

**LESSON PLAN**  
**BIO-II.E-2: Metabolism of Biomolecules**  
**2019 - 2020**

Lecture No	Unit	Sub-unit	Mandatory Reading	Optional Reading	Link to Lecture notes	Link to Videos/ Research Articles
01	<b>Unit 1: Basic concepts and design of metabolism</b>	Introductory Lecture				
02		Definition of metabolism; catabolism; anabolism; ATP as energy currency	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company. Pg No: 25 - 26	-	<a href="https://drive.google.com/file/d/1p5Pi4LVaCL3AdD6be6k86PThHabd1Xk3/view">https://drive.google.com/file/d/1p5Pi4LVaCL3AdD6be6k86PThHabd1Xk3/view</a>	-
03		Energy relationship between catabolic and anabolic pathways	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins Pg No: 4 - 6.	-	<a href="https://drive.google.com/file/d/10BH0mkerHCOOHILbNOmFtxDwVWw_5Cox/view">https://drive.google.com/file/d/10BH0mkerHCOOHILbNOmFtxDwVWw_5Cox/view</a>	-
<b>Practical Session 1</b>						

04	<b>Unit 2: Carbohydrate metabolism</b>	Glycolysis	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company. Pg no:528 - 530.	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins, Pg no:91 - 93.	<a href="https://drive.google.com/file/d/1SUHjm4xtJy994oWu0S7RbPvNhst7evH-/view">https://drive.google.com/file/d/1SUHjm4xtJy994oWu0S7RbPvNhst7evH-/view</a>	
05		Gluconeogenesis	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins, Pg no:117 - 121.	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company. Pg no: 551 - 558.	<a href="https://docs.google.com/presentation/d/1q-pYw1FOKwdJWE4EX7wJLX4oc_dL7x0SGH6VrWdsQ30/edit#slide=id.g5d261af518056">https://docs.google.com/presentation/d/1q-pYw1FOKwdJWE4EX7wJLX4oc_dL7x0SGH6VrWdsQ30/edit#slide=id.g5d261af518056</a>	
06		Pentose-Phosphate pathway	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th	<a href="https://docs.google.com/presentation/d/10lmas-lZqXzAjfnNt">https://docs.google.com/presentation/d/10lmas-lZqXzAjfnNt</a>	

			Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins, Pg no:145 - 147.	Edition, W.H. Freeman and Company. Pg no: 558 - 563.	<a href="https://docs.google.com/presentation/d/15tFWNxVDfMt0hU/edit#slide=id.p">YXF6aOgXuv i5tFWNxVD FMt0hU/edit #slide=id.p</a>	
Practical Session 2						
07	<b>Unit 2: Carbohydrate metabolism</b>	Glycogen synthesis and breakdown	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins, Pg no: 125 - 131.		<a href="https://docs.google.com/presentation/d/1paunLNNGOfjqadHAdSe9KwI2FJRK-7XAR71RalDT8uY/edit#slide=id.p">https://docs. google.com/ presentation /d/1paunLN NGOfjqadH AdSe9KwI2F JRK-7XAR71 RalDT8uY/e dit#slide=id. p</a>	
08		Tri-carboxylic acid cycle	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and	<a href="https://docs.google.com/presentation/d/1pO4jTI8S6iYM2iDNox5eSY9yFnQozGHfUOkX">https://docs. google.com/ presentation /d/1pO4jTI8 S6iYM2iDNo x5eSY9yFnQ ozGHfUOkX</a>	

			Edition, Lippincott Williams and Wilkins, Pg no: 109 - 115	Company. Pg no: 615 - 635.	<a href="https://www.gutenberg.org/files/59582/59582-h/59582-h.htm">G1UHBxs/edit#slide=id.g5d261af518_0_73</a>	
09		Glyoxylate pathway	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company. Pg no: 638 - 640.	-	<a href="https://docs.google.com/presentation/d/1DKjyUrAusQhNGtu9A0I3sl-vbhTXUjuw95UXCNIW4/edit">https://docs.google.com/presentation/d/1DKjyUrAusQhNGtu9A0I3sl-vbhTXUjuw95UXCNIW4/edit</a>	
Practical Session 3						
10	<b>Unit 3: Oxidative phosphorylation</b>	The respiratory chain in mitochondria	Karp, G. (2010). Cell and Molecular Biology. (6th Edition). USA: John Wiley & Sons, Inc. Pg no: 174 - 204.	-	<a href="https://drive.google.com/file/d/110zCi9YXzbL7tVmXpHpcCNij4LcQcZcR/view">https://drive.google.com/file/d/110zCi9YXzbL7tVmXpHpcCNij4LcQcZcR/view</a>	<a href="https://drive.google.com/file/d/1QBopCHOfn7ZtIsMwO3eY9dSRpGiSCBvU/view">https://drive.google.com/file/d/1QBopCHOfn7ZtIsMwO3eY9dSRpGiSCBvU/view</a>
11		Proton gradient powering ATP synthesis	Karp, G. (2010). Cell and	-	<a href="https://drive.google.com/file/d/110zCi9YXzbL7tVmXpHpcCNij4LcQcZcR/view">https://drive.google.com/file/d/110zCi9YXzbL7tVmXpHpcCNij4LcQcZcR/view</a>	<a href="https://drive.google.com/file/d/1rGuVrJ">https://drive.google.com/file/d/1rGuVrJ</a>

			Molecular Biology. (6th Edition). USA: John Wiley & Sons, Inc. Pg no: 174 - 204.		<a href="https://drive.google.com/file/d/110zCi9YXzbL7tVmXpHpcCNij4LcQcZcR/view">9YXzbL7tVmXpHpcCNij4LcQcZcR/view</a>	<a href="https://drive.google.com/file/d/110zCi9YXzbL7tVmXpHpcCNij4LcQcZcR/view">HCeII9POBjdiVsRjbBU1UZGUZk/view</a>
12		Transfer of cytosolic reducing equivalents to mitochondria: glycerol-3-phosphate and malate - aspartate shuttle	Karp, G. (2010). Cell and Molecular Biology. (6th Edition). USA: John Wiley & Sons, Inc. Pg no: 174 - 204.	-	<a href="https://drive.google.com/file/d/110zCi9YXzbL7tVmXpHpcCNij4LcQcZcR/view">https://drive.google.com/file/d/110zCi9YXzbL7tVmXpHpcCNij4LcQcZcR/view</a>	
Practical Session 4						
13	Unit 4: Fatty acid synthesis and degradation	Digestion; mobilisation and transport of cholesterol and triacylglycerols	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins, Pg no:173 - 179.	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company. Pg no: 648 - 649.	<a href="https://docs.google.com/presentation/d/1ObOLXDlZtjWY4cvoRjy1c84oX63vMshLEGE0z-YzHu0/edit#slide=id.g5d261af518_0_73">https://docs.google.com/presentation/d/1ObOLXDlZtjWY4cvoRjy1c84oX63vMshLEGE0z-YzHu0/edit#slide=id.g5d261af518_0_73</a>	

14		oxidation of fatty acids	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company. PgNo: 653 - 665,805 - 806.	Harvey, R.A. & Ferrier, D.R (2010) Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins. Pg No: 183 - 184.	<a href="https://drive.google.com/file/d/15m7JPKNdwxQ_UWFTYJvJD_HHWvUS6492y/view">https://drive.google.com/file/d/15m7JPKNdwxQ_UWFTYJvJD_HHWvUS6492y/view</a>	
15		ketone bodies			<a href="https://docs.google.com/presentation/d/1Owqg1D405-Ktgoz_skGVJYRryURtxbeEH0snmwCFuiQ/edit#slide=id.g5f51e436110_21">https://docs.google.com/presentation/d/1Owqg1D405-Ktgoz_skGVJYRryURtxbeEH0snmwCFuiQ/edit#slide=id.g5f51e436110_21</a>	
Practical Session 5						
16	Unit 4: Fatty acid synthesis and degradation	biosynthesis of fatty acids - elongation and unsaturation of fatty acids.	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company. PgNo:	Harvey, R.A. & Ferrier, D.R (2010) Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and	<a href="https://drive.google.com/file/d/15m7JPKNdwxQ_UWFTYJvJD_HHWvUS6492y/view">https://drive.google.com/file/d/15m7JPKNdwxQ_UWFTYJvJD_HHWvUS6492y/view</a>	

			653 - 665,805 - 806.	Wilkins. Pg No: 183 - 184.		
17	Tutorials/Revision					
18	Continuous Assessment I <a href="https://docs.google.com/document/d/14p3QSCsvoQEw6vgtO7x5fg6scvofAoN8oli6uEhs2to/edit">https://docs.google.com/document/d/14p3QSCsvoQEw6vgtO7x5fg6scvofAoN8oli6uEhs2to/edit</a>					
Practical Session 6						
19	Unit 5: Amino acid catabolism and anabolism	Overview of biosynthesis				
20		catabolism of amino acids				
21		Urea cycle	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company. Pg No: 682 - 686.	-	<a href="https://drive.google.com/file/d/1D_dNm-VLC76zaVBYAefzocigFe0YOGc3/view">https://drive.google.com/file/d/1D_dNm-VLC76zaVBYAefzocigFe0YOGc3/view</a>	
Practical Session 7						
22	Unit 6: Nucleotide metabolism	Biosynthesis - <i>de novo</i> synthesis of nucleic acid	Nelson, D.L. & Cox, M.M. (2008) Lehninger Principles	Harvey, R.A. & Ferrier, D.R (2010) Lippincott's Illustrated Reviews:	<a href="https://drive.google.com/file/d/1hyMEPu8tyaURquxcpkdtbSze">https://drive.google.com/file/d/1hyMEPu8tyaURquxcpkdtbSze</a>	
23		salvage pathways				

24		Degradation of Nucleic acid	of Biochemistry, 5th Edition, W.H. Freeman and Company. Pg No: 271.	Biochemistry, 5th Edition, Lippincott Williams and Wilkins. Pg No: 291 - 305.	<a href="https://drive.google.com/file/d/1th05AcE/viiew">1th05AcE/viiew</a>	
Practical Session 8						
25	Feedback of Continuous Assessment I					
26	Peer Tutorials					
27	Peer Tutorials					
Practical Session 9						
28	Unit 7: Integration of Metabolism	The Feed-Fast Cycle: overview	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins, Pg no: 321- 328.	NELSON, D. L. & COX, M.M. (2000). Lehninger's Principles of Biochemistry (5th Edition), Worth Publishers, New York, USA. Pg no: 912 - 922.	<a href="https://drive.google.com/file/d/1aQzhx-SpGZELKC a95j8nAiX8M zxl02KY/viiew">https://drive.google.com/file/d/1aQzhx-SpGZELKC a95j8nAiX8M zxl02KY/viiew</a>	
29		enzymatic changes				
30		activity in the liver; adipose tissue				



Practical Session 10

31	Unit 7: Integration of Metabolism	resting skeletal muscle and brain during absorptive state	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins, Pg no: 321- 328.	NELSON, D. L. & COX, M.M. (2000). Lehninger's Principles of Biochemistry (5th Edition), Worth Publishers, New York, USA. Pg no: 912 - 922.	<a href="https://drive.google.com/file/d/1aQzhx-SpGZELKCx-95j8nAiX8Mzx102KY/view">https://drive.google.com/file/d/1aQzhx-SpGZELKCx-95j8nAiX8Mzx102KY/view</a>	
32		overview; activity in liver, adipose tissue	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5	NELSON, D. L. & COX, M.M. (2000). Lehninger's Principles of Biochemistry (5th Edition), Worth Publishers, New York, USA. Pg no: 912 - 922.	<a href="https://drive.google.com/file/d/199xuq5oA9RtucO2zHIzWRUfMnMjjscz/view">https://drive.google.com/file/d/199xuq5oA9RtucO2zHIzWRUfMnMjjscz/view</a>	
33		resting skeletal muscle, brain	th Edition, Lippincott Williams and Wilkins, Pg no: 329 - 333.			

Practical Session 11

34	Unit 7: Integration of Metabolism	kidney during fasting	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins, Pg no: 329 - 333.	NELSON, D. L. & COX, M.M. (2000). Lehninger's Principles of Biochemistry (5 th Edition), Worth Publishers, New York, USA. Pg no: 912 - 922.	<a href="https://drive.google.com/file/d/199xuq5oA9RtucO2zHIzWRUfMnMjjszc/view">https://drive.google.com/file/d/199xuq5oA9RtucO2zHIzWRUfMnMjjszc/view</a>	
35	Unit 8: Metabolic Disorders	Ehler"s Danlos syndrome	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins. Pg no: 412.		<a href="https://drive.google.com/file/d/13ssdnDicnR4F3Lx3RqLv1krpkxFcm-X/view">https://drive.google.com/file/d/13ssdnDicnR4F3Lx3RqLv1krpkxFcm-X/view</a>	<a href="https://www.youtube.com/watch?v=cPpl2cxjBuA">https://www.youtube.com/watch?v=cPpl2cxjBuA</a>

36		Lesch-Nyhan syndrome	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins. Pg no: 412.		<a href="https://drive.google.com/file/d/13ssdnDicnR4F3Lx3RqLv1krpkxFcm-X-/view">https://drive.google.com/file/d/13ssdnDicnR4F3Lx3RqLv1krpkxFcm-X-/view</a>	<a href="https://www.youtube.com/watch?v=DaYSpcMmZbU">https://www.youtube.com/watch?v=DaYSpcMmZbU</a>
Practical Session 12						
37	Unit 8: Metabolic Disorders	Alzheimer"s disease	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins. Pg no: 412.		<a href="https://drive.google.com/file/d/13ssdnDicnR4F3Lx3RqLv1krpkxFcm-X-/view">https://drive.google.com/file/d/13ssdnDicnR4F3Lx3RqLv1krpkxFcm-X-/view</a>	<a href="https://www.youtube.com/watch?v=v5gdH_Hydes">https://www.youtube.com/watch?v=v5gdH_Hydes</a>
38		Xeroderma pigmentosum				<a href="https://www.youtube.com/watch?v=wklWGU RTUi8">https://www.youtube.com/watch?v=wklWGU RTUi8</a>
39		Crutzfeldt-Jakob disease				

Practical Session 13						
40	Unit 8: Metabolic Disorders	Gout	Harvey, R.A. & Ferrier, D.R. (2010). Lippincott's Illustrated Reviews: Biochemistry, 5th Edition, Lippincott Williams and Wilkins. Pg no: 412.		<a href="https://drive.google.com/file/d/13ssdnDicnR4F3Lx3RqLvlkrpkxFcm-X-/view">https://drive.google.com/file/d/13ssdnDicnR4F3Lx3RqLvlkrpkxFcm-X-/view</a>	
41	Tutorials/Revision					
42	Continuous Assessment II <a href="https://docs.google.com/document/d/1kjMZxwLd4WojZ3NNHCitIBeWif0EGEGOqguHZBZcalU/edit">https://docs.google.com/document/d/1kjMZxwLd4WojZ3NNHCitIBeWif0EGEGOqguHZBZcalU/edit</a>					
43	Instructions Regarding SEE					
Practical Session 14						
44	Feedback on CA II					
45	Revision/Feedback about the course					