randomised controlled trials (Vaccine efficacy/effectiveness (VE), Number needed to treat (NNT), Number needed to harm (NNH). 179. Describe the difference between efficacy and effectiveness (clinical vs effectiveness) **<u>Theme 6: Tumours of the kidney and urinary tract</u>** ***Mechanisms of disease*** 180. Describe the pathological features of Renal Cell Carcinoma, Transitional Cell Carcinoma of the bladder and Wilms tumour and discuss the relevant risk factors and the role of genetic predisposition. 181. Describe the pathological features of Renal Angiomyolipoma and the association with Tuberous Sclerosis and describe the pathological features of Renal Oncocytoma. ***Clinical assessment & management*** 182. Describe the clinical presentation of tumours of the kidney and urinary tract and discuss the differential diagnosis of painless haematuria. 183. Discuss the investigation of tumours of the renal tract and the use of imaging, tissue biopsy and genetic testing as appropriate. 184. Outline the management of malignant tumours of the renal tract and the role of surgery, radiotherapy, chemotherapy and targeted therapies. *Pharmacology & Therapeutics*

	185. Outline the mode of action and adverse effects of chemotherapeutic agents used to treat malignant tumours of the renal tract. 186. Outline the indications and mode of action of targeted therapies such as Tyrosine Kinase Inhibitors and checkpoint inhibitors and discuss their limitations and adverse effects. ***Impact of disease*** 187. Discuss the incidence and prevalence of the different types of renal tract malignant tumours and their global health burden. 188. Climate change and Health stream: 189. Examine the direct and indirect impacts of climate change on renal diseases and the mechanisms involved.		
Prerequisites	None	**Required**	None
Course content	**Cardiovascular System Themes:** 1. Hypertension 2. Venous thromboembolism 3. Coronary Artery Disease 4. Heart Failure 5. Conduction abnormalities 6. Valvular heart disease **Respiratory System Themes:** 1. Obstructive Lung Disorders 2. Restrictive Lung Disorders 3. Pulmonary Infections 4. Neoplastic Disorders of the Respiratory System Mechanisms of Disease **Renal System Themes:** 1. Glomerular diseases 2. Tubulointerstitial diseases 3. Diseases of the renal vasculature and hypertension 4. Obstruction of the urinary tract 5. Acute kidney injury and chronic kidney disease 6. Tumors of the kidney and urinary tract		
Teaching methodology	Lectures Tutorials Flipped learning Directed self-study Group Work		
Bibliography	**Required Textbooks/Reading:**		

Authors	Title	Edition	Publisher	Year	ISBN

Medical Microbiology	Medical Microbiology	9th Edition	Elsevier	2021	9780323673228
Clinical Neurology	Clinical Neurology	11th Edition	McGraw Hill/Lange	2020	9781260458350
Oxford Desk Reference: Clinical Genetics and Genomics	Oxford Desk Reference: Clinical Genetics and Genomics	2nd edition	Oxford University press	2017	9780199557509
Kumar and Clark's Clinical Medicine	Kumar and Clark's Clinical Medicine	10th Edition	Elsevier	2021	9780702078682
Kuby Immunology [Including COVID-19 & digital update]	Kuby Immunology [Including COVID-19 & digital update]	8th Edition	WH Freeman	2022	9781319498658
Robbins & Kumar Basic Pathology	Robbins & Kumar Basic Pathology	11th Edition	Elsevier	2023	9780323790185
Rang and Dale's pharmacology	Rang and Dale's pharmacology	10th Edition	Elsevier	2024	9780323873956
Macleod's clinical examination	Macleod's clinical examination	15th Edition	Elsevier	2023	9780323847704
Skills for communicating with patients	Skills for communicating with patients	3rd Edition	CRC Press	2013	9781846193651 https://ebookcentral.proquest.com/lib/nicosia/detail.action?docID=4742673

Recommended Textbooks/Reading:

Authors	Title	Edition	Publisher	Year	ISBN
Dominic Wilkinson, Jonathan	Medical Ethics and Law: A	3rd Edition	Elsevier	2020	9780702075964

	Herring, Julian Savulescu	curriculum for the 21st Century				
	Ronald Cohn, Stephen Scherer, Ada Hamosh	Thompson & Thompson Genetics in Medicine	9th edition	Elsevier	2023	9780323547628
	Hoffbrand, A.V	Hoffbrand's essential haematology	9th Edition	Wiley-Balackwell	2024	9781394168156
	by Joseph Loscalzo (Author), Anthony S. Fauci (Author), Dennis L. Kasper (Author), Stephen Hauser (Author), Dan Longo (Author), J. Larry Jameson (Author)	Harrison's Principles of Internal Medicine, Twenty-First Edition (Vol.1 & Vol.2)	21st Edition	McGraw Hill / Medica	2022	9781264268504
	Gillespie and Bamford	Medical Microbiology and Infection at a glance	5th Edition	Wiley-Blackwell	2022	9781119592167
	Delves, Martin, Burton and Roitt	Roitt's Essential Immunology	13th Edition	Wiley-Blackwell	2017	9781118415771
	Paul Johns	Clinical Neuroscience: an illustrated colour text	1st edition	Elsevier	2014	9781455742127
	Impey and Child	Obstetrics and Gynaecology	5th edition	Wiley-Blackwell	2017	9781119010791
	DeVita Vincent T, Rosenberg Steven A,	DeVita, Hellman & Rosenberg's Cancer: Principles	12th edition	Wolters Kluwer Health	2023	9781975184742

	Lawrence Theodore S	and Practice of Oncology				
	Karen J. Marcdante, Robert M. Kliegman, Abigail M. Schuh	Nelson Essentials of Pediatrics	9th edition	Elsevier	2022	9780323775625
	Laurence Brunton, Bjorn Knollmann	Goodman & Gilman's The Pharmacological Basis of Therapeutics	14th Edition	McGraw Hill	2023	9781264258079
		Diagnostic and Statistical Manual of Mental Disorders	5th Edition (DSM5)	American Psychiatric Publishing	2022	9780890425763
	Krentel A, McKee M	Issues in public health: challenges for the 21st Century	3rd Edition	Open University Press	2022	9780335249152
	Timothy L. Lash, Tyler J. VanderWeele, Sebastien Haneuse, Kenneth J. Rothman	Modern Epidemiology	4th Edition	Wolters Kluwer	2021	9781451193282 https://ebookcentral.proquest.com/lib/nicosia/detail.action?docID=6947080
	Lawrence, Peter	Essentials of General Surgery and Surgical Specialties	6th edition	LWW	2018	9781496351043
	O. James Garden, Rowan W. Parks	Principles and Practice of Surgery	8th Edition	Elsevier	2023	9780702082511
Assessment	Final exam (100%)					
Language	English					